Revised 2023 and Later Model Year Light-Duty Vehicle Greenhouse Gas Emission Standards:

Response to Comments

United States Environmental Protection Agency

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

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This Response to Comments (RTC) document is a compilation of public comments that EPA received on the proposed rule "Revised 2023 and Later Model Year Light-Duty Vehicle Greenhouse Gas Emissions Standards" as well as EPA responses. This RTC also includes a few comments that we received after the close of the comment period on September 27, 2021, and that we have considered to the extent practicable. Additional responses appear in the preamble to the final rule. We have generally organized this RTC by category of comment topic and have included a list of commenters in each topic category. The original documents submitted by commenters, including any attachments, footnotes, tables, and figures, as well as public hearing transcripts are available in Docket ID No. EPA–HQ–OAR–2021–0208.

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

Table of Contents

1. General Comments in Support of or Opposing the Proposal

1.1. General Support for EPA's Rulemaking

Commenters Included in this Section

Advanced Engine Systems Institute (AESI)
Alliance For Automotive Innovation
Alliance for Vehicle Efficiency (AVE)
Alliance of Nurses for Health Environments
Aluminum Association
American Honda Motor Company (Honda)
American Lung Association
Anderson, Laurie
Asthma and Allergy Foundation of America (AAFA)
Bay Area Air Quality Management District
Blue Green Alliance
BorgWarner Inc.
Brandt, Peter
California Air Resources Board (CARB)
California Attorney General Office, et al.
Cantley, Jennifer
Center for Climate and Energy Solutions (C2ES)
Chicago Metropolitan Agency for Planning
City of Albuquerque, NM
City of San Antonio, Texas
Connecticut Department of Energy and Environmental Protection
Consumer Federation of America
Consumer Reports (CR)
Corporate Electric Vehicle Alliance (CEVA)
Cuny, Phillip
Davidson, William
DENSO International America, Inc. (DENSO)
E2 - Environmental Entrepreneurs
Electric Drive Transportation Association (EDTA)
Energy Innovation Policy and Technology LLC
Energy Strategy Coalition
Environment America
Environmental Defense Fund (EDF)
Environmental Law and Policy Center (ELPC)
General Motors LLC (GM)
Gillet, Victoria
Hawkins, Dodie
Hewes, Celerah
Holiday, Thomas
Holmgren, Doug

International Union, United Automobile, Aerospace & Agricultural Implement Workers of America (UAW)
Jaguar Land Rover North America, LLC (JLRNA)
Kansas Senator Marci Francisco
Keagle, Josh
Kimmel, Julie
Klein, Stephanie
Lucid USA, Inc. (Lucid)
Marcot, Nicole
Maryland Department of Environment
Mass Comment Campaign sponsored by Evangelical Environmental Network (15,748)
Mass Comment Campaign sponsored by Environment America (11,080)
Mass Comment Campaign sponsored by Interfaith Power and Light et al. (1,599)
Mass Comment Campaign sponsoring organization unknown-9 (3,219)
Mass Comment Campaign sponsoring organization unknown-11
McQuire, Terry
Metropolitan Washington Air Quality Committee (MWAQC)
MI Air MI Health
Minnesota Pollution Control Agency (MPCA) and Minnesota Department of Transportation (MnDOT)
Moore, Cinthia
National Association of Clean Air Agencies (NACAA)
National Parks Conservation Association (NPCA)
New Mexico Environment Department
Newhouse, Richard
NGVAmerica
Nissan North America, Inc.
Oliver, Shaina
Program for Public Consultation
Pruitt, Katherine
Representative Padma Kuppa
Sabetta, Tracy
Sainz, Columba
Scholar, Reverend
Sierra Club
Smith, Arthur
South Coast Air Quality Management District
Stout, Linda
Thomas, JP
Trombetta, Nick
Uberuaga, Michelle
Villalpando Paer, Natalir
Volkswagen Group of America, Inc. (Volkswagen)
Volvo Car Corporation
Whyte, Yolanda

Wisconsin Department of Natural Resources
Wiste, Leah
World Resources Institute (WRI)

Commenter: Advanced Engine Systems Institute (AESI)

AESI supports EPA's reconsideration of the light-duty GHG standards through MY 2026 and the Administration's commitment to promulgate standards for MY2027 and beyond. Suppliers rely on long term regulatory certainty to justify their investments that will allow the US to meet our national climate objectives and ensure the creation of high quality U.S. jobs. We agree with EPA's assessment that the majority of the improvements through MY 2026 are achievable through broader deployment of existing technologies already available for combustion engines and vehicles with hybrid and fully electrified powertrains. Performance based regulations are a proven method for meeting environmental goals through a diversity of technology solutions.

Commenter: Alliance For Automotive Innovation

Auto Innovators supports the goals of EPA's GHG program: to drastically reduce greenhouse gas emissions from light-duty vehicles and to encourage a transition to electric and net-zero emission vehicles, including plug-in hybrid electric vehicles, battery electric vehicles, and fuel cell electric vehicles. [EPA-HQ-OAR-2021-0208-0571-A1, p. 2]

Auto Innovators and our member companies are aligned with this Administration's goals and vision for addressing climate change and fostering a strong and competitive U.S. economy. We support the goals of EPA's GHG program: to reduce greenhouse gas emissions from light-duty vehicles and to encourage a transition to EVs, including battery electric, plug-in hybrid electric, and fuel cell electric vehicles.

Auto Innovators generally supports EPA's proposed GHG standards with appropriate and necessary flexibilities included in the program. [EPA-HQ-OAR-2021-0208-0571-A1, p. 7]

Commenter: Alliance for Vehicle Efficiency (AVE)

AVE is supportive of EPA's stated purpose to issue the Proposed Rule in response to President Biden's Executive Order 13990 'Protecting Public Health and the Environment and Restoring Science To Tackle the Climate Crisis' (Jan. 20, 2021). [EPA-HQ-OAR-2021-0208-0256-A1, p. 1]

The Proposed Rule's objective of restoring the standards to the level anticipated before the Safer Affordable Fuel-Efficient (SAFE) Vehicles Rule for Model Years 2021–2026 Passenger Cars and Light Trucks re-establishes support for the long-term investments that technology suppliers made over a decade ago. The Proposed Rule will provide suppliers with the opportunity to obtain a return on these earlier investments which will in turn support the next generation of technology investments necessary to meet future emission standards. [EPA-HQ-OAR-2021-0208-0256-A1. p. 2]

Commenter: Alliance of Nurses for Health Environments

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, p. 21.]

As the transportation sector is the leading source of harmful carbon pollution in the U.S., strong clean car standards are critical to providing meaningful pollution reductions and fuel savings.

Commenter: Aluminum Association

Broadly, the Association supports the continued prioritization of GHG tailpipe emission reductions in the light duty vehicle sector and believes that increasing the efficiency of mobility solutions will strengthen the United States' competitive advantage in the evolving global vehicle marketplace [EPA-HQ-OAR-2021-0208-0233-A1, pp. 2-3]

Whichever GHG gram/mile trajectory between MY 2023 and 2026 is ultimately selected by EPA, the U.S. aluminum industry will continue to work closely with automakers in innovating across the aluminum supply chain so the material continues to serve as a key enabler, helping automakers meet their specified emission reduction targets [EPA-HQ-OAR-2021-0208-0233-A1, p.3]

Commenter: American Honda Motor Company (Honda)

With the recent administration change comes, as expected, a new policy direction. Despite a whipsaw of federal environmental vehicle regulations over the past decade, Honda firmly believes the correct path forward is a robust program rooted in the tenets of the California Framework agreement. That is: challenging but achievable standards paired with meaningful policy flexibilities that accommodate a diverse array of compliance strategies. Based on our experience, not only is this a proven approach of good public policy, but it also provides opportunity for further investment in vehicle electrification, a critical technology necessary to meet future climate goals. Honda appreciates EPA's work on the August 2021 proposed rule, and the opportunity to comment on it. The proposal is, in many respects, consistent with the above approach, and we applaud the agency for proposing such action. At the same time, certain elements of the proposal could, in our view, benefit from additional agency consideration. Honda's views on those elements are shared below. We appreciate EPA's consideration of Honda's input,6 and are happy to answer any questions the agency may have. [EPA-HQ-OAR-2021-0208-0565-A1, p.3]

Honda commends the agency for its proposal to resume substantive GHG reductions in the light duty transportation sector. As a regulated party with strong views on corporate responsibility, we have long believed that challenging but achievable standards – paired with meaningful policy flexibilities that accommodate a diverse array of compliance strategies – is an appropriate approach for bringing continued environmental progress at a reasonable cost. [EPA-HQ-OAR-2021-0208-0565-A1, p.14]

The agency's proposed standards represent a brief but significant preface to a new chapter for the auto industry: accelerated decarbonization, higher levels of electrification and, ultimately, a step-function of further emissions reduction opportunities. Yet with that change come new challenges. Although these proposed standards cover just four years, they reflect a pivotal moment that will have lasting impact on both the auto industry and its readiness to face additional progress. As such, Honda supports the agency's proposed MY2023-2026 stringency, though we believe small modifications to certain program elements could improve industry's ability to comply with future regulations. We thank EPA again for its consideration of our input, and would be happy to have further discussion at the agency's convenience. [EPA-HQ-OAR-2021-0208-0565-A1, p.14]

Honda also generally supports comments to this docket submitted by our trade association, the Alliance for Automotive Innovation (AFAI).

Commenter: American Lung Association

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, pp.88-89]

Furthermore, the standards are very popular. I want to emphasize this important point. Americans want cleaner cars. In June the American Lung Association released a poll showing that 74 percent of American voters supported the Federal Government setting stronger standards on tailpipe emissions for passenger cars and trucks with the amount of emissions allowed declining over time.

Here's some more findings from that poll. 72 percent of voters agreed that the nation should make significant investments in zero emission vehicles as part of efforts to rebuild the economy, 74 percent of voters support the Federal Government advancing policies to encourage a nationwide transition to electric vehicles, and 70 percent of voters support the Federal Government requiring that by 2040 all new freight trucks, buses, and delivery vans sold in the U.S. must produce zero tailpipe emissions.

Commenter: Anderson, Laurie

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, p. 103.]

Climate change and air pollution is a reality we must contend with and we must address pollution from all sectors. Therefore, I support this Administration's proposal to reduce greenhouse gas emissions from cars and light trucks.

Commenter: Asthma and Allergy Foundation of America (AAFA)

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, p. 214.]

we support the Administration's proposal to strengthen greenhouse gas standards for passenger cars, SUVs, and light trucks.

Commenter: Bay Area Air Quality Management District

In this comment letter, the Bay Area Air District expresses our support for putting strong greenhouse gas standards back on the books: an important step towards rectifying the actions promulgated in SAFE Part Two. Greenhouse gas standards should reflect robust scientific and technical analyses, control emissions to the greatest extent feasible, and appropriately increase in stringency over time in order to maximize benefits. [EPA-HQ-OAR-2021-0208-0283-A1, p. 1]

Overall, the Bay Area Air District asks EPA to adopt greenhouse gas standards that achieve the greatest emission reductions feasible and encourage the deployment of zero emission technology. California and the Bay Area are hubs of technical and environmental progress. We have seen firsthand what can be achieved by government regulations that foster leadership, galvanize use of the best available technologies, and promote technological innovation. Together, the State and the Bay Area Air District have been at the forefront of air pollution control, designing programs and strategies to reduce air pollution for decades. These locally designed programs have been replicated around the country and indeed throughout the world, bringing pollution control solutions far beyond the Bay Area. [EPA-HQ-OAR-2021-0208-0283-A1, pp.2-3]

Ultimately, the Bay Area Air District supports EPA in this rulemaking, as it puts forward strong greenhouse gas standards and addresses the critical missteps from the greenhouse gas portion of the SAFE Vehicles Rule. [EPA-HQ-OAR-2021-0208-0283-A1, p.3]

Commenter: Blue Green Alliance

[The following comments were submitted as testimony at the virtual public hearing on August 26, 2021. See Hearing Testimony – 26Aug2021, pp. 92-93.]

That's why it's critical that we use all the tools we have at our disposal to urgently reduce greenhouse gas emissions through policies and investments that engage and benefit all people, from the manufacturing workers who build the vehicles of the future to the people who drive them, from the communities where they're made to the communities where they're driven. Strong clean vehicle standards accompanied by policies to rebuild manufacturing are critical to achieving these aims. Returning to a strong trajectory of vehicle emissions reductions can put the U.S. back in the leadership role and clean vehicle deployment and manufacturing innovation.

Commenter: BorgWarner Inc.

BorgWarner is in favor of forward progress to consistently reduce CO2 and other emissions. We support the proposed rule with flexibilities to provide industry with a broader pathway forward to zero emission vehicles. The proposed rule represents an ambitious acceleration of the pace of improvement. [EPA-HQ-OAR-2021-0208-0260-A1, p. 1-2]

Commenter: Brandt, Peter

[The following comments were submitted as testimony at the virtual public hearing on August 26, 2021. See Hearing Testimony – 26Aug2021, p. 211.]

There are a lot of reasons I support EPA's proposal here.

[The following comments were submitted as testimony at the virtual public hearing on August 26, 2021. See Hearing Testimony – 26Aug2021, p. 214.]

So I'm very heartened that the agency is considering this and I would urge you to not water things down in response to industry opposition.

Commenter: California Air Resources Board (CARB)

The California Air Resources Board (CARB) supports the proposal by the U.S. Environmental Protection Agency (U.S. EPA) to revise its 2023 and later model year light-duty vehicle greenhouse gas emissions standards. [EPA-HQ-OAR-2021-0208-0643-A6, p.6]

The proposed standards are squarely directed at reducing greenhouse gas emissions but contribute to meeting all these needs, as explained in detail below. CARB strongly supports this proposal. [EPA-HQ-OAR-2021-0208-0643-A6, p.6]

Commenter: California Attorney General Office, et al.

Our States and Cities1 hereby submit these comments in response to the United States Environmental Protection Agency's ('EPA') notice of proposed rulemaking: Revised 2023 and Later Model Year Light-Duty Vehicle Greenhouse Gas Emissions Standards, 86 Fed. Reg. 43,726 ('Proposal'). We welcome EPA's reconsideration of its Safer Affordable Fuel-Efficient Vehicles Rule for Model Years 2021-2026 Passenger Cars and Light Trucks ('SAFE 2') (85 Fed. Reg. 24,174 (April 30, 2020)), and we strongly support increasing the stringency of EPA's greenhouse gas ('GHG') emissions standards. [EPA-HQ-OAR-2021-0208-0245-A1, p.1]

We, thus, welcome EPA's proposal to implement more stringent GHG emissions standards for light-duty vehicles and urge the agency to continue actions to reduce these emissions from this sector. [EPA-HQ-OAR-2021-0208-0245-A1, p.10] There is no time to lose in acting to avoid the catastrophic impacts of the climate crisis. We, therefore, urge EPA to expeditiously adopt rigorous GHG standards for model years 2023 through 2026. The technologies to achieve significant reductions are available, well-understood, and cost-effective, so there is no need to wait to require further deployment of these technologies or to delay the massive economic and public health benefits of reducing these emissions. [EPA-HQ-OAR-2021-0208-0245-A1, p.34]

1 The States of California, Colorado, Connecticut, Delaware, Hawaii, Illinois, Maine, Maryland, Minnesota, Nevada, New Jersey, New Mexico, New York, North Carolina, Oregon, Rhode Island, Vermont, Washington, and Wisconsin; the Commonwealths of Massachusetts and Pennsylvania; the District of Columbia; the Cities and Counties of Denver and San Francisco; and the Cities of Los Angeles, New York, Oakland, and San Jose.

Commenter: Canaday, Woody

I'm writing in support of the EPA's proposed tightening of standards for GHG emissions by light duty trucks. First, it was disappointing that standards were loosened under the prior administration. This appeared to be a strictly political action for, as noted in the proposed regs, five manufacturers had already agreed to more stringent California standards. Second, there is obvious and increasing urgency to reduce GHGs and light duty trucks make up one-sixth of US emissions according to the EPA notes. Third, government regulation is required when markets are unable to take external costs into consideration. A prime example of this was the introduction of seat belt regulations over the objection of profit-seeking manufacturers. Much, much more is at stake in this particular case. [EPA-HQ-OAR-2021-0208-0490, p. 1]

Commenter: Cantley, Jennifer

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, pp. 272-273.]

I am a supporter of the Administration's proposal to the regulatory actions to reduce greenhouse gas emissions in this country.

Commenter: Center for Climate and Energy Solutions (C2ES)

Statement of Nathaniel Keohane, President, Center for Climate and Energy Solutions

'Dramatically reducing climate pollution from transportation, and ultimately moving to a zero-emissions fleet, are vital steps to achieving our climate goals and maintaining America's global competitiveness. The administration's draft proposed car standards are an important step in the right direction. They demonstrate that President Biden, the EPA, and NHTSA recognize the importance of eliminating harmful transportation pollution and point the way toward the increased ambition we will need through the end of the decade.

'Our success in cutting vehicle emissions and building an American clean energy economy will depend not only on the standards we set, but also on the investments we make. The 50 percent EV sales target reflects the direction that leading automakers are already going, with many committing to making 100 percent of new car sales electric by 2035. Congress must play its part and enact the policies needed to support those efforts, including rapid expansion of EV charging infrastructure, credits for EV sales, and offering rebates for consumers purchasing them.' [EPA-HQ-OAR-2021-0208-0287-A1, pp. 8-9] https://www.c2es.org/press-release/nat-keohane-on-proposed-vehicle-standards-and-ev-targets/

Commenter: Chicago Metropolitan Agency for Planning

While CMAP is able to play a role in mitigating climate change through the programming of federal transportation funds regionally, there is an urgent need for a national strategy to reduce emissions. This proposed rule would provide a critical piece of that strategy at the federal level. According to the U.S. EPA, light-duty vehicles are responsible for 58 percent of emissions within the transportation sector, which equates to 17 percent of total U.S. emissions. [EPA-HQ-OAR-2021-0208-0219-A1, p.1]

In the Chicago region, light-duty vehicles account for approximately 65 percent of transportation emissions. Since 2015, the composition of vehicle types registered in the region has changed significantly. Passenger cars have decreased from 66.5 percent of all registered vehicles to 51.5 percent while light-duty vehicles have increased from 30.2 percent to 43.8 percent. Addressing this growing source of emissions is critically important to not only the Chicago region, but the transportation sector overall. [EPA-HQ-OAR-2021-0208-0219-A1, p.2]

Once again, CMAP is encouraged by the federal government's efforts to reduce harmful emissions and increase national mitigation efforts against climate change. We urge the U.S. EPA and other federal departments such as the U.S. Department of Transportation to continue to develop comprehensive strategies that will move our nation toward a more resilient, sustainable, and healthier future. [EPA-HQ-OAR-2021-0208-0219-A1, p.2]

Commenter: City of Albuquerque, NM

AQP respectfully submits the following comments in support of the Environmental Protection Agency's ('EPA') recently proposed Revised 2023 and Later Model Year Light-Duty Vehicle Greenhouse Gas Emissions Standards ('Proposed Emission Standards'). [EPA-HQ-OAR-2021-0208-0535-A1, p.1]

Additionally, the Proposed Emission Standards are consistent with the City's Climate Action Plan. Under this plan, the City is committed to reducing greenhouse gas emissions from public transportation, increasing the City's fleet size for electric and hybrid vehicles, and expanding the number of public electric vehicle charging stations. Thus, AQP strongly supports EPA's Proposed Emission Standards. [EPA-HQ-OAR-2021-0208-0535-A1, p. 3]

Commenter: City of San Antonio, Texas

The City of San Antonio, Texas supports the Environmental Protection Agency's (EPA) proposed revision as included on Docket item EPA-HQ-OAR-2021-0208, 'Revised 2023 and Later Model Year Light-Duty Vehicle Greenhouse Gas Emissions Standards'. If approved, these revisions will strengthen the City's efforts to meet Ozone Attainment standards and implementation of our Climate Action and Adaption Plan (CAAP). [EPA-HQ-OAR-2021-0208-0236-A1, p.1]

Commenter: Connecticut Department of Energy and Environmental Protection

Connecticut DEEP appreciates the opportunity to comment on the proposal and encourages EPA to continue to adopt strong policies to curb GHG and criteria pollutant emissions from the mobile sources sector to reduce air pollution, protect public health especially in our most vulnerable communities. [EPA-HQ-OAR-2021-0208-0264-A1, p.3]

Commenter: Consumer Federation of America

We must begin by applauding the agency for taking the time to lay out a process to do it right. It would have been easier to say that the rule adopted by the previous administration made no sense, but much more challenging to reverse the rule in a manner that would withstand scrutiny by the courts under the Administrative Procedure Act. We believe that the Environmental Protection Agency has risen to the challenge placed before it. [EPA-HQ-OAR-2021-0208-0297-A1, p. 3]

Commenter: Consumer Reports (CR)

Consumer Reports supports EPA’s efforts to reverse the previous administration’s rollback and reinstate strong light duty vehicle greenhouse gas standards. [EPA-HQ-OAR-2021-0208-0602-A1, p.4]

Consumers want better fuel economy for their vehicles, and support stronger standards by a wide margin. Nationally representative surveys have repeatedly demonstrated overwhelming public, bipartisan support for continuing to strengthen federal standards that affect vehicle efficiency. CR’s most recent fuel economy survey continues to show this strong interest.12 Key results include:

— 94% of consumers consider fuel economy to be important when considering what vehicle to purchase or lease

— 89% of consumers agree that automakers should continue to improve fuel economy for all vehicle types

— 83% of consumers expect each new generation of vehicles available on the market to be more fuel-efficient than the last

— 73% of consumers agree that the U.S. government should continue to increase fuel efficiency standards [EPA-HQ-OAR-2021-0208-0602-A1, pp.6-7]

Further, when asked what attributes in their current vehicle had the most room for improvement, consumers selected fuel economy 42% of the time, significantly more than any other selection, and 3 times as often as they selected horsepower as shown in Figure 2.1. [EPA-HQ-OAR-2021-0208-0602-A1, p.7] [[See EPA-HQ-OAR-2021-0208-0602-A1, p.7 for Figure 2.1]]

In a separate survey Consumer Reports asked consumers about their interest in electric vehicles.13 It found that 71% of consumers had some interest in buying an electric vehicle, with 31% considering purchasing an EV for their next vehicle. Further analysis of these survey results uncovered a trend showing a significant increase in interest in purchasing an EV with direct experience with the vehicles. Survey respondents were given an “experience score” from 0-3 based on the answers to the following questions:

— Do you know someone who owns a plug-in electric vehicle?

— Have you ever been a passenger in a plug-in electric vehicle?

— Have you ever driven a plug-in electric vehicle? [EPA-HQ-OAR-2021-0208-0602-A1, p.8]

The results are shown in Figure 2.2. Consumers with an experience score of 1 or 2 were more than two times as likely to consider an EV for their next vehicle, while consumers with an experience score of 3 were three times more likely to consider an EV for their next vehicle. However, only 6% of consumers in the survey sample had an experience score of 3, while 63% had an experience score of 0. This shows that there is significant room for improvement in consumer interest in electric vehicles as they become more common, and consumers gain greater experience and comfort with them. [EPA-HQ-OAR-2021-0208-0602-A1, p.8] [[See EPA-HQ-OAR-2021-0208-0602-A1, p.8 for Figure 2.2]]

Despite consumers’ clear preference for vehicles with lower emissions and fuel costs, consumer choices are limited in the market, with 2/3 of car models getting within 5 mpg of the model average and nearly 2/3 (63%) of truck models getting within 3 mpg of the model average.14 Furthermore, a team of researchers from UC Davis analyzed auto advertisements and found that performance is mentioned three times as frequently as either fuel economy or safety.15 In 2017, a mere 7% of ads mentioned fuel economy.16 This is despite the fact that consumers have shown a willingness to pay two to three times more for improvements in fuel economy and safety than for improvements in acceleration, and their willingness to pay increases with information on fuel economy.17 [EPA-HQ-OAR-2021-0208-0602-A1,p.9]

Commenter: Corporate Electric Vehicle Alliance (CEVA)

As companies that represent over $1 trillion in annual revenue and collectively own, lease, or operate more than one million fleet or networked vehicles in the United States, we are writing to express our support for strong light duty vehicle standards [EPA-HQ-OAR-2021-0208-0276-A1, p.1]

We share a common goal of electrifying our fleets and networks as well as reducing our transportation carbon footprint, and we recognize that strong policies will be necessary to effect this critical transition. Our members see climate change as a significant risk, and reducing GHGs as a major economic opportunity. We recognize that clean vehicles, including zero emission vehicles (ZEVs) and efficient internal combustion engine vehicles, bring significant economic and environmental benefits, including operational cost savings and protection from fuel price volatility, as well as improved air quality and a reduced carbon footprint. [EPA-HQ-OAR-2021-0208-0276-A1, p.1]

Commenter: Cuny, Phillip

[The following comments were submitted as testimony at the virtual public hearing on August 26, 2021. See Hearing Testimony – 26Aug2021, p. 245.]

One thing we can do right now, though, is raise these mileage standards and emission standards for cars and light trucks. This is probably not going to be very popular in Texas where it seems everybody drives a truck, but it is the right thing to do.

For years, SUVs have been allowed to dodge the mileage standards because they are classified as light trucks which is really ridiculous. They are designed to carry passengers. They really are passenger vehicles and now many trucks have four doors and they are used more as passenger vehicles than trucks.

If we're not going to redesignate these vehicles as passenger vehicles, we need to at least raise the standards.

[The following comments were submitted as testimony at the virtual public hearing on August 26, 2021. See Hearing Testimony – 26Aug2021, p. 246.]

What I want to impress upon you is that we need to act now.

Commenter: Davidson, William

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, p. 207.]

Cleaner cars of all types are a win-win for everyone. Everyone wins with cleaner air. Everyone wins with less dependence on oil, and everyone wins by slowing and ultimately reversing climate change, and when I say everyone, I include automakers who will also win domestically and internationally by selling cleaner cars.

Commenter: DENSO International America, Inc. (DENSO)

DENSO supports the goals of the EPA program to strengthen federal GHG emissions standards for passenger cars and light trucks by setting stringent requirements for reductions through MY 2026. We also support a regulatory structure that promotes flexible and cost-effective compliance pathways, encourages investment in advanced technologies, and provides real world benefits. Finally, DENSO encourages a revised national program that is harmonized to the greatest extent possible between EPA, the National Highway Transportation Safety Agency (NHTSA), and includes the State of California. More details on these points and others are discussed below. [EPA-HQ-OAR-2021-0208-0282-A1, p. 2]

Commenter: E2 - Environmental Entrepreneurs

As outlined in our recent factsheet: The Need for Speed: The Economic Urgency for Bold Action on Clean Vehicles: Speeding the transition to electric and other zero-emissions vehicles (ZEVs) is critical to the future of America's auto industry. It will save jobs, save money for consumers and businesses, and keep the U.S. auto industry competitive with the rest of the world. As transportation is now the country's biggest source of carbon emissions, it is also key to addressing the economy's biggest threat - climate change. [EPA-HQ-OAR-2021-0208-0604-A1, p. 1]

Commenter: Electric Drive Transportation Association (EDTA)

EDTA Supports EPA's Proposed Standards for MYs 2023–2026, in combination with a comprehensive policy framework, which will reinforce industry efforts, buildout electric drive infrastructure and supply chain networks, and grow consumer markets.

Collaboration and cooperation across government and industry is critical to ensuring that the transition proceeds as rapidly and coherently as possible. In addition to advancing vehicle policies, a concerted policy effort will be needed to achieve the Administration's goals for deploying 500,000 charging stations across the country by 2030.

The U.S. can lead the development and adoption of innovative technologies, while also shaping supplychains, creating jobs, defining global standards, and reshaping the international marketplace. Together, we can establish the policies that will speed the transition to e-mobility, while reducing greenhouse gas emissions, expanding U.S. market leadership, and securing the transportation workforce of the future. [EPA-HQ-OAR-2021-0208-0569-A1, p. 3]

Commenter: Energy Innovation Policy and Technology LLC

In summary, we applaud the EPA for their work to update and revise the Safer Affordable Fuel-Efficient (SAFE)1 Vehicles Rule for Model Years (MY) 2021-2026 Passenger Cars and Light Trucks to better reflect real-world advances in clean vehicle technologies, changing market trends, and the urgent need to reduce greenhouse gas emissions (GHGs) and other pollutants from the transportation sector. [EPA-HQ-OAR-2021-0208-0605-A1, pp. 1]

Commenter: Energy Strategy Coalition

Meaningful standards on light-duty vehicles that lead to decreasing emissions through 2026, and beyond, are an appropriate, essential, and widely supported component of national efforts to reduce emissions. Such standards are critical to provide regulatory certainty and send a long-term investment signal to promote low-carbon, low-emitting transportation technologies necessary to achieve emissions reductions. We accordingly support EPA's Proposed Standards. [EPA-HQ-OAR-2021-0208-0533-A1, pp. 1-2]

Commenter: Environment America

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, p. 237.]

I would like to thank this Administration for taking the first steps to roll back the attacks the previous Administration placed on clean car standards by reinstating limits on vehicle pollution.

Commenter: Environmental Defense Fund (EDF)

EDF supports the Agency's Proposal to strengthen the Clean Car standards that were weakened by the previous administration. These comments highlight the importance and urgency in finalizing this rulemaking for model years ('MY') 2023-2026 and in finalizing longer term standards for MYs 2027 and beyond. [EPA-HQ-OAR-2021-0208-0688-A1, p. 1]

Commenter: Environmental Law and Policy Center (ELPC)

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, p. 287.]

It is critical to remember that the necessity for this NPRM and this hearing is because the auto industry, which agreed to the 2012 program, including letters of commitment, lost no time in pushing the Trump Administration to undermine it. As a result, we have lost years of emissions reductions as the urgency for action mounts daily.

Commenter: General Motors LLC (GM)

GM supports economy wide efforts to address climate change including a drive towards an all-electric future and improving the fuel efficiency of our fleet through one national regulatory program that supports and strengthens American jobs and enhances the wellbeing of American consumers. GM supports the emission reduction goals of this proposal. [EPA-HQ-OAR-2021-0208-0234-A1] [p.2]

Further, we believe the standards should drive American leadership in battery electric vehicles (EVs). America must take the lead in this effort or other nations will dominate in electric vehicles and set global regulatory and industrial standards. [EPA-HQ-OAR-2021-0208-0234-A1] [p.2]

GM supports the emission reduction goals of this proposal and believes that the environmental benefits can and should be achieved through high-volume electric vehicle sales that will set the industry on a stronger trajectory to greater GHG reductions in model year 2027 and later. The auto industry is embarking upon a profound transition as we do our part to achieve the country's climate commitments. [EPA-HQ-OAR-2021-0208-0234-A1][p.3]

Significant EV Investments Are Needed to Meet Climate Goals. These commitments towards an all-electric future demonstrate GM's seriousness in achieving the environmental benefits envisioned by the proposed standards. Accordingly, GM supports the proposal and is committed to working constructively to achieve those benefits. GM believes that industry compliance should primarily be met through increased sales of battery electric vehicles that will encourage mass adoption and help the U.S. claim a leadership position in auto electrification. We believe that focusing on a battery electric vehicle compliance pathway is a key component to setting the industry on an irreversible path towards a tailpipe-free light duty fleet. Concentrating industry on this pathway would also provide the necessary clarity for all stakeholders to make the critical investments in the nationwide charging infrastructure that will be required. Increasing battery electric vehicle volumes in the period of this rulemaking would provide a strong foundation for the industry to make the GHG reductions necessary to meet the Paris Climate objectives and provide a model for the next set of regulations targeting 2027-2035 which will need to focus on battery electric vehicle deployment. [EPA-HQ-OAR-2021-0208-0234-A1] [p.4]

GM supports one national program across all 50 states and urges the federal government to pursue a regulatory program that encourages holistic consideration of the most cost-effective means to decarbonize the transportation sector and transition to an all-electric vehicle future that benefits the industry, its workforce, the nation, and our global climate. [EPA-HQ-OAR-2021-0208-0234-A1] [p.7]

Commenter: Gillet, Victoria

[The following comments were submitted as testimony at the virtual public hearing on August 26, 2021. See Hearing Testimony – 26Aug2021, p. 287.] I'm strongly in favor of the new proposed light-duty vehicle greenhouse gas emission standards.

Commenter: Hawkins, Dodie

[The following comments were submitted as testimony at the virtual public hearing on August 26, 2021. See Hearing Testimony – 26Aug2021, pp. 55-56]

What more can I say to convince the EPA to develop the standards requested by so many esteemed speakers? Anything I might say related to climate change, combustion engines, electric vehicles, or the like would only be redundant.

So, I would like to focus my few minutes on something else, our responsibility to be good stewards of God's creation: this world. I know there are people rolling their eyes and tuning me out as just some batty old lady but hear me out, please.

We can't all be at all places at all times. So responsible people are selected to be stewards or the persons who manage another person's property or affairs and that is what the EPA is, our steward of earth.

I believe the earth is speaking to us loud and clear. Earthquakes, floods, droughts, fires, and many other tragic consequences of our disregard for the earth are becoming all too frequent. Unfortunately, we have not heard the cries from the earth for far too long. Is it too late? I pray not. I am blessed with 15 grandchildren and five great-grandchildren so far. Will they feel that I betrayed them by not doing enough to stop the onslaught of climate change? Again, I pray not. But EPA stewards, you have the opportunity to be good stewards, good managers of this earth. Personally, at 84, I'm running out of time and energy to fight the fight but not so for you.

Commenter: Hewes, Celerah

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, pp. 106-107.]

The transportation sector is the largest source of carbon pollution in the U.S. Cleaning up vehicle pollution is one of the most important things we can do to fight climate change.

That is why I was glad to hear that the EPA is proposing to strengthen federal greenhouse gas emission standards for passenger cars and light trucks which accounts for 17 percent of U.S. climate pollution.

Commenter: Holiday, Thomas

[The following comments were submitted as testimony at the virtual public hearing on August 26, 2021. See Hearing Testimony – 26Aug2021, p. 81.]

I support the proposed EPA Greenhouse Gas Emissions Standards for Model Year 2026 and just to be conscious about that, that would be a 52-mile-per-gallon efficiency and a CO2 burn of a 171 grams per mile.

Commenter: Holmgren, Doug

[The following comments were submitted as testimony at the virtual public hearing on August 26, 2021. See Hearing Testimony – 26Aug2021, p. 95.]

You've heard many people speak about how it will lead to greater savings and eliminate unnecessary manufacturing loopholes. Those are wonderful achievements if they can come about.

[The following comments were submitted as testimony at the virtual public hearing on August 26, 2021. See Hearing Testimony – 26Aug2021, p. 97.]

So, yes, it is imperative that we return to and improve upon the Obama/Biden Administration targets for vehicle greenhouse gas emissions. Tragically, we lost valuable time due to the malfeasance of the Trump Administration. We must get back on track.

Commenter: International Union, United Automobile, Aerospace & Agricultural Implement Workers of America (UAW)

It was an honor to stand with President Biden, you, other members of the Administration, members of Congress, and industry leaders in the Rose Garden when President Biden announced his Administration's proposed 2023-26 Model Year (MY) light-duty emission regulations. I believe that carbon emission and fuel efficiency standards can be good for the environment, American workers, U.S. manufacturing, and the economy. [EPA-HQ-OAR-2021-0208-0749-A1, p. 1]

We have learned from experience that strong standards based on broad input from key stakeholders can be good for the environment and autoworkers. Well-constructed regulations promote investment, establish certainty, create new jobs in vehicle production and advanced technology, and allow manufacturers the flexibility necessary to meet the standards. Our union is proud of the role we played in reaching a consensus on MY 2011-2025 light-duty vehicle standards. We worked with a wide variety of stakeholders, including the administration, state and federal regulators, the automobile industry, environmental advocates, elected officials, and many others throughout that process. The consensus was not easily obtained and required decades of hard work and compromise. Fortunately, the standards that resulted from this process led to significant reductions in greenhouse gases, increases in the average fuel economy of passenger vehicles sold in the United States, and the creation of the 'One National Program' that was implemented in 2012. [EPA-HQ-OAR-2021-0208-0749-A1, p. 1]

I believe that carbon emission and fuel efficiency standards can be good for the environment, American workers, U.S. manufacturing, and the economy. The Environmental Protection Agency's Revised 2023-26 Model Year (MY) Light-Duty Vehicle Greenhouse Gas (GHG) Emissions Standards by and large strike the right balance of continuing to reduce automotive GHG emissions and encourage automakers to invest in new technologies that will benefit autoworkers and the economy.

Commenter: Jaguar Land Rover North America, LLC (JLRNA)

JLRNA strongly supports efforts to reduce Greenhouse Gas (GhG) emissions from light-duty vehicles, improve their fuel economy and advance the transition to low emissions vehicles. Therefore, JLRNA would welcome the opportunity to continue its constructive dialogue with the relevant Government agencies in order to agree a balanced solution based on our unique position. [EPA-HQ-OAR-2021-0208-0269-A1, p.1]

Commenter: Kansas Senator Marci Francisco

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, p. 293.]

My thanks to you, the EPA officials, for the opportunity to testify today in support of the EPA solidifying strong greenhouse gas emissions standards for light-duty vehicles to further fuel efficiency of automobiles and curb pollution.

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, p. 296.]

Please focus on reducing the emissions from both internal combustion engines as well as encourage electric vehicles and embrace the opportunities for the standard to be raised for all passenger vehicles and light-duty trucks so that we have fewer emissions and thus a lower negative impact to society's health and ecosystems.

Commenter: Keagle, Josh

I write in support of the “Revised 2023 and Later Model Year Light-Duty Vehicle Greenhouse Gas Emissions Standards.” Here in North Carolina, our farmers are suffering. Climate change is making wetter hurricanes which hurts the crops. More days of extreme heat degrades livestock productivity and fish farms. Please help our farmers!

Commenter: Kimmel, Julie

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, p. 99.]

I support this Administration's proposal to strengthen federal greenhouse gas emissions standards for passenger cars and light trucks. This proposal is a step in the right direction for the health of our children and our climate.

Commenter: Klein, Stephanie

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, pp. 279-280.]

I strongly support EPA's proposal to strengthen federal greenhouse gas emissions standards for passenger cars and light trucks for Model Years 2023 to 2026.

Cleaning up vehicle pollution is one of the most important things we can do to clean up our air and fight climate change.

Commenter: Lucid USA, Inc. (Lucid)

The Biden Administration made its commitment to electrification clear when President Biden last month issued Executive Order 14037, Strengthening American Leadership in Clean Cars and Trucks, which set an ambitious new goal that 50% of all new cars and trucks sold in the United States be EVs or plug-in hybrid electric vehicles by 2030, and directed EPA and NHTSA to revise Trump-era GHG and Corporate Average Fuel Economy (CAFE) standards. Lucid supports this overall electrification goal, as well as EPA’s proposed increase in stringency of the GHG standards above the standards set by the Trump Administration. These steps will push the U.S.

automobile market towards faster electrification, but additional steps are needed to meet President Biden's goal. [EPA-HQ-OAR-2021-0208-0528-A1, p. 3]

Lucid supports the Biden Administration's goals to fight climate change through full electrification of transportation. We also support the Biden Administration's goals for manufacturing and production of EVs and components within the United States. Lucid is leading by example on both fronts with our new Arizona factory and longstanding research and development at our California facilities. Lucid looks forward to being a committed partner to EPA in achieving these goals. [EPA-HQ-OAR-2021-0208-0528-A1, p. 7]

Commenter: Marcot, Nicole

[The following comments were submitted as testimony at the virtual public hearing on August 26, 2021. See Hearing Testimony – 26Aug2021, pp. 156-157.]

I'm deeply concerned about the effects air pollution and climate change have on the health of my community and on our children's future. So I support this Administration's proposal to strengthen greenhouse gas emissions standards for cars and light trucks.

Commenter: Maryland Department of Environment

MDE supports the proposal to revise the greenhouse gas (GHG) emission standards for model year (MY) 2023 through 2026 light-duty vehicles (LDVs). In 2020, there was a recission of the 2012 National Clean Car Standards under the Safe Affordable Fuel-Efficient (SAFE) Vehicles Rule for Model Years 2021-2026 Passenger Cars and Light Trucks (SAFE 2 Rule). That recission did not further the country's progress towards reductions of GHG and criteria pollutant emissions. [EPA-HQ-OAR-2021-0208-0241-A1, p.1]

Maryland is supportive of this proposed rulemaking and appreciates EPA's initiative on this issue. [EPA-HQ-OAR-2021-0208-0241-A1, p.2]

Commenter: Mass Comment Campaign sponsored by Evangelical Environmental Network (15,748)

We write to commend you on the EPA's proposed rule revision to strengthen federal greenhouse gas emissions standards for passenger cars and light trucks (EPA-HQ-OAR-2021-0208-0116). We offer not only our personal gratitude for this important step, but also the support of tens of thousands of our fellow pro-life Christians across the country. [EPA-HQ-OAR-2021-0208-0561-A1, p.1]

Commenter: Mass Comment Campaign sponsored by Environment America (11,080)

I write to you on behalf of Environment America, a national network comprised of 29 state environmental groups with members and supporters across the country who want clean air and a healthy climate. I want to first thank you for revisiting the 2023 and Later Model Year Light-Duty Vehicle Greenhouse Gas Emissions Standards. Stronger emissions standards are better for our environment and for public health. [EPA-HQ-OAR-2021-0208-0557-A1, p.1]

Commenter: Mass Comment Campaign sponsored by Interfaith Power and Light et al. (1,599)

Therefore, we are united in our call for continuing to reduce vehicle emissions. As the United States builds a clean energy economy, we must focus on the sector that now generates the largest percentage of climate pollution: transportation. The clean car standards are the most effective policy currently available to contribute to climate solutions. [EPA-HQ-OAR-2021-0208-0192-A1, p.1]

In 2012, auto companies, federal agencies, and the state of California agreed to a long overdue new set of clean car standards to boost vehicles' fuel efficiency and reduce carbon pollution from tailpipes. Implementing these standards was a critical step in our moral obligation to address the climate crisis. However, this significant step forward was rolled back under the previous administration. Now, we are calling on the Biden Administration to move forward with stronger national clean car standards. [EPA-HQ-OAR-2021-0208-0192-A1,p.1]

We urge you to consider this moral opportunity and enact bold new standards that truly envision the best for our communities, our nation, and our world. [EPA-HQ-OAR-2021-0208-0192-A1,p.1]

Commenter: Mass Comment Campaign sponsoring organization unknown-9 (3,219)

As an American, concerned with the climate crisis and the harmful air pollution that afflicts our communities, I'm writing to express my support for EPA's proposed GHG emission standards for passenger cars and light trucks. [EPA-HQ-OAR-2021-0208-0640-A1, p.1]

Commenter: Mass Comment Campaign sponsoring organization unknown-11 (1,667)

Enacting more stringent clean car standards will provide numerous co-benefits for people and parks — from saving American's billions at the pump, to preventing unhealthy vehicle air pollution that severely harms public health and the wellbeing of park ecosystems. [EPA-HQ-OAR-2021-0208-0642-A1, p.1]

Commenter: McQuire, Terry

[The following comments were submitted as testimony at the virtual public hearing on August 26, 2021. See Hearing Testimony – 26Aug2021, p. 224.]

ask that EPA as quickly as possible move forward with cleaner car standards that bring us closer to zero emission vehicles that have zero greenhouse gas emissions as well as other dangerous air pollutants that we know harm our communities.

Commenter: Metropolitan Washington Air Quality Committee (MWAQC)

On behalf of the Metropolitan Washington Air Quality Committee (MWAQC), the Metropolitan Washington Council of Governments' (COG) Climate, Energy and Environment Policy Committee (CEEPC), and the National Capital Region Transportation Planning Board (TPB), we are writing to offer our support for the proposed rule to revise existing national greenhouse gas (GHG) emissions standards for passenger cars and light trucks through Model Year (MY) 2026. We support your efforts to revise these standards to be more stringent than the Safer Affordable Fuel-Efficient (SAFE) Vehicles Rule standards, and the proposed rule aligns with our 2021 Legislative Priorities. [EPA-HQ-OAR-2021-0208-0208-A1][p.1]

The EPA's current proposal to strengthen federal GHG emissions standards for passenger cars and light trucks by setting stringent requirements for reductions through MY 2026 would provide the critical leadership needed for our region to work towards meeting adopted environmental goals and standards. We agree that this comprehensive federal program will achieve significant GHG emissions reductions and will result in substantial public health and welfare benefits, while providing consumers with savings from lower fuel costs. [EPA-HQ-OAR-2021-0208-0208-A1][p.2]

Commenter: MI Air MI Health

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, p. 195.]

For the record, MI Air MI Health fully supports the U.S. EPA's proposal to tighten greenhouse gas standards for passenger cars, SUVs, and light trucks for Models 2023 to 2026, replacing the SAFE Vehicles Rule.

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, p. 197.]

Again, MI Air MI Health fully supports quickly finalizing today's proposal to move forward with strong ambitious greenhouse gas and fuel efficiency standards for cars, light trucks, and SUVs.

We encourage even more aggressive action. Our environment, public health, and our most vulnerable populations can't afford to be idle on this issue, and I hope that you feel the urgency that I feel. Everyone deserves to breathe clean and healthy air.

Commenter: Minnesota Pollution Control Agency (MPCA) and Minnesota Department of Transportation (MnDOT)

The MPCA and MnDOT continue to support strong and technically feasible vehicle GHG emissions standards that drive deep greenhouse gas (GHG) emission reductions and a healthy environment for all Minnesotans. [EPA-HQ-OAR-2021-0208-0211-A1, p,1]

The MPCA and MnDOT appreciate EPA making it a priority to address light-duty vehicle GHG emissions standards and quickly replace the unreasonable and damaging Safer Affordable Fuel-Efficient (SAFE) Vehicles Rule. The SAFE rule rolled back the federal emissions standards adopted in 2012, which had been robustly analyzed and affirmed to be reasonable and achievable in the 2016 Midterm Review. As noted in our comments throughout the SAFE rulemaking process, the SAFE standards were unnecessary, based on bad analyses, and harmful to human health and the environment. [EPA-HQ-OAR-2021-0208-0211-A1, p.2]

Commenter: Moore, Cinthia

[The following comments were submitted as testimony at the virtual public hearing on August 26, 2021. See Hearing Testimony – 26Aug2021, p. 115.]

Today, I am calling in support of the EPA's proposal to strengthen greenhouse gas emissions standards for cars and light trucks.

Commenter: National Association of Clean Air Agencies (NACAA)

NACAA welcomes this EPA proposal to revise greenhouse gas (GHG) emission standards for model year (MY) 2023 through 2026 light-duty vehicles (LDVs) and commends the agency for placing a top priority on seeking to rectify the 2020 rollback, under the ‘Safer Affordable Fuel-Efficient (SAFE) Vehicles Rule for Model Years 2021-2026 Passenger Cars and Light Trucks’ (‘SAFE 2’ Rule), of the 2012 National Clean Car Standards. This proposal has the potential to offer substantial benefits in the form of important emission reductions that state and local air agencies need to achieve and/or sustain public health, clean air (including attainment and maintenance of the health-based National Ambient Air Quality Standards, or NAAQS) and other environmental goals and address air quality impacts in disproportionally impacted communities. These standards would also contribute to domestic job growth, economic development and fuel security. [EPA-HQ-OAR-2021-0208-0255-A1, p.1]

Commenter: National Parks Conservation Association (NPCA)

A strong clean cars standard will provide clear benefits for these communities across the nation—from improving localized health outcomes in hot spot communities, to saving average American’s billions at the pump. [EPA-HQ-OAR-2021-0208-0291-A1, p. 2]

Commenter: New Mexico Environment Department

New Mexico Environment Department (NMED) applauds your leadership in addressing climate change consistent with Executive Order 13990 on Protecting Public Health and the Environment and Restoring Science to Tackle the Climate Crisis (January 20, 2021), including the recently proposed Revised 2023 and Later Model Year Light-Duty Vehicle Greenhouse Gas Emissions Standards. As light-duty vehicles (LDVs) contribute 17 percent of the US greenhouse gas emission (GHGe), these CO2 standards are urgently needed to address emissions from transportation. The EPA rule, modeled as average fleet-wide CO2 targets, will also assist New Mexico in achieving the targets laid out by New Mexico Governor Lujan Grisham to reduce the state's GHGe by 45 percent by the end of the decade. NMED respectfully submits these comments on the proposed standards for your consideration. [EPA-HQ-OAR-2021-0208-0205-A1] p.1]

NMED supports increasing stringency standards that best advance the needs of New Mexicans and would, at a minimum, achieve the same level of emission benefits as under the standards adopted in 2012. NMED's reasons for supporting the increased stringency are presented below. [EPA-HQ-OAR-2021-0208-0205-A1][pp.1-2]

Commenter: Newhouse, Richard

[The following comments were submitted as testimony at the virtual public hearing on August 26, 2021. See Hearing Testimony – 26Aug2021, p. 77.]

We must ensure that the voices in support of strong vehicle emissions standards are heard, especially since the industry lobbyists will use this hearing as an opportunity to submit misinformation in support of weaker standards.

Improving fuel economy is one of the ways U.S. automakers can reduce greenhouse gas emissions of their vehicles and nine of 10 U.S. adults agree that automakers would continue to improve fuel economy for all vehicles and large SUVs and pickup trucks.

Strong clean air standards can drive down vehicle pollution, support our economy with consumer savings and spur innovation in the development of new cleaner car technologies and electrification of the transportation sector which you've heard quite a bit about.

[The following comments were submitted as testimony at the virtual public hearing on August 26, 2021. See Hearing Testimony – 26Aug2021, p. 78]

Setting strong federal clean air standards through 2026 can put us back on track to save consumers up to $80 billion in reduced gas, maintenance, and price costs over the lifetime of new vehicles purchased during the next five years while restoring clean air in our communities.

Commenter: NGVAmerica

NGVAmerica and its member companies support the efforts of President Biden and the Administration to accelerate the move to deep decarbonization of the U.S. economy. Therefore, we support the steps the U.S. EPA is taking in this rulemaking to accelerate the pace of change within the transportation sector and its efforts to reduce transportation related greenhouse gas emissions. NGVAmerica and its members are committed to supporting actions that will result in the decarbonization of the transportation sector through the increased use of low-carbon, gaseous-fuels including renewable, conventional natural gas, and, eventually, hydrogen [EPA-HQ-OAR-2021-0208-0214-A1, p.1]

Our members support the ultimate goal of the model year 2023 and later light-duty vehicle greenhouse gas emission standards – to decarbonize the transportation sector as quickly as possible while greatly reducing harmful criteria emissions that contribute to poor air quality and federal ambient air standards [EPA-HQ-OAR-2021-0208-0214-A1, p.1]

Commenter: Nissan North America, Inc.

Nissan strongly supports the long-term electrification, fuel efficiency, and carbon neutrality goals of the U.S. Environmental Protection Agency ("EPA") and the National Highway Traffic Safety Administration ("NHTSA"). Policy actions by federal, state, and local governments to invest in and accelerate electric vehicle ("EV") market expansion are vital to realizing these shared goals. Nissan encourages EPA and NHTSA to maintain support for expanded market measures such as purchase incentives and infrastructure development, which encourage adoption of zero-emission vehicles ("ZEVs"). Nissan further encourages EPA and NHTSA to continue to offer and expand incentives for the development, manufacture, and sale of EVs, including credit multipliers, A/C and off-cycle credits, as well as to expand CAFE credit trading and extend GHG credit life. Nissan also encourages the agencies to maintain and expand the compliance flexibilities built into the existing GHG and CAFE programs in order to allow the automotive industry to continue investing heavily in meeting and exceeding these goals. [EPA-HQ-OAR-2021-0208-0529-A1, p. 1-2]

Commenter: Oliver, Shaina

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, p. 72.]

I support this Administration's proposal to strengthen protection for clean car standards that will protect all children's health and future.

I urge this Administration to move forward on setting ambitious federal clean car standards would be a step in the right direction. The transportation sector is the largest source of carbon pollution in the U.S. Cleaning up vehicle pollution is one of the most important things we can do to fight climate change.

Commenter: Program for Public Consultation

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, pp. 96-98.]

They were informed that this proposal would increase the cost of vehicles but save consumers more on gas in the long run. Similarly, increasing fuel efficiency standards for heavy-duty trucks, vans, tractors, and similar vehicles was supported by 71 percent, including 84 percent of Democrats, 68 percent of Independents, and 56 percent of Republicans, though they were told the increase would increase the cost of the vehicle, once again saving money on gas in the long run. These were also supported in Texas, despite its dependence on oil, as well as in Ohio and Florida. After the Trump Administration's replacement of the Clean Power Plan with the Affordable Clean Energy rule, which froze the fuel efficiency standards, a survey by Yale University and George Mason University asked respondents whether they would support the government setting stronger fuel efficiency standards for cars, trucks and SUVs, a large majority of 78 percent of voters were in support, including 91 percent of Democrats, 76 percent of Independents, and 62 percent of Republicans.

In conclusion, increasing fuel efficiency standards as a way to reduce air pollution is consistently supported by a large majority of the public, including majorities of Republicans, even after informed that it would raise the cost of vehicles.

At the Program for Public Consultation, we do not take a position on policy issues but believe that in a democracy it is important for government agencies to consult citizens on key public issues that the government faces. We encourage you to take the views of all of the public into account when deciding whether to change federal fuel efficiency standards.

Commenter: Pruitt, Katherine

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, p. 156.]

I am grateful and relieved after so many rollbacks of critical public health and environmental protections under the previous Administration that President Biden and his Administration have acknowledged the importance of tackling pollution from the transportation sector that is contributing to climate change.

I appreciate that the Biden Administration is taking a small step in the right direction with this proposal and other broader actions on clean cars, climate change, and environmental justice which I support.

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, p. 158.]

Stronger standards for cleaner cars, if enacted now, will make a much-needed difference in my community and will protect my family.

The great thing about setting standards is that it works and the public supports it. It ensures equitable access to health and environmental benefits that cleaner technologies are making available now and into the future.

EPA must finalize the rule this year, 2021, to cover Model Years 2023 through 2026.

Commenter: Representative Padma Kuppa

[The following comments were submitted as testimony at the virtual public hearing on August 26, 2021. See Hearing Testimony – 26Aug2021, p. 144.]

I've always been conscious of the need to protect our planet for the future generations and a critical component of this is reducing vehicle emissions and having stringent clean air standards.

[The following comments were submitted as testimony at the virtual public hearing on August 26, 2021. See Hearing Testimony – 26Aug2021, p. 145.]

We bring to our jobs a belief in science that empowers us to improve vehicle emissions. We have a work ethic that drives us also empowers innovation and support for clean car standards so that our automotive industry can deliver real-world emissions reductions and set standards for others to follow around the world.

Commenter: Sabetta, Tracy

[The following comments were submitted as testimony at the virtual public hearing on August 26, 2021. See Hearing Testimony – 26Aug2021, p. 99.]

In support of an EPA proposal to set the strongest possible federal clean car standards through 2026.

Commenter: Sainz, Columba

[The following comments were submitted as testimony at the virtual public hearing on August 26, 2021. See Hearing Testimony – 26Aug2021, p. 226.]

I support this Administration's proposal.

Commenter: Scholar, Reverend

As an American, concerned with the climate crisis and the harmful air pollution that afflicts our communities, I'm writing to express my support for EPA's proposed GHG emission standards for passenger cars and light trucks. I respectfully urge you to finalize them as soon as possible and move swiftly to establish the next set of standards that put us on the path to 100% sales of new zero-pollution cars and light trucks by 2035. With ambitious multi-pollutant standards, we can protect the health of our communities and achieve the President's goal of a zero-emission transportation future. [EPA-HQ-OAR-2021-0208-0724-A1, p. 1]

Commenter: Sierra Club

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, pp. 28-29.]

I cannot overstate the importance of strong clean car standards, for climate action, racial justice, and improving public health.

I'm calling on EPA to strengthen this proposed rule to deliver on our shared priorities.

President Biden and his Administration have promised to take action to reverse Donald Trump's illegal and dangerous attacks on cleaner cars and clean air.

I thank the Administration for the speed with which they have worked on new clean car standards to set us back on track.

Strong standards will protect communities across the country from harmful transportation pollution, set enforceable regulations that the auto industry must meet, and are critical to our nation slashing climate= disrupting emissions and meeting our Paris Agreement commitment by 2030.

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, p. 30.]

During the previous Administration, Sierra Club in coalition with the diverse set of advocacy groups worked to defend the clean car standards. Now is the moment for the Biden Administration to go further than ever before and establish the strongest rule possible.

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, p. 31.]

I'm here today to urge the EPA to set the strongest possible clean car standards to deliver real world emissions and reductions that match the urgency of the climate crisis that we're living right now.

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, pp. 33-34.]

We appreciate President Biden and his Administration for following through on promises to address climate action and environmental justice by reversing the previous Administration's attacks on clean car standards, but by acting swiftly on these rules the Administration has acknowledged the importance of tackling climate pollution for transportation.

But we need the boldest and strongest possible clean car standards to truly make good of these commitments. We cannot afford a rule that locks in more climate pollution.

It's time for the Biden Administration to reinstate our strongest tool against climate change and go beyond the standards President Obama set nearly a decade ago.

Commenter: Smith, Arthur

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, p. 315.]

I strongly support this Administration's swift action on clean cars.

Commenter: South Coast Air Quality Management District

The South Coast AQMD supports EPA regulatory action to correct as far as possible the unlawful, damaging course set by the 2020 SAFE rulemaking. [EPA-HQ-OAR-2021-0208-0215-A1, p.2]

Commenter: Stout, Linda

[The following comments were submitted as testimony at the virtual public hearing on August 26, 2021. See Hearing Testimony – 26Aug2021, pp. 118-119.]

In 2020, the American Lung Association stamped us with an F for our failing air quality. This is why I support our Administration's proposal to allow states to adopt strong clean car standards.

[The following comments were submitted as testimony at the virtual public hearing on August 26, 2021. See Hearing Testimony – 26Aug2021, p. 120.]

Infrastructure for cleaner options is available right now. That's why I wholeheartedly support the proposal allowing states to establish clean car standards that protect our children's health and their future.

Commenter: Thomas, JP

[The following comments were submitted as testimony at the virtual public hearing on August 26, 2021. See Hearing Testimony – 26Aug2021, pp. 182-185.]

Overall, PPC finds that a large majority support the government taking action to reduce air pollution. In a September 2020 survey, 78 percent of voters assigned a very or somewhat high priority to the government working to reduce air pollution that causes negative health effects. This included 54 percent of Republicans, eight in 10 Independents, and 98 percent of Democrats.

A survey in 2016 on the clean power plans proposal to require all cars and trucks by 2025 to emit half the carbon dioxide of the 2010 model elicited support from 73 percent of voters, including 86 percent of Democrats, 71 percent of Independents, and 57 percent of Republicans.

They were informed that this proposal would increase the cost of the vehicle but save consumers more on gas in the long run. Similarly, increasing fuel efficiency standards for heavy-duty trucks, vans, tractors, and similar vehicles was supported by 71 percent of American voters, including 84 percent of Democrats, 68 percent of Independents, and 56 percent of Republicans, though they were told the proposal would increase the cost of the vehicle, again while saving money on gas in the 16 long run.

Both of these increases were supported also by bipartisan majorities of voters in Texas, despite its dependence on the oil industry.

After the Trump Administration replacement of the clean power plan with the Affordable Clean Energy Rules, which froze the fuel efficiency standards, a survey by Yale University and George Mason University asked respondents whether they would support the government setting stronger fuel efficiency standards for cars, trucks, and SUVs.

A large majority of 78 percent of voters were in support, including 91 percent of Democrats, 76 percent of Independents, and 62 percent of Republicans.

In conclusion, increasing fuel efficiency standards as a way to reduce air pollution is consistently supported by a large majority of the public, including majorities of Republicans, even after being informed that it would raise the cost of vehicles. At Voice of the People we do not take a position on policy issues but believe that democracy is important for government agencies to consult citizens on key policy issues that the government faces.

We encourage you to take the views of all of the public into account when deciding whether to change federal fuel efficiency standards.

Commenter: Trombetta, Nick

[The following comments were submitted as testimony at the virtual public hearing on August 26, 2021. See Hearing Testimony – 26Aug2021, p. 216.]

I wanted to voice my support for reinstating and strengthening the clean car standards that were rolled back by the Trump Administration.

[The following comments were submitted as testimony at the virtual public hearing on August 26, 2021. See Hearing Testimony – 26Aug2021, pp. 218-219.]

In conclusion, strengthening clean car standards are a win for all parties involved, not just the environment and not just for consumers. It's clearly in the best long-term interests of car manufacturers, the planet, and vulnerable communities. It is past time that the United States takes a strong stance on climate change.

Commenter: Uberuaga, Michelle

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, p. 283.]

I'm testifying today to support the EPA's proposal. This proposal is a step in the right direction to address the urgent climate emergency that we are living in right now.

Commenter: Villalpando Paer, Natalir

[The following comments were submitted as testimony at the virtual public hearing on August 26, 2021. See Hearing Testimony – 26Aug2021, pp. 202-203.]

That is why I support this Administration's proposal to strengthen federal clean greenhouse gas emissions standards for passenger cars and light trucks for Model Years 2023 and 2026.

Commenter: Volkswagen Group of America, Inc. (Volkswagen)

Volkswagen Group Supports the Proposed Direction of EPA's NPRM Volkswagen supports the overall proposal from EPA for reductions in light-duty vehicle CO2 emissions for model years (MY) 2023-2026. EPA's proposed regulations are consequential both for the future transformation of the auto industry and for meeting the imperative of climate change. Volkswagen supports the Administration's ambitions to dramatically lower greenhouse gases (GHGs) from the transportation sector and accelerate the adoption of electric vehicles. [EPA-HQ-OAR-2021-0208-0237-A1, p.1]

Volkswagen supports the goals of the EPA proposal for reducing vehicle GHG emissions for 2023-2026MY. We are supportive of annual reductions in CO2 emissions from motor vehicles and in the flexibilities in the proposal that will continue to provide an important incentivizing effect on vehicle electrification. [EPA-HQ-OAR-2021-0208-0237-A1, p.7]

Commenter: Volvo Car Corporation

The automotive industry is currently undergoing significant changes driven both by technology shifts, digitalization and changing consumer behaviour. Volvo Cars is fully committed to promoting and advancing technology on electrification, connectivity, mobility services and autonomous driving (AD). But many uncertainties remain (tariffs, infrastructure, incentives) so government should pursue policies that encourage auto industry investment and jobs, development of the electric vehicle market and advancement of motor vehicle safety. With the right complementary government policies, this rulemaking presents an opportunity for government and industry to pursue these shared goals. [EPA-HQ-OAR-2021-0208-0253-A1, p.4]

Commenter: Whyte, Yolanda

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, p. 142.]

I support this EPA Administration and this proposal to reduce pollution from passenger cars and light trucks for Model Years 2023 to 2026 with the goal of reducing our consistently-increasing greenhouse gas emissions. Urgent actions must be taken now.

Commenter: Wisconsin Department of Natural Resources

The 2020 Safer Affordable Fuel Efficient (SAFE) Vehicles Rule substantially weakened the standards that had been established in 2012. Due to the pressing need to reduce both GHG and criteria pollutant emissions from light duty vehicles, WDNR urges EPA to move expeditiously to promulgate a final rule that strengthens these standards and reduces emissions from these vehicles. [EPA-HQ-OAR-2021-0208-0223-A1, p.1]

Commenter: Wiste, Leah

[The following comments were submitted as testimony at the virtual public hearing on August 26, 2021. See Hearing Testimony – 26Aug2021, p. 87.]

The draft clean cars proposal can be a moral opportunity. We have in front of us a chance to respond to the cry of our communities and the cry of the earth, an opportunity to follow the science and to move rapidly to make the emissions reductions we know are necessary.

Commenter: World Resources Institute (WRI)

The World Resources Institute (WRI) appreciates the opportunity to comment on this important rulemaking. This rulemaking can be an important step toward achieving the pollution-free transportation system the United States needs to respond adequately to the climate crisis, to provide clean air for all Americans, and to realize billions of dollars in consumer fuel savings. To achieve these ends the final rule will have to incorporate key improvements as discussed in these comments. [EPA-HQ-OAR-2021-0208-0207-A1, p. 1]

EPA Response

EPA acknowledges the comments received expressing general support for EPA’s rulemaking. Some of these commenters had additional comments that disagreed with or suggested changes in specific aspects of the proposed program; we address these in other sections of this RTC or in the preamble.

1.2. General Opposition to the Proposal

Commenters Included in this Section

Anonymous Public Comment 1
Attorney General of Missouri et al.

Competitive Enterprise Institute et al.
Taxpayers Protection Alliance
Turlo, Andy
Valero Energy Corporation (Valero)
Zimmerman, Don and Linda

Commenter: Anonymous Public Comment 1

Whatever social ills automobiles and emissions may cause, there is no overriding ill so profound as to allow for an overreach of government authority. Moreover: there is no problem so profound as to justify a ban on anything! Customers are well-served from having multiple vehicle options and are perfectly capable of making intelligent adult decisions for themselves without the need for expansive mileage regulations from the EPA. If customers truly valued high-mileage vehicles (as is suggested in the EPA's logical overreach), then there would be a sizable profit opportunity for major automobile manufacturers in meeting that need. There is no need for the EPA to push unwanted products on customers under the mandate of an explicit mileage regulation.

As a consumer who values choice, I firmly reject the EPA's authority to set these rules and think that this mileage tightening exercise is a massive mistake. The country would be better off if OEMs were allowed to chart their own path and make cars truly desired by consumers without government intervention. [EPA-HQ-OAR-2021-0208-0357, p. 1]

Commenter: Attorney General of Missouri et al.

Building on the IWG's flawed analysis, the EPA's rush to carbon-zero vehicles compounds the risk to the American economy with ever more stringent mandates. Although promising, such technology also comes with substantial negative impacts to the environment, the economy, the poor, and to national security. For these reasons, we urge the EPA with withdraw this proposed rule and leave in place the rule promulgated by the previous administration. [EPA-HQ-OAR-2021-0208-0288-A1, p.17]

Commenter: Competitive Enterprise Institute et al.

The authors and undersigned organizations strongly oppose the EPA’s proposal to replace the Safer Affordable Fuel-Efficient (SAFE) Vehicle Rule’s GHG standards with more stringent regulatory requirements. [EPA-HQ-OAR-2021-0208-0292-A1, p. 1]

Commenter: Taxpayers Protection Alliance

On behalf of millions of taxpayers and consumers across the country, the Taxpayers Protection Alliance urges you to reconsider onerous proposed emissions standards on light-duty vehicles (i.e., passenger cars and light trucks). [EPA-HQ-OAR-2021-0208-0202-A1, p.1]

Commenter: Turlo, Andy

The EPA needs to extricate themselves from the automotive industry. They have repeatedly proven the do not understand the industry or the science behind it. They push a clear political agenda while bulling private companies in shakedown techniques that were previously employed by organized crime. If anyone at the EPA actually read or understood the science then they would see the glaring problems with the studies done. They are based more on guesses and thin air than science. The EPA at best is run by incompetent individuals or in my opinion run by individuals lacking integrity. It is a sad and depressing state the country has come to to rely on people doing their best to justify their existence while taking resources from private citizens to do so. [EPA-HQ-OAR-2021-0208-0367, p. 1]

Commenter: Valero Energy Corporation (Valero)

Valero urges EPA to revise the GHG emission standards to provide a level playing field in which different vehicle designs, fuel types, and technologies can compete fairly to meet an appropriate performance target where such targets act in harmony, not in conflict, with other statutory requirements aimed at reducing overall GHG emissions [EPA-HQ-OAR-2021-0208-0601-A2, pp.8-9]

Commenter: Zimmerman, Don and Linda

As an American I'm writing to express my firm opposition for EPA's proposed GHG emission standards for passenger cars and light trucks. I respectfully urge you to leave them as they currently exist. While the goal of zero emission vehicles is worth pursuing the process of achieving this standard has not been fully researched and a valid plan developed to achieve this standard. The current proposal has merit for highly urbanized areas but heavily penalizes rural areas.

The knee jerk reaction to achieve goals without fully researching, developing viable and effective plans and minimizing actual costs and impacts has got to stop. [EPA-HQ-OAR-2021-0208-0656-A1, p. 1]

EPA Response

EPA acknowledges these comments expressing general opposition to the proposed rule. For responses to specific issues raised by some of these commenters, please see the separate sections of this RTC and the preamble. Specifically, as context for the comment of the Attorney General of Missouri et al. in this section, see also EPA responses in Sections 12.3, 13, 14, 14.1, 16, 17.2, 19, and 23 of this RTC, and as context for the comment of the Competitive Enterprise Institute in this section, see also EPA responses in Sections 2.2, 15, and 21 of this RTC. We also summarize our general reasoning in support of our final standards and provisions in Section VI of the preamble.

2. CO2 Emissions Standards and Feasibility

<u>Commenters Included in this Section</u>

California Air Resources Board (CARB)
California Attorney General Office, et al.
Center for Climate and Energy Solutions (C2ES)
Dream Corps Green for All et al.
Elders Climate Action (ECA)
Energy Strategy Coalition
Environmental Defense Fund (EDF)
Holiday, Thomas
Illinois et al. Corn Growers Associations (Corn Growers Associations)
Maine Department of Environmental Protection
Michalek, Jeremy and Whitefoot, Kate S.
National Automobile Dealers Association (NADA)
Platt, Keari

Commenter: California Air Resources Board (CARB)

U.S. EPA, by adopting this proposal along these lines, would be correcting serious errors in the current rule, the Safer Affordable Fuel-Efficient (SAFE) Vehicles Rule for Model Years 2021-2026 Passenger Cars and Light Trucks (Final SAFE Rule),2 which improperly sets standards far below emissions levels that have clearly been feasible for many years. As U.S. EPA recognizes in its proposal, the extensive record supporting the National Program standards, the rigorous analyses that have been done since that record was developed, and the increasing pace and declining cost of the technology to reduce and eliminate motor vehicle emissions supports the proposed standards, including the most stringent alternatives. The draft Technical Assessment Report in 2016 and analyses by U.S. EPA in its Midterm Evaluation showed then that the National Program standards were technologically feasible (including with many extant technologies), appropriate, and would have benefits that far outweighed their costs. CARB reached similar conclusions about its greenhouse gas emission standards in its 2017 Midterm Review. [EPA-HQ-OAR-2021-0208-0643-A6, pp.6-7]

U.S. EPA properly recognizes this here and has weighed the factors relevant to setting emission standards in a manner consistent with Congressional direction. Because the National Program standards have been and continue to be appropriate and feasible, U.S. EPA has grounds to adopt its proposal and any combination of more stringent measures within its proposal.[EPA-HQ-OAR-2021-0208-0643-A6, p.7]

Stringent Federal Standards Will Reduce Pollution Nationwide and Lower Costs, Even in California. CARB supports more stringent federal greenhouse gas emission standards independent of and complimentary to its own standards adopted under as an exercise of authority preserved by the federal Clean Air Act. CARB has consistently and vigorously opposed the actions by U.S. EPA to improperly withdraw a waiver of federal preemption for its standards.10 CARB encourages U.S. EPA to quickly finalize its proposal to restore California's waiver of preemption for its standards.11 Nevertheless, more stringent federal standards would support greater emission reductions nationwide.

This is even more true where the Alternative 2 proposed standards would return to the National Program standards that are similar to CARB's standards for any model years for which they are adopted; the feasibility of the preferred alternative is also supported by CARB's voluntary agreements with many automakers and would yield significant reductions. Stringent California and federal emission standards can work together to facilitate compliance by manufacturers by creating a broader market to develop cleaner technologies. This is as true for greenhouse gas emission standards as it is for criteria pollutant standards, where U.S. EPA's Tier 3 standards for model years 2017-2025 and CARB's Low-Emission Vehicle III standards both reduce pollution from motor vehicles.12

Most importantly, stringent federal GHG emission standards are needed to address the worsening climate crisis. [EPA-HQ-OAR-2021-0208-0643-A6, p.9]

Commenter: California Attorney General Office, et al.

In sum, automakers are already producing a wide array of vehicles that would facilitate compliance with standards significantly more stringent than SAFE 2 as early as MY2023. That, combined with the additional fleet improvements that can be reasonably expected between MYs 2021 and 2023, establish automakers' ability to meet at least the preferred alternative standards in MY2023. [EPA-HQ-OAR-2021-0208-0245-A1, p.28]

Commenter: Center for Climate and Energy Solutions (C2ES)

Regarding feasibility of the standards for automakers, given the extended timeline over the initial 2012 final rule, automakers should be able to meet the annual performance targets with the proposed flexibilities, although some may need to rely more heavily on market credits than others. Additionally, the commitment of five major automakers to sign onto the California Clean Cars Framework Agreement with similarly ambitious targets to EPA's proposed rule demonstrates the willingness and ability of automakers to comply with the standards.

Many automakers have made voluntary commitments to electrifying 40 percent or more of their fleets by 2030 or 2035, including General Motors, Ford Motor Co., Stellantis N.V., Mercedes-Benz, and Volvo. Toyota projects 80 percent of its cars sold in 2030 to be battery, fuel cell, or hybrid electric. Adding to their ambitious targets, these companies have announced financial commitments of more than $150 billion in electric and autonomous vehicle development through 2030, even before the application of regulatory pressure of more stringent emissions standards.13 [EPA-HQ-OAR-2021-0208-0287-A1, p.5]

To date, fifteen states have adopted California's Clean Car standards, setting requirements for automakers to offer increasing shares of low- and zero-emission vehicles for sale. In setting emissions standards, EPA should take into account state-level ambition and align federal stringency to provide a more consistent level of ambition across the nation. [EPA-HQ-OAR-2021-0208-0287-A1, p. 5]

Commenter: Dream Corps Green for All et al.

We are heartened to see EPA state a target of reducing pollution by 60% by 2030, which will save lives and accelerate clean transportation choices, but changes are needed to ensure the final rule actually delivers on this goal. [EPA-HQ-OAR-2021-0208-0285-A1, p.1]

Commenter: Elders Climate Action (ECA)

EPA's proposed rule merely reduces carbon fuel combustion per mile driven. Zero emissions cannot be achieved if vehicles continue to burn carbon fuels. Internal combustion engines (ICEs) must be replaced as quickly as possible by zero emission vehicles (ZEVs). EPA's proposed rule does not chart a course toward implementing either the national policy declared by President Biden or reflect the urgent need to cut GHG emissions in half by 2030 to avoid much worse future climate catastrophes. The rulemaking fact sheet acknowledges that over the next 30 years the rule will only reduce emissions from light duty vehicles equal to one year's emissions. The rule does not achieve, or describe how it will contribute to achieving, zero emissions by 2050. [EPA-HQ-OAR-2021-0208-0521-A1, p. 2]

We petition the Administrator to make this finding as the predicate for re-opening this rulemaking for the purpose of promulgating a zero emission standard for LDVs, and a phase-in schedule that prescribes for each automaker a share of total LDV sales that must be ZEVs beginning with the 2026 MY. [EPA-HQ-OAR-2021-0208-0521-A1, p. 12]

Motor Vehicle Emission Control programs is Not Adequate to Protect Health. In most nonattainment counties, ozone emission inventories and a significant fraction of PM2.5 inventories are dominated by tailpipe emissions. Obviously the national emission control program for motor vehicles has not been, and is not now adequate to reduce mobile source emissions to the levels needed to attain the NAAQS in these regions. Only the conversion of vehicle fleets to zero emission technologies offers the possibility of attaining the NAAQS to resolve the public health crisis suffered by residents in these counties.

If EPA sets a zero emission standard for new motor vehicles, fossil fueled vehicles will be replaced with zero emission technologies. For ozone, reducing emissions of ozone precursors a few percent can make an observable difference in both ozone peak concentrations and the frequency of exceedance days. Precursor emissions increases in most metro nonattainment areas that exacerbate ozone violations are at the rate of VMT growth which typically is 2- 3% annually. So small changes in emissions, along with increasing heat that drives the atmospheric chemistry, can have a big impact on ozone formation.

As soon as a ZEV sales mandate takes effect, fleet-wide emissions will begin dropping at the rate of ICE replacement. Assuming a 20-year time horizon for full fleet replacement, each year 5% of the ICE fleet will be replaced. Under a zero emission standard for new vehicles, the portion of the replacement vehicles that will be zero emissions will be determined by the ZEV sales requirement for that MY.

That means total emissions of all reactive hydrocarbons emitted from tailpipes, aromatics included, will drop 5% after one year if 100% ZEV sales are required, or 1.5% if 30% ZEV sales. Under a 100% sales regime, ozone precursor emissions will drop quickly: 10% after two years. 15% after three years, etc. These reductions are HUGE compared to what can be accomplished with fuel additives, or EPA's proposed rule which aims to reduce emissions by 5% each year only from the new vehicles added to the fleet (i.e. in year one 5% of 5%, or 0.25% of total emissions); instead of reducing 5% from the entire fleet emission inventory. A ZEV sales mandate promises to completely resolve ozone nonattainment in nonattainment areas where a 20% reduction is enough in as few as four years. And clean air for our kids will be permanent because fleet replacement will continue to accelerate in future years to reduce emissions at a rate significantly faster than VMT growth.

When tailpipes no longer exist and coal is no longer burned to generate electricity, urban ozone exceedances and its devastating impacts on human health will become a footnote in history. Cities will have air quality safe for raising children. [EPA-HQ-OAR-2021-0208-0521-A1, pp. 14-16]

Commenter: Energy Strategy Coalition

As companies and utilities in the electric industry, we understand the importance of business and market certainty to our operations. Given the lead time necessary for investment in research and development and eventual deployment of new technologies, we need regulatory certainty that allows us to anticipate future challenges and opportunities and invest in solutions to meet them. In 2012, EPA, working with NHTSA and the California Air Resources Board, sought to do just that—by aligning standards and creating consistency across the three agencies and by creating standards that extend over the investment horizon. Returning to Proposed Standards that create a national program by harmonizing with California's standards will help repair the regulatory environment and help spur additional critical private and public investment. [EPA-HQ-OAR-2021-0208-0533-A1, p.3]

Commenter: Environmental Defense Fund (EDF)

Five manufacturers (BMW, Ford, Honda, Volvo, and Volkswagen) have signed voluntary agreements with the State of California committing themselves to reducing GHG emissions from their national fleets in MYs 2021-2026.24 Those agreements impact EDF's assumptions about the GHG performance of those manufacturers in those model years. In particular, we assume that the automakers that voluntarily committed themselves to reduce emissions in excess of requirements to which they would be subject under EPA's Proposed Standards through MY 2024 will, as a group, be able to comply with the Proposed Standards through MY 2024 without acquiring credits held by automakers that have not made such commitments. [EPA-HQ-OAR-2021-0208-0688-A1, p. 14]

The feasibility of EPA's Proposed Standards is supported by the California's ongoing Advanced Clean Cars II (ACCII) rulemaking. The California Air Resources Board ("CARB")'s ACCII standards will see automakers transition large percentages of their fleets to ZEVs between model years 2026 and 2035. Early rulemaking documents released in May 2021 indicate CARB will set a proposed Zero Emissions Vehicle (ZEV) standard that will achieve 26% ZEV and PHEV sales in 2026.56 The standards then increase to 76% ZEV sales by 2031 and ultimately eliminate tailpipe pollution by 2035, in line with the goal of 100% ZEV sales set out by Governor Newsom.57 CARB found that proposed 26% ZEV sales rule is feasible for manufacturers to comply, based on comparison with the redesign timeline for vehicles.58 The agency found that the trajectory of ZEV and PHEV sales doubled between MY 2016 and 2018 but decreased in MY 2019 (along with total vehicle sales). According to manufacturers' own projections, almost 25% of statewide sales will be ZEV and PHEV by MY 2025.59

California's Advanced Clean Car II standards will likely also be adopted by other Clean Air Act Section 177 states that have adopted the California standards. Currently 14 states and the District of Columbia have adopted California standards. Eleven of those states have adopted ZEV standards. 60 The ACCII rulemaking, supports the feasibility of the EPA emissions standards as manufacturers will have to comply with the ZEV regulations. As a result, EVs will likely make up a growing percentage of the vehicle fleet, due to market forces, consumer demand, and regulation, and improve manufacturers' corporate GHG performance. [EPA-HQ-OAR-2021-0208-0688-A1, p. 36]

Commenter: Holiday, Thomas

[The following comments were submitted as testimony at the virtual public hearing on August 26, 2021. See Hearing Testimony – 26Aug2021, p. 81.]

The reason I endorse that is it's already done by the top three hybrids, the top three, the most efficient, the most highest-achieving hybrids in production, the Toyota Prius, the Honda Insight, the Shindai Hyundai Ioniq, and so those three really already do that.

Commenter: Illinois et al. Corn Growers Associations (Corn Growers Associations)

The key defect with the proposal is that it does not provide a pathway for actually achieving the emissions goals it claims to seek. EPA acknowledges that "the vast majority of vehicles produced in the time frame of the proposed standards will be gasoline-fueled vehicles."3 But it does not seriously consider the current technological limitations that stand in the way of further emissions reductions from internal combustion engines. When coupled with EPA's extremely aggressive proposed timeline, this defect makes it virtually certain that automakers will not be able to comply with the proposed rule without what the proposal euphemistically calls regulatory "flexibility."4 That flexibility is promised in part in the form of extensions of "EV multipliers," which allow traditional automakers to buy their way out of compliance with EPA's standards by double counting electric-vehicle credits when calculating fleet-average greenhouse gas emissions. This is counterproductive because, as EPA admits, multipliers do not meaningfully encourage the adoption of electric vehicles, but instead serve only to enrich electric vehicle manufacturers at the expense of consumers, industry, and the environment. [EPA-HQ-OAR-2021-0208-0563-A2,p.3]

Commenter: Maine Department of Environmental Protection

Unfortunately, these standards were subsequently rescinded despite EPA's 2018 mid-term evaluation that confirmed the standards for model years 2022-2025 were both technically feasible and appropriate.1 [EPA-HQ-OAR-2021-0208-0225-A1, pp.1-2]

Commenter: Michalek, Jeremy and Whitefoot, Kate S.

Reexamining outdated artifacts of inter-agency coordination: The proposed regulation and cost-benefit analysis contains some legacy artifacts that were due to restrictions placed on NHTSA that are no longer relevant now that the agencies are not issuing joint regulations. Notably, EPA should account for all credit provisions in the regulations when examining their feasibility, costs and benefits. Additionally, we recommend that EPA examine a regulatory alternative that creates one standard across the full fleet of light-duty vehicles rather than two separate standards for passenger cars and light trucks. [EPA-HQ-OAR-2021-0208-0300-A1, p. 2]

Reexamine Outdated Artifacts of Inter-Agency Coordination. We recommend that EPA examine legacy elements of the regulation that were based on restrictions applied to NHTSA but not to EPA that are no longer relevant now that the two agencies are not issuing joint regulations. These include (1) separate standards for passenger cars and light trucks and (2) ignoring certain flexibilities of the regulations (such as averaging, banking, and trading of credits) in the cost-benefit analysis.

Separate standards for passenger cars and light trucks. A legacy element that appears outdated is setting two distinct regulations, one for passenger cars and one for light trucks. This provision was present in previous regulations because NHTSA was restricted by Congress to separately set regulations for passenger cars and light trucks, but EPA is not subject to such a restriction. We believe this separation is outdated for the following reasons:

1. The industry has seen an emergence and growth in SUVs and crossover vehicles, many of which are classified as light trucks.

2. Having less stringent standards for light trucks than passenger vehicles can create an incentive to sell more light trucks and design vehicles to be classified as light trucks than would have occurred with a single standard across the fleet of light-duty vehicles.

3. Multiple vehicle models, such as the Honda CRV and the Ford Escape, have a passenger car version and a light-truck version that are nearly identical, but the light-truck version is subject to a less stringent GHG emission standard.

4. Having a single standard would increase manufacturers' flexibilities to meet the standards across their full fleet, and reduce compliance costs.

EPA should study the alternative of issuing one set of average standards that would apply to the full fleet of light-duty vehicles. [EPA-HQ-OAR-2021-0208-0300-A1, p. 6]

Commenter: National Automobile Dealers Association (NADA)

NADA also objects to EPA decision to model its proposal, at least for MY 2023, on standards agreed to by five OEMs in conjunction with the State of California.40 Certainly, individual OEMs are entitled to go beyond what the law requires, and NADA does not object to them voluntarily electing to do so. However, the voluntary "framework" standards agreed to by California and five OEMs should not automatically serve as the basis for any revised federal GHG mandates that all OEMs must comply with. As EPA notes, the OEMs that entered the "framework" agreements represent only "about a third of U.S. vehicle sales."41 That OEMs representing the other 2/3 of U.S. vehicle sales did not enter similar agreements is telling and raises significant questions as to whether those standards are reasonable and appropriate. [EPA-HQ-OAR-2021-0208-0290-A1, p. 10]

Commenter: Platt, Keari

As such, I appreciate and approve of the EPA's decision to use the California Framework as the least stringent alternative. The EPA's decision to adopt a 10% stringency increase is reasonable considering how many automakers already made a voluntary commitment to improve fuel efficiency. Meeting the EPA's more stringent standards by 2026 would be feasible because automakers demonstrated a capability and willingness to do so. [EPA-HQ-OAR-2021-0208-0201-A1, p. 1]

EPA Response

CARB's request for EPA to finalize its proposal to restore California's waiver of preemption for its standards is addressed in Section 26.2 of this Response to Comments.

Elders Climate Action suggested that EPA establish a zero-emissions vehicles (ZEV) mandate. EPA did not propose or request comment on adopting a ZEV mandate; therefore this comment is outside the scope of this rulemaking. In addition, EPA disagrees with this approach for the time frame of this regulatory action (MY2023 – 2026). EPA believes the appropriate approach to structuring emissions standards through the MY2026 time frame is through performance-based standards with year-over-year increases in CO_2 emissions stringency. As shown in our analysis, this approach is projected to result in increasing EV penetrations (reference Table 4-29 and Chapter 4.1.4.1 of the RIA), as EVs are one of the technology options automakers can choose to use to comply with increasingly stringent standards. Most importantly, the final performance-based standards are projected to reduce air pollution emissions (both GHG and criteria pollutant emissions) with cumulative emission reductions growing as more of the light-duty fleet becomes subject to the more stringent standards through fleet turnover. Tables 34 and 37 of the Preamble detail the projected GHG and criteria pollutant emissions reductions, respectively, for the final standards.

In its comments, NADA objects to EPA basing its proposal on standards consistent with the California Framework Agreement. NADA also states that it "supports a harmonized set of federal light-duty vehicle GHG/fuel economy standards that are technologically feasible..." As described in Preamble VI.A and RIA 2.2, EPA considered many factors in assessing the feasibility of the standards and the California Framework Agreement nationwide targets were appropriately one of these many factors.

The Corn Growers Associations commented that EPA "does not seriously consider the current technological limitations that stand in the way of further emissions reductions from internal combustion engines." EPA disagrees with these comments, and on the contrary, EPA's projection of vehicle technology applications does consider the technological limitations for internal combustion engines[1] (including the potential improvements that come from multiple forms of powertrain hybridization which rely upon internal combustion engines), and we believe that the incremental improvements we project for gasoline-fueled vehicles are reasonable and the final standards are feasible. In response to increasingly stringent standards, manufacturers have shown a decade of continual innovation and technological progression. Furthermore, the technological achievements already developed and increasing in application to vehicles within the current new vehicle fleet (RIA Chapter 2.3) will enable the industry to achieve the final standards even without the development and implementation of additional technologies. EPA discusses the feasibility of the standards further in Preamble III and VI.A and RIA 2.2

Regarding the Corn Growers Associations' critique of EV multipliers, EPA responds to their comment in Section 6.1 of this RTC.

Drs. Michalek and Whitefoot requested EPA to examine an alternative of one standard for all light-duty vehicles rather than two separate standards for passenger cars and light trucks. EPA did not propose or seek comment on combining the footprint-based curves into one curve representing the entire light-duty vehicle fleet, and we believe that this would be a substantial change in the structure of the program which is not appropriate to undertake on the timeline of this rule, which is only intended to revise standards for MY 2023-2026. EPA may evaluate various approaches to setting light-duty vehicle CO2 standards as part of the planned future rulemaking.

Secondly, Drs. Michalek and Whitefoot requested that EPA consider certain flexibilities of the regulations (such as averaging, banking, and trading of credits) in the cost-benefit analysis. In the analyses for this final rule, we have updated the manufacturers' credit banks for the baseline MY 2020 fleet with best available data from the EPA certification and compliance program. For our primary analysis, we continue, as in past regulatory actions, to consider credit transfers between a manufacturer's car and truck fleets. We have also conducted a sensitivity analysis representing perfect credit trading between manufacturers. The results of that sensitivity are presented in Chapters 4 and 10 of the RIA.

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[1] EPA did consider current technological limitations in its ICE modeling. As discussed in Preamble III.A and RIA 4.1.1.3, EPA did apply limitations to effectiveness of high compression ratio engine technology by restricting the CCEMS model to only HCR0 and HCR1.

2.1. Lead Time Issues

Commenters Included in this Section

Alliance For Automotive Innovation
American Lung Association
American Lung Association in the Mid-Atlantic
Bay Area Air Quality Management District (Bay Area AQMD)
California Attorney General Office, et al.
Consumer Reports (CR)
Environmental Defense Fund (EDF)
Environmental Protection Network (EPN)
Institute for Policy Integrity
Tesla
Union of Concerned Scientists (UCS)

Commenter: Alliance For Automotive Innovation

Meeting the proposed MY 2023 targets will be challenging. EPA proposes to increase the stringency of MY 2023 targets by 10 percent relative to MY 2022.31 This unprecedented leap in stringency with virtually no lead-time will be a challenge for at least some manufacturers to meet. [EPA-HQ-OAR-2021-0208-0571-A1, p. 10]

In MY 2019, the last year for which EPA has published data, automakers on average trailed annual performance targets for both the passenger car and light truck fleets,32 meaning an even greater rate of improvement is necessary to close that gap and achieve performance requirements in future years. Based on estimated targets under the proposal for MY 2023,33 manufacturers on average will need to improve the passenger car fleet performance by 19%, the light truck performance by 31%, and the overall performance by 21%, relative to MY 2019, in only four years to meet such a target, or will need to continue to consume previously banked over-compliance credits. The future availability of such credits is limited for many manufacturers, and there are no guarantees that credits potentially offered for sale by some manufacturers will be available for all or purchased in advance by a limited few. [EPA-HQ-OAR-2021-0208-0571-A1, p. 10]

According to the most recent IHS Markit “Baseline Study,”34 fleet average performance improved in MY 2020 but continued to fall short of annual requirements (Figure 1). Comparing MY 2020 values from the Baseline Study to those estimated by EPA for the NPRM, manufacturers would have to improve U.S. fleet average performance, net of credits, by 18% overall between MY 2020 and MY 2023 to meet the proposed MY 2023 targets.35 [EPA-HQ-OAR-2021-0208-0571-A1, p. 10-11] [Figure 1 can be found on p. 11 of Docket number EPA-HQ-OAR-2021-0208-0571-A1]

These types of performance gains are usually only obtained through combined vehicle and powertrain redesigns or significant market shifts in powertrain choices. Given that four years is a short time for vehicle redesigns and extremely short for powertrain redesigns, it is unlikely that the entire fleet would be improved to this level. Thus, the burden would fall to a combination of changes to the smaller volume of vehicles actually redesigned and potential fleet mix changes where those actions fall short. [EPA-HQ-OAR-2021-0208-0571-A1, p. 11]

IHS Markit also assessed MY 2020 fleet performance against future targets including MY 2023 (Figure 2). Only 11.6 percent of vehicle production in MY 2020 meets MY 2023 targets. Assuming a normal distribution of vehicles above and below target, this would need to be improved to roughly 50 percent between MYs 2020 and 2023 for the fleet on average to meet its annual target (or higher to generate credit). Note that, despite the presence of some EVs in MY 2020, with only 41 percent of production meeting or exceeding annual targets (Figure 2), the fleet as a whole is still a net deficit generator (Figure 1). [EPA-HQ-OAR-2021-0208-0571-A1, p. 11-12] Figure 2 can be found on p. 12 of Docket number EPA-HQ-OAR-2021-0208-0571-A1]

EPA's statement that, "…in light of the design cycle timing for vehicles, EPA has basis to expect that the vehicles that automakers will be selling during the first years of the proposed MY 2023-26 program were already designed before the less stringent SAFE standards were recently adopted,"156 completely misconstrues the importance and significance of design cycles on real world response to changes proposed in today's policy. DOT and EPA jointly proposed the SAFE Vehicles Rule on August 24, 2018,157 signaling some probability of changes in federal regulations on GHG and CAFE. It is reasonable to expect that some manufacturers updated production plans for new vehicles accordingly, and consistent with the corporate strategies, for some of the affected model years in the SAFE proposal (MYs 2021-2024, for instance). The most reasonable way to characterize how each manufacturer responded to recent policies and market conditions is with an up-to-date fleet, and not conjecture about what manufacturers could have, or should have done in retrospect.158 A small portion of the fleet is redesigned every year, and often the burden of higher stringency weighs significantly on redesigned vehicles.159 In response to a rapid increase in standards like those in the proposed standards, manufacturers may use banked credits, produce many hybrid and electric vehicles, which the market will hopefully adopt, and continue to integrate fuel saving technologies, like tire rolling resistance technology, aerodynamic drag reducing technology, and mass reduction technology.

Tables 7 and 8 , below, show the portion of the fleet with at least one redesign after MYs 2023 and 2024, respectively. As can be observed, only a small portion of any manufacturer's fleet is likely to be redesigned in any particular model year. For most manufacturers, their entire fleet will not be redesigned until after MY 2026. [EPA-HQ-OAR-2021-0208-0571-A1, p. 52-53] [Tables 7 and 8 can be found on p. 54 of Docket number EPA-HQ-OAR-2021-0208-0571-A1]

Commenter: American Lung Association

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, p.19]

EPA must finalize this rulemaking this year in order to set stronger tailpipe standards for Model Year 2023. Climate change is a health emergency and the Biden Administration must respond with dispatch.

Commenter: American Lung Association in the Mid-Atlantic

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, pp. 110-112.]

The need for the strongest possible clean car standards in the short term and on track for the clean electric vehicle market in the longer term implemented as soon as possible could not be clearer and lest there be any wonder about the need for these improvements, I can cite no more convenient example than the fact that today has been declared an air quality action day for ozone smog for much of the Mid-Atlantic, for Baltimore, Washington, and Northern Virginia, and the South, to Delaware and Philadelphia and the East, to Pittsburgh and the West, and quoting from the official forecast, "Ozone formation during the late morning, afternoon will be robust and eight-hour maximum concentrations are expected to reach into the Code Orange range," and the extended forecast continues, "The heat is expected to continue Thursday with sunshine for the most part and again Code Orange ozone concentrations are possible," and climate change is making these scenarios all the more likely. The need is clear.

Commenter: Bay Area Air Quality Management District (Bay Area AQMD)

The Bay Area Air District agrees that strengthened standards should start with MY 2023, without delay, and tighten over time. [EPA-HQ-OAR-2021-0208-0283-A1, p.2]

Additionally, credits are available from the current weakened standards to assist in meeting more stringent standards over the short term. [EPA-HQ-OAR-2021-0208-0283-A1,p. 2]

As outlined in this letter, the Bay Area Air District encourages EPA to adopt the strongest feasible standards. [EPA-HQ-OAR-2021-0208-0283-A1, p.3]

Commenter: California Attorney General Office, et al.

In addition, many automakers already have substantial credit banks and the opportunity to add to those credit balances under the unlawfully weak SAFE 2 standards through model year (MY) 2022. The crediting flexibilities already built into the program—including the ability to trade, carry-forward, and carry-back—place automakers in even better positions to craft strategies to comply with more stringent standards. [EPA-HQ-OAR-2021-0208-0245-A1, p.2]

For MY2023, automakers can comply with standards at least as stringent as EPA's preferred alternative without the use of the credit banks they will likely hold coming into that year. Those banks, including the windfall credits available under the SAFE 2 standards, support EPA's consideration of its Alternative 2 standards for MY2023 and underscore that EPA should not finalize standards less stringent than its preferred alternative for that model year. [EPA-HQ-OAR-2021-0208-0245-A1, p.2]

There Is Adequate Lead Time for Standards at Least as Stringent as EPA's Preferred Alternative for MY2023, and EPA Should Consider Finalizing Alternative 2's Standards for that Model Year

While the amount of lead time provided for MY2023 is not unprecedented for Section 202(a) standards,123 we recognize that lead time for that year is more limited than for other years covered by the proposal. Lead time is nonetheless sufficient for the industry to meet EPA's preferred alternative standards for MY2023 without substantial use of credits from prior model years.124 And because, inter alia, there will likely be significant prior-year credits available for use in MY2023, the industry has adequate lead time for standards more stringent than the preferred alternative, including Alternative 2.125 EPA should, thus, consider finalizing the Alternative 2 standards for MY 2023, based on the full record before it, including any new information EPA receives or develops concerning automaker plans and anticipated credit balances at the start of MY2023. If EPA concludes lead time is insufficient for the Alternative 2 standards for MY2023, EPA should finalize standards at least as stringent as the preferred alternative for that model year and should adopt the more stringent Alternative 2 standards for subsequent model years (see below). That latter option would produce most of the benefits of Alternative 2—returning to the more stringent standards promulgated in 2012 more quickly—but would obviate arguments some automakers may make that lead time for Alternative 2's MY2023 standards is inadequate. It is also entirely within the scope of EPA's Proposal. 86 Fed. Reg. at 43,739 ('EPA requests comments on … other alternatives roughly within the stringency range of the proposal and the Alternatives.'). [EPA-HQ-OAR-2021-0208-0245-A1, p.26]

In addition, as EPA found in the Proposal, a sizable number of vehicles being sold today (in MY2021) would support compliance with EPA's proposed MY2023 standards.138 For example, in the vehicle category with the highest sales in MY2021 (small SUVs, which make up 28% of the market), 23% of the models would generate credits under EPA's preferred alternative MY2023 standards.139 Similarly, 24% of the MY2021 standard-pick-up and large-car models (which, together, account for another 18% of the market) would generate credits under the preferred alternative MY2023 standards.140 In fact, there is no major vehicle category in MY2021 for which less than 12% of the models would generate credits under those standards. [EPA-HQ-OAR-2021-0208-0245-A1, p.28]

Anticipated Prior-Year Credit Balances Indicate Adequate Lead Time for Even More Stringent Standards. Automakers can also utilize the well-established flexibilities built into EPA's GHG regulatory regime since its beginning, including the credit carry-forward mechanism that allows automakers to bank credits from one model year and use them up to five model years later. The credit banks the industry will likely bring into MY2023 position automakers to comply with even more stringent standards, including Alternative 2, in MY2023, especially given the low-stringency SAFE 2 standards for MY2021-2022.141 EPA's 2020 Automotive Trends Report shows that, as of the end of MY2019, automakers, collectively, held more than 55 million credits that would not expire before MY2023. Moreover, credit modeling performed by several non-governmental organizations demonstrates that, even assuming only limited improvement in the fleets, automakers can be expected to have sizable credit banks available in MY2023 that could be used to comply with Alternative 2's standards (and, of course, with the preferred alternative's standards).142 That underscores that additional lead time for any of those standards is not required. Nat'l Petrochemical & Refiners Ass'n v. EPA, 630 F.3d 145, 165 (D.C. Cir. 2010) (affirming EPA's decision to provide limited lead time under similar circumstances where credit program was well-established and regulated parties would not need to invest in construction or technology development). Notably, if, as can reasonably be anticipated (see supra at 26-28), automakers make more improvements in fleetwide GHG emissions than the conservative assumptions underlying these analyses, automakers will not only earn more credits under the weak SAFE 2 standards in MYs 2021-2022 but will also require fewer credits for compliance in MY2023. Finally, we encourage EPA to adopt some form of multipliers (with a cap) for EVs, fuel cell vehicles (FCVs), and PHEVs in MYs 2023-2025.143 And, if EPA makes such multipliers available for MY2023 that will further reduce the need for additional lead time for that model year, especially given the anticipated expansion in sales of these vehicles (see supra at 27-28). [EPA-HQ-OAR-2021-0208-0245-A1, p.29]

Commenter: Consumer Reports (CR)

Consumer Reports strongly supports EPA's proposal to institute these new standards as soon as possible, which we agree is model year 2023. Consumer Reports agrees with EPA that this should not be a problem for automakers. The SAFE rule was only finalized in March of 2020. Prior to this, automakers were planning to meet much stronger standards. This has given them little time to make significant changes, given relatively long product cycles in the auto industry. Since automakers already had plans in place to meet the original standards, which are more strict, it should not be a significant challenge for them to reinstate them, if they ever abandoned them in the first place. [EPA-HQ-OAR-2021-0208-0602-A1, p.17]

Furthermore, the availability of large credit banks whose lifetimes have been extended in this proposal, the ability to carryforward and carryback, and the likelihood of credit generation in MY2021 and MY2022 under the much weaker SAFE rule, mean that meeting the higher standard in MY2023 should not be a problem for automakers. Furthermore, five automakers had already agreed to the California Framework, which already kept them on a trajectory more in line with the preferred alternative. In addition, nearly every automaker has committed to rapid electrification trajectories49 which should assist them in meeting strong standards. Given the immediacy of the climate crisis, and the significant consumer savings available, there is no room for delay, and EPA should stick to their plan to implement strong standards starting in MY2023. [EPA-HQ-OAR-2021-0208-0602-A4, pp.17-18]

Commenter: Environmental Defense Fund (EDF)

EDF stresses the importance of prompt finalization of this rule to ensure that these stronger and more protective emissions standards will apply to MY 2023 vehicles. Near-term emissions reductions are vital to the health of frontline communities and communities of color that are disproportionally impacted by transportation air pollution and are crucial to mitigating the effects of climate change. EPA has reasonably determined that the proposed MY 2023 standards are feasible and appropriate. [EPA-HQ-OAR-2021-0208-0688-A1, p.1]

EPA has reasonably determined the feasibility of the Proposed Standards for MY 2023 and 2024. First, automakers need no extended "period" of lead time to comply with the proposed MY 2023 standard as automakers hold a vast reserve of tradable compliance credits that will help facilitate compliance, and any emission-reduction technologies that would be used for compliance have already been developed and are in widespread use. EDF conducted analysis that confirms that the Proposed Standards can be adopted without extended lead time, assessing three scenarios for automaker compliance with the proposed MY 2023 and MY 2024 standards using the credits automakers held as of the end of MY 2019 and the credits they are projected to earn through MY 2024 under EPA's preferred alternative. The scenarios project outcomes based on different assumptions about automakers' use and generation of credits, use of off-cycle technologies, and GHG emissions performance, and range from extraordinarily conservative to mildly optimistic. All three scenarios support the feasibility of the standards as, even in the most conservative scenario, the analysis demonstrates that automakers will be able to comply with the proposed MY 2023 standard largely through the application of existing credits. Finally, the feasibility of early year standards, without extended lead time, is supported by market trends, as automakers' have made significant commitments to develop and sell more ZEVs in the near term and have already invested hundreds of billions of dollars to manufacture and sell ZEVs. [EPA-HQ-OAR-2021-0208-0688-A1, p. 7]

Second, automakers already hold a vast reserve of tradeable compliance "credits" available to facilitate compliance with standards for MY 2023-2026. Trading of credits, especially credits on the verge of expiring (and becoming worthless), is a well-established practice. U.S. EPA, The 2020 EPA Automotive Trends Report: Greenhouse Gas Emissions, Fuel Economy, and Technology since 1975, EPA-420-R-21-003, at 110 (Jan. 2021) (2020 Report). In fact, 8 automakers already have traded large quantities of credits that, under the Proposed Standards, could be utilized toward compliance in MY 2023 and MY 2024. Id. at 111 (reflecting more than 30 million megagrams of traded credits expiring in those model years). And automakers' reliance on their own banked credits to facilitate compliance is a longstanding and widespread practice. [EPA-HQ-OAR-2021-0208-0688-A1, p. 7-8]

Automakers' credit reserve is large enough that if EPA were to adopt the Proposed Standards, all automakers that have not already voluntarily committed via agreements with the California Air Resources Board ("CARB") to decrease their GHG emissions in a manner comparable to the Proposed Standards could comply with EPA's new standards through MY 2023 by doing no more than the following: trading credits among themselves, reducing tailpipe GHG emissions in parallel to the trend line the 2020 Rule imposes for MY 2021-2023, [EPA-HQ-OAR-2021-0208-0688-A1, p. 8]

EDF analysis confirms that the Proposed Standards for MY 2023-2026 can be adopted without further lead time.

EDF conducted analysis to assess the feasibility of automaker compliance with the proposed MY 2023 and 2024 standards using the credits automakers held as of the end of MY 2019 and the credits they are projected to earn through MY 2024 under EPA's preferred alternative. For our projections of credits earned through MY 2024, we have developed three scenarios that reflect different assumptions about deployment of existing emissions-reduction technologies that range from extraordinarily conservative (lesser assumed deployment of technologies) to mildly optimistic (more reasonable assumptions around technology deployment).

We offer a primary case, estimating credit availability and use in a conservative but plausible scenario, as well as two sensitivity cases. The first sensitivity shows credit availability and use in an extremely conservative scenario, and the second shows a more realistic scenario. All three scenarios support the feasibility of the standards as, even in the most conservative scenario, the analysis shows that automakers will be able to feasibly comply with the Proposed Standards beginning in MY 2023.

Each case focuses on compliance by automakers that have not entered into voluntary agreements with California ("Framework Agreements") because we assume that, for those five automakers who have ("Framework manufacturers"), compliance with the California Framework will facilitate compliance with EPA's Proposed Standards without using compliance credits held by manufacturers who have not entered into Agreements ("non-Framework manufacturers"). The primary case illustrates that non-Framework manufacturers could comply with EPA's Proposed Standards through MY 2024 by trading credits among themselves and acquiring existing credits already held through MY 2020 by Framework manufacturers; applying so-called "off-cycle" technologies that do not require significant lead time; and reducing tailpipe GHG emissions in parallel to the trend line that the 2020 Rule imposes for MY 2021-2024.23

The extremely conservative sensitivity case shows that even if non-Framework manufacturers (1) did not have access to credits held through MY 2020 by Framework manufacturers; (2) limited use of off-cycle and other credits; (3) and reduced tailpipe GHG emissions in parallel to the trend line that the 2020 Rule imposes for MY 2021-2023, they could still comply with EPA's Proposed Standards through MY 2023 using credits.

In comparison, the more realistic sensitivity case demonstrates that even a modest increase (2% annually) in ZEV sales, in line with recent public announcements by manufacturers of increased ZEV deployment, would allow manufacturers to easily comply with the Proposed Standards through at least MY 2024 using only credits. Table 1 captures these scenarios and key variables. [Table 1 can be found at docket EPA-HQ-OAR-2021-0208-0688-A1, pp. 10-11]

We describe our analysis in four parts. The first is an overview of the historic generation and use of GHG credits under EPA's regulations. Second, we present automakers' bank of credits as of 2019, the last year for which detailed data is available, and explain our basis for projecting the application of those credits to compliance in MYs 2020-2024. Third, we consider the effect of the agreements that five automakers have entered into with the State of California regarding voluntary GHG emissions reductions for MY 2021-2026 MY vehicles. These agreements commit Framework manufacturers to reduce emissions and include stipulations regarding the use of GHG credits earned during this timeframe under EPA's program, both of which affect their own compliance with the Proposal and their ability to sell credits to non-Framework manufacturers. Finally, we project manufacturers' future GHG performance through MY 2024 under three scenarios, which inherently leads to the generation or need for GHG credits.[EPA-HQ-OAR-2021-0208-0688-A1, pp. 9-11]

Future GHG Compliance with EPA's Proposed MY 2023 and 2024 Standards

The 2020 Trends Report includes details regarding the status of the EPA GHG credit bank through the end of MY 2019. Thus, GHG performance must be projected for MY 2020 and beyond. We perform this projection through MY 2024, as we assume manufacturers will have sufficient lead time to make major changes to their production plans by MY 2025. To be clear, this is not to say that manufacturers cannot make such changes for MY 2023 or MY 2024, or that production plans already in place will not enable compliance with the Proposed Standards.

To model future GHG compliance, we first adjusted EPA's baseline fleet. In the Proposal, EPA utilized a MY 2017 baseline vehicle fleet in its projection of the costs and benefits of the proposed GHG standards. This baseline fleet pre-dates the status of the MY 2019 GHG credit bank. NHTSA, in modeling its recent Proposal, utilized a MY 2020 baseline fleet ("MY 2020 baseline fleet"). This 2020 MY fleet is based on preliminary GHG and CAFE performance data and sales and may change in the next few months. Even so, it represents a reasonable estimate of MY 2020 GHG performance and so we use it as our starting point to project performance in future model years.

However, the one aspect of the MY 2020 data which is least representative of future model years is the level of vehicle sales. MY 2020 sales were significantly affected by the COVID-19 pandemic and are lower than sales in previous years. MY 2021 sales have also been affected by the pandemic, including the pandemic related shortage in the supply of computer chips. We assume that these sales impacts will dissipate by MY 2022. Thus, we use the vehicle sales in NHTSA's MY 2020 baseline fleet for MYs 2020 and 2021 and the vehicle sales in MY 2019 reported by EPA in their 2020 Fuel Economy Trends Report for MYs 2022, 2023 and 2024. Had we assumed that MY 2022 sales would still be affected by COVID, like MYs 2020 and 2021, sales would be lower and credit use would also be lower, extending the life of the credit bank. Thus, our assumption that vehicle sales in MY 2022 and beyond will recover to pre-pandemic levels is conservative as it relates to credit availability.

After establishing this baseline fleet, we considered several additional variables that influence the size of the credit bank available to support compliance with EPA's proposed MY2023–2024 standards. Those major variables are:

1. The rate at which automakers will improve their GHG emissions performance in MY 2021-2022. This includes both 2-cycle tailpipe reductions and the generation of air conditioning and off-cycle credits;

2. The availability of credits earned by Framework manufacturers prior to MY 2021 for purchase by non-Framework manufacturers; and

3. The rate of increase of ZEV deployment in MYs 2021 through 2024 and multiplier credits earned.

The three scenarios we developed take differing approaches to addressing each of these variables and describe the resulting effects on the credit bank and compliance with EPA's Proposed Standards. All three scenarios start with the bank of credits available at the end of MY 2019 and the GHG performance of the NHTSA MY 2020 baseline fleet. All three scenarios focus solely on non-Framework manufacturers' compliance with the proposed EPA standards in MY 2023-2024. All assume a reduction in GHG emissions consistent with the trendline of the 2020-2024 MY standards contained in the 2020 Rule. All three scenarios assume that manufacturers take full advantage of the additional 5 g/mi of off-cycle emissions and 2.5 g/mi advanced technology vehicle multipliers provided as part of EPA's Proposal.

The scenarios differ in whether they assume that the current credit banks of Framework manufacturers are available to non-Framework manufacturers, the degree to which manufacturers increase their use of air conditioning and off-cycle credits under the 2020 Rule and the degree to which manufacturers increase their sale of PEVs. [EPA-HQ-OAR-2021-0208-0688-A1, p. 14-16]

Primary (Conservative) Scenario:

For our primary case, we have conservatively assumed the following:

- Credits held at the end of MY2020 by automakers that entered into Framework agreements with California are available to trade to non-Framework manufacturers.

- Non-Framework manufacturers make modest improvement in GHG tailpipe emissions following the 2020 Rule's trend lines for MY2021-2024 passenger cars and light trucks.

- Non-Framework manufacturers increase their use of menu-based off-cycle credits in a trajectory to reach 10 g/mi in MY2023 under the 2020 Rule and increase these credits to 15 g/mi credits starting in MY 2023 as allowed under the Proposal

- Non-Framework manufacturers take full advantage of the reinstatement of the advanced technology vehicle multiplier credits at 2.5 g/mi per year starting with MY 2022.

- Non-Framework manufacturers take full advantage of direct and indirect air conditioning credits at 18.8 g/mi for cars and 24.4 g/mi for trucks by MY 2023.

This is a reasonable conservative scenario for the following reasons:

First, we assume credits held at the end of MY2020 by automakers that entered into Framework agreements with California are available to trade to non-Framework manufacturers. Framework manufacturers have voluntarily committed to the GHG emissions reductions specified in the Agreement, and it is therefore reasonable to assume that these manufacturers intend to make those reductions, have developed product plans to do so, and so will not need credits held at the end of MY 2020 to meet federal compliance obligations. Second, we assume that nonFramework manufacturers will decrease the 2-cycle tailpipe CO2 emissions from their MY 2020 levels in accordance with the progression of the 2020 Rule. The nominal progression of the 2020 Rule between 2020 and 2026 is 1.5% per year. However, when applied to NHTSA's MY 2020 baseline fleet, the year over year reductions of the 2020 Rule range from 1.4-2.6% per year for cars and trucks separately, as shown in Table 3. We assumed that non-Framework manufacturers would reduce their GHG emissions in accordance with the percentage reductions shown in Table 4. As shown, the reductions are generally somewhat greater than 1.5% per year. [Table 4 can be found on p. 16 of Docket number EPA-HQ-OAR-2021-0208-0688-A1].

Third, we increased the number of off-cycle and air conditioning credits earned by nonFramework manufacturer in addition to the overall GHG reductions shown in Table 4 to ensure compliance with the 2020 Rule. The first set of light-duty vehicle GHG standards in 2010 included an "early credits program" that created an initial bank of over 200 million metric tons of CO2 credits for automakers.25 Because of the large number of credits that was banked in the early years of the program, in recent model years, some automakers have chosen to exceed the GHG standards and comply by using credits that will otherwise expire. This trend is evidenced by the large number of credits that will ultimately be forfeited when they expire at the end of model year 2021.26 To account for the status quo of fleetwide exceedance of the MY 2020 standard and to maintain conservative projections for GHG improvement, in each scenario, we project that in MY2021 through 2024, automakers will decrease the 2-cycle tailpipe CO2 emissions from their MY 2020 levels at the same rate as the trajectory of the 2020 Rule and take advantage of offcycle credits to make up any the difference between their 2-cycle emissions and the emissions reductions required by the 2020 Rule.

EPA regulations cap direct and indirect air conditioning credits at 18.8 g/mi for cars and 24.4 g/mi for trucks. They also limit menu-based off-cycle credits to 10 g/mi for both vehicle groups. The technology required to achieve these credits does not require major redesign of the powertrain and can be implemented relatively quickly, as indicated by the historic growth in the earnings of these credits. Many manufacturers have already achieved the maximum air conditioning credits for their car or truck fleet. EPA's series of Trends Reports indicates that offcycle credit generation has been increasing over the past several model years. A number of truck manufacturers have already achieved 10 g/mi or more off-cycle credits.

Table 5-11 of EPA's 2020 Automotive Trends Report shows manufacturers' use of 10 distinct off-cycle technologies in MY 2019. Those which do not involve the operation of drivetrain (other than more rapid warm-up27) include: high efficiency lighting, active cabin ventilation, passive cabin ventilation, active aerodynamic improvements, active seat ventilation, glass or glazing, solar reflective coating and active engine and/or transmission warm-up. None of these technologies are new, nor involve intricate interaction with fundamental powertrain operation. Almost all of these specific technologies have been applied to at least one manufacturer's entire new vehicle fleet.

Thus, we believe that manufacturers can make, and possibly already have in place, plans to maximize their earnings of these credits and can do so by MY 2023 as part of their planned compliance with the 2020 Rule. In light of these factors, to ensure manufacturer compliance with the 2020 Rule, we increased manufacturer earnings of off-cycle and air conditioning credits to 10 and 18.8 or 24.4 g/mi, respectively. We included one-third of this increase in credits in MY 2021 and two-thirds of this increase in MY 2022. We also increased the use of off-cycle credits in MY 2023 and MY 2024 to 15 g/mi, as allowed in EPA's Proposal. [EPA-HQ-OAR-2021-0208-0688-A1, p. 16-17]

In the primary and more realistic scenarios evaluated below, we increased the number of offcycle and air conditioning credits earned by non-Framework manufacturers in addition to the overall GHG reductions shown in Table 4. EPA regulations cap direct and indirect air conditioning credits at 18.8 g/mi for cars and 24.4 g/mi for trucks. They also limit menu-based off-cycle credits to 10 g/mi for both vehicle groups. The technology required to achieve these credits does not require major redesign of the powertrain and can be implemented fairly quickly, as indicated by the historic growth in the earnings of these credits. Many manufacturers have already achieved the maximum air conditioning credits for their car or truck fleet. A number of truck manufacturers have already achieved 10 g/mi or more off-cycle credits. Thus, we believe that manufacturers can make, and possibly already have in place, plans to maximize their earnings of these credits and can do so by MY 2023. Thus, for those manufacturers projected to have a combined car-truck shortfall with the 2020 Rule in MY 2023, we increased their earnings of off-cycle and air conditioning credits to 10 and 18.8 or 24.4 g/mi, respectively. We included one-third of this increase in credits in MY 2021 and two-thirds of this increase in MY 2022. We maintained the increase occurring in MY 2023 into MY 2024.

EPA's Proposal also extends to MY 2025 the advanced technology vehicle multiplier credits. Plug-in electric vehicles (PEVs) are expected to dominate the vehicles qualifying for this credit. PEV sales decreased slightly in 2020 relative to 2019, but total vehicle sales decreased by more than 10%. Thus, PEV sales increased by 10% in terms of manufacturers' sales fractions. Here, we conservatively project modest growth of 10% per year in MYs 2021 and 2022 in non-Framework manufacturers' 2019 sales fractions of ZEVs.28 Beginning with MY 2023, we project that all non-Framework manufacturers will earn the maximum average multiplier credit of 2.5 g/mi. When projecting manufacturers' level of multiplier credits, we factor in that the level of the multiplier decreases in MYs 2020 and 2021, before increasing in MYs 2022 and 2023 and decreasing again in MY 2024, per EPA's Proposal. Also, while we project these increases in ZEV sales, resulting in ZEV multiplier credits, we did not adjust manufacturers' 2-cycle tailpipe GHG levels any further than the reductions shown in Table 4. In other words, we assumed that a portion of the reductions shown in Table 4 would occur through increased ZEV sales.

EPA also proposes to reinstate the credit for strong hybrid pickup sales. While we believe it is likely that some or all of the pickup manufacturers will qualify for this credit, we did not include any of this type of credit in our projections due to the absence of specific product plans from the pickup manufacturers. This a very conservative assumption and likely further understates credits available for compliance. 29

We combined each manufacturer's projected sales with their potential shortfalls to determine their generation or need for GHG credits by model year and vehicle class. Once determined at this level, the potential need for credits to enable compliance was summed up across the nonFramework manufacturers and compared to the 2019 credit bank. We assume that manufacturers will use their oldest credits first, to avoid their expiration. We also assume that credits are freely traded between manufacturers (118 million megagrams of GHG credits have been traded between manufacturers through MY 2019 per EPA's 2020 Automotive Trends Report). This means that credits generated in MY 2020 and beyond are assumed to be banked, while deficits are assumed to be eliminated through the use or purchase of credits of earlier vintage.

Table 5 shows the credit bank in this Primary Scenario. The column for MY 2019 describes the starting point of the analysis and is consistent with the 2020 Report. Framework manufacturers were included in the MY 2019 credit bank balance, as the Framework Agreements place no restriction on their sale. The performance of Framework manufacturers is also included in the need for and generation of credits in MY 2020. Starting with MY 2021, compliance by only nonFramework manufacturers is considered. [Table 5 can be found on p. 19-20 of Docket number EPA-HQ-OAR-2021-0208-0688-A1]

Table 5 indicates that non-Framework manufacturers, even under these very conservative assumptions, will be able to comply with EPA's proposed GHG standards through MY 2024 through the use of the numerous sources of GHG credits, modest improvement in 2-cycle tailpipe emissions consistent with the trend line of the 2020 Rule, and some additional off-cycle and air conditioning credits. All of the credits earned in MYs 2023 and 2024 are still available for future use, as well as most of those earned in MY 2022. The credit bank of 27 million megagrams at the end of MY 2024 is sizeable, being equivalent to a single model year's shortfall of 8 g/mi GHG across the entire fleet. [EPA-HQ-OAR-2021-0208-0688-A1, p. 18-20]

Extremely Conservative Scenario:

For the extremely conservative scenario we assumed the following:

• Non-Framework manufactures make modest improvement in GHG tailpipe emissions following the 2020 Rule's trend lines for MY 2021-2024 passenger cars and light trucks

• Non-Framework manufacturers cannot acquire any credits of any vintage held or earned by Framework manufacturers

• No additional off-cycle and air conditioning credits are applied to reduce shortfalls under the 2020 Rule other than an additional 5 g/mi of off-cycle credits in MY 2023, per EPA's Proposal.

• Non-Framework manufacturers take full advantage of advanced technology vehicle multiplier credits at 2.5 g/mi per year.

Table 6 shows the credit bank in this extremely conservative sensitivity. [Table 6 can be found on p. 20-21 of Docket number EPA-HQ-OAR-2021-0208-0688-A1]

As shown, even in this extraordinarily conservative scenario, again the level of credits available is sufficient to enable compliance for non-Framework manufacturers through MY 2023. [EPA-HQ-OAR-2021-0208-0688-A1, p. 20]

More Realistic Scenario:

For the more realistic scenario we made the following assumptions:

• Same assumptions as primary scenario and

• Non-Framework manufacturers will increase their sales of BEVs by an absolute 2% each year starting in MY 2022.

o This is assumed to occur over and above the 1.4-2.6% annual reductions in GHG emissions starting with MY 2021 under the 2020 Rule.

o These increased BEV sales would not affect advanced technology vehicle multiplier credits, as these were already assumed to be capped at 2.5 g/mi per year under the primary scenario. However, it would further improve automakers' GHG emission performance beyond MY 2020 levels and reflect the numerous announcements by non-Framework manufacturers that they plan to offer new ZEV models and increase ZEV sales.

Numerous manufacturers have stated publicly that they will be introducing new PEV models prior to MY 2025, as described below. The assumption that these and potentially other PEV models will account for 2-6% of new vehicle sales by MY 2024 appears quite reasonable. the California Air Resources Board recently found that manufacturers supplying vehicles to that State would achieve 23-25% sales of PEVs in MYs 2023-2024.30 PEV sales nationally have historically been about half of the levels in California. Given that current nationwide sales of PEVs represent 2% of national new vehicle sales, our projection only requires that national PEV sales be one-third of California sales on a percentage basis.

Table 7 shows the credit bank in this sensitivity. [Table 7 can be found on p. 22 of Docket number EPA-HQ-OAR-2021-0208-0688-A1]

The results in Table 7 show that increased ZEV sales would make it even easier for manufacturers to comply with EPA's Proposed Standards in MYs 2023 and 2024. As can be seen, banked credits would be far more than sufficient through MY 2024, with all of the credits earned in MYs 2019-2024 remaining at the end of MY 2024. The 107 million megagrams of credit remaining at the end of MY 2024 are equivalent to a single model year's GHG emissions of 32 g/mi. [EPA-HQ-OAR-2021-0208-0688-A1, p. 21-22]

In summary, through MY2024, the automakers that have not entered into agreements with California could comply with EPA's Proposed Standards by doing no more than the following:

• trading credits among themselves and acquiring credits held today by automakers that did execute agreements with California;

• applying air conditioning and off-cycle technologies that do not require significant lead time; and

• reducing 2-cycle tailpipe GHG emissions in parallel to the trend line that the 2020 Rule imposes for MY 2021-2024. See infra, at 16-23. 22 [EPA-HQ-OAR-2021-0208-0688-A1, p. 8]

It is eminently reasonable to assume automakers that voluntarily committed to GHG emissions reductions comparable to those required by EPA's Proposed Standards could collectively comply with those standards without utilizing their preexisting credits (leaving them available for trade to other automakers). See infra, at 16. [EPA-HQ-OAR-2021-0208-0688-A1, p. 8]

Last year, the trade association representing the automakers that did not execute agreements with California defended the 2020 Rule's trend line as "appropriate" on the ground that it "afford[s] the industry a return on its investment in emissions-reduction … technologies" and does not preclude industry from "meet[ing] consumer demand." Mot. of Alliance for Automotive Innovation to Intervene at 3-4, Competitive Enter. Inst. v. NHTSA, No. 20-1145, ECF No. 1844089 (D.C. Cir. May 22, 2020). Accordingly, those automakers would not require more lead time to comply with EPA's Proposed Standards for MY 2023. [EPA-HQ-OAR-2021-0208-0688-A1, p. 8]

Accordingly, EPA reasonably determined that automakers would not require additional lead time to comply with EPA's Proposed Standards for MY 2024. [EPA-HQ-OAR-2021-0208-0688-A1, p. 8]

Market trends support the feasibility of the Proposed Standards for MY2023-2026 without further lead time. The feasibility of early year standards is also supported by automakers' broad commitments to develop and sell more ZEVs and the billions of dollars they have invested to bring these commitments to fruition. A recent M.J. Bradley report on the status of the electric vehicle market found that automakers are investing $268 billion worldwide on electrification through 2030, with over $22 billion on domestic manufacturing.31 That number is even higher in light of more recent automaker announcements.

General Motors has set forth its aspiration to produce only EVs by 2035.32 In an effort to reach this goal, it plans to invest $35 billion into EV and AV development through 2025, with 30 new plug-in models arriving in that timeframe.33 GM is supporting this near-term commitment by accelerating plans to build two new battery cell manufacturing plants in the United States by mid-decade to complement the Ultium Cells LLC plants under construction in Tennessee and Ohio.34 General Motors is also creating a $25 million Climate Equity Fund that will focus on closing equity gaps as the auto industry transitions to ZEVs. 35

Ford has committed to spending more than $30 billion on electrification by 2025.36 It also announced thisweek that it will spend $11.4 billion to expand battery and electric vehicle assembly in the U.S. and creating 11,000 jobs. 37 CEO Jim Farley stated that Ford expects "to be well positioned to have fully electric vehicles account for 40 to 50% of our U.S. sales by 2030."38 The E-Transit cargo van will be available to customers later this year and the F-150 Lightning will be available by mid-2022. Ford has already taken more than 130,000 reservations for the Lightning, far surpassing projections.39

These commitments over the next few years by the nation's largest automakers signal that they recognize the feasibility and importance of transitioning to ZEVs. Many other automakers are also rolling out ZEVs over the next few years, indicating that the proposed MY2023 standards are feasible. Stellantis plans to launch 10 hybrid or electric models across its brands by the end of this year. Mercedes plans to introduce 10 new EVs through its EQ brand by the end of 2022.40 Nissan plans to have launched eight EVs by the end of 2023 and hopes to be on pace to sell 1 million hybrid or electric vehicles per year globally.41 Toyota plans to launch 60 new hybrid, electric, or fuel-cell vehicles by the end of 2025 and expects to have reached its goal of selling 5.5 million electrified offerings each year.42 Volkswagen plans to have built 1.5 million EVs across its brands by the end of 2025.43 And Volvo has pledged to put 1 million hybrid or electric vehicles on the road by the end of 2025, and expects 50 percent of its global sales to come from EVs.44 Honda announced it will sell only battery-electric and fuel-cell vehicles by 2040.45 [EPA-HQ-OAR-2021-0208-0688-A1, p. 23-24]

Commenter: Environmental Protection Network (EPN)

The proposal provides a clear and compelling discussion showing the lead time for the MY 2023 to 2026 standards is appropriate. EPA discusses the long lead time provided when standards were originally adopted in 2012; the widespread availability of vehicles already meeting the proposed MY 2023 standards; the approximate five-year cycle to design, develop, and produce vehicle models, indicating manufacturers are unlikely to have made significant changes to their product plans based on the rollback standards adopted just over a year ago; the agreement of several manufactures to meet standards similar to those proposed in the California Framework Agreement; and other factors such as credit banking, trading, and deficit carry-forward provisions. All these factors support the conclusion that the lead time for the proposed standards is appropriate.

Lead time must be evaluated considering all the relevant circumstances. It would be improper to consider just the period between when these standards are adopted and the beginning of the MYs at issue. That view would artificially truncate the actual lead time provided to manufacturers and would ignore several relevant factors. [EPA-HQ-OAR-2021-0208-0213-A1, p. 11-12]

Commenter: Institute for Policy Integrity

EPA Can Finalize Its Proposed Standards with Adequate Lead Time for the 2023 Model Year, Consistent with Prior Standards. Under Clean Air Act Section 202(a), emission standards may take affect ‘after such period as the Administrator finds necessary to permit the development and application of the requisite technology, giving appropriate consideration to the cost of compliance within such period.’17 Thus, when setting new standards, EPA must consider—among other factors—how much lead time is necessary for automakers to comply with new standards. [EPA-HQ-OAR-2021-0208-0299-A1; pp. 3-4.]

’Lead time’ is generally understood to be the time period between a new standard being finalized and the beginning of the relevant model year to which the standard applies. The model year varies by manufacturer production cycle and by vehicle model, since it starts on either January 2 of the preceding calendar year or ‘when any vehicle or engine within the engine family is first produced’ (whichever is later), and ends on either December 31 of the year for which the model year is designated or when ‘the last such vehicle or engine is produced’ (whichever is sooner).18 This provides automakers with significant flexibility in setting their production schedules to comply with upcoming standards.19 Thus, automakers could begin producing vehicles subject to the proposed MY 2023 standards as early as January 2, 2022, though they also have flexibility to delay the start of their production periods as needed in anticipation of regulatory standards and other factors.20 [EPA-HQ-OAR-2021-0208-0299-A1; p. 4]

The Clean Air Act does not require a specific number of days or months for lead time. Instead, EPA has the discretion to balance what is required of manufacturers by any particular regulatory standard versus the time to comply and determine in its judgment how much lead time is necessary. When previous standards have required significant investment in new technologies and could not be achieved with existing technology, EPA has provided somewhat longer lead times in the past. But if a new standard can already be met with existing technology, without extensive redesign of powertrains and engine lines, EPA has the discretion to provide much shorter lead times. Here, EPA has properly exercised its discretion to determine how much lead time is necessary given existing compliance options, and has acted consistently with its historical regulation of vehicle tailpipe emissions.

Congress Provided EPA With Significant Discretion to Determine Appropriate Lead Time. The statutory history and structure suggest that EPA should balance lead time against how technology forcing its standards are, so when compliance options are readily available, a shorter lead time is permissible. When drafting the Clean Air Act, Congress sought to confront the problems of an automotive industry that previously had no obligation or incentive to reduce its emissions. Congress understood that state-of-the-art pollution controls would not be developed ‘until some sort of regulation took it by the hand and gave it a good pull.’21 So Congress crafted a statutory scheme that would require EPA to regulate through the ‘drastic medicine’ of setting stringent standards that would ‘force the state of the art.’22 Through the technology-forcing structure in Title II of the Clean Air Act, Congress readily demonstrated its intent for EPA ‘to project future advances in pollution control capability . . . [and] ‘press for the development and application of improved technology rather than be limited by that which exists today.’’23 Congress instructed EPA in 1970 that it must set standards for MY 1975 that would reduce hydrocarbons and carbon monoxide emissions by more than 90% compared to MY 1970 levels,24 and set future standards to take effect ‘after such period as the Administrator finds necessary to permit the development and application of the requisite technology.’25 Congress directed EPA to consider lead time when setting standards because it expected EPA to set stringent standards that would require the development of new emissions controls. Over more than five decades of mobile source regulation since then, EPA has drastically reduced automotive emissions. And it has indeed done so by issuing standards that have sometimes asked automakers to ‘do what seems to be impossible.’26

But EPA’s proposed standards here do not ask the same of automakers. Instead, the current proposal seeks to remedy a misguided, arbitrary rollback27 by re-proposing standards for MY 2023 that are equivalent to, or even less stringent than, those that were set almost a decade ago28—standards with which many vehicle models already comply. This hardly presents a situation where automakers need significant lead time to rework their product lines. Given the discretion granted to EPA, the agency need not ‘provide detailed solutions to every engineering problem’ or ‘rebut all speculation that unspecified factors may hinder [meeting the standard]’ when evaluating adequate lead time.29 Rather, EPA ‘need only identify the major steps necessary for development . . . and give plausible reasons for its belief that the industry will be able to solve those problems in the time remaining.’30 Here, EPA has provided a more than sufficient explanation in the Proposed Rule for why the agency expects automakers to be able to meet its proposed MY 2023 standards.

Indeed, given that a significant percentage of the MY 2021 automotive fleet already meets the MY 2023 proposed fleet average standard,31 EPA's analysis is far from a ''crystal ball' inquiry,'32 but rather is based on a reasonable assessment of the domestic automotive fleet. In addition, EPA is providing multiple new flexible compliance options for automakers, including extending the availability of credits generated in MYs 2016–2020, extending multiplier credits, and expanding the off-cycle credits program. These extended flexibilities come on top of other existing flexibilities, like credit trading, the large bank of available credits,33 and the carryback period for compliance. Further, five automakers (and more than one-third of domestic automotive sales) since 2019 have been in compliance with a framework agreement with California to voluntarily meet emission targets for MY 2023 that are equivalent to EPA's new proposed standards. Indeed, EPA could easily increase the standards' stringency, especially for MYs 2024–2026, and, if it retains sufficient flexible compliance options, still determine that 'the development and application of the requisite technology'34 already exists. [EPA-HQ-OAR-2021-0208-0299-A1; pp. 4-6.]

EPA Has Historically Provided Lead Time in Proportion to Necessary Technology Development. The lead time that EPA can provide when it finalizes these proposed standards will hardly be an outlier in comparison to its previous rules. EPA will likely finalize standards for MY 2023 in late 2021 or early 2022, and EPA has issued new tailpipe standards mere months before a new model year begins on numerous occasions. For example, EPA finalized standards for MY 1975 light-duty trucks in August 1973, noting in its discussion of lead time that roughly fifty percent of models available in the MY 1973 truck fleet were already capable of meeting the new MY 1975 standards, that EPA believed automakers would be able to meet the MY 1975 standard in time, and that there was 'no evidence to suggest that any manufacturer would be required to utilize [new technology] to meet these standards.'35 Likewise, EPA finalized heavy-duty truck standards for MY 1979 in September 1977.36 EPA noted that automakers did not object to the short lead time provided to meet the MY 1979 emission standards because they 'could be met by all of the manufacturers with the use of currently available emission control technology.'37

When EPA has provided exemptions in consideration of short lead time, it has been because of limitations in compliance testing procedures, rather than technological feasibility. For example, EPA finalized high-altitude standards for MY 1982 in October 1980,38 explicitly rejecting calls for additional lead time from automakers because EPA did not believe major hardware or retooling was necessary to meet the standards.39 But, given the complexities in certifying engines for high altitude performance, EPA permitted a one-year exemption for thirty percent of an automaker's high altitude fleet based solely on the 'availability of testing facilities' and 'available personnel'—not on technological feasibility.40 And EPA's judgment regarding technological feasibility was correct, as the agency noted in a subsequent rulemaking that '[t]he adequacy of the 9-month leadtime is now apparent from the fact that manufacturers' scheduled introduction dates for 1982 model year vehicles were not adversely affected.'41

More recently, EPA issued the first-ever greenhouse gas standards for light duty vehicles for MYs 2012– 2016 in May 2010, noting that it believed seven months of lead time before MY 2012 began was appropriate because 'the vast majority of technology required by this final rule is commercially available' and the 'vast majority of the emission reductions which will result from this final rule will be produced from the increased use of these technologies.'42 And, again, EPA's judgment on lead time was confirmed when automakers easily met the MY 2012 standards and even outperformed the standards by 11 g/mile industrywide.43 Indeed, a trade group for automotive dealerships suggested during the next round of rulemaking that EPA was providing too much lead time when it issued standards for MY 2017 in 2012.44

Conversely, when EPA has finalized standards further in advance of the affected model year, those standards typically required a longer lead time in order to develop and implement new emission control technologies across the fleet. For example, in February 2000, EPA issued stringent hydrocarbon and oxides of nitrogen standards for MY 2004 and beyond, which were designed to significantly reduce vehicle emissions in order to attain and maintain the national ambient air quality standard for ozone.45 And EPA applied the same flat standard across all passenger cars, light trucks, and larger passenger vehicles.46 These standards included a lengthy lead time in light of the ultimate goal to reduce emissions by more than 90% by 2009, requiring 'widespread applications of upgraded and improved technology across the fleet.'47

As discussed above, a significant portion of existing models already meet the proposed MY 2023 standard, and EPA believes automakers will be able to meet the fleet average standards without significant development of new electric vehicles, but instead with increased application of conventional technologies already developed for internal combustion vehicles, in combination with multiple flexible compliance options.48 To the extent automakers choose to comply with the standards by selling more electric vehicles, many have already made voluntary pledges to do so independently of these standards.49

Further, a number of factors make it easier for manufacturers to comply with these proposed standards than various past standards that may have necessitated somewhat lengthier lead times.

First, these standards are in the form of a fleet average rather than requiring individual compliance for each vehicle model, a significant flexibility not provided for most of EPA's earlier light duty vehicle standards.50 When EPA enacted the first greenhouse gas emissions standards for passenger vehicles in 2010, it noted that it was using fleet averaging because it 'resolve[d] issues of lead-time or technical feasibility, allowing EPA to set a standard that is either numerically more stringent or goes into effect earlier than could have been justified otherwise[,] . . . increas[ing] flexibility and reduc[ing] costs for the regulated industry.'51 The fleetwide averaging and trading provisions built into the Proposed Rule offer critical flexibilities that justify EPA's approach to lead time. In addition, the Proposed Rule provides for size- and sales-based standards that are not the same across the entire vehicle fleet. Rather, automakers have targets unique to their fleet and sales mix depending on the size of the models produced by that manufacturer in that model year, with larger vehicles subject to less stringent standards than smaller vehicles.52 And since that target is not determined until the model year is over and final production numbers are available, each automaker can set its own path based on its own individual production plans—unlike earlier standards that required automakers to rework their production schedule ahead of time to ensure every engine family individually met its flat tailpipe emission standards.53 Yet even when EPA in the past required more stringent flat standards that applied to all individual vehicles, the agency still issued numerous standards with mere months of lead time—further supporting that the Proposed Rule here, with its flexible footprint-based fleet average standard, does not necessitate significant lead time. [EPA-HQ-OAR-2021-0208-0299-A1 , pp. 6-8]

Second, manufacturers have access to significantly more compliance flexibilities under the Proposed Rule than they did under EPA's past criteria pollutant standards, including credit trading, credit multipliers, a large bank of available credits, and credit carryback provisions that allow automakers to make up for any possible shortfalls in earlier model years by increasing their efforts in subsequent years. Thus, even if automakers do not quite meet the MY 2023 standards, they have several years of lead time to adjust their production in MYs 2024–2026 and apply any credits earned in those years backwards to MY 2023. In addition, automakers are sitting on a significant bank of credits earned in past model years that can be applied toward any shortfalls in MY 202354 (and indeed, EPA has proposed extending the lifetime of those credits to provide even more flexibility55). [EPA-HQ-OAR-2021-0208-0299-A1, p. 8.]

As demonstrated by the examples provided above, the anticipated finalization of these proposed standards in the near future will be consistent with the lead time provided for other MYs throughout EPA's regulatory history, and reflects a proper use of EPA's discretion to provide shorter lead times when compliance requires less technological development and investment. Indeed, the significantly more flexible form of these standards provides evidence that even less lead time is necessary here than EPA may have provided historically for standards that did not contain the multiple complex flexibilities offered now. [EPA-HQ-OAR-2021-0208-0299-A1, p. 8]

Commenter: Tesla

Manufacturers Have Had Ample Lead Time Necessary to Implement the Technology Needed to Meet a More Stringent Standard. As EPA suggests, 'although manufacturers have less lead time before these standards would be implemented than with previous rulemakings, the significant progress that has been made in implementing advanced gasoline technologies in the fleet (as well as advances in electric and hybrid vehicle technology) since 2012 means the proposed standards can be achieved at roughly the same cost as previous estimates, and additional lead time is unnecessary.'130 Tesla believes, and has demonstrated through our own experience, that the automobile industry is technologically ready to meet LDV standards in the near term that are far more stringent than the agency has proposed. To that end, the proposal's implementation and start date of MY 2023 is more than reasonable—and meets the legal obligations for lead time under the CAA—without need for the extension of the compliance flexibilities which otherwise undermine the EPA's proposed stringency goals.

As the agency knows well, the regulatory structure around averaging, banking, and trading of compliance already builds in flexibility that allows for product lead adjustments. Under the existing regulations, manufacturers unable to meet the fleet level standard can carry forward a credit deficit for three years before it must be offset by a credit surplus.131 Some manufacturers may also be eligible for the Temporary Lead Time Allowance Alternative Standards, delaying the relevant compliance year (and hence level of standard stringency) they are required to meet.132[EPA-HQ-OAR-2021-0208-0278-A1] [p.15]

For over a decade, manufacturers also have been on notice and aware that GHG standards more stringent than the agency proposes were set to be in place after MY 2021. Indeed, in July 2011, Ford, GM, Chrysler, BMW, Honda, Hyundai, Jaguar/Land Rover, Kia, Mazda, Mitsubishi, Nissan, Toyota and Volvo – which together account for over 90% of all vehicles sold in the United States – as well as the United Auto Workers (UAW), all joined President Obama to support new MY 2017-2025 vehicle GHG standards that are effectively more stringent than the EPA's current proposal.133 Indeed, the automakers signed commitment letters that outlined their support for the standards and the future process 'to help our country address the need to reduce dependence on oil, to save consumers money, and to ensure regulatory predictability.'134

As the chart below demonstrates at a minimum, since these OEMs signed commitments, Tesla's market and technological success has more than proven that the last decade has allowed and permitted 'the development and application of the requisite technology' to achieve zero tailpipe emissions.135 In 2012, the first year of EPA and NHTSA's Final Rule for Model Year 2012 - 2016 Light-Duty Vehicle GHG Standards and CAFE Standards,136 Tesla delivered 2,636 vehicles to customers137 and had just under 3,000 employees. By 2020, Tesla delivered almost 500,000 vehicles to customers, including over 180,000 vehicles in the fourth quarter of 2020 alone—during the ongoing COVID-19 pandemic, its highest sales quarter to date,138 and employed over 70,000 people worldwide. In sum, from 2012 to 2020, under the current EPA and NHTSA performance standards, Tesla's vehicle deliveries grew by nearly 19,000% and its American manufacturing footprint and workforce have expanded rapidly. In 2021, Tesla's production and delivery has continued to accelerate.139 At the same time, according to the latest Consumers Reports Owner Satisfaction Survey, Tesla has received the highest owner satisfaction rating of any car brand in 2020—recognition which we have achieved seven times since 2013.140[EPA-HQ-OAR-2021-0208-0278-A1][p.16] [Figure 2 can be found on p. 16 of EPA-HQ-OAR-2021-0208-0278-A1]

While EPA points to the voluntary California Framework Agreements as an acknowledgment of manufacturer capability to meet the proposed standard, such an assertion is fundamentally incomplete. The agency fails to acknowledge that some manufacturers may have entered into the framework agreements not because of technological capabilities, but as an opportunistic hedge and safe harbor from the more rigorous California GHG standards should the SAFE rule's rescinding of California's Advanced Clean Car (ACC) waiver been found to be illegal.141 EPA's new proposal does not recognize that manufacturers also have continued to be subject to the regulatory rigors of the California and CAA Section 177 state zero emission vehicle mandates142 and GHG standards consistently over many years.143 While EPA is now in the process of reinstating the ACC waiver that underpins these programs,144 even under SAFE Rule Part 1, the agency recognized that these state regulations remained enforceable.145 California and the Section 177 states have written their ZEV mandates and GHG standards into their EPA approved State Implementation Plans (SIPs). As a result, these more stringent standards have remained in place and enforceable while the waiver gets reinstated because EPA never compelled any of these SIPs to be amended or revised to remove the purportedly preempted standards. Accordingly, they have remained important guideposts for company technology development and new production efforts, and the new rules do not significantly alter these trajectories in a way that would raise any legitimate lead time concerns. EPA-HQ-OAR-2021-0208-0278-A1][p.17]

Moreover, manufacturers also now deliver and deploy technology to meet stricter GHG standards globally. Since 2020 manufacturers have had to prepare and deploy technology in the European Union that meets far more stringent GHG emissions standards. It is not a question of needing additional lead time to develop and commercialize the technology to meet a standard more stringent than the one proposed. Simply put, EPA needs to put stronger standards in place so that manufacturers choose to bring their already developed and deployed advanced technology into the U.S. market. The fact that manufacturers can already deploy this technology imposes a heightened burden on EPA to explain why 'technology that is currently available could not be applied' to obtain greater emissions reductions.146 EPA-HQ-OAR-2021-0208-0278-A1][p.17]

The standards may permissibly be made more stringent, particularly with respect to MY 2024-2026, without running afoul of any lead time requirement. The CAA requires that for any standard adopted or revised under Section 202, the Administrator must take into consideration factors such as the availability and costs of the technology, and noise, energy, and safety factors, and lead time.147 Lead time is thus only one of a set of factors the Act instructs EPA to consider, and the Act's 'language does not resolve how [EPA] should weigh all these factors in the process of finding the 'greatest emission reduction achievable.''148 As the D.C. Circuit has recognized, EPA need not always establish long lead times.149 Indeed, the D.C. Circuit has explained that a lead time of less than two years can be acceptable.150 Particularly where, as here, the more stringent Obama-era standards nearly a decade ago prompted adjustments in the industry, manufacturers have had sufficient lead time for more stringent standards.151 As the Proposed Rule recognizes, 'significant progress … has been made in implementing advanced gasoline technologies in the fleet (as well as advances in electric and hybrid vehicle technology) since 2012.'152 Further lead time is not necessary. EPA-HQ-OAR-2021-0208-0278-A1][pp.17-18]

Finally, any lead time concerns are particularly misplaced considering that it is only EPA's unlawful decision to depart from the 2017 mid-term evaluation's correct conclusion that the 2022-2025 standards were entirely feasible that gave rise to a change in the standards. Tesla and many other parties challenged EPA's decision on the mid-term review in the D.C. Circuit, and the merits of that decision were never reached.153 But the uncertainty over the legal authority for the Trump Administration's rollback of the standards certainly put the industry on notice that a more stringent compliance pathway was not completely off the table. And other automakers consistently have noted that their product planning cycles take years,154 so the timely correction of the standards from the SAFE rule departure off of consistently increasing levels of stringency would not be prejudicial to manufacturers' planning and investment cycles for the affected model years, which have long been locked in. Moreover, to the extent EPA relies on any lead time considerations, it should immediately 'schedule a future rulemaking' timetable for MY 2027 and beyond to address the need for enhanced stringency.155 [EPA-HQ-OAR-2021-0208-0278-A1] [p.18]

Commenter: Union of Concerned Scientists (UCS)

EPA can and must finalize strong standards for MY2023, and the industry is well positioned to comply with those standards thanks in large part to a significant bank of credits that the agency did not fully account for in the compliance pathways modeled for the proposal. [EPA-HQ-OAR-2021-0208-0277-A1, p.3]

Support for setting strong greenhouse gas emissions standards in 2023. It has been more than a decade since the first federal LDV greenhouse gas standards were finalized4—since then manufacturers have responded with significant advancements in technology while amassing a tremendous quantity of banked credits from overcompliance with the greenhouse gas regulations.5 At the same time, few of the internal combustion engine technologies identified to reduce fuel use in line with those standards have made their way into the majority of the new vehicle fleet, indicating substantial room for improvement with off-the-shelf technology.6 Even newer combustion technologies continue to be developed and deployed, including high-energy ignition systems, electrically assisted turbochargers, and more.7 And all this is happening as manufacturers continue to deploy an increasing number of electric vehicle models, indicating that the transition to electrification is fully underway now, and through the timeframe of the proposed rule.

All of these ongoing developments support finalizing a strong rule as quickly as possible, beginning no later than MY2023. Below we address the explicit support industry's progress provides for any concerns around lead-time in the early years of the Preferred Alternative or Alternative 2.[EPA-HQ-OAR-2021-0208-0277-A1, p.4]

Industry product cycles and current product plans

Market analysis shows that in the MY2022-2025 period, industry is expected to annually launch 50 percent more new vehicle models than the historical average and replace over 80 percent of the fleet.8 The annual replacement rate increases from 1 in 6 to 1 in 5 vehicles over this time period, and some manufacturers like Honda and Toyota will be replacing the entirety of their fleet in this four-year window, indicating a rapid, ongoing transition; even General Motors, which is expected to have a below average turnover in this timeframe, is doing so as the result of 'a concerted effort on powertrain investment and launch of niche, lower-volume electric vehicles over our forecast period."9 It is clear that the market is currently preparing for a significant period of product development in the timeframe of these rules, with more than 60 percent of these vehicles having an hybrid-electric or electric powertrain option, including more than 90 standalone electric models, 10 a level of technology deployment well above what is needed to comply with the current federal greenhouse gas program.11

These product plans indicate an industry that is well-prepared for stringent regulations. While 30 percent of the industry has committed to meeting national fleet greenhouse gas targets that well exceed what is federally required and generally match the stringency of the Preferred Alternative in MY2023, 12 the remainder of the industry has not likely altered their product plans to increase fleet emissions in response to the weakening provided by the SAFE rule, given that the rule being replaced by this proposal was finalized just 18 months ago (and quickly became the subject of litigation)—and the market analysis bears this out.

UCS concurs with EPA's analysis that manufacturer plans are not likely to have changed significantly in response to the SAFE regulation.13 But to the extent that manufacturers may have adjusted their product portfolio, such flexibility from manufacturers would only further demonstrate the feasibility of more stringent standards under the proposal—not only does that mean they have additional foregone technology strategies at the ready, but if a rule finalized in March 2020 was sufficient for them to adjust product plans for MY2021 or MY2022, then finalizing a change in standards by December 2021 allows adjustments are possible by MY2023 or MY2024. Or, alternatively, manufacturers continue to move forward with their own product plans that pre-date the SAFE rule, i.e. greenhouse gas standards finalized in 2012 which are actually more stringent than the agency's proposal.14 [EPA-HQ-OAR-2021-0208-0277-A1, pp.4-5]

EPA Response

The California Attorney General's comments on lead time and stringency are addressed in Preamble VI.A.

Many commenters (e.g., ALA, Bay Area AQMD, Consumer Reports, EDF, UCS) supported the MY 2023 start date for the revised standards, urging that revised standards must begin as soon as possible since further emission reductions are both needed and feasible in this time frame. Several commenters (Consumer Reports, EDF, EPN, the Institute for Policy Integrity, UCS, Tesla) were supportive of EPA's assessment that the MY 2023 standards are feasible with adequate consideration of lead time. UCS and EDF conducted independent analyses of MYs 2023 and 2024 using publicly available modeling tools. As described further in Preamble VI.A, both UCS and EDF concluded that manufacturers will be able to comply using existing credits by following product planning trajectories for the no-action case, even with conservative assumptions that restrict technology deployment beyond what is already projected under the no-action case. EPA agrees with these commenters that the lead time provided is reasonable, as discussed in Preamble VI.A and RIA 2.2 and 2.4. The Alliance for Automotive Innovation commented in support of the proposed standards (as discussed in this response to comments (RTC) document, section 2.2) but also commented that the stringency of the MY 2023 targets would be challenging for some automakers in consideration of lead time.

The Alliance commented about required fleet improvements from 2019 MY to meet 2023 standards, the importance of considering redesign cycles, and regarded that timeframe as a short window for redesign to occur. The commenter provided an example of the pace of redesign opportunities based on DOT CCEMS modeling inputs in its Tables 7 and 8 and suggested that these are appropriate. EPA agrees that redesign opportunities are only available to a portion of the fleet in any given year. In its compliance modeling EPA included consideration for vehicle refresh and redesign – in fact, EPA used the same redesign assumptions as DOT for its CCEMS modeling (referenced by the Alliance in Tables 7 and 8 of their comments). Shares of vehicle sales available for refresh and redesign are provided in Table 4-3 of the RIA. Based on comments from UCS providing market evidence of accelerating refresh and redesign rates within the industry, our modeling assumptions may even be conservative. Finally, it is important to note that some redesigns are already planned for every model year, including MY 2022 and 2023.

In referencing an IHS Markit study which claims that while only 11.6 percent of vehicle production (sales volume) in MY 2020 meets EPA's proposed MY 2023 targets, the Alliance asserts (assuming a normal distribution of vehicles above and below target) that roughly 50% of the sales volume should meet the target in a given model year to achieve overall compliance. EPA disagrees with the Alliance's claim. As we discuss in Preamble VI.A, even a small number of BEVs and PHEVs can have a large influence on a manufacturer's compliance credits in a given year and, while the program does not require any manufacture to produce specific technologies such as BEV/PHEVs, we note that this situation is true even where such credits are produced by one manufacturer and purchased by another. EPA also notes that manufacturers are already producing many vehicle products that would be credit-generating vehicles under the MY 2023 standards, and we consider the availability of models in production more relevant for assessing feasibility than a sales-weighted approach. As described in Preamble VI.A and RIA 2.4, a considerable portion of the current new LD fleet (16% of all MY 2021 vehicle models today, across a wide range of vehicle segments) would generate credits under the final MY 2023 standards. In addition, as several commenters including the Bay Area AQMD and California Attorney General point out, manufacturers will have additional opportunity to generate credits in MYs 2021 and 2022 against the weakened SAFE standards.

The Alliance also commented that on average manufacturers used credits to meet compliance requirements for MYs 2019-2020, the availability of credits is limited for some manufacturers, and there are no guarantees that they will be available for sale. As described in Preamble VI.A, our central case analysis was done without accounting for credit trading between manufacturers, and yet still projects feasible compliance pathways. However, EPA recognizes that credit trading does occur, and as a result we believe that our central case is conservative. EPA recognizes that manufacturers are using credit banking and trading provisions for compliance, but we believe that is neither surprising nor cause for concern as a large bank of GHG credits exists within the industry overall and we anticipate that for some automakers for some years or models using credits will be more efficient than applying emissions technologies. Moreover, the use of those credits is not restricted to the manufacturers who currently hold them. Indeed, publicly available information suggests that some manufacturers have designed business strategies around selling credits, while others have designed strategies around purchasing credits.[2] EPA considered how trading between manufacturers can contribute towards compliance in MY 2023 and 2024 in a perfect trading sensitivity described in Preamble VI.A and RIA 4.1.5.1. Finally, in its independent modeling, UCS applied conservative assumptions about the continued trajectory of Framework and non-Framework manufacturers under the No-Action case and concluded there is "sufficient credit availability for manufacturers to comply with the proposed MY2023 and 2024

[2] For example, according to EPA's 2021 Automotive Trends Report, Tesla outperforms its fleet standard by the largest margin of any automaker, yet has the fewest credits on hand. According to one calculation, the $518 million revenue Tesla reported from selling emission credits in the first quarter of 2021 represented nearly all of its profit for the quarter. See "Tesla Made More Money Selling Credits and Bitcoin Than Cars" Autoweek, April 27, 2021. By contrast, Stellantis has stated publicly that it historically has relied on credits for compliance where that is cost-effective, and it currently holds the largest number of credits. See Stellantis N.V. (2020). ''Annual Report and Form 20–F for the year ended December 31, 2020."

standards, even without resorting to additional technology deployment or credit carryback from improvements made post-MY2024."

EPA accounted for a number of important factors related to lead time in our modeling. However, the CCEMS model does not account for the ability of manufacturers to borrow credits from future model years. Furthermore, CCEMS projects manufacturer's decisions to apply technologies while holding vehicle model shares fixed within car and truck regulatory classes. CCEMS does not account for the opportunity for manufacturers to adjust the sales mix towards existing credit-generating vehicles as a compliance strategy. Although our modeling supports the conclusion that there is appropriate lead time for the final standards, we believe that by excluding these factors our modeling is somewhat conservative.

In its assessment of lead time for MY 2023, EPA considered in its analysis all of the aforementioned factors: vehicle refresh and redesign opportunities, the existing credit banks present within the industry, the ability of manufacturers to trade credits, and their ability to carry back credits earned in future years. EPA believes that its modeling results, along with the flexibilities provided by averaging, banking and trading and other aspects of the final program, as discussed in in Preamble VI.A, support the agency's conclusion that manufacturers have sufficient lead time to meet the final standards.

The Institute for Policy Integrity commented on EPA's discretion under the Clean Air Act in determining the appropriate amount of necessary lead time based on the standards it is considering, and that EPA has acted consistently with its historical consideration of lead time in regulating vehicle tailpipe emissions. EPA agrees with this comment. See Preamble I.A.2. for a discussion of how lead time and other factors were considered in determining the appropriateness of the final standards.

In its comments, Tesla provided similar arguments for why manufacturers have had ample lead time to implement the technology needed to meet not just the proposed standards, but also more stringent standards for MY 2024-2026. Tesla expressed that the proposal is more than reasonable and meets legal obligations for lead time under the CAA without need for the extension of the compliance flexibilities. While EPA agrees that the lead time provided is appropriate, we have chosen to finalize a more targeted set of flexibilities primarily limited to MYs 2023 and 2024, as discussed in Preamble II.B and RTC Sections 4, 5, 6, 7, and 8. Based on public comments and newer available data, EPA has also revised the standards to be more stringent than the original proposal for MY 2025 and MY 2026 as discussed in Preamble Section II and RTC Section 2.2.

2.2. Level of Stringency of the Standards and Alternatives

Commenters Included in this Section

Advanced Engine Systems Institute (AESI)
Agortsas, George
Allen, Martin
Allergy & Asthma Network, et al.
Alliance For Automotive Innovation
Alliance For Vehicle Efficiency (AVE)
Alliance of Nurses for Health Environments
American Council for an Energy-Efficient Economy (ACEEE)
American Honda Motor Company (Honda)
American Lung Association
American Lung Association (Sacramento, CA)
Anderson, Laurie
Baier, Mary Ann
Bay Area Air Quality Management District
Begley, Amanda
Beitzel Snow, Stephanie
Bjork, Deb
Blue Crab Strategies
Brandt, Dorothy
Brandt, Elizabeth
Buzzelli, Melanie
California Air Resources Board (CARB)
California Attorney General Office, et al.
Campbell, Nancy
Cantley, Jennifer
Caudill, Gregory
Center for Biological Diversity
Center for Biological Diversity, Earthjustice, and Sierra Club
Center for Biological Diversity, et al.
Center for Climate and Energy Solutions (C2ES)
CERES
Ceres BICEP (Business for Innovative Climate and Energy Policy) Network
Chun, Mark
City of Albuquerque, NM
City of San Antonio, Texas
Climate Group EV100
Collins, Molly
Competitive Enterprise Institute (CEI)
Connecticut Department of Energy and Environmental Protection
Consumer Federation of America
Consumer Reports (CR)
Cooper, Almeta

Corporate Electric Vehicle Alliance (CEVA)
Cuny, Phillip
Dang, Vinh
Davidson, William
Davis, Darien
Dessart, Peter
District of Columbia Department of Energy and Environment
Donnelly, Russel
Dream Corp Green for All
Dream Corps Green for All et al.
Dugan, Maureen
E2 - Environmental Entrepreneurs
Egbert, Judi
Elders Climate Action (ECA)
Energy Innovation Policy and Technology LLC
Environment America
Environmental Defense Fund (EDF)
Environmental Law & Policy Center (ELPC), et al.
Environmental Law and Policy Center (ELPC)
Environmental Protection Network (EPN)
EOS at Federated Hermes (on behalf of its stewardship clients)
Fleischer, Cara
Fleming, Melinda
Ford Motor Company
Gallagher, James A.
Garcia Mann, Jackie
General Motors LLC (GM)
Gerber-Fligel, Gerri
Gersten, Dana
Gillet, Victoria
Godwin, Nadine
GreenLatinos
Haines, Meredith
Hall, Marilyn
Hauptman, Elizabeth
Hewes, Celerah
Holmgreen, Jack
Holmgren, Doug
Hyundai America Technical Center, Inc. (Hyundai)
Institute for Policy Integrity
Interfaith Power & Light (IPL)
International Council on Clean Transportation
International Union, United Automobile, Aerospace & Agricultural Implement Workers of America (UAW)
Jaguar Land Rover North America, LLC (JLRNA)
Kansas Senator Marci Francisco

Klein, Stephanie
Kuntz, Laurie
Levison, Laura
Lish, Christopher
Lucid USA, Inc. (Lucid)
Lynch, Vanessa
Maine Department of Environmental Protection
Manufacturers of Emission Controls Association (MECA)
Marcot, Nicole
Maryland Department of Environment
Mass Comment Campaign sponsored by American Lung Association (121)
Mass Comment Campaign sponsored by Center for Biological Diversity (77,692)
Mass Comment Campaign sponsored by Consumer Reports (19,038)
Mass Comment Campaign sponsored by Environment America (11,080)
Mass Comment Campaign sponsored by Interfaith Power & Light (1,093)
Mass Comment Campaign sponsored by Interfaith Power and Light et al. (1,599)
Mass Comment Campaign sponsored by National Religious Partnership for the Environment-GA (563)
Mass Comment Campaign sponsored by National Religious Partnership for the Environment-MN (92)
Mass Comment Campaign sponsored by National Religious Partnership for the Environment-PA (142)
Mass Comment Campaign sponsored by Natural Resources Defense Council (NRDC) (26,929)
Mass Comment Campaign sponsored by Sierra Club (13,699)
Mass Comment Campaign sponsoring organization unknown-1 (7,010)
Mass Comment Campaign sponsoring organization unknown-10 (2,832)
Mass Comment Campaign sponsoring organization unknown-11 (1,667)
Mass Comment Campaign sponsoring organization unknown-2 (2,214)
Mass Comment Campaign sponsoring organization unknown-3 (2,178)
Mass Comment Campaign sponsoring organization unknown-4 (195)
Mass Comment Campaign sponsoring organization unknown-6 (39)
Mass Comment Campaign sponsoring organization unknown-7 (37)
Mass Comment Campaign sponsoring organization unknown-8 (25)
Mass Comment Campaign sponsoring organization unknown-9 (3,219)
Mathews, Mary
McQuire, Terry
Melton, Karen
Mercedes-Benz USA, LLC
Metropolitan Mayors Caucus
Metropolitan Washington Air Quality Committee (MWAQC)
MI Air MI Health
Michalek, Jeremy and Whitefoot, Kate S.
Mid-America Regional Council (MARC)
Minault, Kent

Minnesota Pollution Control Agency (MPCA) and Minnesota Department of Transportation (MnDOT)
Moore, Cinthia
Moore, Kenneth
Mothers and Others for Clean Air
Motor & Equipment Manufacturers Association (MEMA)
Muller, Melinda
National Association of Clean Air Agencies (NACAA)
National Automobile Dealers Association (NADA)
National Coalition for Advanced Transportation (NCAT)
National Parks Conservation Association (NPCA)
Natural Resources Defence Council (NRDC)
New Mexico Environment Department
New York State Department of Environmental Conservation
Newhouse, Richard
Nissan North America, Inc.
Northeast States for Coordinated Air Use Management (NESCAUM)
Olmstead, Thomas
Our Children's Trust
Pate, Susan
Pennoyer, Marguerite
Peterson, Doug
Pien, Natalie
Platt, Keari
Plug In America, the National Association of Electric Vehicle Drivers
Price, Heather
Rambo-Jones, Lynn
Rauch, Molly
Remilien, Sandra
Representative Padma Kuppa
Richards, Claire
Rivian Automotive, LLC
Sabetta, Tracy
Securing America's Future Energy
Sainz, Columba
Scholar, Reverend
Seeman, Carolyn
Shevelew, Jonathan
Shiffrin, Joyce
Singh, Varsha
Smith, Arthur
Smith, Graham
Smith, Rita L.
South Coast Air Quality Management District
Southern Environmental Law Center
Spencer, Sam

St. Julien, Rene
Stein, Karen
Steitz, Jim
Stellantis
Sturza, Taisia
Tafoya, Ian
Terwilliger, Phyllis
Tesla
Tomcik, Patrice
Toyota Motor North America, Inc. (Toyota)
Trombetta, Nick
Uberuaga, Michelle
Union of Concerned Scientists (UCS)
Valentine, Lucia
Venner, Marie
Verdin, Langston
Villalpando Paer, Natalir
Volkswagen Group of America, Inc. (Volkswagen)
Whyte, Yolanda
Williams, Emerson
Wisconsin Department of Natural Resources
Wiste, Leah
Witt, Anthony
World Resources Institute (WRI)
Wyman, Stephen
Zero Emission Transportation Association (ZETA) and EVHybridNoire (EVHN)
Zewadski-Bricker, Edith

Commenter: Advanced Engine Systems Institute (AESI)

Over the past 50 years, U.S. technology leadership has been based upon stringent and predictable standards allowing domestic suppliers to establish competitive advantage through the early adoption and optimization of technologies on vehicles. The 2012 GHG standards allowed suppliers to rapidly introduce new technologies to the market. Subsequently, when EPA conducted their mid-term review, the pace and breadth of technology options for compliance grew and cost reductions exceeded expectations. The decision to weaken GHG standards in 2018 have left many advanced technologies on the shelf and put the US behind other leading auto manufacturing regions like Europe and China where CO2 standards accelerated. [EPA-HQ-OAR-2021-0208-0267-A1, pp. 1-2]

We enthusiastically support the standards proposed in this MY 2023-2026 NPRM, contained in EPA's Preferred Alternative. [EPA-HQ-OAR-2021-0208-0267-A1, p. 3]

Commenter: Agortsas, George

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, p. 188.]

I support the swift action on clean cars and urge the EPA to adopt the most stringent standards that would deliver greater environmental benefits and savings to consumers.

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, p. 190.]

Therefore, I urge the EPA to adopt these stringent guidelines for the automotive industry, transportation industry, so we can reduce emissions because I believe we can make a difference in the world not only for our children but also for others as we've done in the past.

I know we're capable. We just need the willpower.

Commenter: Allen, Martin

[The following comments were submitted as testimony at the virtual public hearing on August 26, 2021. See Hearing Testimony – 26Aug2021, p. 23.]

I strongly support this Administration's efforts to encourage production and use of clean cars and urge the EPA to adopt the second alternative which would deliver greater savings to consumers and eliminate industry loopholes.

[The following comments were submitted as testimony at the virtual public hearing on August 26, 2021. See Hearing Testimony – 26Aug2021, p. 27.]

Improved fuel economy standards by the EPA is but one way to put industry on a path to reduce greenhouse gas emissions by encouraging development and sales of electric vehicles. EPA's strong car standards will drive down overall pollution, spur technological electrification innovation and drive down consumer costs.

The EPA should not accept a rule which with a weak proposal and loopholes for the automaker industry. There's no need to compromise. I therefore ask the EPA to take action to set the strongest clean car standards possible, reinstate the Obama/Biden federal standards, and Alternative 2, and even stronger standards thereafter

Commenter: Allergy & Asthma Network, et al.

The undersigned health and medical organizations write to urge the United States Environmental Protection Agency (US EPA) to set the strongest possible standards to curb climate-forcing greenhouse gas (GHG) emissions from the light-duty vehicle sector. We call on US EPA to act now to revise the existing standards set by the previous administration, and to finalize model year 2023-2026 rules that aggressively respond to the immediate and generational threat climate change poses to public health and health equity. [EPA-HQ-OAR-2021-0208-0296-A1, p. 1]

While US EPA has proposed increasing the stringency of the inadequate standards set by the previous administration, our organizations believe US EPA must establish a more stringent standard than has been proposed as the final rule. The final rule must require greater real-world GHG reductions and set a stronger pathway toward the full transition to zero-emission technologies. [EPA-HQ-OAR-2021-0208-0296-A1, p. 2]

The 2023-2026 standards are a critical steppingstone to climate and clean air benefits that are desperately needed in communities throughout the United States. We urge US EPA to finalize the rule this year so it will implemented in Model Year 2023. US EPA must take full advantage of the opportunity to revise these standards and must set the course to a healthier, more sustainable future for all Americans. [EPA-HQ-OAR-2021-0208-0296-A1, p. 3]

US EPA must select the more health-protective Alternative 2 as a starting point for the 2023-2026 standards. The US EPA proposal notes that an alternative proposal ('Alternative 2') would yield greater climate, health and societal benefits. US EPA estimates that Alternative 2 would reduce carbon dioxide emissions by 72 million metric tons, or nearly twice the EPA central proposal, during 2023-2026.3 As noted in the documentation, US EPA estimates that by 2050, Alternative 2 would result in approximately $170 billion in health and other societal benefits (excluding fuel savings, which are valued at an additional $290 billion), significantly higher than benefits outlined for US EPA’s central proposal.4 Further, the regulatory impact assessment notes that Alternative 2 would reduce consumption of by 486 million barrels of oil more than the central proposal.5 For communities living at the fenceline and downwind of refineries, every reduction counts. Alternative 2 must be the baseline for US EPA’s final rule revision to maximize climate and health benefits and reduce burdens in highly impacted communities. [EPA-HQ-OAR-2021-0208-0296-A1, p. 2]

However, US EPA should not rely solely on post-2026 rules to accelerate the transition to ZEVs when more stringent standards for 2023-2026 are needed to secure major health and climate benefits of non-combustion transportation.7 Adopting Alternative 2 with limits on excess credits and loopholes that diminish effectiveness of the rule will spur greater ZEV deployment across multiple platforms. We encourage US EPA to establish standards that position the nation for a smoother transition to zero-emission vehicles today. [EPA-HQ-OAR-2021-0208-0296-A1, p. 3]

Commenter: Alliance For Automotive Innovation

Auto Innovators opposes the adoption of the more stringent and less flexible alternatives discussed in the proposed rule. [EPA-HQ-OAR-2021-0208-0571-A1, p. 7]

Actions must start now to ensure the necessary conditions are in place for manufacturers to meet the proposed standards through MY 2026. Meeting the proposed standards will be a challenge, requiring significant increases in EV market share in only four model years. EPA projects a 7.8 percent market share for EVs by MY 202617 (a threefold increase from calendar year 2020 at 2.5 percent18). NHTSA projects an even higher 13 percent EV penetration by MY 202619 (a fivefold increase). According to recent estimates shared by IHS Markit in August 2021, auto manufacturers are planning sales of battery electric and plug-in hybrid electric vehicles to reach approximately 23 percent of new light vehicle sales in the U.S. market in 2026.20 While such levels are possible, a market and necessary supporting conditions and policies must be in place to achieve them.

Manufacturers are also already announcing plans to reduce or eliminate investments in ICEs.21,22,23,24,25,26 Some automotive executives are saying that they no longer intend to develop new ICEs, are no longer setting aside significant money for new ICEs, or that ICEs will only get incremental work.27

Others, such as policymakers, may suggest that little or no investment is needed in ICE technologies because they are "off-the-shelf" or present in the fleet today. This view ignores that technologies can't simply be "bolted on" to existing engines. Instead, they must be carefully integrated into existing designs, requiring engineering resources, and in many cases, new engine designs. A new engine design can cost as much as $1 billion.

The EPA analysis diverges in compliance pathways in 2018-2021 model years, both between alternatives considered today, and with what manufacturers achieved. Vehicles produced in these years are already produced and sold. MY 2022 vehicles are in production now. Manufacturers cannot go back in time and change past decisions about engines or transmissions offered in products, and it's not instructive at all for how changes in policy considered today may affect societal costs and benefits, or future stakeholder actions. The DOT analysis uses the SAFE rule stringency as the baseline, and ensures compliance pathways chosen by manufacturers are the same for 2021, and 2022, regardless of alternative, and this is a recommended approach. However, the DOT analysis also bakes a ZEV program into the baseline, and as a result, the technology costs associated with ZEV compliance do not appear to affect incremental technology cost, or future sales, and this is incorrect (a very large ZEV mandate could increase technology costs significantly, and consumers may be less likely to purchase as many vehicles at higher prices, but the current form of the DOT analysis would not consider this, and this is an error, and a failure to properly account for the technology cost of other vehicle standards affecting fuel economy and economic practicability). [EPA-HQ-OAR-2021-0208-0571-A1, p. 53]

Thus, it is critical that EPA, NHTSA, CARB, Auto Innovators, automobile manufacturers, suppliers, technology companies, and other stakeholders work together to make sure this rule sets the right balance – to provide greater GHG benefits in the near term, to encourage and enable a shift to EVs and other net-zero emission vehicles, and to continue to support U.S. auto jobs. The revised EPA GHG regulations must balance these policy goals with a market and ecosystem for EVs that are still developing and highly uncertain; in the context of major, increasing investments in EVs and declining or eliminated investments in ICEs; and while recognizing the limited opportunity to incorporate major changes through vehicle redesigns between MY 2023 (which starts in as little as three months) and MY 2026 (beginning less than four years from now). [EPA-HQ-OAR-2021-0208-0571-A1, 7-9]

The Proposed GHG Standards for MYs 2023-2026

Auto Innovators generally supports EPA's proposed GHG standards with appropriate and necessary flexibilities included in the program. Auto Innovators generally supports the proposed

GHG standards, but complementary policy measures to greatly expand the EV market are critical to manufacturers' ability to meet them. Fueling infrastructure, supply chains, recycling industry, purchase incentives and more will be necessary. Necessary complementary measures also include recognition of the zero tailpipe emissions of vehicles operating on electricity or hydrogen, and various flexibility mechanisms including EV production multipliers for at least model years 2022 through 2025.30 The proposed targets and flexibilities establish a strong foundation for additional standards in subsequent years. [EPA-HQ-OAR-2021-0208-0571-A1, p. 9-10]

The proposed MY 2026 targets will likely require significant electrification.

As shown in Figure 2 [Figure 2 can be found on p. 12 of Docket number EPA-HQ-OAR-2021-0208-0571-A1], MY 2020 vehicles (many of which already include ICE technologies modeled by EPA) were also assessed against the MY 2026 proposed targets. In the MY 2020 fleet, only EVs are capable of meeting the proposed MY 2026 targets. The same holds true for the proposed MY 2025 targets.

The projections of the Agencies also make it clear that significant increases in the EV market are anticipated. EPA projects a 7.8 percent market share for EVs by MY 202636, and NHTSA projects 13 percent.37 According to recent estimates shared by IHS Markit in August 2021, auto manufacturers are planning sales of battery electric and plug-in hybrid electric vehicles to reach approximately 23 percent of new light vehicle sales in the U.S. market in 2026.38

Regarding More Stringent Standards

Other stakeholders, such as environmental and health NGOs, have expressed their desire for EPA to adopt more stringent standards than proposed. These arguments fail to appreciate fundamental engineering timelines, namely that vehicles and powertrains are not redesigned every year, and that even redesigned vehicles have a limited engineering and design budget that must cover every need of a vehicle or powertrain program. Even more importantly, greater stringency will increase electrification needs even further, putting greater pressure on the development of the EV market while government legislators and others continue to debate the need for and quantity of complementary supporting measures.

Auto Innovators opposes adoption of Alternative 2.

EPA considered a more stringent "Alternative 2" that is broadly based on regulations finalized in 2012 (the "2012 Rule") 39 that include the removal of proposed EV incentives and other flexibilities.40

Auto Innovators and its predecessor organizations noted many times during the midterm evaluation process that changes were necessary from the 2012 Rule. We re-affirm that position here, and as such, believe that returning immediately to the stringency of the 2012 Rule would be bad policy.

We therefore cannot support EPA's Alternative 2. It is broadly the same as the 2012 Rule with an additional year of standards (MY 2026) defined. Moreover, based on the EV market and other challenges described above in our response to the proposed standard, Alternative 2 would be an unrealistic standard to meet in the near-term. [EPA-HQ-OAR-2021-0208-0571-A1, p. 12-13]

Comments on Alternative Standards for Small Volume Manufacturers

Auto Innovators appreciates and supports the inclusion and the maintenance of alternative fleet average standards for manufacturers with limited U.S. sales under the criteria set forth at 40 C.F.R. § 86.1818(g). To comply with provisions on fleet average GHG emissions, small volume manufacturers must intervene on substantial elements related to the primary characteristics of their vehicles. However, these actions must be consistent with their business models and investment sustainability. For these reasons, it is crucial that the option to apply for alternative GHG standards is maintained in this and future rulemakings so that the actions required under EPA's regulations are proportionate to the GHG emissions share for which each stakeholder is responsible.

Auto Innovators recommends that EPA consider process improvements to speed consideration and approval of petitions for alternative standards to provide more regulatory certainty and business stability. [EPA-HQ-OAR-2021-0208-0571-A1, p. 15-16]

Auto Innovators opposes adoption of more stringent standards specific to model year 2026.

EPA requests comment on increasing the proposed MY 2026 standards by 5-10 g/mile.41

Increasing the proposed standards by another 5-10 g/mile in MY 2026 presumes that the lead-time provided is sufficient to make an even larger leap forward in stringency in the next four years. The development of the EV market and complementary policy measures remains highly uncertain. If, over the next several years, such uncertainties are resolved and a robust market for EVs is developing, it may be appropriate at that time for EPA to consider whether a stronger standard in subsequent (MY 2027 and later) years is warranted. [EPA-HQ-OAR-2021-0208-0571-A1, p. 13-14]

Commenter: Alliance for Vehicle Efficiency (AVE)

EPA's Proposed Standards are Ambitious but Achievable with Flexibilities such as Multipliers and Credits

As EPA correctly states, OEMs have already, and will continue to, incorporate '…an increasing array of advanced gasoline vehicle GHG emission-reducing technologies at a rapid pace throughout their vehicle fleets.'3

OEMs and technology suppliers spend over $100 billion per year on research and development of technology to meet increasing fuel efficiency standards and to reduce vehicle emissions. Automotive suppliers provide over two-thirds of the value of a new vehicle and are the largest patent recipients in this sector. These supplier investments will provide OEMs with the advanced technologies necessary to comply with the standards proposed by EPA. By supporting multiple pathways for compliance today and in the future, EPA will allow technology suppliers to invest with confidence in even greater emission reduction technologies. [EPA-HQ-OAR-2021-0208-0256-A1, pp. 2-3]

Commenter: Alliance of Nurses for Health Environments

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, pp. 22-23.]

The preferred alternative identified by EPA is not as strong as the standard finalized during the Obama Administration. The EPA itself identified a much better rule, Alternative 2, which would put 400,000 extra electric vehicles on the road by 2026 and result in a 130 million metric tons fewer greenhouse gas emissions.

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

The US needs strong vehicle standards

The United States will need to greatly reduce light-duty vehicle greenhouse gas emissions if it is to have any chance of meeting the Biden Administration’s emissions reduction goal of 50% by 2030 and to stave off the worst impacts of climate change. The central aim of Title II of the Clean Air Act, which establishes the authority and obligation for the Environmental Protection Agency (EPA) to set vehicle standards, is 'the protection of public health and welfare.' After a summer of severe forest fires and flooding, the EPA cannot miss an opportunity to make significant progress on emission reductions from the 2023 to 2026 vehicle model years (MY). These standards must also set the foundation for further efficiency gains and electrification beyond model year 2026 and ambitious targets will help to meet President Biden’s 2030 goal of 50% zero emission new vehicles sales (White House 2021). The stringency and structure of these standards will have lasting impacts and it is crucial that EPA gets them right. Electric vehicles (EVs) are widely recognized as the future of the automotive industry and post-2026 standards should be consistent with this future (NAS 2021a). [EPA-HQ-OAR-2021-0208-0251-A1, pp. 1-2]

EPA’s proposal is weak

The proposed targets for MY 2023-2026 fall far short of what is needed to make significant progress on addressing GHG emissions from light-duty vehicles. EPA has chosen to move forward with standards that do not maximize the social and environmental net present benefit (NPB) and fails to justify its reasoning for this decision. Of the various scenarios considered by EPA in the NPRM, Alternative 2 is shown to have the highest NPB. [EPA-HQ-OAR-2021-0208-0251-A1, p.2]

The weakness of the proposal is further supported by EPA’s own analysis that shows that the proposed rule will only lead to an EV market share of 8% by MY 2026, far short of what is needed by then to make progress towards the White House’s goal of a of 50% new EV sales by calendar year 2030 (White House 2021). ACEEE discusses key areas of concern in additional detail below. [EPA-HQ-OAR-2021-0208-0251-A1, p.2]

BANKED CREDITS

The existing pool of banked credits makes reaching standards substantially more stringent than the EPA proposal much easier than the nominal gram-per-mile targets would suggest. Even ignoring EPA's proposed extension of credit lifetimes, automakers earned over 56 million MMT of credits in MYs 2018 and 2019, which could be applied toward meeting the proposed 11% increase in stringency for MY 2023 under Alternative 2. This is a realistic scenario because none of these credits would need to be spent before MY 2021, given that the available early action credits earned in MY 2009-2011 greatly exceed the need for banked credits in those model years. Automakers would also have access to the earned credits of MYs 2016 and 2017 and could use them to meet targets for MYs 2021 and 2022 meaning that they would not need to use the later MY credits. MYs 2018 and 2019 credits alone would be worth over 17 g/mi for MY 2023.15 If all of MY 2018 and just 60% of MY 2019 credits are used toward MY 2023 compliance, the proposed 9.5% reduction in the average gram-per-mile target could actually be achieved with under a 3% reduction in that year. For Alternative 2 this would reduce the 11% target reduction in emissions to a 4.8% reduction in emissions. [EPA-HQ-OAR-2021-0208-0251-A1, p. 11]

Automakers are also more likely to save all their banked credits or even earn more credits before MY 2023 because of the SAFE rule's decrease in stringency for MYs 2021 and 2022. Should the automakers simply manage to preserve their 56 million MY 2018-2019 credits until MY 2023 and earn only an additional 22 million MMT of credits16 over MYs 2020, 2021, or 2023, then automakers would need to produce no actual improvement in MY 2023 to comply with the new standards. In all likelihood, automakers could exceed this and enter MY 2024 with banked credits as well. Even without extending credit lifetimes, as EPA proposes to do, the existing stock of banked credits make compliance with the Alternative 2 MY 2023 target achievable, contrary to what the 11% reduction in emissions headline would suggest. [EPA-HQ-OAR-2021-0208-0251-A1, p. 11]

To reach 2030 and 2035 climate and vehicle electrification goals, the MY 2023-2026 targets need to be considerably stronger than proposed and push faster growth in EV penetration. [EPA-HQ-OAR-2021-0208-0251-A1, p.13]

EPA's light-duty vehicle emission standards are a vital tool to protecting vehicle owners, the environment, and the public. Standards that push technology forward help consumers save on fuel costs, reduce environmental damage, and reduce dangerous pollution that increases the risk of breathing-related illness. ACEEE believes that EPA has built a good framework for the SAFE replacement rule, but believes it needs to be more ambitious to reflect the White House's new goals for emission reductions by 2030 and EV market development. ACEEE thanks EPA for the opportunity to contribute these comments and improve the final rule. [EPA-HQ-OAR-2021-0208-0251-A1, p. 15]

EPA has built a good framework for the MY 2023-2026 emissions regulations. However, the rule needs improvements. As discussed above the proposed rule is weakened by counterproductive and discretionary credit provisions. Even without these credits the proposed rule is not stringent enough to pave the path towards the White House's goal of 50% EV market share by 2030 (White House 2021). ACEEE proposes the following recommendations for the final rule. [EPA-HQ-OAR-2021-0208-0251-A1, p. 14]

Alternative 2 with an additional 10 g/mi in MY 2026 is the minimum starting point for the SAFE replacement standards

EPA requests comment on Alternative 2, which adds 10g/mi to the stringency of targets for model year 2026 (EPA 2021b). This scenario should be the absolute minimum stringency that EPA considers when setting emission limits. This is the most stringent option that EPA puts forward and yet it only achieves 84% of the emission reductions for MYs 2021-2026 as the 2012 rule (plus another year of growth in MY 2026) and achieves a fleetwide average compliance of 160 g/mi in our modelling. The proposed standard, on the other hand, even without any incentive provisions, only achieves about 73% of the emission reductions as the 2012 rule. Also, by EPA's own calculations, Alternative 2 has the highest net present benefits (NPB) of any option that EPA investigated. The NPB of Alternative 2 ranges from $110 to $180 billion compared to $86-140 billion for the rule as proposed. EPA has not shown, or even asserted, that the proposed rule is the strongest and most reasonable rule possible, and indeed their own analysis finds that Alternative 2 has greater net benefits. [EPA-HQ-OAR-2021-0208-0251-A1, p. 14]

One benchmark for the SAFE replacement rule should be achieving at least the net carbon savings of the 2012 rule. To recapture these savings, ACEEE estimates that the rule would need to increase in stringency linearly from the proposed MY 2023 target to 155 g/mi in MY 2026. Making these changes would not only ensure that we capture back the losses from the SAFE rule, but also better position the nation to set post-2026 standards in line with the White House's 2030 goals. [EPA-HQ-OAR-2021-0208-0251-A1, p. 14]

Commenter: American Honda Motor Company (Honda)

The agency's proposed standards move quickly to begin delivering emissions reductions promptly, calling for a significant g/mi drop (increase in stringency) in 2023 and bringing federal standards in line with the California Framework stringency. Honda supports this approach for the societal benefits it ensures. By contrast, standards set further into the future could be viewed as having less certainty associated with them.

Beginning in MY2024, the agency's proposed standards go beyond the California Framework topline stringency, with proposed MY2026 standards well below (more stringent than) MY2025 levels set during the Obama administration. Figure 1, at right, charts output from EPA's scenario modeling analyses. Clearly, the revised MY2023-2026 federal standards would deliver substantially more environmental benefits than the regulatory construct they are proposed to replace.12 These standards represent challenging and ambitious targets that will require significant levels of electrification, particularly in the outer years of the program. [EPA-HQ-OAR-2021-0208-0565-A1, p.5] [Figure 1 can be found at docket number EPA-HQ-OAR-2021-0208-0565-A2, p. 5]

Model Year 2026 Stringency

The agency requests comment on appropriate level of stringency for Model Year 2026, including whether an additional 5-10 g/mi reduction (increase in stringency) should be applied. Honda supports the proposed MY2026 targets, but for the reasons stated above opposes the agency's alternative proposals as well as an additional 5-10 g/mi reduction. We believe the proposed targets represent challenging near-term obligations, calling for fleet average levels in 2026 notably cleaner than those finalized under President Obama's Final Rule, as well as the California Framework agreement. Considering the fact that the proposed reconsideration significantly limits use of advanced technology vehicle multipliers, the base proposal's MY2026 stringency already represents a daunting near-term requirement. We believe that setting a requirement 5-10 g/mi more stringent than those targets could create a highly disruptive compliance landscape as industry heads into the next round of standards. [EPA-HQ-OAR-2021-0208-0565-A1, p. 8]

EPA's modeling analysis suggests MY2026 standards can be achieved with an industry average of 6.9% ZEVs. A further reduction (increased stringency) of 10 g/mi would likely have a non-trivial impact on the amount of electrification needed to comply. As shown in Table 1 [Table 1 can be found at docket number EPA-HQ-OAR-2021-0208-0565-A2, p. 9], by our calculations, doing so would drive the number of ZEVs from 6.9% to 12.3% of the national fleet, representing a 78% increase17 in the volume of electrified powertrains needed to comply. Given the near-term regulatory window, comparatively limited opportunity for product refresh/redesign, and current supply chain challenges with unknown resolution dates, this represents an exceedingly difficult compliance target. [EPA-HQ-OAR-2021-0208-0565-A1, p. 9]

Figure 3, similar to Figure 1 shared earlier in our comments, shows the additional emissions benefits of a further 10 g/mi reduction in MY2026. As can be seen, this would only slightly increase the cumulative CO2 emissions benefits though, as stated above, require a non-trivial increase in electrified volume. Using EPA's cost data for this NPRM, we estimate these additional reductions could have a marginal abatement cost of as much as $300/metric ton.18 Honda has long voiced support for steady and reasonable increases in stringency. Rapid escalation – or de-escalation – can create significant regulatory uncertainty that is anathema to automobile manufacturers' strategic planning efforts. In our view, a more reasonable approach is to maintain the proposed 2026 targets, and to seek additional reductions under the subsequent (MY2027 and later) regulatory construct. [EPA-HQ-OAR-2021-0208-0565-A1, p. 9] [Figure 3 can be found at docket number EPA-HQ-OAR-2021-0208-0565-A2, p. 9]

17 This percentage increase is a fleet average; while some OEMs would see more modest increases, others could be expected to face more severe obligations.

18 Analysis based on substitution of turbocharged ICE with BEV300 for the MedSUV tech class in 2026.

Commenter: American Lung Association

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, p.19]

Third, EPA's own analysis points to more Protective Alternative Number 2, which would provide more pollution reduction and more electric vehicles on the road by 2026.

EPA estimates that Alternative 2 would result in significant present value net benefits of up to a 180 billion and analyzed net benefits of up to 9.1 billion. Quoting from the NPRM, "The total benefits far exceed the costs of the program." As noted above, this is a health emergency and maximizing pollution reductions is needed.

We encourage EPA to pursue at minimum the stringency laid out in Alternative 2 and remove excess crediting and loopholes that will reduce the real world benefits of a more health-protective alternative.

Commenter: American Lung Association (Sacramento, CA)

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, pp. 254-255.]

Given that the transportation sector is the leading source of greenhouse gas emissions, U.S. EPA must act this year to adopt and finalize standards through 2026 that go beyond previous standards and deliver real-world emission reductions. This is necessary in order to reflect the urgency of our climate crisis and to set a course for the rapid transition away from combustion technologies.

The American Lung Association urges the U.S. EPA to build off of and really to go beyond the foundation set by the 2012 standards to really at a minimum achieve the stringency outlined in Alternative 2.

Alternative 2 could provide the strongest foundation for more stringent rules to follow, would usher in greater reductions in harmful pollutants, yield health and societal benefits that EPA states will far exceed the costs, and really can accelerate the pathway to zero emission technologies that is urgently needed to protect our health and our climate.

We call on U.S. EPA to set the standards at least to the level outlined in Alternative 2 and to ensure that these stringency levels are achieved in the real world.

Commenter: Anderson, Laurie

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, p. 103.]

The EPA must set the strongest possible federal clean car standards through 2026, avoiding loopholes, and putting automakers on track to meet ambitious pollution reduction goals.

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, p. 105.]

In order to set us on the path to 100 percent zero emissions new vehicle sales by 2035, the near-term standards for climate pollution must be as strong as possible. Therefore, please finalize the strongest possible national greenhouse gas emissions standards for passenger cars and light trucks for Model Year 2026.

Commenter: Baier, Mary Ann

[The following comments were submitted as testimony at the virtual public hearing on August 26, 2021. See Hearing Testimony – 26Aug2021, p. 62.]

I support this Administration's swift action on clean cars but urge the EPA to adopt their second alternative that would deliver greater savings to consumers and eliminate unnecessary loopholes for automakers.

Commenter: Bay Area Air Quality Management District

Thus, the Air District urges EPA to move forward with the strongest feasible requirements, presented in EPA's Alternative 2, rather than promulgate the less stringent Proposal. [EPA-HQ-OAR-2021-0208-0283-A1, p.2]

Regarding MY 2026, the Air District is supportive of the addition of a model year beyond the range of the 2012 Obama-era standards, continuing a trend that ramps down past MY 2025 and requires even lower greenhouse gas emissions for 2026. With respect to the request for comment on EPA considering a 5-10 g/mi stronger requirement for MY2026, the Air District reiterates that it supports the strongest standards feasible, in order to achieve maximum air pollution reductions and boost air quality benefits. A 10 g/mi more stringent MY 2026 requirement is feasible and should be adopted. [EPA-HQ-OAR-2021-0208-0283-A1, p.2]

Commenter: Begley, Amanda

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, p. 246.]

I urge you to keep those standards as originally designed to ensure the greatest reduction in oil use and global warming emissions.[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, pp. 248-249.]

Not only will setting the strongest standards possible help with climate change, but they will also help clean the air.

Once again, I urge this Administration to set the strongest standards possible because they are working.

Commenter: Beitzel Snow, Stephanie

[The following comments were submitted as testimony at the virtual public hearing on August 26, 2021. See Hearing Testimony – 26Aug2021, pp. 240-241.]

Thank you for the chance to testify before this panel on the Revised 2023 Later Model Year Light-Duty Vehicle Greenhouse Gas Emissions Standards and I plead with you to finalize the strongest possible national vehicle greenhouse gas emission standards for passenger cars and light trucks.

Commenter: Bjork, Deb

[The following comments were submitted as testimony at the virtual public hearing on August 26, 2021. See Hearing Testimony – 26Aug2021, pp. 37-38.]

Moving quickly and decisively to zero pollution vehicles paves the way for people to take action. Please enact the strongest federal clean car standards through 2026 to meet ambitious pollution reduction goals. Please eliminate loopholes for automakers. Strong regulations puts them on track to sell millions of vehicles and sets us on the path to a hundred percent zero emissions new vehicles sales by 2035.

We have the technology. We have the science. We have the large automakers posed to comply, and we have the American public clamoring for change. Vehicle pollution not only causes climate change but it also degrades air quality and threatens our health. Strong regulations can give my grandchildren and all children clean air and a trajectory towards a healthier climate

Commenter: Blue Crab Strategies

This is the moment to go big. Choose Alternative #2, and really make a mark on our country's future. The climate crisis demands it, the health of millions of at-risk Americans demand it, moral imperative demands it. Please be bold in your work; these are times that call for boldness. [EPA-HQ-OAR-2021-0208-0639, p.1]

Commenter: Brandt, Dorothy

[The following comments were submitted as testimony at the virtual public hearing on August 26, 2021. See Hearing Testimony – 26Aug2021, pp. 208-209.]

Please hear my urgent plea to create the strongest possible federal clean air standards to protect us as Americans who are hit hard by climate change and breathing polluted air. As a mom, grandmother, teacher, and principal, I highly recommend that the EPA work to strengthen these standards to ensure that our most precious national treasure, our children, are given the best air we can give them. This is our responsibility. Our country's future depends on it and as a Roman Catholic my sense of morality dictates it. I urge the EPA leadership to fight to protect life and health for each American child.

Commenter: Brandt, Elizabeth

[The following comments were submitted as testimony at the virtual public hearing on August 26, 2021. See Hearing Testimony – 26Aug2021, p. 197.]

Please finalize the strongest possible national greenhouse gas emission standards for passenger cars and light trucks through Model Year 2026.

[The following comments were submitted as testimony at the virtual public hearing on August 26, 2021. See Hearing Testimony – 26Aug2021, p. 199.]

The EPA must set the strongest possible federal clean car standards through 2026, avoiding loopholes and putting automakers on track to meet ambitious pollution reduction goals.

Commenter: Buzzelli, Melanie

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, p. 124.]

I ask that EPA finalize this rule as quickly as possible so that it can take effect as quickly as possible and in doing so, I ask that EPA maximize the emissions reductions and health benefits of this rule.

EPA must also hold automakers accountable in order to ensure that the standards actually result in real-world reductions in greenhouse gas emissions and then, perhaps more importantly, I ask that EPA set up stronger standards to follow. Stronger standards covering cars, SUVs, and light trucks through at least 2030 and stronger standards for heavy-duty vehicles are necessary to drive the transition to zero emission vehicles that the nation and the world desperately need.

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, p. 122.]

thank President Biden and his Administration for recognizing and seeking to address climate pollution from transportation.

I'm happy to see this proposal and the broader efforts on the part of the Administration regarding clean cars, but I'm here to say that it is not enough.

Commenter: California Air Resources Board (CARB)

However, if U.S. EPA believes additional lead time is appropriate in model year 2023, then the best option is to adopt a standard as least as stringent as its preferred alternative for model year 2023 and greater stringency thereafter consistent with Alternative 2, with additional reductions required in model year 2026 to remedy the lost emission reductions if the most stringent alternative is not adopted in model year 2023. CARB offers the following comments in further support of the proposal. [EPA-HQ-OAR-2021-0208-0643-A6, p.6]

The Alternatives and the Proposal Meet Lead Time Requirements.

Manufacturers have developed the requisite technology, have time to deploy it, and can do so at a reasonable cost within the time provided to meet the preferred alternative, Alternative 2, and the requirement for further emission reductions for model year 2026. Considering the urgency of the public health crisis created by these emissions, CARB believes adopting the Alternative 2 standards as quickly as possible (and no later than model year 2024) with the additional model year 2026 stringency best responds to the agency's mandate to reduce emissions in raw terms. As we have noted above, should lead-time considerations lead U.S. EPA to finalize less stringent standards for Model Year 2023, it should recoup emissions consistent with Alternative 2 for later model years, including strengthening Model Year 2026 as U.S. EPA proposes. [EPA-HQ-OAR-2021-0208-0643-A6, p.28]

Alternative 2, a return to the National Program standards with an improvement of those standards for model year 2026 by an additional 10 grams of carbon dioxide per mile, would maximize the reduction in emissions. However, CARB recognizes that U.S. EPA may determine additional lead time is appropriate; if so, the best option is to adopt a standard at least as stringent as its preferred alternative for model year 2023 and greater stringency thereafter, along the lines of Alternative 2 for later model years, with additional reductions required in model year 2026 to recoup further lost emission reductions. [EPA-HQ-OAR-2021-0208-0643-A6, p.1]

Alternative 2, to return to the 2017-2025 Model Year National Program1 standards and improve those standards for model year 2026 by an additional 10 grams of carbon dioxide (CO2) per mile, certainly maximizes emission reductions and should be adopted for all model years for which U.S. EPA determines it is feasible. [EPA-HQ-OAR-2021-0208-0643-A6, p.6]

CARB agrees that manufacturers have developed the technology to meet U.S. EPA's more stringent alternative, identified in the proposal as Alternative 2, to return to the National Program standards. The technology exists to extend and improve those standards for model year 2026 by an additional 10 grams of carbon dioxide per mile. [EPA-HQ-OAR-2021-0208-0643-A6, p.7]

Time is of the essence to stabilize our climate. The worsening climate catastrophes show the urgent need to recover the progress lost under the previous federal administration. CARB urges U.S. EPA to quickly finalize this proposal and adopt the most stringent standards feasible. Alternative 2, a return to the National Program standards with an improvement of those standards for model year 2026 by an additional 10 grams of carbon dioxide per mile, would achieve the greatest emission reductions amongst the proposal. However, should U.S. EPA determine additional lead time is appropriate, the best option is to adopt standards at least as stringent as its preferred alternative for model year 2023 and greater stringency thereafter, along the lines of Alternative 2 for later model years, with additional reductions required in model year 2026 to recoup further lost emission reductions. These would deliver tangible benefits to everyone who breathes and drives that they will be able to feel. [EPA-HQ-OAR-2021-0208-0643-A6, pp.40-41]

Commenter: California Attorney General Office, et al.

In the Proposal, EPA set forth three alternative sets of standards—a preferred alternative, a less stringent alternative (Alternative 1), and a more stringent alternative (Alternative 2). We urge EPA to adopt the most stringent standards for which the statutory requirement to provide adequate lead time is satisfied. [EPA-HQ-OAR-2021-0208-0245-A1, p.2]

As discussed in more detail below, the need for standards far more stringent than SAFE 2 is critically urgent. And the industry's ability to meet such standards and to cost-effectively reduce dangerous pollution is clear [EPA-HQ-OAR-2021-0208-0245-A1, p.2]

EPA SHOULD REPLACE ITS SAFE 2 STANDARDS WITH MORE STRINGENT ONES AS PROPOSED [EPA-HQ-OAR-2021-0208-0245-A1, p.18]

THE PROPOSED STANDARDS ADVANCE THE OBJECTIVES OF SECTION 202(A) OF THE CLEAN AIR ACT

As discussed in more detail below in Section II, we support EPA's adoption of standards for MY2023 that are at least as stringent as the preferred alternative and urge EPA to consider the more stringent Alternative 2 standards for that year, in the context of the full record (including these comments). We also support adoption of the most stringent standards in the proposal for MYs 2024-2026—in other words, the Alternative 2 standards for MYs 2024-2025 and the Alternative 2 standards strengthened by 10 grams/mile for MY2026. EPA must begin now to address the devastating risks of climate change and the on-going harms facing communities over-burdened by harmful pollution, and EPA must do so with the gravity these threats require. [EPA-HQ-OAR-2021-0208-0245-A1, p.18]

Automakers Are Well-Positioned to Sell Fleets that Comply at Least with the Preferred Alternative for MY2023

There are a number of reasons automakers are well-positioned to meet standards at least as stringent as the preferred alternative as early as MY2023. First, as EPA noted in the Proposal, automakers had long planned to meet the MY2023 standards promulgated in 2012. It would be reasonable, then, to reinstate those standards as proposed in Alternative 2. [EPA-HQ-OAR-2021-0208-0245-A1, p.26]

The evidence demonstrates that there is sufficient lead time for automakers to develop compliance strategies for MY2023 standards including both the preferred alternative and Alternative 2. We urge EPA to consider standards as stringent as Alternative 2 for this model year, and to adopt the most stringent standards—but at least the preferred alternative—for which it determines lead time is adequate, based on the full record before it. [EPA-HQ-OAR-2021-0208-0245-A1, pp. 29-30]

There Is Adequate Lead Time for the Alternative 2 Standards for MY2024

There is sufficient lead time for automakers to comply with the Alternative 2 standards for MY2024.144 Assuming EPA finalizes new standards relatively quickly, automakers will have more than a year to make adjustments for MY2024. That is more than sufficient lead time where, as here, compliance is a matter of designing a cost-effective strategy that combines decisions about which vehicles to manufacture and market (including by way of sales incentives) and decisions about credit acquisition, banking, and use. As noted above, automakers are already producing vehicles in all major vehicle categories that can satisfy more stringent standards and have been steadily increasing their use of GHG-reducing technologies across their fleets (in conventional vehicles, hybrids, and BEVs). Again, there is no reason to think these trends will stop; and many reasons—including global trends, technological availability, and consumer and shareholder demands—to believe they will continue. For example, the further expansion of mild hybrids—which have been broadly adopted in Europe and Japan and can achieve emission reductions of 10% or more—can be expected in the United States market beginning in MY2024, especially given their already demonstrated cost-effectiveness and performance advantages.145

The increasing production and sale of BEVs and PHEVs also supports the promulgation of Alternative 2’s MY2024 standards. EPA projects that automakers would comply with these standards if only 7.4% of their MY2024 fleets comprised BEVs and PHEVs.146 The industry is on track to meet, or even exceed, that figure.147 Neither those sales nor the fleetwide sales of internal combustion engine vehicles needed to meet the Alternative 2 MY2024 standards requires the development of new technology, and, as discussed above, automakers have continued to plan to expand applications of these technologies, even after the promulgation of the SAFE 2 standards. Compliance with the Alternative 2 MY2024 standards is, thus, mostly, if not entirely, a matter of automaker strategy—of which vehicles to incentivize and market heavily and of planning whether and how to utilize the flexibility provided by the credit provisions. It requires modest, if any, changes to production plans (e.g., automakers could choose to speed up technology transfers from other markets). None of that requires more than a year’s lead time.148 [EPA-HQ-OAR-2021-0208-0245-A1, p.30]

For MYs 2024 and later, there is adequate lead time for the Alternative 2 standards and for the proposed additional 10 grams/mile of stringency in MY2026. EPA should thus finalize those standards— the most stringent it proposed—for MYs 2024-2026. [EPA-HQ-OAR-2021-0208-0245-A1, p.2]

THE PROPOSED STANDARDS ADVANCE THE OBJECTIVES OF SECTION 202(A) OF THE CLEAN AIR ACT

As discussed in more detail below in Section II, we support EPA’s adoption of standards for MY2023 that are at least as stringent as the preferred alternative and urge EPA to consider the more stringent Alternative 2 standards for that year, in the context of the full record (including these comments). We also support adoption of the most stringent standards in the proposal for MYs 2024-2026—in other words, the Alternative 2 standards for MYs 2024-2025 and the Alternative 2 standards strengthened by 10 grams/mile for MY2026. EPA must begin now to address the devastating risks of climate change and the on-going harms facing communities over-burdened by harmful pollution, and EPA must do so with the gravity these threats require. [EPA-HQ-OAR-2021-0208-0245-A1, p.18]

There Is Also Adequate Lead Time for the Alternative 2 Standards for MY2025 and MY2026, As Well As for Additional Stringency in MY2026

We urge EPA to adopt the Alternative 2 standards for MY2025 and to adopt the Alternative 2 standards plus the proposed additional 10 grams/mile of stringency for MY2026. There is no question that lead time is sufficient for these standards. There is ample time for automakers to apply available and proven GHG-reducing technologies in a broader array of vehicles, including, for example, substantially expanding the availability of mild hybrids which reduce emissions and provide other features consumers demand.149 Of course, automakers would also have ample time to plan to manufacture and sell already-existing or already-planned vehicles that could support compliance of their fleets. Notably, by MY2025, the lead time automakers will have had to adjust to more stringent standards will equal, or exceed, the period during which the SAFE 2 standards were in effect. As shown above, reliance on SAFE 2 would never have been reasonable, but, in any event, by MY2025 any reliance on SAFE 2 should be irrelevant.

Moreover, EPA projects that the Alternative 2 standards would require 7.5 and 9.6% penetration of BEVs and PHEVs in MY2025 and MY2026, respectively. The market share for these vehicles is on track to exceed those figures, with market share of BEVs alone reaching 10% in MY2025 and growing from there.150 Compliance will, thus, be easier than EPA anticipates. As EPA noted in the Proposal, multiple major automakers have projected that their fleets will be between 40 and 100% BEV by 2030.151 Those automakers, at least, can be expected to have reached levels well above 10% by MY2025 and MY2026, meaning the industry as a whole should have sufficient credits for compliance even if one or more automakers' EV sales fall below the projected average. [EPA-HQ-OAR-2021-0208-0245-A1, p.31]

Moreover, Alternative 2, which would require larger emissions reductions, would produce even greater net benefits. See id. at 43,742 (Table 12). The range of standards from the preferred alternative to the more stringent Alternative 2 (and the 10 grams/mile of additional stringency for MY2026) would not only faithfully execute EPA's statutory mandate to reduce emissions and protect public health, but their benefits would also significantly outweigh their costs. [EPA-HQ-OAR-2021-0208-0245-A1, p.33]

Commenter: Campbell, Nancy

PLEASE! Let's quit dithering around. Let's get unstuck. Let's MOVE FORWARD and return to clean car standards. Let's ditch the 'dirty car standards' that are decades old and shamefully behind the rest of the world. LET'S BE A LEADER IN FUEL STANDARDS!

I can't believe that the EPA has proposed car fuel standards that – while better than the dirty fuel standards of the previous president – are weaker than the ones in 2012! So we're worse off than we were a full decade ago!

TECHNOLOGY KEEPS MOVING AT LIGHTENING SPEED BUT AMERICA'S FUEL STANDARDS STAGNATE, creating huge waste, massive pollution, and unbelievable cost.

The EPA proposal is also FULL of loopholes.

And giveaways to car makers.

All of which are just a way of trying to make things look good while maintaining the status quo. God forbid we should actually move forward, right??

The current proposal falls short of what we desperately need.

It doesn't meet the Intergovernmental Panel on Climate Change targets.

It doesn't mett American commitments under the Paris Agreement.

It doesn't require car makers to meet President Biden's goals.

It doesn't come anywhere close to what our scientists say is necessary.

PLEASE go with Alternative #2 instead – with one significant change: require car makers to start selling ZEV's by 2026 and all ZEV's by 2030. We can't afford to fool around any longer. We can't afford to stand still or slide backwards.

PLEASE TAKE THESE STEPS:

1. In this rulemaking, adopt Alternative #2 through model year 2025.

2. Supplement this proposal with another, to be finalized before the end of 2022, that sets a ZEV mandate for model year 2026 consistent with a pathway toward requiring 100 percent of new vehicles to be ZEVs by 2030.

3. Start another rulemaking for model years 2027 to 2030 that achieves 100 percent ZEVs by 2030.

The world's scientists have made it clear: we have a rapidly-closing window to prevent the most dire consequences of climate change.

Nothing short of the strongest possible clean car standards will deliver the carbon reductions that President Biden has promised the country and the world -- and, more importantly, that we deserve. [EPA-HQ-OAR-2021-0208-0418, p. 1]

Commenter: Cantley, Jennifer

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, pp. 274-275.]

This is why the EPA must make stronger possible federal air standards for 2026, avoiding the loopholes and putting automakers on track to meet ambitious pollution-reducing vehicles.

The Federal Government must hold these companies to the highest standards, especially for foreign companies coming to rural communities. Low-income families, especially Native communities, 13 percent of Indigenous children, have asthma attacks compared to 8.6 percent of the children of non-Indigenous descent.

A lithium site currently in Nevada could produce 5,800 tons of sulfuric acid a day towards the Piute Shoshone Territory in Nevada. This is why we need to make the strongest possible national greenhouse emission standards for passenger cars and light trucks through Model Years of 2026.

Commenter: Caudill, Gregory

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, p. 311.]

Strong standards have been established before and I have seen them gutted every time.

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, pp. 312-313.]

The EPA should tighten light-duty emissions and this Administration must once again make those rule changes by law.

Strong clean air standards will drive down pollution, provide communities savings, and spur innovation such as membrane nano-fiber hydrogen fuel cells, lithium alkaline long-term storage batteries, and wind and solar-powered rapid-charging stations.

So I say let's save money and move ever forward toward the Alternative 2 clean standards.

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, p.310.]

I fully support this Administration's swift action on clean cars and I strongly urge the EPA to adopt the second alternative for more stringent regulations.

Commenter: Center for Biological Diversity

According to the Rule's Draft Regulatory Impact Analysis, while the proposal projects a reduction in greenhouse gas emissions compared to Trump's SAFE Rule rollback, it would still allow millions of metric tons of greenhouse gases and other criteria pollutants to be emitted. This is especially stark when the proposal is compared to EPA's suggested Alternative 2, which would save 293 million metric tons CO_2 and 426,545 metric tons of methane compared with the proposal through 2050.27 Similarly, compared to the proposal, Alternative 2 would reduce emissions of NO_x by approximately 30,000 tons and SO_2 by over 100,000 tons through 2050.28 In other words, by making the decision to adopt the proposal instead of Alternative 2, EPA is, in its discretion, authorizing an addition 293 million metric tons of CO_2 and 426,545 metric tons of methane, in addition to other greenhouse gases and increased criteria pollution. Of course, EPA could have analyzed other alternatives stronger than Alternative 2, which would have made these emissions savings even higher.

These numbers are not insignificant, and they can be directly tied to harm to species or critical habitat, such as to precise losses of sea ice and sea ice days in the Arctic. For instance, the greenhouse gas emissions can be tied to precise losses of sea ice and sea ice days in the Arctic;29 the excess 293 million metric tons of CO_2 alone—not including the other greenhouse gases—that will be emitted if EPA decides to adopt the proposal instead of Alternative 2 will lead to a sustained loss of sea ice of 879 square kilometers,30 larger than the area of New York City. This loss will have devastating consequences for polar bears, as described below. [EPA-HQ-OAR-2021-0208-0726-A1, p. 5]

Commenter: Center for Biological Diversity, Earthjustice, and Sierra Club

EPA must adopt the most stringent standards feasible to reduce light duty vehicle emissions Instead of the current proposal, EPA should have chosen Alternative 2 as its preferred alternative. Alternative 2 mirrors the agency's 2012 standards in stringency for Model Years 2023 through 2025 and extends the same annual trajectory to MY 2026. Alternative 2 produces more benefits than the proposal under every category analyzed and offers adequate lead time for automakers to comply. [EPA-HQ-OAR-2021-0208-0270-A1, pp.1-2]

EPA's stated arguments for the feasibility of the Proposal provide virtually equal support for Alternative 2's feasibility. The agency acknowledges that most automakers likely have not significantly changed their product plans in reliance on SAFE II. As EPA states, '[T]he industry's product plans developed in response to EPA's 2012 GHG standards rulemaking for MYs 2017-2025 [have] largely continued' despite the less stringent 2020 SAFE rule because automakers 'generally require about five years to design, develop, and produce a new vehicle model.' As a result, 'in most cases the vehicles that automakers will be selling during the first years of the proposed MY 2023-26 program were already designed under the original, more stringent GHG standards finalized in 2012.' Moreover, 'the ability of the industry to commit to revised plans based on the SAFE rule's relaxed standards, especially for MYs 2023 and later, has been highly uncertain in light of pending litigation.' Several automakers have admitted as much.4

Therefore, any reliance on the SAFE rule would have been relatively recent, and as EPA notes, 'the automakers' earlier plans could be reinstated or adapted with little change.' Moreover, 'some automakers may have adopted product plans to overcomply with the prior, more stringent standards, with the intention of selling credits to other automakers,' which would help to insulate them from the tighter standards currently proposed. [EPA-HQ-OAR-2021-0208-0270-A1, p.2]

EPA also underestimates the rate of electric vehicle ('EV') market penetration in MY 2023-2026, which inaccurately makes Alternative 2 appear less feasible. A 'wide range of stakeholders, including but not limited to the automotive manufacturers and the automotive suppliers,' informed EPA 'that significant investments [are] being made now to develop and launch new EV [models] and in the expansion of EV charging infrastructure could enable higher levels of EV penetration . . . than EPA has projected . . . for both the proposed MY 2026 standards and the Alternative 2 MY standards.' Automakers are also increasing their EV commitments: GM, Volvo, Volkswagen, Honda, and Fiat have all promised that EVs will make up half or more of their US sales by 2035 or sooner.8 Consumer demand is also strong: during the first half of 2021, US EV sales have surged despite the impacts of the pandemic. 9 These facts support the likelihood that EV penetration will be higher than EPA has assumed in all of the Model Years this rulemaking covers.

Furthermore, automakers' EV production targets for the European Union suggest most automakers have the capacity to vastly scale up EV technology. For example, Ford, which did not sell any EVs in Europe in 2020, states that it will sell 100% EVs by 2030,10 as will Volvo and Jaguar. Volkswagen will sell 70% EVs by 2030.11 While there are differences between the European Union and the American context, this trend demonstrates that manufacturers have the capacity to produce additional EVs if lax regulations do not make internal combustion engine vehicles ('ICEVs') seem more profitable than they actually are.12

In sum, these trends and observations all underscore the feasibility of Alternative 2 and erode the agency's justification for preferring the less stringent proposal. [EPA-HQ-OAR-2021-0208-0270-A1, pp.2-3]

Alternative 2's Benefits Dwarf those of the Proposal

As EPA explains in detail, Alternative 2 produces superior benefits across every metric. Alternative 2 would result in at least $40 billion more in net benefits by 2050 than the Proposal.13 While the proposal will save $91 billion in climate benefits, Alternative 2 will save $100 billion, including an additional 110 MMT of saved upstream CO_2, as well as 183 MMT of tailpipe CO_2.14 Alternative 2 would also eliminate roughly 2,340 MT of $PM_{2.5}$, 29,896 MT of NO_x, 104,468 MT of SO_2 and 36,147 MT of VOCs over the Proposal, saving more than $7.2 billion in human and environmental health.15 EPA's analysis does not even capture the full benefit because the agency did not model $PM_{2.5}$ environmental impacts; health and environmental impacts from ozone, NO_2, and SO_2; visibility improvements; ecosystem benefits; and air toxics impacts.16 These impacts are severe, serious, and extensive, including lung and other cancers, cardiovascular and respiratory effects, respiratory and other forms of premature mortality, tree mortality, acid deposition, and coastal eutrophication.17 EPA should recognize that these uncounted benefits further tip the balance in favor of Alternative 2.

Under Alternative 2, consumers would directly save $360 billion on fuel (accounting for reductions in gasoline consumption and increased electricity use), $50 billion more than under the Proposal. 18 This would reduce domestic fuel consumption by 486 million barrels of gasoline and as well as domestic electricity use by 151,305 gigawatt hours by 2050.19 The resultant non-emissions benefits would be $18 billion over the Proposal from a rebound effect (the increase in driving resulting from reduced operating costs), reduced fueling time, energy security, and reduced dependence on foreign petroleum.20

Despite the benefit imbalance in favor of Alternative 2, EPA has not performed a direct cost and benefit comparison of the Proposal and Alternative 2, noting only that 'the total benefits [of both the Proposal and Alternative 2] far exceed the total costs' of both programs.21 EPA should provide that comparison and follow it to its logical conclusion: 'that it is appropriate, particularly in light of the accelerating transition to electrified vehicles, to require additional reductions in'

MY 2023-2026.22 Alternative 2 Plus would further increase those benefits. [EPA-HQ-OAR-2021-0208-0270-A1, pp.3-4]

In future years, EPA should return to its historical practice of considering more alternatives that span a broader range of emission reductions

EPA acknowledges that the current alternatives, which differ by only 8 grams per mile and would prescribe equivalent annual stringency increases of roughly 4.5%,52 represent a 'fairly narrow' range of potential regulations.53 This narrow range limits the ability of both EPA and the public to analyze the proposal's benefits through comparison to more stringent alternatives. In the past, EPA has considered not only a greater number of alternatives but a broader range of stringencies between the least and most restrictive alternatives. In future rulemakings, the agency should revert to this prior practice.

EPA's analysis of alternative options should achieve the same goals as the environmental review process under the National Environmental Policy Act. It is well-understood that Clean Air Act rulemakings are exempt from the National Environmental Policy Act's ('NEPA') formal environmental impact statement ('EIS') requirement precisely because EPA's analysis should be the functional equivalent of the EIS process. As the D.C. Circuit explained, there is 'little need in requiring a NEPA statement from an agency whose raison d'etre is the protection of the environment and whose decision . . . is necessarily infused with the environmental considerations so pertinent to Congress in designing [NEPA].'54 Other courts and legislators have confirmed that EPA was granted this exemption because NEPA requirements were viewed as 'redundant' of the CAA requirements.55

According to NEPA regulations, an agency must 'present the environmental impacts of the proposed action and the alternatives in comparative form' 'so that reviewers may evaluate their comparative merits.'56 The agency need not consider an infinite array of potential alternatives, merely those that are feasible or reasonable.57 In this context, the process is meant to ensure that the agency and the public can compare not only the costs and feasibility of different levels of stringency, but also whether the proposed standards are as environmentally protective as they could be. A thorough evaluation of more alternatives would more meaningfully achieve this purpose. For example, a broader scope might shed light on whether the proposal will put light duty vehicle emissions on track to meet President Biden's goal of reducing national emissions 50% by 2030, a goal which requires immediate reductions. 58

Of the several reasons EPA cites for limiting its discussion to two alternatives, the agency mentions lead time most prominently.60 Yet even here, the agency might have analyzed alternatives that would mitigate lead time concerns by ramping up stringency incrementally in the later MYs. For instance, while Alternative 2 increases in stringency by roughly 4.5% from MY 2023-2026, EPA could have considered an alternative that started with only a 4.5% increase in 2024, 5.5% in MY2025, and 6.5% in MY2026. Such an approach might have discussed other ways to address any lead time concerns in the earliest years while maximizing emissions reductions in later years when lead time is not a factor. [EPA-HQ-OAR-2021-0208-0270-A1, pp.9-10]

EPA should further strengthen its Alternative 2 plan by adding an additional 10 grams per mile of stringency in Model Year 2026 ('Alternative 2 Plus'), and by making the other improvements described below. This letter details why Alternative 2 Plus is a more effective response to climate change than the current proposal, and several ways in which the alternative should be strengthened prior to adoption. [EPA-HQ-OAR-2021-0208-0270-A1, p.1]

Alternative 2 Plus

In addition to adopting Alternative 2 for MY 2023 to 2025, EPA should add an additional 10 grams per mile of stringency to MY 2026. The additional stringency is feasible in MY 2026 because it does not raise the same lead time concerns that exist for earlier years, and it produces even more benefits than Alternative 2 across a range of metrics.

An independent analysis by Dan Meszler found that Alternative 2 Plus would confer an additional $20 billion of total net benefits by 2050 (with a 3% discount rate).23 In many areas, the difference in benefits between Alternative 2 Plus and Alternative 2 is greater than between Alternative 2 and the Proposal. For example, Alternative 2 Plus would produce $27 billion in additional climate benefits over Alternative 2, as compared to the $9 billion difference between Alternative 2 and the Proposal. Similarly, Alternative 2 Plus would save consumers an additional $82 billion over Alternative 2, whereas the difference between Alternative 2 and the Proposal was only $50 billion.

Because Alternative 2 Plus affects MY 2026, potential lead time issues do not present a real challenge to automakers. This standard would begin at least three years, and as many as four years, after the finalization of this rule. The longer time frame will give automakers more time to comply with what is otherwise a more significant annual increase in stringency. The potential lead time concern would be further lessened if the agency is underestimating future EV market penetration, as EPA admits is a possibility. 24 The additional 10 grams per mile stringency would help automakers reach President Biden’s goal of 50% of new vehicle sales being electric by 2030,25 and it would put the US light duty vehicle fleet on track to meet 100% EV sales by 2035, a crucial target to achieve compliance with the Paris Agreement. By contrast, weaker standards would necessitate steeper annual improvements in later years to meet the same targets.

Though Alternative 2 Plus outperforms Alternative 2 in many ways, it too should be further improved. EPA needs to begin to lay the groundwork to an all-electric future in order to further spur development of EV technology. To meet the demands of the climate emergency, the country needs 100% of vehicles sales to be electric by at least 2035, and even better, by 2030. EPA should begin to set the stage for this future now by analyzing paths of annual stringency increase that reach zero emissions by both 2030 and 2035.

In 2019, transportation emissions accounted for 37.5% of U.S. CO2 emissions, the largest share of any sector, of which 57.7% came from passenger cars and light duty trucks.26 These vehicles cannot simply be swapped for EVs in 2050, and new vehicle technologies are often slowly adopted. A 2019 study found that if new vehicle technology, such as electric vehicles, is immediately adopted and incorporated into 100% of all new vehicle sales, it will still only be present in 90% of the on-road vehicle fleet in 20 years.27 Another recent study further concluded that immediately phasing out all fossil fuel technology at the end of its design lifetime would preserve only a 64% chance of limiting global temperature rise below 1.5â„ƒ.28 Thus, even a future with 100% ZEV sales in 2030 might still not be enough to meet the Paris Agreement's 1.5â„ƒ goal due to long lived ICEVs that would continue to emit carbon pollution for decades.

We have laid out the case for a 100% ZEV future in a past comment letter.29 We urge EPA to begin modeling the pathways to this future now. [EPA-HQ-OAR-2021-0208-0270-A1, pp.4-5]

23 The alternative '10 g/mile in MY2026 beyond Alternative 2' run was modeled by revising the Scenarios input files for EPA runs 7 and 8 (the Agency's Alternative 2 runs). In the Scenarios input file, only the CAFE standard coefficients A, B, C, and D were changed for model years 2026 through 2032 (effectively replacing the Alternative 2 coefficients for those same model years). The revised inputs were developed to produce a precise 10g reduction in the effective car and truck standards (and thus the same reduction in the overall fleet) and were set as follows for cars: A=68.74545094, B=51.40090295, C=0.000327233, and D=0.001129867; and for trucks: A=55.1193845, B=33.07946016, C=0.000366297, and D=0.00312426. All other CAFE model inputs were left unchanged, and all model runs and post-processing steps were performed identically to those of EPA's Alternative 2 evaluation.

Commenter: Center for Biological Diversity, et al.

There is Sufficient Lead-time for Automakers to Comply with Either EPA's Proposed Standard or with Alternative 2.

EPA's vehicular emission standards "shall take effect after such period as the Administrator finds necessary to permit the development and application of the requisite technology, giving appropriate consideration to the cost of compliance within such period." 42 U.S.C. § 7521(a)(2). The phrase cost of compliance "encompasses only the cost to the motor vehicle industry to come into compliance with the new emission standards." Coal. for Responsible Regulation v. EPA, 684 F.3d 102, 128 (D.C. Cir. 2012), rev'd in part on other grounds sub nom. Util. Air Regulatory Grp. v. EPA, 573 U.S. 302 (2014). Given the state of technology development and application and available compliance pathways, the agency would be compelled in this instance to find that automakers need no "period" of lead time to comply with Alternative 2. For the same reasons, it is also the case that no period is needed prior to implementation of EPA's proposed standards.

First, the emission-reduction technologies needed to comply with Alternative 2 for MY2023-2026 already have been developed and applied in each category of vehicles to which those standards would apply. The requisite technologies were "developed in response to EPA's 2012 GHG standards rulemaking for MYs 2017-2025." Proposal, 86 Fed. Reg. at 43,782. Indeed, even when EPA decided in the 2020 Final Rule to weaken the standards set in 2012, the agency acknowledged that "the technologies projected to be used to meet" the 2012 Final Rule were by then already "available and in production." 85 Fed. Reg. at 25,108. [EPA-HQ-OAR-2021-0208-0651-A1, p. 24]

Second, automakers already hold a vast reserve of tradeable compliance "credits" available to facilitate compliance with standards for MY2023-2026.68 Trading of credits, especially credits on the verge of expiring (and becoming worthless), is a well-established practice.69 In fact, automakers already have traded large quantities of credits that, under more stringent standards, could be utilized toward compliance in MY2023 and MY2024. And automakers' reliance on their own banked credits to facilitate compliance is a longstanding and widespread practice.70 Automakers' practice of complying with EPA's GHG standards by using earned or acquired compliance credits is thus an essential part of the agency's Section 202(a)(2) analysis.

Automakers' credit reserve is now so massive that if EPA were to adopt Alternative 2, all automakers could comply with MY2023 without changing their vehicle fleets at all in response to the finalization of Alternative 2. In fact, the credit reserve is large enough that this is true for both Alternative 2 and the proposal even without the proposed extension of credit lifetimes. The analysis conducted by Dr. David Cooke of the Union of Concerned Scientists demonstrates this by preventing the Volpe model from deploying new technology for MY2023 beyond levels consistent with the 2020 Final Rule and, in the case of automakers that joined the agreement with the California Air Resources Board, the trajectory contained in that agreement. See Comments of Dr. David Cooke, to be filed in docket EPA-HQ-OAR-2021-0208 on Sept. 27, 2021. In those model runs, Dr. Cooke found that all automakers not in the voluntary agreement could comply with EPA's new standards through MY2023 by doing no more than the following: trading credits among themselves and reducing tailpipe GHG emissions consistent with the trend line the 2020 Final Rule imposes for MY2021-2023. Dr. Cooke's analysis assumed that automakers not party to the voluntary agreement with California would utilize the optimal mix of new technologies and banked credits in order to comply with the 2020 Final Rule standards in 2021, 2022 and 2023 and further assumed, when modeling compliance in those years, that the 2020 Final Rule standards remained in effect through MY2026. Automakers that are party to the voluntary agreement complied with that agreement in Dr. Cooke's modeling.

Importantly, use of credit banks to comply with Alternative 2 for MY2023 would still leave additional banked credits available for automakers who decide to use them in later years. Indeed, in MY 2024, Dr. Cooke's analysis suggests that automakers would use a mix of banked credits remaining following MY 2023 and increased deployment of technology on the portion of each manufacturer's fleet that the Volpe model determined would get a major or minor redesign as part of the automakers' normal product development cycle. There is a sufficient period prior to MY 2024 that automakers can reasonably add additional technologies for that model year. But the banked credits that remain available means that automakers are not required to install sufficient technologies in MY2024 to achieve the standards for that year but can comply by using a mix of additional banked credits and technology. The same is true for model years 2025 and 2026.

Importantly, Dr. Cooke's analysis does not account for the fact that prior to 2020 automakers were planning to comply with the stronger standards adopted in 2012 and very likely retained most or some of their plans to improve their fleets in line with those standards even following adoption of the 2020 Final Rule. Nor does Dr. Cooke's analysis reflect automakers' current trends toward electrification that will only facilitate compliance with strong GHG standards. In fact, auto sector analysts at Bank of America published a report in June 2021, prior to EPA's proposal, indicating that automakers are expected to introduce 50% more new models starting in MY 2022 and continuing through MY2025 compared to the historic average number of new models, and that sixty percent of the new models are expected to be electric vehicles, hybrid vehicles or fuel cell vehicles.71 This increase in the number of new models and the percentage of advanced powertrains likely reflects automakers' plans to comply with the 2012 Rule standards in place prior to the 2020 Rule, and in any event shows automakers' existing plans to improve the performance of their fleets, especially in 2022 and beyond. This analysis indicates that the industry is on a better trajectory than that assumed in Dr. Cooke's modeling analysis.

Dr. Cooke's analysis also does not include several immediately available means by which automakers can improve the greenhouse gas performance of their fleet. These include adding features that do not require much if any lead time such as applying already approved off-cycle technologies to more of their vehicles and prioritizing sales of the least emitting vehicles within an automaker's fleet.

In light of the credit banks and other compliance options available, finalizing EPA's Proposed MY2023-2026 Standards even on the (theoretical) eve of MY2023 would comport with CAA Section 202(a)(2).72 In this case, there are multiple compliance options available to automakers, including not changing their plans at all through 2023 and utilizing available credits. No waiting "period" can be "necessary" if the pace of "application of the requisite technology" to comply, 42 U.S.C. § 7521(a)(2), will not require any additional technology beyond those that would be deployed under the pre-existing standards. That is especially so where the 1.5 percent annual improvement required by the existing 2020 Rule standards falls well short of the 5 percent annual improvement that automakers long expected the law would require of them in MY2023-2025.

Section 202(a)(2) notably differs from other provisions—including other provisions of the same statutory subsection—in that it does not prescribe a minimum period before new or revised standards can take effect. Cf. 42 U.S.C. § 7521(a)(3)(C) (four model years); 49 U.S.C. § 32902(a) & (g)(2) (18 months). And there is substantial precedent for EPA finding that no lead time, or very little lead time, is needed before new or stronger standards may take effect under Section 202(a)(2). E.g., 48 Fed. Reg. 1,148 (Jan. 12, 1983) (imposing new standards for model year 10 days after model year might have begun); 45 Fed. Reg. 66,984 (Oct. 8, 1980) (providing 2 months' lead time before model year could commence); 42 Fed. Reg. 45,132 (Sep. 8, 1977) (3 months); 38 Fed. Reg. 21,362 (Aug. 7, 1973) (4 months); 38 Fed. Reg. 21,348 (Aug. 7, 1973) (same); 35 Fed. Reg. 17,288 (Nov. 10, 1970) (1 month). In those instances, as here, EPA's prompt imposition of new or stronger standards was warranted by the absence, or relative modesty, of shifts in product development required of automakers in the near term. Cf. 69 Fed. Reg. 38,958, 38,996 (June 29, 2004) (explaining that credit averaging, banking, and trading "allows the manufacturer to adjust [its] compliance schedule … without special delays or exceptions having to be written into the rule" under CAA Section 213; such a rule "shall take effect at the earliest possible date considering the lead time necessary to permit the development and application of the requisite technology, giving appropriate consideration to the cost of compliance within such period and energy and safety," 42 U.S.C. § 7547(b)).

As for the later model years of EPA's proposed standards (MY2025 and MY2026), given that the requisite emission-reduction technology is and has long been available and applied in a wide variety of vehicles, there is ample lead time for automakers to apply as much of that technology as is required to meet the standards for those model years, even taking into account the standard product-development cycles for light-duty vehicles. Cf. 49 U.S.C. § 32902(a) & (g)(2) (requiring 18 months' lead time for fuel-economy standards for light-duty vehicles). In any event, recent announcements by automakers comprising a supermajority of the market presage far broader and deeper deployment of zero-emission and hybrid vehicles by MY2025.73

Finally, it should be emphasized that the foregoing analysis does not account for the demonstrated compliance strategy of automakers "borrowing" against credits they expect to earn through overcompliance in future model years. Specifically, EPA's program allows automakers to run deficits that they can satisfy by carrying back overcompliance credits from the subsequent three model years. See, e.g., Proposal, 86 Fed. Reg. at 43,753. The credit borrowing provisions mean that any automaker that does not wish to comply in MY2023 by obtaining or using credits from existing credit banks or by raising its fleet average by applying technologies or promoting its lowest emitting vehicles, can also comply by borrowing credits from future model years. That strategy further lengthens the effective period before automakers need to come into compliance with the proposed standards and further underscores that Section 202(a)(2) does not require any delay in the effective date of EPA's rulemaking revising MY2023-2026 standards. [EPA-HQ-OAR-2021-0208-0651-A1, p. 24-27]

EPA should adopt mechanisms to maximize GHG reductions across the fleet to guard against the effects of underestimating EV penetrations.

Like in the case of an unanticipated vehicle mix shift described in the previous section, an unanticipated growth in EV adoption could lead to fewer GHG reductions than projected by the agency.

If EPA has significantly underestimated EV deployment when designing standards, then compliance with the standards could be achieved without improvements to internal combustion engine vehicles (ICEVs) and even backsliding in ICEV emissions performance. This could be the case in the MY 2023-2026 proposal and alternatives, as noted in Comments of the World Resources Institute. 187

For example, the proposal's MY 2027 standard of 171 g/mile is projected to be met with EV sales of 7.8%. This implies that ICEVs need to achieve 185 g/mile, assuming all EVs have a compliance value of 0 g/mile. If EV sales are instead 19.0% in MY 2026—as projected in a recent analysis by the Rhodium Group based on current policy188—then ICE vehicles could emit as much as 211 g/mile. This shift would also increase fuel costs for ICEV owners. Under the higher EV scenario, an owner of a MY 2026 ICEV rated at 211 g/mile can be expected to spend an additional $1,731 at the gas pump compared to owning an ICEV rated at 185 g/mile over 200,000 miles of driving with gasoline priced at $3.00 per gallon. [EPA-HQ-OAR-2021-0208-0651-A1, p. 77]

Commenters welcome and strongly support EPA's reconsideration of its 2020 rule concerning greenhouse gas emission standards for model years (MY) 2021-2026 passenger cars and light trucks (the 2020 Final Rule). We urge the agency to reverse that indefensible rule and instead finalize the most stringent standard it has considered in the Proposal. [EPA-HQ-OAR-2021-0208-0651-A1, p. 6]

I support the Administration's action on cleaner cars and urge the EPA to adopt the second alternative that would deliver savings to consumers, eliminate loopholes, and, most importantly, reduce pollution and greenhouse gases.

Each of the alternatives EPA presents in the Proposal is entirely feasible, and we urge EPA to finalize the most stringent one: Alternative 2, with the addition of 10 grams per mile in MY 2026. Automakers are well-positioned for compliance through MY 2026. Nearly a decade ago, EPA had already found, correctly, that the requisite technology was available and cost effective; it validated that finding in 2016, noting that the task had become easier as costs had declined. Today these technologies are in wide use in many types of vehicles. Also nearly a decade ago, automakers themselves agreed to reach the 2012 Final Rule’s annual stringency increases by 2025. They have been planning to do so ever since and have stated that they did not rely on the 2020 Final Rule to delay those plans and actions. Beyond that, since the 2020 Rule became final, many automakers have fully committed themselves to tens of billions in additional investments and aim to build only zero or near-zero emissions vehicles by 2035, plans that must necessarily include significant stringency increases now and that will very likely result in many more EVs than EPA projects. On top of that, automakers already have a glut of credits available to help smooth out any remaining lead time concerns, and can earn more by outperforming the minimal standards of the 2020 Final Rule through MY 2022.

There is no doubt that the most stringent proposed alternative is urgently needed in light of the climate crisis, that it is eminently feasible, and that its many benefits will exceed its costs both at the societal level and for consumers, who will save money at the pump. This alternative also produces benefits that far outstrip those of the others. EPA should finalize it as quickly as possible. [EPA-HQ-OAR-2021-0208-0651-A1, p. 6-7]

EPA must adopt stronger standards than its preferred alternative.

Given the urgency of the climate crisis detailed in Section 1 above, EPA should adopt its more stringent alternative, Alternative 2, which mirrors the 2012 standards in stringency for Model Years 2023 through 2025 and extends the same annual trajectory to MY 2026. Proposal, 86 Fed. Reg. at 43,738. In addition, EPA should add the additional 10 grams per mile of stringency to MY 2026 (hereinafter “Alternative 2 plus”). Even if EPA were to adopt its proposed alternative in lieu of Alternative 2, EPA should add the additional 10 grams per mile of stringency to MY 2026.

EPA concludes that Alternative 2 “may be feasible” and that “[s]everal arguments can be made in support of Alternative 2 that are similar to those that support the proposed standards.” Id. at 43,777. Indeed, most, if not all, of the agency’s justifications for its main proposal are equally, if not more, applicable to Alternative 2. EPA cites only “lead time” as a potential reason not to use Alternative 2 as its preferred alternative. Id. This concern is unfounded, for the reasons discussed below. See infra Section 5. Automakers have had nearly a decade of notice that they would have to comply with Alternative 2’s standards for MY 2023 - 2025. Lead time concerns should not deter EPA from quickly reverting to the 2012 standards in the current rule. [EPA-HQ-OAR-2021-0208-0651-A1, p. 19-20]

Costs and Benefits of Alternative 2 and the Proposal

EPA acknowledges that Alternative 2 surpasses the Proposal across virtually every metric, and that it will result in at least $40 billion additional net benefits. DRIA at xvii, Tbl. 4; xxv, Tbl. 12. As compared to the Proposal, by 2050 Alternative 2 will save 110 MMT of upstream CO2, as well as 183 MMT of tailpipe CO2, for a total of 293 MMT of CO2 savings. DRIA at 5-1, Tbl. 5-1; 5-3, Tbl. 5-3.62 In addition to these significant CO2 reductions, Alternative 2 is superior on overall climate benefits, calculations which take into account the social cost of CO2, CH4, and N2O. The Proposal would produce climate benefits of $91 billion by 2050, while Alternative 2 would generate $100 billion—a difference of $9 billion. DRIA at 3-39, Tbl. 3-14; 3-41, Tbl. 3-16.

Aside from greenhouse gases, EPA also notes the health and environmental benefits of Alternative 2 that result from reduced emissions of and exposure to criteria pollutants and airborne toxics. By 2050, Alternative 2 would save at least $7.2 billion across these categories, including fewer hospital admissions, fewer respiratory conditions, and fewer lost work days. DRIA at 7-26, Tbl. 7-5; 7-28, Tbl. 7-7. Notably, these benefits “do not include the full complement of health and environmental effects that, if quantified and monetized, would increase the total monetized benefits.” DRIA at xvii, Tbl. 4, note (e). EPA omitted PM2.5 environmental impacts, as well as health and environmental impacts from ozone, nitrogen dioxide (NO2), sulfur dioxide, visibility improvements, ecosystem benefits, and air toxics impacts. DRIA 7-4. These omitted impacts include, but are not limited to, PM2.5 induced cancer and emergency department visits for cardiovascular issues, ozone induced premature respiratory mortality, NO2 induced premature mortality, increased vegetation mortality, acid deposition, and coastal eutrophication. DRIA, Tables 7-1, 7-2 & 7-3. We encourage EPA to model these impacts further in future rulemakings, but in any event, the benefits of

Alternative 2 clearly exceed those EPA now assumes by a considerable margin. Alternative 2 also outshines the Proposal with regards to consumer benefits. Because both the Proposal and Alternative 2 will be more stringent than the 2020 Final Rule standards, EPA predicts that consumers will spend less on gasoline (and more on electricity) in the coming years. By 2050 consumer fuel savings would be $310 billion under the Proposal, compared with $360 billion under Alternative 2, a $50 billion difference. DRIA at 6-5, Tbl. 6-4; xxv, Tbl. 12. Alternative 2 would also result in consumption of 486 million fewer barrels of gasoline by 2050. DRIA at 5-7, Tbl. 5-7; 5-9, Tbl. 5-9. [EPA-HQ-OAR-2021-0208-0651-A1, p. 20]

EPA has also quantified the non-emission benefits from the rebound effect (the increase in driving resulting from reduced operating costs), changes in refueling time, and energy security benefits from reduced dependence on foreign petroleum. EPA projected non-emission benefits for the Proposal to be $35 billion through 2050, while Alternative 2 would generate $53 billion—a difference of $18 billion. DRIA, Tables 6-8, 6-10.

EPA's cost analysis of Alternative 2 is mixed. On one hand, compliance with the stronger rule would cost automakers less per vehicle. In 2026, the fleet average cost per vehicle is $1,044 under the Proposal and $1,030 for Alternative 2. DRIA, Tables 4-16, 4-20. On the other hand, EPA calculates the overall costs of Alternative 2 —from foregone consumer surplus, adoption of emissions technology, and increased congestion, noise, fatalities, and non-fatal crashes—as higher than the Proposal ($290 billion compared to the Proposal's $240 billion). DRIA at 6-2, Tbl. 6-1; 6-4, Tbl. 6-3. However, these additional costs are more than offset by Alternative 2's higher benefits. Net benefits reflect fuel savings plus benefits minus costs. EPA projects that through 2050, the Proposal has a net benefit of $140 billion, compared with Alternative 2's net benefit of $180 billion. The cumulative weight of costs and benefits is unambiguous: Alternative 2 outranks the Proposal across virtually every metric, and would result in at least $40 billion more in net benefits. DRIA at xvii, Tbl. 4; xxv, Tbl. 12. [EPA-HQ-OAR-2021-0208-0651-A1, p. 21]

For these reasons, EPA should adopt Alternative 2. By EPA's own calculations, Alternative 2 would produce greater benefits under each category analyzed and greater net benefits than the Proposal. Despite this, EPA has not performed a direct comparison of the costs and benefits of the Proposal and Alternative 2, noting only that "the total benefits [of both the Proposal and Alternative 2] far exceed the total costs" of both programs. Proposal, 86 Fed. Reg. at 43,741. EPA should provide that comparison and follow its work to its logical conclusion: that Alternative 2 produces superior benefits across every metric. Alternative 2 plus would further increase those benefits, as explained infra. [EPA-HQ-OAR-2021-0208-0651-A1, p. 21]

Feasibility of Alternative 2

While EPA notes that reaching Alternative 2's standards "may be feasible" for the same reasons it considers the Proposal to be feasible, the agency prefers the less beneficial Proposal because it provides a "more gradual transition to the 2012 [rule] trajectory," which "may be appropriate taking into consideration lead time." Proposal, 86 Fed. Reg. at 43,777. However, EPA's stated arguments in support of the Proposal's feasibility provide nearly equal support for Alternative 2.

To start, EPA notes that "the ability of the industry to commit to revised plans based on the 2020 Rule's relaxed standards, especially for MYs 2023 and later, has been highly uncertain in light of pending litigation." Id. at 43,782. Indeed, given the eight years between the finalization of the 2012 standards and the 2020 Final Rule, automakers' own statements indicate that they likely continued to follow pathways for compliance with the 2012 Final Rule,64 and, in light of the immediately pending litigation about the 2020 Final Rule, they are not likely to have changed much, if at all, since 2020.

EPA also notes that any change since 2020 would be easily reversible: "Although we do not believe that automakers have significantly changed their product plans in response to the 2020 Final Rule, any that did would have done so relatively recently and there is reason to expect that, for any automakers that changed their plans after the 2020 Final Rule, the automakers' earlier plans could be reinstated or adapted with little change." Proposal, 86 Fed. Reg. at 43,782. Moreover, "some automakers may have adopted product plans to overcomply with the prior, more stringent standards, with the intention of selling credits to other automakers." Id.

In sum, EPA's observations all underscore the feasibility of Alternative 2 and support the conclusion that it has a higher net benefit than the Proposal. EPA also acknowledges why lead time concerns should not be a barrier to implementing Alternative 2, which is only slightly more stringent than the Proposal itself. In light of the lack of distinction between the relative feasibilities of the Proposal and Alternative 2, EPA should conclude that the more stringent approach needs no additional lead time. Given that both the Proposal and Alternative 2 are feasible, and that EPA itself does not believe lead time is a concern, EPA should instead at a minimum adopt Alternative 2. [EPA-HQ-OAR-2021-0208-0651-A1, p. 21-22]

Alternative 2 Plus

Commenters strongly urge EPA to add 10 g/mile of stringency to MY 2026, as a stronger rule would increase all of the benefits described above and put the industry on a more secure path to full electrification over the coming years. According to an independent analysis by Dan Meszler, Alternative 2 Plus would confer an additional $20 billion of net benefits by 2050 (with a 3% discount rate), including an additional $82 billion in pre-tax fuel savings and an additional $27 billion in criteria and GHG emissions benefits.65

Importantly, EPA should add 10 g/mile to MY 2026 even if it were to decide not to adopt Alternative 2. There are no lead time concerns with this option, as MY 2026 would be at least three years from the finalization of the current rule. Also, based on many automakers' announced plans, there will likely be an even higher EV penetration in MY 2026 than EPA currently forecasts. For example, General Motors has pledged to be 100% electric by 2035, Ford has announced that 40% of its fleet will be electric by 2030, and Stellantis (formerly Fiat-Chrysler) promises to offer an electrified variant for every new model released from now until 2025.66 Those targets drive automakers by themselves to reach significantly increased EV market penetration by MY 2026. And indeed, these automakers echoed President Biden's commitment in August 2021 that 50% of all new vehicle sales be electric by 2030.67

These pronouncements have reached the agency: "EPA has also heard from a wide range of stakeholders over the past several months, including but not limited to the automotive manufacturers and the automotive suppliers, that the significant investments being made now to develop and launch new EV product offerings and in the expansion of EV charging infrastructure could enable higher levels of EV penetration to occur in the marketplace by the MY 2026 time frame than EPA has projected in this Proposal for both the proposed MY 2026 standards and the Alternative 2 MY 2026 standards." Proposal, 86 Fed. Reg. at 43,738. EPA should not set too low of a bar in the current rule, when the industry is poised to make a significant jump in the coming years in any event and the planet is in peril.

Adding 10 g/mile to Alternative 2 would also put the vehicle fleet on a steadier path to achieving 100% electrification by 2035, which climate science confirms is the latest acceptable date for reaching that benchmark. Manufacturers would face a gentler slope of improvement to reach 100% ZEV sales by 2035 than if the substantial improvements start with the next rule, which would require steeper annual improvements to reach the same target. Instead, a gradual rate of improvement, completed over more years, would ease the pathway to electrification, rather than requiring a very large jump in MY 2027. This approach requires that there be a significant step forward from the 2012 Final Rule standards in MY 2026. For these reasons, commenters urge EPA to solidify the path to full electrification by adding 10 g/mile of stringency to Alternative 2 in MY 2026. [EPA-HQ-OAR-2021-0208-0651-A1, p. 23-24]

62 This and the following calculations in this section assumes a 3% discount rate, as calculated by EPA.

65 The alternative “10 g/mile in MY2026 beyond Alternative 2” run was modeled by revising the Scenarios input files for EPA runs 7 and 8 (the Agency's Alternative 2 runs). In the Scenarios input file, only the CAFE standard coefficients A, B, C, and D were changed for model years 2026 through 2032 (effectively replacing the Alternative 2 coefficients for those same model years). The revised inputs were developed to produce a precise 10g reduction in the effective car and truck standards (and thus the same reduction in the overall fleet) and were set as follows for cars: A=68.74545094, B=51.40090295, C=0.000327233, and D=0.001129867; and for trucks: A=55.1193845, B=33.07946016, C=0.000366297, and D=0.00312426. All other CAFE model inputs were left unchanged, and all model runs and post-processing steps were performed identically to those of EPA's Alternative 2 evaluation.

Commenter: Center for Climate and Energy Solutions (C2ES)

C2ES welcomes the proposed greenhouse gas emissions standards for passenger cars and light trucks and supports the expedient reinstatement of standards that are significantly more stringent than the SAFE rule. That said, in order to keep the nation on track to meet mid-century decarbonization goals, the standards should be at least as stringent, if not more so, than proposed in Alternative 2, and Alternative 1 should be eliminated as a feasible option. The current rate of emissions reductions is not sufficient to negate light-duty vehicle emissions in the United States by 2050 without significant acceleration of this rate of year-over-year change in subsequent standards. If EPA determines that Alternative 2 is more stringent than appropriate for model year (MY) 2023, given the relatively short lead time between the implementation of the SAFE rule and the year this proposal would go into effect, C2ES suggests that EPA consider an intermediate approach that would start at the proposed standard in MY 2023 but lower the gram per mile (g/mile) standard (i.e., increase stringency) more rapidly than in the proposed approach, in order to reach the same level of stringency in MY 2026 as under Alternative 2. Regardless of whether EPA finalizes C2ES’s proposed approach, Alternative 2, or something in between, in subsequent EPA rulemakings, standards beginning in MY 2027 should follow a more accelerated rate of change to be consistent with a target of 100 percent reductions in tailpipe greenhouse gas emissions from new light-duty vehicles by 2035. [EPA-HQ-OAR-2021-0208-0287-A1, p.2]

C2ES believes that the proposed standards, along with Alternative 2, represent a return to the approximate level of ambition displayed by the 2012 Final Rule and will drive emissions reductions from the light-duty vehicle fleet; however, alone they are not sufficient to put the United States on a path to net-zero by 2050. C2ES recommends that EPA adopt the standards presented in Alternative 2, or if EPA determines these are more stringent than technologically feasible for automakers to meet in MY 2023 given the relatively short lead time, an intermediate approach that would start at the proposed standard in MY 2023 but reach the same stringency in MY 2026 as in Alternative 2. [EPA-HQ-OAR-2021-0208-0287-A1, p.4]

EPA should set the emissions standards at a stringent enough level to preserve ambition while still allowing this flexibility. Lowering the MY 2026 fleet average target levels five to 10 g/mile below the current level proposed would support increased ambition and prepare the auto industry for more ambitious targets beginning in MY 2027, while preparing the national fleet to meet the decarbonization challenge ahead. [EPA-HQ-OAR-2021-0208-0287-A1, p.4]

Commenter: CERES

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, p. 82.]

I'm here today to testify in support of the Biden Administration's Alternative 2 Proposal for updating the SAFE 2 regulations.

The U.S.'s ability to meet climate goals and the future competitiveness of the U.S. auto industry are both contingent on strong vehicle standards and a rapid shift to low-emission vehicles and electrification, and Alternative 2 comes closest to realizing those goals.

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, p. 83.]

We strongly support EPA adopting the strongest possible emissions standards and see this as a first of many steps it should take to reduce transportation emissions.

As you know, commercial vehicles are a major driver of emissions and transportation emissions disproportionately impact low-income and communities of color.

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, p. 84.]

The stronger standards represented by Alternative 2 will accelerate the cost-effective deployment of fuel-efficient commercial vehicles, allow our members to meet financial and climate goals, and significantly reduce fuel costs for businesses and consumers.

We applaud EPA and the Biden Administration for these initial steps.

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

I write to urge you to adopt the most stringent proposal - Alternative 2 - to replace the SAFE Part II regulations adopted by the Trump Administration. [EPA-HQ-OAR-2021-0208-0273-A1][p.1]

The recent IPCC report, which was characterized as a 'code red for humanity' by UN Secretary-General Guterres, underscores the urgency of drastically reducing greenhouse gas (GHG) emissions in the next decade. Given that the transportation sector is the largest source of U.S. GHG emissions, strong standards are critical to meeting U.S. climate goals. In order for our member companies to meet their own climate goals and commitments, strong policy is needed to ensure sectoral change, and ensure the availability of clean vehicles across the U.S., as well as drive the necessary shift to electrification. Adopting standards at least as stringent as Alternative 2 will be necessary to ensure this critical transition. [EPA-HQ-OAR-2021-0208-0273-A1][p.1]

Our members see climate change as a significant business risk, and reducing GHGs as a major economic opportunity. They recognize that strong standards will serve to mitigate the economic risks associated with our continuing dependence on oil. In light of the volatility of fuel prices, strong standards are needed in order to reduce transportation costs for businesses and consumers; and electric vehicles will reduce operating and maintenance costs in addition to providing important air quality benefits, especially in disadvantaged communities. In addition, given the important role of strong standards in driving innovation, strong standards will also help ensure the global competitiveness of the U.S. industry. [EPA-HQ-OAR-2021-0208-0273-A1][p.1]

A recent analysis [1] commissioned by Ceres and produced by independent automotive industry analysts finds that strong standards would benefit the U.S. auto industry. Specifically, strong standards would make automakers more globally competitive, and reduce risk in the event of future fuel price spikes. Strong standards would especially benefit auto suppliers, which account for about 78% of auto industry jobs. [EPA-HQ-OAR-2021-0208-0273-A1][p.1]

Finally, standards driving EV production will not only benefit U.S. suppliers in particular, but also provide incentives to build a robust domestic EV supply chain, which is critical to job growth. [EPA-HQ-OAR-2021-0208-0273-A1][p.2]

I urge EPA to adopt regulations at least as stringent as the Alternative 2 proposal. We also urge EPA to ensure that the next round of standards ensure at least 60% reduction in emissions, and at least 50% EV sales by 2030, in order to put the industry on a glide path to 100% EV sales by 2035 at the latest. [EPA-HQ-OAR-2021-0208-0273-A1][p.2]

Commenter: Chun, Mark

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, pp. 250-251.]

Today, I'm testifying to urge the EPA to adopt Alternative Number 2.

Alternative 2 drives customers to make decisions not only for lofty global warming aspirations but, more importantly, the basic pocketbook. Federal plus state incentives can level the playing field against nice cars plus provide gateways to the every-day low-to-middle-income families.

We need to enforce higher standards to address immediate global warming concerns as soon as possible.

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, p. 252.]

Next, we need to mandate the automakers to do the right thing for our environment by legislating a pathway to compliance and not leave it to their own means.

Finally, let's ensure USA takes the leading role amongst the global community by setting the bar to ensure success.

Commenter: City of Albuquerque, NM

Further, the City supports the benefits of more stringent emissions standards, as they will:Be cost effective as the total benefits of more stringent standards far exceed the total cost of the program; [EPA-HQ-OAR-2021-0208-0535-A1, p.2]

Recommending EPA adopt the standards in Alternative 2,[1] which will decrease the fleet average CO2 target level to 169 g/mile by model year 2026 ('MY2026'); 2. Recommending EPA increase the stringency of the fleet average compliance CO2 targets for MY2026 by 10 g/mile more than the proposed rules (Table 8 and Figure 2);[2].

Commenter: City of San Antonio, Texas

While the Model Year (MY) 2024-2026 standards are proposed at a level of 5 percent per year, the City of San Antonio recommends the MY 2024-2026 standards continue at 10 percent as proposed through MY 2023. In addition, the City of San Antonio also recommends the mix of Electric Vehicles/Plug-in Hybrid Electric Vehicle's (EV/PHEV) at a level of 10 percent compared to the 8 percent that is proposed in the base revision. These recommendations will have long-lasting health benefits. [EPA-HQ-OAR-2021-0208-0236-A1, p.1]

Commenter: Climate Group EV100

At a minimum, the US must implement Alternative #2. Compared to the current US EPA proposed standards, Alternative #2 is a safer, more beneficial option for both the climate and consumers.

Clean car standards must not be undermined by complex credit schemes that reward automakers for emission reductions on paper that are not reflected in real-world performance. Without stronger clean car standards, the US will not meet its Nationally Determined Contribution (NDC) of 50-52% emission reductions below 2005 levels by 2030 or achieve net-zero emissions by no later than 2050. [EPA-HQ-OAR-2021-0208-0200-A1, p. 1]

Alternative #2 would put 400,000 extra EVs on the road by 2026 and eliminate 130 million metric tons of greenhouse gas emissions. It would also save American drivers a total of $150-290 billion in fuel savings through 2050. [EPA-HQ-OAR-2021-0208-0200-A1, p. 1]

We urge the US Environmental Protection Agency (EPA) to set the strongest possible clean car standards for vehicle model years 2023-2026 to achieve 100% of all new passenger car and truck sales to be zero-emission ideally by 2030. We appreciate that the Biden-Harris Administration is following through on its promise to reverse clean car standard rollbacks from the previous administration. Additionally, we're pleased to see President Biden send the correct market signals that electric vehicles (EVs) are the future. However, we need stronger, more ambitious action. Stronger clean car standards ensure automakers produce more efficient vehicles and market them to all consumers. [EPA-HQ-OAR-2021-0208-0200-A1, p. 1]

Our members, which include leading US employers, directly support establishing strong vehicle standards designed to achieve 100% zero-emission vehicle sales for new passenger cars and trucks ideally by 2030. [EPA-HQ-OAR-2021-0208-0200-A1, p. 1]

Ultimately, the US EPA must act to make clean car standards as strong and comprehensive as possible, which would be a win for the American people and all those looking to spur job creation, economic growth, family cost savings, and public health protection at a time when we most need it. [EPA-HQ-OAR-2021-0208-0200-A1, pp. 1-2]

Commenter: Collins, Molly

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, p. 231.]

I wanted to share my story with you today and ask you to commit to making the strongest possible clean car standards so that my two kids and my community can breathe easier.

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, p. 232.]

We have the tools to begin to address these issues. The EPA must finalize the rule this year and ensure that these standards result in real-world reductions in greenhouse gas emissions.

Commenter: Competitive Enterprise Institute (CEI)

In addition, EPA has ignored the more lenient regulatory alternatives that were proposed by CEI and others in the SAFE rulemaking. It has instead set an arbitrary limit to the range of alternatives that it will consider in this rulemaking. The illegality of this approach warrants that EPA initiate a new rulemaking. [EPA-HQ-OAR-2021-0208-0652-A1, p. 2]

EPA Has Arbitrarily Restricted the Range of Alternatives that It Is Considering

EPA states that it will not consider alternatives less stringent than the California Framework: 'EPA views the California Framework as a reasonable basis for the least stringent alternative that EPA would consider finalizing, since it represents a level of stringency that five manufacturers have already committed to achieving.' 86 FR 43737-38; see also 86 FR 43766. However, the fact that five carmakers have committed to meeting this standard says little about whether it satisfies all the appropriate criteria, which include health and safety.

Similarly, Walter Kreucher, an individual petitioner in CEI v. NHTSA, proposed in his SAFE comments that the agencies keep the standards at the 2016 level, and impose only modest stringency increases for the three model years after that. 85 FR 24257. And several other commenters in that proceeding, such as Borg Warner and the Alliance for Vehicle Efficiency, argued for lowering the CAFE baseline to what the auto industry had actually achieved in MY 2018. Id. EPA should examine these proposals rather than artificially limit the scope of the alternatives that it is considering.

EPA's use of the California Framework to limit the alternatives open to public comment has skewed this proceeding from the outset. It should abandon this limit and issue a new notice of proposed rulemaking, inviting public comment on a far broader range of regulatory alternatives. [EPA-HQ-OAR-2021-0208-0652-A1, p. 8]

Commenter: Connecticut Department of Energy and Environmental Protection

CTDEEP believes that at a minimum, EPA must restore sufficiently stringent GHG emission standards as the National Clean Car Standards EPA adopted in 2012. These federal GHG emissions standards for MYs 2017 and later LDVs were developed based on an extensive record of scientific data and comprehensive technical analyses, and received overwhelming support from a wide-range of stakeholders. The automotive industry has planned accordingly for nearly a decade, and these GHG standards are readily achievable as evidenced by industry announcements and EPA's 'Consideration of Technological Feasibility and Leadtime'. [EPA-HQ-OAR-2021-0208-0264-A1, p.1]

EPA should at a minimum, adopt Alternative 2, augmented with a MY 2026 standard that is 10 grams/mile more stringent.[3]This option comes the closest to returning to more aggressive light-duty vehicle standards that are more in line with the 2012 National Clean Car Standards, and would establish a trajectory designed to meet the deployment goals established in President Biden's August 5, 2021 Executive Order 14037, 'Strengthening American Leadership on Clean Cars and Trucks' [4]. Many state and local jurisdictions, including Connecticut, were counting on the benefits of the 2012 rule. Nine years later, these reductions are still urgently needed. EPA should do everything possible to recapture those benefits – including those related to climate change, ground-level ozone and particulate matter. [EPA-HQ-OAR-2021-0208-0264-A1, p.2]

Commenter: Consumer Federation of America

While the EPA's proposed rule has made strides in correcting the dozens of fundamental errors made by the Trump administration, CFA urges the current administration to vigorously support the transition to electric vehicles (EVs). Given the current trajectory of fuel economy standards, over 100 million gasoline vehicles will still be sold before the full transition to EV's. Stronger fuel economy standards are just one way to help spur the transition, as setting high standards on the gasoline part of the fleet will speed the adoption of electric vehicles. Additionally, with a significant amount of the gain in efficiency seen in traditional internal combustion (ICE) vehicles – both in vehicle design and operation – these may be applicable to the electric portion of the fleet as well.

Second, it is critical to close the remaining loopholes, especially those that could allow the automakers to 'use' the electric vehicle part of their fleet to 'relax' the efficiency of the gasoline-powered part. This trade-off must not be allowed.

Establishing a national goal of transitioning to an all-electric fleet while simultaneously accelerating the transition of the electrical grid to cleaner renewable sources is essential. It is clear the current administration has recognized this and is working hard to move the country in this direction.

As our economic analysis shows, and the agency seems to agree, that these additional changes can be made with a net positive benefit-cost ratio. The total cost of driving for consumers will go down, measured by the pocketbook savings. Public health and environmental benefits will further increase an already positive benefit-cost ratio. By fully embracing the transition to EVs, Americans of all income levels will be better off at the end of the changeover. [EPA-HQ-OAR-2021-0208-0297-A1, p. 2]

Commenter: Consumer Reports (CR)

CR's own analysis finds that EPA's preferred alternative will only recover ~75% of the consumer and climate benefits of the original Obama-Biden standards.2 [EPA-HQ-OAR-2021-0208-0602-A1, p.4]

CR strongly supports the administration's stated goal of reducing greenhouse gas emissions from new vehicles by 60%, while achieving 50% electrification by 2030.3 Achieving this goal would result in over $1 trillion in consumer savings while reducing emissions by 10 gigatons through 2050.4 Unfortunately, EPA's preferred alternative will leave the US fleet off the pace to achieve this important goal. [EPA-HQ-OAR-2021-0208-0602-A1, p.4]

Consumer Reports asks EPA to increase the stringency of their proposal such that it achieves similar consumer savings through model year 2026 as the original 2012 Obama-Biden standards would have achieved, while putting the US fleet on track to achieve President Biden's climate commitments.5 [EPA-HQ-OAR-2021-0208-0602-A1, p.4]

In order to achieve these goals CR provides the following recommendations for strengthening the standard:

1) Adopt Alternative 2 stringency from MY23-25

2) Increase the stringency of the standard in 2026 by 10 g/mi beyond Alternative 2 [EPA-HQ-OAR-2021-0208-0602-A1, pp.4-5]

EPA's own analysis shows that Alternative 2 will result in greater net benefits and CR's own analysis comes to the same conclusion. This alternative essentially matches the stringency of the original Obama-Biden standards for MY23-25, which automakers already agreed to almost a decade ago and were planning to comply with up until the SAFE rule was finalized last year. Furthermore, trends have shown that declining compliance costs, and growth in electrification will make meeting this level of stringency even easier. There is no strong justification for setting a standard weaker than Alternative 2. [EPA-HQ-OAR-2021-0208-0602-A1,p.5]

CR also strongly supports increasing the stringency of the 2026 standard by 10 g/mi. According to EPA's own analysis, the current proposal will result in less than 8% electrification by 2026, putting the US fleet well behind both automakers' and President Biden's stated goals of achieving 50% electrification in 2030. Increasing the stringency in 2026 will provide automakers with sufficient lead time for factoring these stronger standards into their production plans, while putting the US on a better trajectory to meet our climate commitments. [EPA-HQ-OAR-2021-0208-0602-A1, p.5]

3. Recommended Improvements to EPA's Preferred Alternative

Consumer Reports asks EPA to strengthen the standards they have proposed. We specifically ask that EPA set stringency at the same level as Alternative 2 for MY23-25, further increase the stringency of the MY2026 standard by 10g/mi, and that EPA reins in various credits and multipliers that weaken the effectiveness of the standard. [EPA-HQ-OAR-2021-0208-0602-A1, p.10]

a. Adopt Alternative 2 levels of stringency for MY23-25

EPA's own analysis shows that Alternative 2 would result in an additional $40B in net benefits through 2050.20 It also shows that Alternative 2 would result in $34B in benefits through MY2026 compared to only $24B in benefits for EPA's preferred alternative.21 Furthermore, Alternative 2 fully restores the top line stringency of the original 2012 Obama-Biden standards which automakers have already agreed to, and were planning to achieve prior to the finalization of the SAFE rule only last year. Throughout the NPRM and RIA, EPA provides very little justification for selecting the weaker proposal with lower benefits over their stronger Alternative 2 that has demonstrably greater net benefits across multiple analysis frames. Consumer Reports' own analysis comes to similar conclusions.22 [EPA-HQ-OAR-2021-0208-0602-A1, p.10]

b. Increase 2026 stringency by 10 g/mi

EPA asked for comment on increasing the stringency of the MY2026 standard by between 5-10 g/mi. Consumer Reports recommends that EPA strengthen the MY2026 standard by 10 g/mi. Consumer Reports estimates that making this change would result in an additional $8 billion in consumer savings through MY2026.23 Achieving our climate commitments will require strong action, and a more stringent 2026 target will set automakers up for success in achieving longer term emissions reductions targets.24 [EPA-HQ-OAR-2021-0208-0602-A1, p.11]

In increasing the stringency in MY2026, EPA provides automakers with more than enough lead time to adjust to these higher standards. Automakers are all in the process of developing, updating, and increasing their electrification plans, and touting them to their shareholders.25 Growing consumer interest (see section 2 of this comment) and improving economics of electrification (see section 3d of this comment) will also contribute to the feasibility of this higher standard. [EPA-HQ-OAR-2021-0208-0602-A1, p.11]

Conclusions

EPA’s proposal is a good start, but can and should go further to protect consumers and reduce emissions. Consumer Reports recommends that EPA adopt the stringency levels of Alternative 2 for MY23-25, increase the stringency in MY2026 by 10 g/mi beyond the stringency of Alternative 2, and tighten up the credits and flexibilities provided within the standards. Consumer Reports concludes that these improvements are justifiable based on cost-benefit analysis, and feasible for automakers to achieve. [EPA-HQ-OAR-2021-0208-0602-A1, p.22]

Commenter: Cooper, Almeta

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, p. 77.]

In closing, on behalf of Georgia's moms, dads, and children, we ask that EPA finalize the strongest possible option to regulate how much and how quickly to limit climate pollution from cars and light trucks.

We support Alternative Number 2.

Commenter: Corporate Electric Vehicle Alliance (CEVA)

As companies that represent over $1 trillion in annual revenue1 and collectively own, lease, or operate more than one million fleet or networked vehicles in the United States, we are writing to express our support for strong light duty vehicle standards, and to urge you to adopt the most stringent proposal - Alternative 2 - in strengthening the SAFE Part II regulations adopted by the Trump Administration. [EPA-HQ-OAR-2021-0208-0276-A1. p.1]

Strong vehicle standards are critical to ensuring economic benefits as well as meeting climate goals. While we are working to do our part as individual companies, we need strong standards to ensure the widespread availability of clean vehicles in the U.S., as well as to drive the economies of scale that will accelerate the necessary transition to electrification. [EPA-HQ-OAR-2021-0208-0276-A1. p.1]

In sum, we urge EPA to adopt standards at least as stringent as Alternative 2, which are necessary to accelerate the cost-effective deployment of fuel-efficient and electric light-duty commercial vehicles, and allow our members to meet our climate goals. Further, we strongly urge that the next round of standards be aligned with climate goals by ensuring at least 50% ZEV sales, and a 60% reduction in emissions by 2030, and that put the U.S. on a glide path toward 100% passenger ZEV sales by 2035. [EPA-HQ-OAR-2021-0208-0276-A1. p.1]

Commenter: Cuny, Phillip

[The following comments were submitted as testimony at the virtual public hearing on August 26, 2021. See Hearing Testimony – 26Aug2021, p. 246.]

Once again, raising mileage standards and cleaning up vehicle emissions is one of the few things that we can do now. I urge you to raise these standards as high as feasibly possible to make our transportation system the most efficient in the world. Let's lead by example. We need to do this for our children and our grandchildren.

Commenter: Dang, Vinh

[The following comments were submitted as testimony at the virtual public hearing on August 26, 2021. See Hearing Testimony – 26Aug2021, p. 221.]

I urge this Administration and the EPA to set the strongest standards possible, one that is stronger than the original Obama clean car standards.

Commenter: Davidson, William

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, p. 207.]

I urge the Administration to set the highest standards possible because it is the right thing to do. We should be making our vehicles cleaner and more efficient. I urge you to adopt the second alternative and set even higher standards through 2030 and beyond and ensure there are no loopholes.

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, p. 206.]

I fully support this Administration's swift action on clean cars and I strongly urge the EPA to adopt the second alternative for more stringent regulations.

Commenter: Davis, Darien

[The following comments were submitted as testimony at the virtual public hearing on August 26, 2021. See Hearing Testimony – 26Aug2021, p. 160.]

I urge the EPA to create the strongest possible limits on vehicle pollution. The EPA should seek to finalize Alternative 2, the strongest standards the EPA analyzed on the proposal.

In order to tackle the climate crisis at the speed and scale that science demands, we need standards that will reduce 60 percent of carbon emissions from new cars by 2030.

[The following comments were submitted as testimony at the virtual public hearing on August 26, 2021. See Hearing Testimony – 26Aug2021, pp. 161-162.]

Once again, I urge this Administration to set the strongest standards possible because they are practical and meet the moment that we're in. The EPA should finalize standards at least as strong as Alternative 2 presented in the proposed rule. These standards can put us on the path to upholding our NBC of 50 to 52 percent net economy-wide greenhouse gas emission reductions below 2005 levels in 2030.

Ultimately, these standards set for 2026 can lay the groundwork for eliminating pollution from new vehicles by 2035. It is clear that we have no time to waste.

Commenter: Dessart, Peter

As the UN IPCC Climate Change 2021 report makes clear, any chance we have of arresting further permanent damage to our environment requires immediate decisive action. When it comes to automobiles (including SUVs and light trucks), this means completely eliminating tailpipe emissions as quickly as possible. Despite any stated plans by auto manufacturers to transition to battery electric vehicles, there is a tremendous amount of vested interest in continuing to produce vehicles with internal combustion engines (including Hybrids and PHEVs). The free market alone cannot counteract this - looking after the health and well-being of citizens is the role of government. Therefore, it is important to recognize that the end goal of Greenhouse Gas Emissions Standards is not merely limiting tailpipe emissions, but disincentivizing them. At the very least, the EPA should look to the EU standards which are more stringent. But ideally, the Greenhouse Gas Emissions Standards enacted by the EPA should be so strict as to make continued production of internal combustion engines uneconomical when compared with the cost of producing vehicles with zero tailpipe emissions. [EPA-HQ-OAR-2021-0208-0506, p. 1]

Commenter: District of Columbia Department of Energy and Environment

In the Proposed Rule, EPA presented a baseline proposal and two alternatives. While all three alternatives move in the right direction, DOEE recommends choosing Alternative 2. On June 18, 2021, DOEE published a proposal to adopt California GHG standards for light duty-vehicles (68 DCR 6298). DOEE found this to be necessary in part because the District was not able to rely on the national program for GHG emission reductions from vehicle emissions standards and compliance requirements to meet the District's GHG reduction commitments due to EPA's rollback of federal light-duty vehicle GHG standards on April 30, 2020 (85 Fed. Reg. 24174).

Vehicle emissions constitute twenty-one percent (21%) of the District's GHG emissions. However, many of the vehicles that travel on District streets come from out of state, so strong federal GHG standards are necessary. EPA's light-duty vehicle GHG standards as adopted in 2012 were found to be the fourth most important program in terms of GHG reductions and second most important in terms of energy use reductions when the District analyzed how to achieve its commitment to reduce GHG emissions by fifty percent from 2006 levels by 2032.1 Alternative 2 is the only option presented by EPA that achieves the same GHG fleet targets in MY 2023 onward that were in place prior to the April 30, 2020, so Alternative 2 is the only option that aligns with the District's GHG reduction commitments. [EPA-HQ-OAR-2021-0208-0240-A1, p.2]

In particular, DOEE supports Alternative 2, which includes the additional 10 g/mile reduction in Model Year (MY) 2026. [EPA-HQ-OAR-2021-0208-0240-A1, p.1]

Additionally, since the level of GHG reduction was not as strong in MYs 2021 and 2022 as they were prior to the August 2020 rollback and carbon dioxide is a long-lived pollutant, implementing the additional 10 g/mile stringency in MY 2026 is necessary to make up for increased emissions that occurred due to the 2020 rollback. [EPA-HQ-OAR-2021-0208-0240-A1, p.2]

The District of Columbia calls on the EPA to finalize GHG standards for light-duty vehicles as expeditiously as practicable along the lines of Alternative 2, which includes the additional 10 g/mile reduction in MY 2026. [EPA-HQ-OAR-2021-0208-0240-A1, p.3]

Commenter: Donnelly, Russel

As an EV driver and concerned citizen, I urge that you select the more stringent "Alternative #2" option for GHG reductions as detailed in your proposed clean car standards and to go beyond it. Given that the market for EVs in the U.S. has already doubled from 2% in 2020 to nearly 4% in 2021, automakers in this country should have no problem meeting these requirements, and in fact, it's reasonable to assume that even more stringent reductions can easily be achieved by Model Year 2026. Please follow President Biden's lead and implement standards that more fully support an electrified transportation future [EPA-HQ-OAR-2021-0208-0458, p. 1]

Commenter: Dream Corp Green for All

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, pp. 305-306.]

We are heartened to see EPA state a target of reducing pollution by 60 percent by 2030 which will save lives and accelerate clean transportation choices, but changes are needed to ensure the rule actually delivers on this goal.

second, EPA's Alternative 2 reduces more pollution and has higher net benefits than EPA's proposal, and Alterative 2 should be the basis for the final rule.

According to EPA's own analysis, the fuel savings alone offset the costs of Alternative 2. Alternative 2 has almost 30 percent higher net benefits and even applying a seven percent discount rate, both EPA's proposal and Alternative 2 have the same delta between the costs and fuel savings. Therefore, there's no downside to adopting Alternative 2 compared to the proposal.

The higher net benefits under both three percent and seven percent discount rate make Alternative 2 the most rational option.

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, pp. 307-308.]

When it comes to passenger vehicle emissions, there's room for dramatic improvement. In Model Year 2019, average emission rates for all new vehicles increased three grams per mile, even as all automakers were compliant with the standards.

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, p. 309.]

EPA's Alternative 2 is the clear superior choice to reach these goals.

Commenter: Dream Corps Green for All et al.

On behalf of [GreenLatinos, EVHybridNoire, National Parks Conservancy, and Dream Corps Green For All] we urge the Environmental Protection Agency to adopt Alternative 2 in its final rule setting light-duty GHG emission standards for passenger vehicles [EPA-HQ-OAR-2021-0208-0285-A1, p.1]

When it comes to passenger vehicle emissions, there's room for dramatic improvement. In model year 2019, the average estimated real-world CO2 emission rate for all new vehicles increased 3 g/mi even as all automakers were compliant.[8] There are too many loopholes and bonus credits even in the existing program, and stricter standards and less potential for gaming the system will be needed to reach a 60% reduction in emissions by 2030. Most automakers (but not all of them) are making real improvements indicating feasibility and affordability of meeting stronger standards. The standard should not be set by laggards, and bringing them up to speed is overdue. [EPA-HQ-OAR-2021-0208-0285-A1, p.3]

EPA's Alternative 2 is the clear superior choice to reach these goals. [EPA-HQ-OAR-2021-0208-0285-A1, p.5]

EPA's Alternative 2 reduces more pollution and has higher net benefits than EPA's proposal and should be the basis for the final rule. [EPA-HQ-OAR-2021-0208-0285-A1, p.2]

EPA's Alternative 2 reduces more pollution and has higher net benefits than EPA's proposal and should be the basis for the final rule. According to EPA's own analysis in Table 15, the fuel savings alone fully offset the costs of Alternative 2 (using a 3% discount rate). Alternative 2 has almost 30% higher net benefits, and even applying a 7% discount rate, both EPA's proposal and Alternative 2 have the same delta between the costs and fuel savings ($30B). Therefore, there's no downside of adopting Alternative 2 compared to the proposal. The higher net benefits under both a 3% and 7% discount rate make Alternative 2 the most rational option. Given the risks of abrupt changes from global temperature rise identified in the 2021 IPCC report,[6] the benefits of reducing emissions are very likely underestimated in the government's analysis.[EPA-HQ-OAR-2021-0208-0285-A1, p.2] [Table 15 can be located at Docket EPA-HQ-OAR-2021-0208-0285, p. 3]

Commenter: Dugan, Maureen

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, p. 297.]

I'm here to implore you to institute the second alternative for clean car emissions. History has shown us that the auto industry will fight this with everything that they have.

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, p. 300.]

Enact the second alternative.

Commenter: E2 - Environmental Entrepreneurs

E2 strongly supports reconsideration by the Environmental Protection Agency (EPA) of the 2020 rule weakening greenhouse gas emission standards for model years (MY) 2021-2026 passenger cars and light trucks (the 2020 Final Rule). We urge the agency to reverse that rule and to finalize the strongest standard it has considered in the Proposal (Alternative 2). [EPA-HQ-OAR-2021-0208-0604-A1, p. 1]

In terms of cost savings: EVs save consumers an estimated $6,000- $10,000 over the lifetime of their vehicle. That includes as much as $1,000 per year in fuel costs and $4,600 in maintenance costs. Businesses with commercial fleets can expect to save $200,000 over the lifetime of one of their heavy-duty electric trucks. That's money that can be reinvested into our economy. [EPA-HQ-OAR-2021-0208-0604-A1, p. 1]

Consumer Benefits: Alternative 2 also outshines the Proposal with regards to consumer benefits. Because both the Proposal and Alternative 2 will be more stringent than the 2020 Final Rule standards, EPA predicts that consumers will spend less on gasoline (and more on electricity) in the coming years.

• By 2050 consumer fuel savings would be $310 billion under the Proposal, compared with $360 billion under Alternative 2, a $50 billion difference. DRIA at 6-5, Tbl. 6-4; xxv, Tbl. 12.

• Alternative 2 would also result in consumption of 486 million fewer barrels of gasoline by 2050. DRIA at 5-7, Tbl. 5-7; 5-9, Tbl. 5-9. [EPA-HQ-OAR-2021-0208-0604-A1, p. 3]

For all of these reasons we strongly urge EPA to finalize the strongest standard it has considered in the Proposal (Alternative 2). [EPA-HQ-OAR-2021-0208-0604-A1, p. 3]

In light of all that is at stake, EPA must strengthen the vehicle standards that were weakened in 2020 rulemaking. And we urge EPA to finalize the most protective and costeffective proposal: Alternative 2, with the addition of 10 grams per mile in MY 2026. Automakers are well-positioned for compliance through MY 2026. Nearly a decade ago, EPA had already found, correctly, that we had the technologies needed to reduce vehicle emissions and also save customers, including small businesses, money at the pump. EPA needs to put the standards in place to ensure that these technologies are broadly deployed and that they are deployed soon enough and widely enough to ensure the auto sector does its part to reduce emissions sufficiently to meet the President's climate goals of at least 50% reduction in US emissions by 2030.

EPA's cost benefit analysis of the proposals shows why it is in the public interest for the agency to support Alternative 2.

Benefits: While both the proposal and alternative 2 are better than the current standards, the evidence shows that Alternative 2 is far superior for the climate and consumers. [EPA-HQ-OAR-2021-0208-0604-A1, p. 2]

Other Non-emissions Benefits: EPA has also quantified the non-emission benefits from the rebound effect (the increase in driving resulting from reduced operating costs), changes in refueling time, and energy security benefits from reduced dependence on foreign petroleum. EPA projected non-emission benefits for the Proposal to be $35 billion through 2050, while Alternative 2 would generate $53 billion—a difference of $18 billion. DRIA, Tables 6-8, 6-10. [EPA-HQ-OAR-2021-0208-0604-A1, p. 3]

The cumulative weight of costs and benefits is unambiguous: Alternative 2 outranks the Proposal across virtually every metric, and would result in at least $40 billion more in net benefits. DRIA at xvii, Tbl. 4; xxv, Tbl. 12. [EPA-HQ-OAR-2021-0208-0604-A1, p. 3]

EPA's own analysis shows that Alternative 2 surpasses the Proposal across virtually every metric, and that it will result in at least $40 billion additional net benefits. DRIA at xvii, Tbl. 4; xxv, Tbl. 12.

As compared to the Proposal, by 2050 Alternative 2 will save 110 MMT of upstream CO2, as well as 183 MMT of tailpipe CO2, for a total of 293 MMT of CO2 savings. DRIA at 5-1, Tbl. 5-1; 5-3, Tbl. 5-3.1

In addition to these significant CO2 reductions, Alternative 2 is superior on overall climate benefits, calculations which take into account the social cost of CO2, CH4, and N2O. The Proposal would produce climate benefits of $91 billion by 2050, while Alternative 2 would generate $100 billion—a difference of $9 billion. DRIA at 3-39, Tbl. 3-14; 3-41, Tbl. 3-16. [EPA-HQ-OAR-2021-0208-0604-A1, p. 2]

Commenter: Egbert, Judi

[The following comments were submitted as testimony at the virtual public hearing on August 26, 2021. See Hearing Testimony – 26Aug2021, p. 176.]

I support and appreciate President Biden's steps toward renewing sensible standards for vehicle fuel efficiency but am concerned that automakers will do as they have repeatedly done before, that is, seek ways in which they conduct and avoid improving fuel efficiency.

Hence, I ask that the EPA choose Alternative Number 2 which will more effectively and rapidly close loopholes sought oftentimes by automakers and Alternative 2 will enable significant savings for consumers, perhaps as much as $2,100 average per vehicle.

[The following comments were submitted as testimony at the virtual public hearing on August 26, 2021. See Hearing Testimony – 26Aug2021, pp. 177-178.]

my expectation that the EPA will apply Alternative Number 2 for a more effective, sensible, and healthy standard and vehicles that are marketed in the U.S.

By having stronger standards, we not only save at the gas pump but we save by having better air, land, and water quality and healthier citizens. 90 percent of American consumers favor more efficient and safer vehicle standards that reduce greenhouse gas emissions and promote healthier communities.

We don't need additional decades of research and development. We have the ability and technology to implement better standards now and Alternative Number 2 will enable that.

Commenter: Elders Climate Action (ECA)

We ask EPA to supplement the current proposed rule for the 2026 MY to 1) set a zero emission standard for new motor vehicles, and 2) establish a phase-in schedule for the standard that includes a 30% ZEV sales target for MY 2026 to begin charting a regulatory path that will transition the auto industry toward achieving 100% production and sale of ZEVs in the U.S. by 2030. [EPA-HQ-OAR-2021-0208-0521-A1, p. 3]

Commenters understand that additional rulemaking will be required to establish a zero emission standard and phase-in schedule. We ask that the Administrator not delay completion of the current proposed rule so that it can apply to 2023-25 MY vehicles. We ask that the Administrator re-open the rulemaking for the 2026 MY to promulgate a zero emission standard and a phase-in schedule that begins with the 2026 MY. [EPA-HQ-OAR-2021-0208-0521-A1, p. 4]

EPA’s current proposed rule will not achieve anywhere near those reductions, and fails to identify any future strategy for achieving those reductions. To fulfill the Agency’s statutory mission to protect public health and welfare it must issue regulations that achieve these targets. [EPA-HQ-OAR-2021-0208-0521-A1, p. 11]

To achieve the zero emission economy needed to stop heating the climate, and to attain urban air quality safe for children to grow up healthy and adults to remain healthy as elders, we ask EPA to determine that a zero emission standard for motor vehicles is necessary to protect public health. To put the nation on the path to zero emissions as soon as possible, and to minimize the atmospheric loading of GHGs as we make the transition to zero emissions, we ask EPA to re-open the current rulemaking for 2026 MY vehicles to 1) promulgate a zero emission standard for LDVs, and 2) establish a schedule for phasing in that standard beginning with the 2026 MY. [EPA-HQ-OAR-2021-0208-0521-A1, pp. 16-17]

Commenter: Energy Innovation Policy and Technology LLC

Of the options analyzed in the proposed rule, we consider Alternative 22, combined with additional 10 g/mile stringency for MY 2026, (“Alternative 2+”) to be the strongest option, relative to the preferred option and Alternative 1. Based on the EPA’s analysis, Alternative 2+ will reduce transportation sector emissions more quickly and will support the deployment of clean, electrified transportation technologies more affordably and efficiently. Finally, while these rules represent an important step to align the U.S. transportation sector with a cleaner and more consumer-oriented future, our research shows that more must be done going forward. We need greater ambition and more stringent tailpipe standards for all vehicle classes to meaningfully reduce transportation sector pollution and GHGs, benefit consumers economically, stimulate our economy, and ensure global competitiveness. [EPA-HQ-OAR-2021-0208-0605-A1, pp. 1]

We concur with the EPA that 'we are at a pivotal moment in the history of the light-duty transportation sector—a shift to [ZEV] technologies is already underway, and it presents a strong potential for dramatic reductions in GHG and criteria pollutant emissions over the longer term.'iv While improved stringency in the proposed rules is a good start, it is not enough. [EPA-HQ-OAR-2021-0208-0605-A1, pp. 2]

Since the EPA recognizes more can and should be done to appropriately address the GHG emissions and other harmful pollutants (and associated environmental injustice) caused by continued overreliance of fossil fuels in the transportation sector, we recommend the following:

As part of this rulemaking, the EPA should adopt the most stringent standards for model years 2023-2026 in the proposed rules (Alternative 2), including adopting more stringent standards for MY 2026 that would result in fleet average target levels that are in the range of 5-10 g/mile lower than the levels proposed (Alternative 2+). [EPA-HQ-OAR-2021-0208-0605-A1, p. 4]

Alternative 2+, on the other hand, would put the U.S. back on track to reduce GHG and air pollution emissions and deploy more ZEVs and clean transportation technologies faster than the preferred option. In its updated analysis, the EPA appropriately integrates updated data and recent market developments, including the availability of advanced GHG and pollution reduction technologies, vehicle electrification trends, auto manufacturers' voluntary commitments, cost declines of battery technologies, and other factors.[xiii] As such, adopting the most stringent standards is appropriate and justified, based on the EPA's analysis and other compelling factors. Nonetheless, while adoption of Alternative 2+ would be an improvement over the status quo, more is needed to meaningfully address climate change, mitigate harmful pollution, and alleviate the burden of transportation pollution, especially for BIPOC and low-income/low-wealth populations. EPA's proposed 2023-2026 vehicle standards do not on their own adequately address the imperative transition to ZEVs made possible by rapid innovations in battery technology, manufacturer investment, and growing customer adoption. The standards also fall short of the imperative to push the U.S. auto industry to keep pace with ZEV sales in China and Europe, which are accelerating and yielding considerable economic benefits. At this juncture and moving forward, the U.S. needs to adopt the most stringent tailpipe standards possible and eliminate loopholes that further delay widespread deployment of clean vehicles. [EPA-HQ-OAR-2021-0208-0605-A1, p. 5]

The companion Policy Report finds that achieving the DRIVE Clean Scenario requires a combination of policy and regulatory changes at the federal, state, local, and utility level, including:

• Strengthened EPA tailpipe emission standards that support ZEV sales and reduce overall tailpipe emissions for all ground vehicle classes to 0 g/mile by 2035;

• Continued adoption of state ZEV standards and rules;

• Incentives for EVs and charging infrastructure to help more consumers access affordable new and used EVs and convenient charging;

• Workforce programs that help streamline the transition to EVs and create new jobs;

• Incentives for domestic manufacturing to encourage the production and sale of electric cars and trucks;

• EV-friendly rules, codes, permitting, interconnection, and rates. [EPA-HQ-OAR-2021-0208-0605-A1, pp. 9-10]

Commenter: Environment America

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, p. 237.]

However, I urge you to make the proposed standards even stronger to ensure the greatest reduction in global warming emissions and air pollution and to accelerate the expansion of the electric vehicle market.

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, pp. 238-239.]

The preferred alternative identified by EPA is not as strong as the Obama/Biden standard and is riddled with loopholes and give-aways to automakers that undermine otherwise strong emissions reduction targets.

It's been almost 10 years since the Obama/Biden vehicle fuel efficiency standards were set. We must start by reinstating at least those standards and ideally stronger ones as the climate crisis has progressed rapidly over the last decade.

The sense of these standards are essential in spurring innovation and clean car technology, but the U.S. can achieve 100 percent zero emission vehicle sales by 2035 which is in line with the Biden Administration's goal of net zero greenhouse gas emissions by 2050.

The EPA itself identifies a much better rule, Alternative 2, which would put 400,000 extra electric vehicles on the road by 2026 and result in a 130 million metric tons fewer greenhouse gas emissions.

Once again, I urge this Administration to set the strongest standards possible because they are working. We should maximize the benefits by making our cars and light-duty trucks more efficient and I urge you to go back to at least the Obama/Biden federal standards and ideally to even stronger ones.

Commenter: Environmental Defense Fund (EDF)

EPA should find that automakers need no extended "period" of lead time to comply with the proposed MY 2023-2026 standards. EPA should determine that automakers need no extended "period" of lead time to comply with the proposed MY 2023-2026 standards. 42 U.S.C. § 7521(a)(2). First, the emission-reduction technologies needed to comply with EPA's Proposed Standards for MY 2023-2026 already have been developed and applied in each category of vehicles to which those standards would apply. The requisite technologies were "developed in response to EPA's 2012 GHG standards rulemaking for MYs 2017-2025," 86 Fed. Reg. at 43,782, which were more protective in MY 2023-2025 than the standards EPA has now proposed. Indeed, even when EPA decided in the 2020 Rule to weaken the standards set in 2012, the agency acknowledged that "the technologies projected to be used to meet" the 2012 Final Rule were by then already "available and in production." EPA & National Highway Traffic Safety Administration ("NHTSA"), The Safer Affordable Fuel-Efficient (SAFE) Vehicles Rule for Model Years 2021–2026 Passenger Cars and Light Trucks, 85 Fed. Reg. 24,2714, 25,108 (Apr. 30, 2020) (2020 Rule). [EPA-HQ-OAR-2021-0208-0688-A1, p. 7]

As for the later model years of EPA's Proposed Standards (MY 2025 and, especially, MY 2026), given that the requisite emission-reduction technology is and has long been available and applied in a wide variety of vehicles, lead time for those model years would be sufficient taking into account the standard product-development cycles for light-duty vehicles. Cf. 49 U.S.C. § 32902(a) & (g)(2) (requiring 18 months' lead time for fuel-economy standards for light-duty vehicles). In any event, recent announcements by automakers comprising a supermajority of the market presage far broader and deeper deployment of zero-emission vehicles by MY 2025. See infra, at 23-24. Even modest increases (2% annually) in deployment of zero-emission vehicles by those automakers that did not enter into agreements with California would allow those automakers to easily comply with EPA's Proposed Standards. See infra, at 21-23.[EPA-HQ-OAR-2021-0208-0688-A1, p. 9]

Accordingly, in addition to the feasibility of the Proposed Standards for the early model years of the program, we urge the administration to consider further strengthening the standards by 10 g/mi in MY 2026 in a way that ensures ZEV deployment is encouraged. EPA could adopt an alternative compliance pathway in the final rule to secure these reductions, including design features and incentives that would help to ensure these additional 10 g/mi were delivered by ZEVs. Doing so would allow automakers choosing this pathway greater certainty in complying with the next generation of standards, which must be based on substantial ZEV deployment, and will create an even stronger foundation for EPA action to adopt those standards. [EPA-HQ-OAR-2021-0208-0688-A1, pp. 1-2]

EPA should consider strengthening the standards by 10 g/mi in MY 2026 in a way that incentivizes greater ZEV deployment

EPA has separately requested comment on standards for MY 2026 that would result in fleet average target levels that are in the range of 5-10 g/mile lower (i.e., more stringent) than the levels proposed. EPA should consider further strengthening the standards by 10 g/mi in MY 2026 and do so by developing an alternative compliance pathway that would help ensure those additional reductions are delivered by ZEVs. EPA has a critical responsibility in this rulemaking to ensure the MY2026 standard increases deployment of ZEVs, creating the needed on-ramp for new standards for MYs 2027 and beyond that will eliminate tailpipe pollution from at least half of all new passenger cars and trucks. [EPA-HQ-OAR-2021-0208-0688-A1, p. 31]

EDF supports standards for MY 2026 that would result in fleet average target levels that are 10 g/mile lower than the MY 2026 levels proposed in a manner that would also achieve significant ZEV deployment beyond business-as-usual projections for MY 2026. Our analysis above shows that, under a range of assumptions, an additional 10 g/mi in 2026 is cost-effective, and that the most cost-effective manner to achieve those reductions is likely through deployment of additional ZEVs. Indeed, automakers have already committed to spending billions of dollars through 2025 on ZEV deployment. Additional ZEV deployment in the 2026 timeframe will help to create an even stronger foundation to achieve 50 percent ZEV deployment in the 2030 timeframe, consistent with the President’s goal. To that end, we encourage EPA to consider an alternative compliance framework that would encourage and incentivize automakers to meet an additional 10 g/mi of stringency through increased ZEV deployment as opposed to ICE control technologies. [EPA-HQ-OAR-2021-0208-0688-A1, p. 35-36]

Commenter: Environmental Law & Policy Center (ELPC), et al.

EPA must issue strong, technology-forcing standards for cars and light trucks to slash U.S. climate pollution. EPA itself notes that '[a] ddressing the climate crisis will require substantial reductions in GHG emissions from the transportation sector' and that we are in a 'pivotal moment.'[15] The climate crisis should leave no doubt that EPA should go beyond its proposed emissions standards. EPA must adopt its more stringent Alternative 2, which adopts the same stringency as 2012 standards in MY 2023–2025 and extends the same level of stringency to MY 2026.[16] [EPA-HQ-OAR-2021-0208-0567-A1, p. 3]

Because Alternative 2 is feasible, there is no reason for EPA not to adopt this alternative that achieves larger, urgently-needed climate benefits and greater consumer benefits. According to EPA’s analysis, Alternative 2 will result in greater net benefits than the proposed standards, including lower tail pipe carbon dioxide emissions, reduced upstream greenhouse gas emissions,[18] increased consumer savings, and other benefits.[19] [EPA-HQ-OAR-2021-0208-0567-A1, p. 3]

The technology 'requisite' to achieve the Alternative 2 standards already exists.[21] Adopting any weaker standards would run counter to EPA’s statutory mission to reduce pollution that endangers the public health and welfare. [EPA-HQ-OAR-2021-0208-0567-A1, p. 3]

EPA should also adopt the 10 g/mi greater stringency for MY 2026 on which the agency requested comments.[17] [EPA-HQ-OAR-2021-0208-0567-A1, p.3]

An increased 10 g/mi stringency in MY 2026 is also appropriate in light of both the greater 'lead time' available before MY 2026 and the accelerating transition to electric vehicles. [EPA-HQ-OAR-2021-0208-0567-A1, pp. 3-4]

Critically, gasoline-fueled light trucks dominate the new vehicle market.[23] These vehicles will be on the road, spewing climate-changing pollution well beyond 2030. Each year that automakers can exploit flexibilities to continue to sell polluting trucks with little to no change in greenhouse gas emissions undermines our ability to mitigate the climate crisis. In order to meet this moment in the climate crisis, EPA must adopt Alternative 2, adopt the additional 10 g/mi stringency in MY 2026, and eliminate flexibilities that are untethered to emissions reductions. [EPA-HQ-OAR-2021-0208-0567-A1, p. 4]

EPA makes clear that its proposed standards will be met with existing technology.[25] And loopholes will allow automakers to do more of the same with the climate paying the price. Adopting Alternative 2, along with the additional 10 g/mi stringency in MY 2026 and without the multipliers and other loopholes, will spur innovation, drive deployment of emissions-reducing technologies, and help sustain clean car manufacturing jobs across the Midwest and beyond. [EPA-HQ-OAR-2021-0208-0567-A1, p. 5]

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, p. 291.]

In conclusion, EPA must strengthen and adopt Alternative 2 with at least the additional reduction in 10 gram per mile for Model Year 2026 while closing loopholes.

Commenter: Environmental Law and Policy Center (ELPC)

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, p. 289.]

Second, EPA must issue strong technology-forcing standards for cars and light trucks. EPA itself notes that addressing the climate crisis will require substantial reductions in greenhouse gas emissions from the transportation sector and that we are in a pivotal moment.

We agree, and we appreciate that EPA is using its authority under the Clean Act to begin with Model Year 2023 and act separately from NHTSA, but the climate crisis can leave no doubt that EPA must adopt Alternative 2 with at least the 10 grams per mile increase in stringency for Model Year 2026.

EPA acknowledges that automakers were already planning for stronger standards and they should not be rewarded with anything less than Alternative 2.

Commenter: Environmental Protection Network (EPN)

The proposal should be seen as the minimum level of progress needed to lay a strong foundation for reaching the longer-term goals. EPA should seriously consider ways to strengthen the combination of standards and flexibilities so that greater progress is made in these four MYs [EPA-HQ-OAR-2021-0208-0213-A1, p.1]

While the standards proposed for these MYs would promote a real increase in zero-emissions vehicles from current levels, it is at best modest progress towards 50% electric power by MY 2030 and near 100% electric power by MY 2035. As we will discuss in Section II, there is no time to lose given the dire need to reduce GHGs from the transportation sector as part of addressing climate change and the compelling need for large reductions in nitrogen oxides (NOx) and particulate matter (PM).[EPA-HQ-OAR-2021-0208-0213-A1, p.1]

Proposed Standards and Flexibilities

The NPRM's analysis shows the combination of proposed standards and flexibilities are projected to result in about 8% EVs/PHEVs for MY 2026.22 While this is a real increase from current levels, it is at best modest progress towards 50% electric power by MY 2030 and near 100% electric power by MY 2035. The proposal should be seen as the minimum level of progress needed to lay a strong foundation for reaching the longer-term goals. EPA should seriously consider ways to strengthen the combination of standards and flexibilities so that greater progress is made in these four model years towards electric power for cars and light trucks. Any changes to the proposal should be in the direction of increased stringency and greater progress to electric power, not less stringency and less progress. [EPA-HQ-OAR-2021-0208-0213-A1, 9-10]

EPA adopted standards in 2012 for MYs 2023 to 2025 that are more stringent than those proposed in this rulemaking, and manufacturers have been on notice since 2012 of their obligation to prepare for the introduction of vehicles that meet those standards. In 2017 EPA confirmed the validity of those standards.

EPA withdrew this determination in 2018, however, EPA stipulates that this withdrawal was not final agency action and provided no more than a starting point for potential futurechanges. The 2018 withdrawal did not change any of the manufacturers' legal obligations. Manufacturers remained obligated to comply with the 2012 standards until EPA took final action in April of 2020, little more than a year ago. The revised standards adopted at that time were immediately litigated.

Given the manufacturers' expected five-year cycle of design and development and their continuous obligation to meet the 2012 standards until just over a year ago, it is quite reasonable for EPA to conclude that manufacturers will be producing and selling vehicles designed and developed to meet the 2012 standards for the first years of the proposed MY 2023 to 2026 program. Combined with the other evidence and analysis produced by EPA, it is clearly reasonable to conclude that the lead time provided for the proposed standards is reasonable and appropriate.

EPN recognizes the proposed 2023-2026 standards as an important building block to establishing the foundation for a strong 2035 rule. The proposal should be seen as the minimum level of progress needed to lay a strong foundation for reaching the longer-term goals. EPA should seriously consider ways to strengthen the combination of standards and flexibilities so that greater progress is made in these four model years towards zero-emissions cars and light trucks. As stated above, any changes to the proposal should be in the direction of increased stringency and greater progress to electric power, not less stringency and less progress. [EPA-HQ-OAR-2021-0208-0213-A1, p. 14]

Commenter: EOS at Federated Hermes (on behalf of its stewardship clients)

As long-term investors with over $2.723 trillion in assets under management, we are writing to express our support for strong light duty vehicle standards, and to urge you to adopt the most stringent proposed alternative - Alternative 2 - to strengthen the SAFE Part II regulations adopted in 2020. The U.S.' ability to meet climate goals, and the future competitiveness of the U.S. auto industry, are both contingent on strong vehicle standards as well as a rapid shift to low-emission and electric vehicles. Adopting standards at least as stringent as Alternative 2 will be necessary to effect this critical transition and to maximize economic benefits. [EPA-HQ-OAR-2021-0208-0568-A1, p. 1]

Commenter: Fleischer, Cara

[The following comments were submitted as testimony at the virtual public hearing on August 26, 2021. See Hearing Testimony – 26Aug2021, pp. 47-48.]

All of this happened when the Obama/Biden vehicle emissions regulations were in effect. That is why I strongly feel that we need to not only return to those standards but to go further to cut vehicle emissions that are making us sick, causing thousands of deaths, and speeding up the climate crisis. The science is clear. The solutions are available, and the political will has risen to make climate action the top voting issue in the 2020 election.

[The following comments were submitted as testimony at the virtual public hearing on August 26, 2021. See Hearing Testimony – 26Aug2021, p. 49.]

Creating strong vehicle emissions rules is a substantial step in showing the world that we are serious about doing our part to solve the climate crisis that our wealthy country played a large part in creating. There is no time to waste. The IPCC Report was as devastating as it was obvious.

Commenter: Fleming, Melinda

[The following comments were submitted as testimony at the virtual public hearing on August 26, 2021. See Hearing Testimony – 26Aug2021, p. 201.]

I'm terrified when I hear that even the strongest formal measures, like Alternative 2, are not really good enough. The reason this terrifies me the most is simple. Even if you build a bridge almost all the way, you might as well not have bothered because it simply won't do the job it was intended to do. We need to stop the atmosphere from heating up further. The EPA's rule for clean vehicle standards need to go all the way for us to cross the chasm of global warming.

Our margin for error has become so slim that we cannot afford half measures of any kind. This is why I urge the EPA to propose and implement the strongest rules possible to create the cleanest vehicles possible.

Commenter: Ford Motor Company

Ford supports EPA's proposal to increase the stringency of the SAFE standards. In the NPRM, along with the primary proposal, several alternatives are offered. We believe EPA's primary proposal - which would deliver similar overall GHG reductions as the California Framework Agreement - is the appropriate level of stringency. Similarly, the program flexibilities in the EPA proposal such as EV multipliers, off-cycle credits, and credits for full-size pickups provide essential regulatory support for the technologies that will be needed to enable future GHG reductions. [EPA-HQ-OAR-2021-0208-0294-A1, p.2]

EPA's proposal to revise the 2023-2026MY SAFE standards is an important step towards reducing lightduty GHG emissions, and more importantly, sets Industry on the right pathway to begin the transition to electrified vehicles. The transformation of the light-duty fleet toward zero-emissions will require unprecedented levels of ingenuity and investment to succeed. Over the last 10 years, rapid improvements in internal combustion engine (ICE) fuel efficiency and criteria emissions performance have been accomplished. Further improvements are possible, but will be marginal, and will come at high cost. Ford requests that the agencies carefully weigh these considerations in the current and future rulemakings to ensure that resources and investment are not diverted from our primary objective: fulfilling President Biden's goal of achieving 40-50% ZEV sales by 2030. [EPA-HQ-OAR-2021-0208-0294-A1, p.3]

Commenter: Gallagher, James A.

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, pp. 263-264.]

Once again, I urge this Administration to set the strongest possible standards because they work. We should be making our cars and light-duty trucks even cleaner and more efficient.

I urge you to reinstate the earlier federal standards with your Alternative 2 and set even stronger ones for 2030, plus ensure there are no loopholes for automakers to get around these standards.

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, pp. 260-261.]

I strongly support this Administration's swift action on clean cars but urge the EPA to adopt their second alternative which would deliver greater savings to consumers and eliminate unnecessary loopholes for automakers.

Commenter: Garcia Mann, Jackie

[The following comments were submitted as testimony at the virtual public hearing on August 26, 2021. See Hearing Testimony – 26Aug2021, p. 248.]

We need things even stricter than these proposed regulations. We need to move fast and people are ready to cooperate.

Commenter: General Motors LLC (GM)

GM acknowledges EPA's request for comment on a potential stringency increase of 5 to 10g/mi for the standards proposed for the 2026 model year. GM does not believe the current record includes sufficient technical analysis of this potential increase upon which to comment. GM believes that such analysis should include, among other things, (i) the likely impact of such an increase on BEV versus PHEV penetration in light of projected charging infrastructure expansion and consumer acceptance during the timeframe, and (ii) the impact of increased BEV versus PHEV penetration on United States' ability to meet its Nationally Determined Contribution under the Paris Agreement. GM would welcome the opportunity to provide additional comments if EPA chooses to supplement the proposal with sufficient technical analysis. [EPA-HQ-OAR-2021-0208-0234-A1][p.6]

Commenter: Gerber-Fligel, Gerri

As a parent, I support the strongest possible greenhouse gas emissions standards for cars and light trucks. The transportation sector is the largest source of climate pollution in the US. This could be done in the next two years; change has to start now , not in 2030. By then the climate will be totally destroyed as it is very damaged right now. Pass emergency legislation to clean up starting today.

EPA's proposal details several options. Withdraw the "preferred" alternative. It's not thorough and anyone who is allowed loopholes will find them. Enough is enough. [EPA-HQ-OAR-2021-0208-0698-A1, p. 1]

Commenter: Gersten, Dana

[The following comments were submitted as testimony at the virtual public hearing on August 26, 2021. See Hearing Testimony – 26Aug2021, p. 280.]

I'm here to urge the EPA to adopt the strongest possible clean air standards because my patients simply can't keep breathing dirty air and live healthy lives.

[The following comments were submitted as testimony at the virtual public hearing on August 26, 2021. See Hearing Testimony – 26Aug2021, p. 282.]

The EPA needs to adopt its alternative standard and enact the strongest possible rule that has aggressive targets, no loopholes, and which puts us on the path to zero emission future.

Commenter: Gillet, Victoria

[The following comments were submitted as testimony at the virtual public hearing on August 26, 2021. See Hearing Testimony – 26Aug2021, p. 289.] So, if we -- strong solution protections for vehicles, like the one that's being proposed by the EPA right now, is a really important tool to facilitate this transition. Therefore, I strongly support strengthening the U.S. light-duty vehicle greenhouse gas emission standards because this change will make my patients and our country happier and healthier. That's what I have.

Commenter: Godwin, Nadine

New York's Governor Hochul on Sept. 9, 2021, signed a bill into law that requires all new passenger vehicles and light-duty trucks sold or leased in New York State to be in the zero-emissions category by 2035, and all medium and heavy-duty vehicles must achieve the zero emissions goal by 2045.

The EPA, in reconsidering car-emissions standards, should at least match the goals set by my home state.

In its current form, it falls short of that and falls short of what we need for this country, especially given the lost years under Donald Trump and given the wake-up call offered by the latest IPCC report. It is astonishing (to me) that the current proposal is not even as aggressive as a plan agreed to by carmakers in 2011 and approved in 2012.

Furthermore, the Alternative #2, while definitely preferable to the opening proposal here, doesn't work either because of the EPA envisions giving carmakers credits for making electric vehicles as some kind of offset to cutting emissions.

Forget such trade-offs. They undermine our chances to move as quickly as current technology allows to drastically cut and eventually eliminate greenhouse gas emissions from our cars and light-duty trucks. Why throw away our best opportunity when the technology is deliverable, something that carmakers themselves acknowledged when they agreed to the 2012 rules.

Please go after greenhouse gas emissions as aggressively as is feasible, based on known technology and other practicalities. And do not offer the envisioned EV credits to carmakers in the final rulemaking. Thank you [EPA-HQ-OAR-2021-0208-0381, p. 1]

Commenter: GreenLatinos

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, pp. 45-46.]

These new standards will continue to promote innovation throughout the automotive industry and will ensure that the U.S. remains an auto industry leader, but I urge you to keep these standards as originally designed to ensure the greatest reductions in oil use in global warming emissions and protect communities from pollution and emissions impacts.

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, p. 47.]

Strong standards can prevent this exposure and these completely unnecessary deaths. EPA must set the strongest possible federal clean car standards to ensure that we are protecting families from vehicle pollution, saving drivers' money at the pump and fighting climate change.

This means restoring standards to at least the levels set by the Obama/Biden Administration and even stronger than the Obama-era standards. By implementing the strongest possible fuel economy standards, the EPA would also be following through on its commitment to environmental justice because issuing stronger clean car standards will help address key transportation-related impacts of pollution.

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, p. 45.]

I thank this Administration for acting swiftly on clean cars but urge the EPA to create the strongest possible limits on vehicle pollution as it reconsiders the previous Administration's attacks on clean car standards.

Commenter: Haines, Meredith

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, p. 113.]

I urge the EPA to adopt at a minimum the second alternative.

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, p. 114.]

The better news is there is at a minimum an Alternative 2.

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, p. 115.]

Just in conclusion, I urge you to reinstate the Obama/Biden standards with your Alternative 2 and set even stronger ones through 2030 and loopholes undermine the possibility of meeting our emissions reduction target and delay undermines the messages of urgency that should accompany all action.

Commenter: Hall, Marilyn

[The following comments were submitted as testimony at the virtual public hearing on August 26, 2021. See Hearing Testimony – 26Aug2021, p. 21.]

I urge the EPA to adopt the second alternative of this rule. That alternative would deliver greater savings to consumers and eliminate loopholes for automakers.

[The following comments were submitted as testimony at the virtual public hearing on August 26, 2021. See Hearing Testimony – 26Aug2021, p. 22.]

This proposed rule, especially the EPA's second alternative, is an essential step towards slowing climate change. I urge you to move forward with the second alternative as the final rule.

Commenter: Hauptman, Elizabeth

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, p. 242.]

I'm asking the EPA to implement the strongest vehicle pollution standards possible.

Commenter: Hewes, Celerah

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, p. 108.]

The EPA must set the strongest possible federal clean car standards through 2026, avoiding loopholes, and putting automakers on track to meet ambitious pollution reduction goals.

Commenter: Holmgreen, Jack

[The following comments were submitted as testimony at the virtual public hearing on August 26, 2021. See Hearing Testimony – 26Aug2021, p. 42.]

Just to be clear, I support Proposal Number 2 in order to eliminate loopholes that the transportation industry will most certainly take advantage of, but with only the two proposals on the table, you're asking us do you want me to cut off both your hands or do you just want me to cut off one? Given those two choices, Number 2 is far superior. I'm asking you to consider a third choice. How about offering us the hand, one that doesn't do more harm than good?

Commenter: Holmgren, Doug

[The following comments were submitted as testimony at the virtual public hearing on August 26, 2021. See Hearing Testimony – 26Aug2021, p. 95.]

I, like many others, am speaking to urge the EPA to adopt Alternative 2.

[The following comments were submitted as testimony at the virtual public hearing on August 26, 2021. See Hearing Testimony – 26Aug2021, p. 97.]

We cannot bow to the need to maximize profits in manufacturing industries. We know what is required to avoid more climate catastrophes. So let's just get on with it. Please adopt tighter standards now. I thank you for this opportunity to speak before you today.

[The following comments were submitted as testimony at the virtual public hearing on August 26, 2021. See Hearing Testimony – 26Aug2021, p. 97.]

The EPA is requesting comment on whether or not to adopt a tighter five to 10 gram per mile greater stringency for Model Year '26 CO2 gram per mile target, the so-called Alternative 2. So here then is my comment. Given all that is happening around the world, why would we not adopt the most stringent CO2 requirement possible.

Commenter: Hyundai America Technical Center, Inc. (Hyundai)

Proposed GHG ramp

EPA has proposed an industry fleet-wide CO2 combined car and truck target of 171 grams per mile ('gpm') in the 2026 MY. EPA has additionally outlined two alternative standards: Alternative 1 is less stringent than the proposed standard (with a 2026 MY CO2 target of 177 gpm), and Alternative 2 is more stringent than the proposed standard (with a 2026 MY CO2 target of 169 gpm).

Hyundai supports the agency's middle-ground proposal for year-over-year improvements reaching 171 gpm CO2 in 2026 MY. The proposal will require an acceleration of electrification and, while very challenging, is reasonable in stringency. [EPA-HQ-OAR-2021-0208-0603-A1, p.7]

Commenter: Institute for Policy Integrity

EPA can rely on legislative and regulatory history to help justify its approach to lead time. Through history, Congress and EPA have balanced the availability of compliance options against the necessary lead time. When existing technologies and flexibilities readily enable compliance, EPA has discretion to determine that relatively shorter lead time is sufficient. [EPA-HQ-OAR-2021-0208-0299-A1, p. 1]

EPA argues that its proposed standards are preferable to Alternative 2 largely because 'EPA believes a lower level of stringency increase for 2023 may be appropriate taking into consideration lead time.'16 EPA has considerable discretion to balance multiple factors in assessing lead time, as the next section of these comments explores. But even if EPA believes that lead time considerations favor a less stringent standard for MY 2023, that logic does not necessarily extend beyond MY 2023. To the extent EPA believes it cannot adopt Alternative 2 due to lead time considerations, EPA should explore a new alternative that combines the proposed standards' target for MY 2023 with Alternative 2's emissions targets for MY 2024 and MY 2025, followed by the 5–10 g/mile increase for MY 2026. [EPA-HQ-OAR-2021-0208-0299-A1, p. 3]

EPA should select the alternative that will maximize net social welfare and promote distributional justice. EPA's analysis shows that Alternative 2 will generate $180 billion in net monetized benefits ($40 billion more than the proposed program), plus additional unmonetized benefits. Further analysis of the option to increase the stringency of MY 2026 standards will most likely reveal such increased stringency is cost-benefit justified as well. EPA also finds that increased standards will generally promote equity and so are appropriate. [EPA-HQ-OAR-2021-0208-0299-A1. p. 1]

Unlike the net costly SAFE 2 Rule, which would increase emissions and jeopardize public welfare, EPA's Proposed Rule will reduce emissions and increase net social welfare and so is justifiable. However, EPA's analysis shows that Alternative 2 would result in net monetized benefits nearly 30% higher than EPA's proposed standards,9 not to mention significant unmonetized climate, health, and environmental benefits that would likely further increase Alternative 2's advantages over the proposed program. (Note also that a variety of methodological changes, such as correcting the sales elasticity estimate as described below, could further strengthen the case in favor of Alternative 2.) Thus, following EPA's own interpretation of how best to balance the factors under Section 202, as well as principles for rational rulemaking under longstanding executive orders, EPA should select Alternative 2 to maximize net social welfare. [EPA-HQ-OAR-2021-0208-0299-A1. p. 2]

Notably, comparing technology costs to fuel savings also suggests that Alternative 2 may have greater net benefits for individual consumers.10 Given EPA's findings that lower-income families benefit more from net fuel savings,11 Alternative 2 should also advance equity goals. [EPA-HQ-OAR-2021-0208-0299-A1. p. 2]

While EPA has not analyzed the expected costs and benefits of making the MY 2026 standards more stringent by 5–10 grams/mile,12 this alternative would likely also result in even higher net benefits. EPA should conduct such an analysis, and if it finds that Alternative 2, with the additional 5–10 g/mile adjustment for MY 2026, would maximize net benefits and be most consistent with EPA's statutory directives to protect and enhance national air quality, and to promote public health and welfare,13 EPA should select that combination of policy options. EPA should similarly analyze the relative distributional effects of Alternative 2 plus the 5–10 g/mile increase for MY 2026 as compared to the Proposed Rule.14 [EPA-HQ-OAR-2021-0208-0299-A1. pp. 2-3]

10 Discounted at 3% over calendar years 2021–2050, the proposal has $210 billion in technology costs versus $250 in fuel savings (a difference of $40 billion), while Alternative 2 has $240 billion in technology costs versus $290 in fuel savings (a difference of $50 billion); at 7%, the proposal has $130 billion in technology costs versus $120 billion in fuel savings (-$10 billion), while Alternative 2 has $150 billion in technology costs versus $150 billion in fuel savings (even). EPA, Revised 2023 and Later Model Year Light-Duty Vehicle GHG Emissions Standards: Regulatory Impact Analysis at tbls.6-1, 6-3, 6-4, 6-6 (2021) [hereinafter "DRIA"]. Alternative 2 also has more consistently net-positive non-GHG emissions benefits. Compare id. at 7-26, tbl.7-5 (showing some years with net negative sums for the Proposed Rule), with id. at 7-28, tbl.7-7 (showing no such years for Alternative 2).

Commenter: Interfaith Power & Light (IPL)

I speak on behalf of our 40 state affiliates, more than 22,000 congregations, and more than 6.5 million people of faith who are a part of our national network, urging the Biden administration and the EPA to enact the strongest and boldest standards to reduce vehicle pollution, at least as stringent at those in Proposal 2. [EPA-HQ-OAR-2021-0208-0224-A1, p. 1]

Commenter: International Council on Clean Transportation

International Comparison

Figure 1 and 2 show the progression of global CO2 emission standards in major vehicle markets for passenger cars and light trucks respectively.32 The recent regulatory proposal in EU includes a new CO2 target value for new vehicles by 2035. From that year onward, manufacturers must ensure a 100% reduction in CO2 for their new passenger car and light commercial vehicle fleets compared to the 2021 standard. In plain language33, this corresponds to a phase out of new combustion engine light-duty vehicles in Europe by 2035. This proposal, once approved, will greatly drive global technology innovation and investment in zero emission transition. [Figures 1 and 2 can be found on pp. 19-20 of Docket number EPA-HQ-OAR-2021-0208-0522-A1]

As a result, the number of national and sub-national governments committed to fully end the sale or registration of new passenger cars equipped with an internal combustion engine (ICE) keeps growing. The national and sub-national governments listed in the map (Figure 3) made up 12% of the about 54 million global new passenger car sales in 2020.34 [Figure 3 can be found on p. 21 of Docket number EPA-HQ-OAR-2021-0208-0522-A1]

Figure 4 compares the passenger car EV market shares in the US, EU, and China. As of July 2021, the EV market share for passenger cars in the US is 3.5% compared with 16% in the EU and 12% in China. The sharp increase in EV sales in EU came about due to 2020-2021 vehicle CO2 standards, whereas the increase in EV sales in China is supported by a combination of vehicle fuel consumption standards and a new energy vehicle mandate.

Not only is the US lagging in terms of EV deployment, it is falling behind in terms of manufacturing of electric vehicles as well. From 2017 to 2020, the U.S. share of cumulative global electric vehicle production since 2010 decreased from 20% to 18%, while manufacturing increased in China and the EU, and the US share was supported largely by a single manufacturer36. If the US auto industry is to remain competitive globally then these trends reinforce the need for the United States to achieve the electric vehicle sales outlined by President Biden, providing a strong additional rationale for the feasibility of EPA increasing the stringency of 2026 GHG standards by 10gCO2/mile. [EPA-HQ-OAR-2021-0208-0522-A1, pp. 19-22; Figure 4 can be found on p. 22 of Docket number EPA-HQ-OAR-2021-0208-0522-A1]

As documented in the following sections, technology effectiveness and cost have continued to improve. Thus, if technology costs and benefits were updated with the latest information, it would show that the proposed standards and Alternative 2 are even more feasible and lower-cost than EPA's analysis indicates. [EPA-HQ-OAR-2021-0208-0522-A1, p. 4]

President Biden has outlined a target of 50% electric vehicle sales share by 2030. The proposed EPA standards may not ensure even 7.8% market share of electric vehicle sales by 2026, as conventional technology could be implemented at much higher rates than modeled for the proposed rule instead of increasing electric vehicle share to 7.8%. Increasing stringency of the 2026 standards by at least 10gCO2/mile will provide additional incentive for vehicle manufacturers to deploy electric drive vehicles beyond the agency's projection of 7.8%. [EPA-HQ-OAR-2021-0208-0522-A1, p. 4]

Since 2010 the U.S. share of global EV production has fallen, from 20% to 18%, and without intervention that trend will continue: a mere 15% of the $340 billion total investment global automakers have planned in EV manufacturing is presently destined for the United States. Strengthening the 2026 standards by 10gCO2/mile beyond the Alternative 2 would allow the United States to close some of this gap, and set stage for more ambitious post-2026 standards. Therefore, ICCT strongly supports adoption of final standards for MY 2026 that would reduce fleet average target levels by 10 gCO2/mile beyond Alternative 2. [EPA-HQ-OAR-2021-0208-0522-A1, p. 4]

ICCT agrees with both of EPA's observations, that MY 2026 stringency should be greater in keeping with the additional lead-time and the accelerating transition to electrified vehicles. However, the case for 5-10 gCO2/mile lower target levels goes far beyond these two issues.

Table 3 compares the technology penetration rates in the proposed rule (DRIA Table 4-24 on page 4-19) for 2026 versus 2023 and for proposed rule versus the no action scenario in 2026. There is little increase in conventional technology penetration, both for the proposal from 2023 to 2026 and from the no action scenario to the proposal. The 2026 proposed standard has significant increases in PHEV+BEV (4.2%) and HCR2 penetration (16%) over the 2023 proposed standards. However, other increases are modest (2% mild hybrids, 3% P2 hybrids, 3% HCR1, 1.2% weight reduction) and counteracting the improvements there is a 9% reduction in turbocharged engines plus modest reductions in GDI (-4%) and cylinder deactivation (-2%). Only 71% of 2026 vehicles under the proposed rule have plug-in, turbocharged, HCR, or hybrid technologies, meaning that over 30% of non-plugin vehicles use nothing beyond basic engine technology even by 2026.

The comparison of the 2026 proposed standard to the 2026 no action scenario is quite similar, as there are only modest differences between the 2023 proposed and 2026 no action technology penetration rates. [EPA-HQ-OAR-2021-0208-0522-A1; p. 17; The tables can be found on p. 17 of Docket number EPA-HQ-OAR-2021-0208-0522-A1]

Finally, President Biden has outlined a target of 50% electric vehicle sales share by 2030. The proposed EPA standards may not ensure even 7.8% market share of electric vehicle sales by 2026, as conventional technology could be implemented at much higher rates than modeled for the proposed rule instead of increasing electric vehicle share to 7.8%. Increasing stringency of the 2026 standards by at least 10gCO2/mile will provide additional incentive for vehicle manufacturers to deploy electric drive vehicles beyond the agency's projection of 7.8%. [EPA-HQ-OAR-2021-0208-0522-A1, p. 18]

Strengthening the 2026 standards by 10gCO2/mile beyond the Alternative 2 would allow the United States to close some of this gap, and set stage for more ambitious post-2026 standards. Therefore, ICCT strongly supports adoption of final standards for MY 2026 that would reduce fleet average target levels by 10 gCO2/mile. [EPA-HQ-OAR-2021-0208-0522-A1, pp. 18-19]

30 DRIA Table 4-24 did not include BEV+PHEV technology penetration for the No Action scenario. These were calculated from the 'technology_utilization_report.csv' file by adding together all the individual technology penetrations for the various reported PHEV and BEV configurations.

Without the additional 10gCO2/mile stringency in 2026, the standards for years 2027-2030 will have to be that much more ambitious in order to meet the target set by the President and achieve reductions of GHGs that are clearly feasible and consistent with EPA's statutory mandate. We note in the section below that the United States is already falling behind the European Union and China in terms stringency of greenhouse gas regulations as well as deployment of electric vehicles. [EPA-HQ-OAR-2021-0208-0522-A1, p. 18]

Commenter: International Union, United Automobile, Aerospace & Agricultural Implement Workers of America (UAW)

UAW does not support alternative proposals that increase stringency or reduce flexibilities, as raised in the request for comment, which would set standards that would have counter-productive impacts by setting unachievable targets. Automakers have been living under the current Safer Affordable Fuel Efficient (SAFE) Vehicles rules and need time to adapt to stronger standards. [EPA-HQ-OAR-2021-0208-0749-A1, p. 1]

The Environmental Protection Agency's Revised 2023-26 Model Year (MY) Light-Duty Vehicle Greenhouse Gas (GHG) Emissions Standards by and large strike the right balance of continuing to reduce automotive GHG emissions and encourage automakers to invest in new technologies that will benefit autoworkers and the economy. [EPA-HQ-OAR-2021-0208-0749-A1, p. 1]

UAW does not support alternative proposals that increase stringency or reduce flexibilities, as raised in the request for comment, which would set standards that would have counter-productive impacts by setting unachievable targets. Automakers have been living under the current Safer Affordable Fuel Efficient (SAFE) Vehicles rules and need time to adapt to stronger standards.

The auto industry is dynamic and complex, which requires flexible regulations and continual input from stakeholders. Over time, automakers have faced increasing challenges in adhering to emissions standards. And in recent years, we have seen how the auto industry can be impacted by a variety of factors, including consumer preference, fuel prices, global supply chains, and even public health. This is why the UAW has long held that emissions regulations must be responsive to conditions on the ground to ensure a robust domestic auto industry.

Commenter: Jaguar Land Rover North America, LLC (JLRNA)

As mentioned above, Jaguar Land Rover supports efforts to reduce GhG emissions and to transition to Zero Emission Vehicles. We agree that, to achieve this, the targets in the proposal must increase in stringency to accelerate this goal. We would, however, like to put forward some amendments to EPAs route map to achieve the proposed 26MY target as some of the assumptions made to model the future target stringency do not accurately reflect our business position.

Jaguar Land Rover understands the principal of the statement in the NPRM that the EPA 'do[es] not believe that automakers have significantly changed their product plans in response to the SAFE final rule issued in 2020'.

While automakers may not have changed plans solely in response to the SAFE2 final rule, the status of the SAFE2 rule, coupled with the impact of the global pandemic and accelerating electrification across the world, was a key consideration in Jaguar Land Rover’s decision to commit to a more ambitious long-term EV portfolio, as defined by Reimagine strategy. In order to launch a superior 'BEV first' architecture, Jaguar Land Rover relinquished a BEV 'capable' architecture (platform prioritizing ICE but could support BEV options) which has subsequent timing implications. While it was a difficult decision to make, the product strategy decisions related to our new Reimagine strategy will unquestionably accelerate Jaguar Land Rover’s electrified future and deliver against our science-based targets as outlined above.

Even with our commitment to electrification and a net zero carbon future, JLR believes that the targets proposed by the NPRM would require Jaguar Land Rover to make commercially unviable CO_2 reductions, which would require a 39 g/mi reduction in target from 20MY to 23MY. The transition period of 23MY to 26MY would be especially challenging considering the impact that Covid-19 and semiconductor shortage have inflicted on our product plan for the period. Given this situation, Jaguar Land Rover proposes that EPA consider an alternative compliance route aimed at creating a fairer standard for niche manufacturers. Similar approaches have had previous success through the Temporary Lead-Time Allowance Alternative Standard (TLAAS) and Alternative Compliance Schedule from 2012-2020 MY with minimal impact to overall fleet emissions but, importantly, delivering the same cumulate target reduction in GHG by 26MY.

Jaguar Land Rover proposes that Intermediate Volume Manufacturers (IVMs) who, individually, make up less than 1% of 2019 MY vehicle sales, can qualify for a new Alternative Compliance Schedule. This would allow smaller manufacturers, who, due to their smaller product portfolio, do not have the flexibility to respond to tougher GhG standards, a viable compliance route to 26MY targets. This would be a flexibility to comply with the federal GHG requirement with targets that decrease at the same annual percentage (around 6.5% decrease annually) as an alternative to the rates in the NPRM’s proposal. This would mean that the Alternative Compliance Schedule targets would rejoin the proposed federal targets in 26MY and be equivalent to projected average target levels set out below: [EPA-HQ-OAR-2021-0208-0269-A1, pp. 3-4] [The table can be found on p.4 of Docket number [EPA-HQ-OAR-2021-0208-0269-A1].

Although EPA did consider an alternative (Alternative 1) that is less stringent than the proposal, we believe that our proposal is preferential for our unique position as an alternative compliance path for IVMs for two key reasons:

1. It should result in fewer Tons of CO_2 emissions than Alternative 1 (without significantly impacting the overall US fleet)

2. It brings manufacturers in-line with the end point of the proposed targets in 26MY, to align with the administrations long term zero-emission goals

Below is a representation of our proposal against the NPRM proposal and Alternative 1: [EPA-HQ-OAR-2021-0208-0269-A1, p.4] [The tables can be found on p.4 of Docket number [EPA-HQ-OAR-2021-0208-0269-A1]

We believe this is a viable alternative proposal that will:

• Put Jaguar Land Rover, as a niche manufacturer, on a direct path to the proposed 26MY GHG level of stringency.

• Set targets that result in lower CO_2 Tons (area under the curve) for 23-26MY compared with EPA's Alternative 1

• Due to Jaguar Land Rover only making up 0.7% of the US fleet, will have a negligible impact on total US fleet emissions at a level much lower than previous similar programs (e.g. TLAAS).

• Enables more realistic CO_2 reduction targets for Jaguar Land Rover in order to focus on the required investments for our zero-emissions journey and our recently modified product portfolio. [EPA-HQ-OAR-2021-0208-0269-A1, p.5]

Summary & Conclusion

Jaguar Land Rover is in alignment with the objectives of the EPA and agrees that the standards must become more stringent to reduce greenhouse gas emissions. Despite the difficulties we have faced over the past year we are committed to investing in long-term CO_2 reductions and making a positive societal impact on our journey to net zero carbon emissions. The impact of the Covid-19 pandemic combined with the semiconductor shortage has and continues to have an adverse effect on the automotive industry and due to these events, Jaguar Land Rover has been forced to make difficult decisions to prioritize the near-term business results to secure funding for future investments in electrification strategies and emissions reduction technologies. [EPA-HQ-OAR-2021-0208-0269-A1, p.7]

Regarding the additional proposal to lower 26MY targets to be 5-10 g/mi lower than the current proposal, Jaguar Land Rover does not see this to be a viable proposal because:

• As acknowledged by the EPA, 23-26MY product plans have already been designed, reducing the options available to a manufacturer to be able to meet increased stringency targets in this time period.

• The previous targets issued by the EPA for 26MY have either been the 2012 Final Rule Makings (finalized under the Obama administration) 25MY target carried over or SAFE part 2 targets, both of which are significantly less stringent than the current 26MY level proposal.

• The loss of Advanced Technology Vehicle (ATV) credits at this point will make the transition to 26MY an even greater challenge, without additional stringency increases.

Based on the above points, Jaguar Land Rover considers it unrealistic for EPA to amend the 26MY targets to be any lower than is already proposed. [EPA-HQ-OAR-2021-0208-0269-A1, p.5]

JLR is inviting the EPA to consider our proposals on an alternative compliance route, to allow for our unique circumstances, starting in 23MY and aligning with national targets in 26MY. [EPA-HQ-OAR-2021-0208-0269-A1, p.7]

Commenter: Kansas Senator Marci Francisco

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, p. 294.]

As an elected representative, I believe stronger federal safeguards on vehicle emissions would benefit my constituents. Addressing vehicle pollution by strengthening vehicle efficiency and encouraging hybrid electric vehicle technology falls squarely in the EPA's mission.

Strengthened standards and a path to 60 percent vehicle emission reduction and a 50 percent electric vehicle fleet by 2030 should spur economic growth and public health protections.

Commenter: Klein, Stephanie

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, pp. 281-282.]

EPA has an important job in setting pollution limits for cars, but we must also go further to address the climate crisis by moving decisively to zero pollution vehicles. In order to set us on the path to 100 percent zero emissions new vehicles by 2035, the near-term standards for climate pollution must be as strong as possible.

On behalf of Moms Clean Air Force's more than 3,000 members in Washington, D.C., I urge EPA to finalize the strongest option possible.

Commenter: Kuntz, Laurie

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, p. 209.]

We must enact the strongest fuel economy standards possible and support incentives and infrastructure for electric vehicles in order to achieve this.

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, p. 210.]

I do support the EPA's Alternative 2 in the proposed rule since it would eliminate many loopholes and would impose stronger standards for automakers.

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, p. 208.]

I support this Administration's swift action on clean cars but urge the EPA to adopt the second alternative.

Commenter: Levison, Laura

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, p. 234.]

I request that EPA and NHTSA make the clean air standards much stronger than you have proposed in the draft rule. As we know, the transportation sector is now the largest source of greenhouse gas emissions in the U.S.

Commenter: Lish, Christopher

I applaud your efforts to cut back on U.S. vehicle emissions and chart a course towards a future with net-zero emissions from transportation, but I'm afraid they don't go far enough. I strongly urge that you select the more stringent "Alternative #2" option for greenhouse gas reductions as detailed in your proposed clean car standards and to go beyond it. [EPA-HQ-OAR-2021-0208-0218-A1, p. 1]

While the standards recently proposed by the Environmental Protection Agency are an important step forward, they unfortunately stop short of the ambition we need. They're riddled with loopholes and giveaways to automakers that undermine Page 2 of 3 otherwise strong pollution reduction targets, rely on unenforceable and unreliable promises by automakers, and fail to require the emissions cuts needed to protect our communities and the climate. [EPA-HQ-OAR-2021-0208-0218-A1, p. 1-2]

While this proposal is certainly an improvement on the regressive policies of the previous administration, it falls far short of what scientists say is needed and the Administration's promises on climate. It fails to achieve the greenhouse gas reductions necessary to meet the Intergovernmental Panel on Climate Change's targets of 45 percent by 2030 and zero emissions by 2050, or for that matter to meet U.S. commitments under the Paris Agreement. And it fails to require automakers to meet President Biden's goal of 50 percent zero emission vehicle (ZEV) sales by 2030 (a target that, itself, is far too lax). [EPA-HQ-OAR-2021-0208-0218-A1, p. 2]

Among the options presented, I urge you to choose the much more effective Alternative #2, with one important caveat: We cannot wait any longer to begin requiring automakers to sell ZEVs—and to get them working toward 100 percent ZEVs by 2030, which is what's necessary to meet science-based climate targets. I urge you to strengthen this rule to put us on track to make all new cars and light-duty trucks zero-emission vehicles no later than 2030 and ensure all new trucks and buses are zero-emission no later than 2040. In the coming weeks, I urge you to strengthen the toughest option the Environmental Protection Agency has considered for short-term auto pollution rules and adopt it. [EPA-HQ-OAR-2021-0208-0218-A1, p. 2]

Automakers already have the technology to safely reduce emissions. Given that the market for EVs in the U.S. has already doubled from 2% in 2020 to nearly 4% in 2021, automakers in this country should have no problem meeting these requirements, and in fact, it's reasonable to assume that even more stringent reductions can easily be achieved by Model Year 2026.

And consumers will save more at the pump than these technologies cost. Strong vehicle standards are a win for our environment, public health, public lands such as parks, and the economy. They are one of America's greatest opportunities to cut deadly pollution, save consumers money at the pump, create good jobs, and ensure the global competitiveness of the U.S. auto industry.

When the Obama administration introduced the first clean car standards, they were the most significant climate rules in U.S. history. The climate crisis has only become more dire and to meet the moment—it's not enough to simply reverse the preceding administration's damage. The world's scientists tell us we have a rapidly closing window to prevent the most catastrophic impacts of climate change. As such, nothing short of the strongest possible clean car standards will deliver the carbon reductions that President Biden has promised the country and the world. We are counting on you to strengthen these common-sense standards and accelerate our transition to a zeroemissions transportation future.

Please adopt at least the Environmental Protection Agency's Alternative #2 and a stronger fuel economy standard to drive much-needed short-term cuts in emissions and put us on the road to the goal of reaching 100% net-zero vehicle sales by 2030. I implore you to heed the dire warnings of the U.N. Intergovernmental Panel on Climate Change's new report and to strengthen clean car and fuel economy standards to ensure that our country can reach its climate goals. Now's the time for strong rules—not halfmeasures. It is time to hold car manufacturers accountable. I urge you to create the best clean car standards in the world. [EPA-HQ-OAR-2021-0208-0218-A1, p. 3]

In this rulemaking, adopt Alternative #2 through model year 2025. [EPA-HQ-OAR-2021-0208-0218-A1, p. 2]

Commenter: Lucid USA, Inc. (Lucid)

Lucid supports EPA's proposal to issue GHG standards for model years 2023-2026 that are more stringent than the present standards that were issued by the Trump Administration. We believe that the coming production of EVs by all manufacturers will enable everyone to meet even greater stringency than has been proposed in the NPRM. Accordingly, we support recommendations to increase the stringency of the proposed standards. In particular, we support the adoption of the stringency proposed in Alternative 2 in the NPRM.[EPA-HQ-OAR-2021-0208-0528-A1, p. 5]

Furthermore, the stringency of the proposed standards in the NPRM is insufficient to achieve President Biden's goal of 50% EV sales by 2030, announced in the August 2021 Executive Order. It will be too late to begin that transition to EVs with the next round of rulemaking starting with MY2027. The proposed standards are based on the assumption of only 8% EV penetration by MY2026. We believe that more stringent standards can encourage a higher rate of EV penetration by MY 2026. [EPA-HQ-OAR-2021-0208-0528-A1, p. 5]

With regard to the request for comments on increasing stringency for MY 2026, Lucid supports standards with at least 10 g/mi greater stringency. Although increased stringency can be achieved through improvements in ICE technologies, greater production and sales of EVs provide manufacturers a straightforward path to compliance with greater stringency. [EPA-HQ-OAR-2021-0208-0528-A1, p.5]

Commenter: Lynch, Vanessa

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, p. 192.]

I'm asking the Environmental Protection Agency to choose the strongest option for their Late Model Light-Duty Greenhouse Gas Emissions Standard which avoids all loopholes for automakers.

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, p. 193.]

In order to set us on the path to 100 percent zero emissions new vehicle sales by 2035, the near-term standards for climate pollution must be as strong as possible and in order to protect families like mine from the most dire impacts of climate change, the Environmental Protection Agency must take bold and ambitious action at every opportunity to protect our children's health and future.

Commenter: Maine Department of Environmental Protection

Given the technological advancements, widespread commitments to electrification, and programs such as the ACC standards, EPA should maximize the proposal's environmental benefits by adopting final standards consistent with those provided in its 2012 national program. In the 2023 LDV proposal, EPA modeled three alternative regulatory scenarios, with 'Alternative 2' providing the greatest net benefit. Alternative 2, along with a more stringent standard for 2026 would most closely approach the GHG and criteria pollutant emission reduction benefits provided by EPA's 2012 standards. [EPA-HQ-OAR-2021-0208-0225-A1, p.2]

In closing, the 2023 LDV Proposal is an important step towards providing the significant GHG motor vehicle emissions reductions necessary to mitigate the climate crisis. Since the proposed GHG standards can be easily achieved with existing technologies that are already in widespread use, the Department encourages EPA to adopt the most stringent feasible GHG emission standards for model year 2023-2026 LDVs, and consider aligning future programs with efforts already underway in California and the Section 177 states. [EPA-HQ-OAR-2021-0208-0225-A1, p.2]

Commenter: Manufacturers of Emission Controls Association (MECA)

MECA enthusiastically supports EPA's reconsideration of the 2023-2026 light-duty GHG standards and the agency's preferred alternative for standards through MY 2026. [EPA-HQ-OAR-2021-0208-0261-A1, p.1]

Commenter: Marcot, Nicole

[The following comments were submitted as testimony at the virtual public hearing on August 26, 2021. See Hearing Testimony – 26Aug2021, pp. 158-159.]

Given that the transportation sector is the largest source of carbon pollution in the U.S., cleaning up vehicle pollution is one of the most important things we can do to fight climate change.

I'm urging EPA to set the strongest possible federal clean car standards through 2026, avoiding loopholes and putting automakers on track to meet ambitious pollution reduction goals.

Commenter: Maryland Department of Environment

MDE agrees with the National Association of Clean Air Agencies (NACAA) recommendation that 'EPA should return to a national program that maintains the authority preserved to California and other states under the Clean Air Act… and should adopt standards sufficiently stringent to, at a minimum, achieve the same level of emission benefits as under the standards adopted in the 2012 rule…EPA's Alternative 2, augmented with a MY 2026 standard that is 10 grams/mile more stringent, comes the closest to NACAA's recommendation of adopting standards sufficiently stringent to, at a minimum, achieve the same level of emission benefits as under the final standards adopted under the 2012 rule.' [EPA-HQ-OAR-2021-0208-0241-A1, p.1]

Commenter: Mass Comment Campaign sponsored by American Lung Association (121)

We urge the U.S. Environmental Protection Agency to set strong greenhouse gas standards for light-duty vehicles that drive the transition to a zero-emission future. [EPA-HQ-OAR-2021-0208-0559-A1, p.1]

Please finalize near-term greenhouse gas standards for light-duty vehicles that are at least as strong as the standards that the SAFE rule replaced. [EPA-HQ-OAR-2021-0208-0559-A1, p.1]

Commenter: Mass Comment Campaign sponsored by Center for Biological Diversity (77,692)

Your proposed clean car rules miss the mark. They're riddled with loopholes, rely on unenforceable and unreliable promises by automakers, and fail to require the emissions cuts needed to protect our communities and the climate. In the coming weeks, I urge you to strengthen the toughest option the Environmental Protection Agency has considered for short-term auto pollution rules and adopt it. Then, to drive real progress, [EPA-HQ-OAR-2021-0208-0560-A1, p.1]

Automakers already have the technology to safely reduce emissions. And consumers will save more at the pump than these technologies cost. Now's the time for strong rules — not half-measures. I urge you to create the best clean car standards in the world. [EPA-HQ-OAR-2021-0208-0560-A1, p.1]

Commenter: Mass Comment Campaign sponsored by Consumer Reports (19,038)

Automakers already agreed to standards stronger than the current proposal almost a decade ago. The Administration must shift to stronger standards to hold the auto industry accountable, and ensure automakers take responsibility for their role in reducing climate-damaging pollution. [EPA-HQ-OAR-2021-0208-0602-A2, p.1]

Commenter: Mass Comment Campaign sponsored by Environment America (11,080)

The proposed rule is not as strong as the original Obama-Biden standard and is riddled with loopholes and giveaways to automakers that undermine otherwise strong emissions reduction targets. [EPA-HQ-OAR-2021-0208-0557-A1, p.2]

Given the above, we urge the EPA to set the strongest standards possible. At a minimum the EPA should reinstate the Obama-Biden era standards, [EPA-HQ-OAR-2021-0208-0557-A1, p.2]

The EPA should implement the strongest clean cars rule possible to effectively solve the climate crisis and protect public health. At a minimum, the EPA should reinstate the Obama-Biden era standards and ideally make them even stronger. [EPA-HQ-OAR-2021-0208-0557-A2, p.1]

This proposed rule is not as strong as the Obama-Biden standards and is riddled with loopholes and giveaways to automakers that undermine otherwise strong emissions reduction targets. [EPA-HQ-OAR-2021-0208-0557-A2, p.1]

The EPA itself has identified a far more effective rule (Alternative #2), which would put 400,000 extra electric vehicles on the road by 2026 and result in 130 million metric tons fewer greenhouse gas emissions. [EPA-HQ-OAR-2021-0208-0557-A1, p.2]

Environment America has collected 11,080 signatures calling for the adoption of the stricter standards detailed in Alternative #2. We ask that these names be entered into the official record and considered as separate public comments. [EPA-HQ-OAR-2021-0208-0557-A1, p.2]

but in order to effectively combat climate change and to enhance public health, the EPA should adopt Alternative #2. [EPA-HQ-OAR-2021-0208-0557-A1, p.2]

The EPA itself has identified a far more effective rule (Alternative #2), which would put 400,000 extra electric vehicles on the road by 2026 and result in 130 million fewer metric tons of greenhouse gas emissions. I urge you to adopt Alternative #2 to help clean our air. [EPA-HQ-OAR-2021-0208-0557-A2, p.1]

Commenter: Mass Comment Campaign sponsored by Interfaith Power & Light (1,093)

The Biden administration made a promise for bold investments in climate, jobs and justice as well as to electrify the transportation sector for all. As a person of faith and conscience, I am writing to ask you to enact the boldest and strongest possible clean car standards. [EPA-HQ-OAR-2021-0208-0553-A1, p.2]

The recently released draft rule is not strong enough. I am asking you to revise the standards beyond levels set during the Obama-Biden administration and put the nation on a trajectory to 100% electric cars and light trucks no later than 2035. This requires at least 60% to be electric by 2030. The EPA must also maximize emissions reductions and not allow loopholes to undermine this progress. [EPA-HQ-OAR-2021-0208-0553-A1,p.2]

This is a moral opportunity to follow the science and rapidly make the emissions reductions we know are necessary. It is possible and it can be done in a way that is beneficial to our country and to the world. [EPA-HQ-OAR-2021-0208-0553-A1,p.2]

Commenter: Mass Comment Campaign sponsored by Interfaith Power and Light et al. (1,599)

As religious leaders, we urge you to enact the strongest possible standards to reduce vehicle pollution. We ask that you:

• Restore national standards and revise them beyond levels set during the Obama-Biden administration; [EPA-HQ-OAR-2021-0208-0192-A1, p.2]

Commenter: Mass Comment Campaign sponsored by National Religious Partnership for the Environment-GA (563)

The Environmental Protection Agency has an opportunity to help address the injustice of pollution and climate change by enacting the strongest possible federal clean car standards. Since transportation is the largest source of carbon emissions in the US, strong fuel economy standards will protect families from vehicle pollution, save drivers money at the pump, and fight climate change. The standards EPA sets should achieve 100 percent zero-emission vehicles in by 2035. [EPA-HQ-OAR-2021-0208-0554-A1, p.1]

This means restoring standards at least to levels set during the Obama-Biden administration and ideally even stronger than Obama era standards. [EPA-HQ-OAR-2021-0208-0554-A1, p.1]

Commenter: Mass Comment Campaign sponsored by National Religious Partnership for the Environment-MN (92)

The Environmental Protection Agency has an opportunity to help address the injustice of pollution and climate change by enacting the strongest possible federal clean car standards. Since transportation is the largest source of carbon emissions in the US, strong fuel economy standards will protect families from vehicle pollution, save drivers money at the pump, and fight climate change. The standards EPA sets should achieve 100 percent zero-emission vehicles in by 2035. [EPA-HQ-OAR-2021-0208-0556-A1, p.1]

This means restoring standards at least to levels set during the Obama-Biden administration and ideally even stronger than Obama era standards. [EPA-HQ-OAR-2021-0208-0556-A1,p.1]

Commenter: Mass Comment Campaign sponsored by National Religious Partnership for the Environment-PA (142)

The Environmental Protection Agency has an opportunity to help address the injustice of pollution and climate change by enacting the strongest possible federal clean car standards. Since transportation is the largest source of carbon emissions in the US, strong fuel economy standards will protect families from vehicle pollution, save drivers money at the pump, and fight climate change. The standards EPA sets should achieve 100 percent zero-emission vehicles in by 2035. [EPA-HQ-OAR-2021-0208-0555-A1, p.1]

This means restoring standards at least to levels set during the Obama-Biden administration and ideally even stronger than Obama era standards. [EPA-HQ-OAR-2021-0208-0555-A1, p.1]

Commenter: Mass Comment Campaign sponsored by Natural Resources Defense Council (NRDC) (26,929)

Furthermore, your proposed rules deliver fewer carbon pollution reductions and fuel savings than the Obama-era standards. [EPA-HQ-OAR-2021-0208-0558, p.1]

We applaud President Biden's executive order mandating that 50% of vehicle sales be zero-emission vehicles by 2030. [EPA-HQ-OAR-2021-0208-0558,p.1]

We implore you to heed the dire warnings of the U.N. Intergovernmental Panel on Climate Change's new report and strengthen clean car and fuel economy standards to ensure that our country can reach its climate goals. [EPA-HQ-OAR-2021-0208-0558,p.1]

Please accept these 26,929 public comments from members and online activists of the Natural Resources Defense Council (NRDC), calling on the Biden administration to heed our growing calls for major climate action by going bigger on clean car and fuel economy standards before it's too late. [EPA-HQ-OAR-2021-0208-0558, p.1]

We applaud your efforts to cut back on U.S. vehicle emissions and chart a course towards a future with net-zero emissions from transportation, but we are afraid they don't go far enough. [EPA-HQ-OAR-2021-0208-0558, p.1]

Please adopt at least EPA's Alternative #2 and a stronger fuel economy standard to drive much-needed short-term cuts in emissions and put us on the road to the goal of reaching 100% net-zero vehicle sales by 2035. [EPA-HQ-OAR-2021-0208-0558,p.1]

Commenter: Mass Comment Campaign sponsored by Sierra Club (13,699)

We need even stronger policies on vehicle emissions! To have any hope of a livable planet for our children and grandchildren, EPA must establish much stronger policies that set us on a rapid path to electrifying all cars and light-duty trucks. We appreciate President Biden making cleaner cars a day-one priority and EPA moving quickly to propose a new regulation. However, our communities and our planet require a bolder standard that will deliver real world emissions reductions that match the urgency of the climate crisis. [EPA-HQ-OAR-2021-0208-0196-A1, p.1]

Despite the enormous technological progress in the auto industry, including on electric and hybrid vehicle technology and the extensive plans for electrification announced by many of the major automakers, the proposed EPA standards would unfortunately move us backward from where we were nine years ago. As climate disasters affect huge portions of our country and the global community, we need to make up for lost time from the previous administration's rollback. EPA must set the light-duty vehicle fleet on a course to reach at least 60 percent annual zero emission vehicles sales by 2030 so that we can achieve 100 percent zero emission vehicle sales no later than 2035. [EPA-HQ-OAR-2021-0208-0196-A1,p.1]

EPA must strengthen the final rule by accelerating the trajectory towards pollution-free vehicles and eliminating the credit scheme. [EPA-HQ-OAR-2021-0208-0196-A1, p.1]

Commenter: Mass Comment Campaign sponsoring organization unknown-1 (7,010)

As a member of the League of Conservation Voters, I am writing to ask you to support strong clean car standards and to require that all new vehicles sold by 2035 be zero emission vehicles. [EPA-HQ-OAR-2021-0208-0545, p.1]

I also welcome the Presidents commitment to a 50 percent reduction in carbon pollution from new cars by 2030, coupled with urgently needed action by Congress to ensure adequate investments in electric vehicles and clean energy. [EPA-HQ-OAR-2021-0208-0545, p.1]

As the EPA works to finalize new vehicle emissions standards, I ask that these and future standards are even stronger than those announced by President Biden and are developed to ensure that all new cars sold are zero emission vehicles by 2035. Now is the time to set the strongest possible clean car standards to meet the climate ambition goals that science and justice require. [EPA-HQ-OAR-2021-0208-0545, p.1]

Due to these considerations, I am asking for your consideration of strong vehicle emissions standards that would require all new vehicles sold by 2035 be zero emission vehicles. [EPA-HQ-OAR-2021-0208-0545, p.1]

Commenter: Mass Comment Campaign sponsoring organization unknown-10 (2,832)

We need 100% of new car sales to be zero-emissions by 2035. To reach that goal, the near-term standards for climate pollution must be as strong as possible, as soon as possible. Please finalize the strongest possible climate pollution limits on cars and light trucks, to help protect our children's health and future from the climate crisis. [EPA-HQ-OAR-2021-0208-0641-A1, p.1]

EPA's proposal details several options. The "preferred" alternative includes loopholes for automakers that may undermine the pollution reduction targets. Alternative 2 is the stronger option that would reduce climate pollution faster, putting 400,000 extra electric vehicles on the road by 2026 and resulting in 130 million metric tons fewer greenhouse gas emissions, among other significant benefits, including billions in economic benefits. Alternative 2 is the better option. [EPA-HQ-OAR-2021-0208-0641-A1, p.1]

As a parent, I am writing in support of the strongest possible greenhouse gas emissions standards for cars and light trucks. The transportation sector is the largest source of climate pollution in the US, and cleaning up this pollution is one of the most important things we can do to fight climate change. [EPA-HQ-OAR-2021-0208-0641-A1, p.1]

Commenter: Mass Comment Campaign sponsoring organization unknown-11 (1,667)

Passenger vehicles are one of the largest sources of climate pollution in the U.S. To combat this threat, the Biden administration must move forward with the strongest possible federal clean car standards. The standards adopted should achieve at least the same total emission reductions as those undertaken by the Obama-Biden administration and should not contain needless credits or other loopholes that reward automakers for reductions that aren't matched in the real world. [EPA-HQ-OAR-2021-0208-0642-A1, p.1]

It is time to hold car manufacturers accountable and move forward with the strongest possible clean car standards. [EPA-HQ-OAR-2021-0208-0642-A1, p.1]

Commenter: Mass Comment Campaign sponsoring organization unknown-2 (2,214)

Hello, I am a member of Public Citizen and I am writing to urge the Biden administration to adopt the strongest possible clean car standards as part of its commitment to tackle the climate crisis, particularly in addressing transportation sector emissions, the biggest contributor to U.S. greenhouse gas (GHG) pollution. [EPA-HQ-OAR-2021-0208-0546, p.1] From its first day in office, the Biden administration promised to reinstate strong clean car standards and take bold steps to address transportation sector emissions. Unfortunately, the Biden EPA has put forth a preferred option that is not even as strong as the Obama-Biden standard from 2012, and is riddled with loopholes and giveaways to automakers that undermine otherwise strong pollution reduction targets. [EPA-HQ-OAR-2021-0208-0546, p.1]

While this proposal is certainly an improvement on the regressive policies of the previous administration, it falls far short of what scientists say is needed and the Administration's promises on climate. It fails to achieve the greenhouse gas reductions necessary to meet the Intergovernmental Panel on Climate Change's targets of 45 percent by 2030 and zero emissions by 2050, or for that matter to meet U.S. commitments under the Paris Agreement. And it fails to require automakers to meet President Biden's goal of 50 percent zero emission vehicle (ZEV) sales by 2030 (a target that, itself, is far too lax). [EPA-HQ-OAR-2021-0208-0546, p.1]

THE PLANET IS ON FIRE!!!! The recent IPCC report made clear that we really do not have time for half measures and lackluster commitment to reversing carbon emissions. President Biden needs to stop just talking the talk, hoping that everyone will approve of his work and yet doing little overall to protect the planet: he needs to start walking the walk. It is already too late to reverse some of the effects of this crisis, so we cannot wait, otherwise why bother doing anything? [EPA-HQ-OAR-2021-0208-0546, p.1]

The world's scientists tell us we have a rapidly closing window to prevent the most catastrophic impacts of climate change. As such, nothing short of the strongest possible clean car standards will deliver the carbon reductions that President Biden has promised the country and the world. [EPA-HQ-OAR-2021-0208-0546, p.1]

Among the options presented, I urge you to choose the much more effective Alternative #2, with one important caveat: We cannot wait any longer to begin requiring automakers to sell ZEVs—

and to get them working toward 100 percent ZEVs by 2030, which is what's necessary to meet science-based climate targets. I urge the following steps:

1) In this rulemaking, adopt Alternative #2 through model year 2025.

2) Supplement this proposal with another, to be finalized before the end of 2022, that sets a ZEV mandate for model year 2026 consistent with a pathway toward requiring 100 percent of new vehicles to be ZEVs by 2030. [EPA-HQ-OAR-2021-0208-0546, p.1]

Commenter: Mass Comment Campaign sponsoring organization unknown-3 (2,178)

I would also urge you to immediately start work on an even stronger set of clean car standards for cars manufactured starting in Model Year 2026 that can send a strong signal to industry that a transition is underway to achieve 100 percent zero-emission new vehicle sales by no later than 2035 and net-zero GHG pollution economy-wide by 2050. [EPA-HQ-OAR-2021-0208-0547, p.1]

America has always led the way in most things and we should be leading the way on green energy, not following behind China. Companies can make as much if not more with clean green energy. [EPA-HQ-OAR-2021-0208-0547, p.1]

I am urging you to choose the much more effective Alternative #2, which would put 400,000 extra electric vehicles on the road by 2026 and result in 130 million metric tons fewer greenhouse gas emissions. [EPA-HQ-OAR-2021-0208-0547,p.1]

Commenter: Mass Comment Campaign sponsoring organization unknown-4 (195)

Please adopt the strongest possible standards against greenhouse gases and all pollution for motor vehicles. If these are "expensive", all the better to switch our lifestyles to active and public transportation more quickly. Personal motor vehicles, even electric ones, will be responsible for the extinction of our species! [EPA-HQ-OAR-2021-0208-0548, p.1]

I am writing to ask the EPA to finalize and implement the strongest possible greenhouse gas emissions standards for model years2023-2026 cars and light trucks. [EPA-HQ-OAR-2021-0208-0548, p.1]

The EPA must take this opportunity to put the auto industry on the path to cleaner vehicles by adopting Alternative 2 in the proposed rule. This stronger standard will result in greater benefits, including lower tailpipe p greenhouse gas emissions, increased consumer savings, and other benefits [EPA-HQ-OAR-2021-0208-0548, p.1]

Commenter: Mass Comment Campaign sponsoring organization unknown-6 (39)

Passenger vehicles are one of the largest sources of climate pollution in the U.S. To combat this threat, the Biden administration must move forward with the strongest possible federal greenhouse gas and fuel-efficiency standards for cars and light trucks. [EPA-HQ-OAR-2021-0208-0550, p.1]

Any standards adopted should achieve at least the same total emission reductions as those undertaken by the Obama-Biden administration and should not contain needless credits or other loopholes that reward automakers for reductions that arent matched in the real world. [EPA-HQ-OAR-2021-0208-0550, p.1]

Enacting more stringent clean car standards will provide numerous co-benefits for people and parks from saving Americans billions at the pump, to preventing unhealthy vehicle air pollution that severely harms public health and the wellbeing of park ecosystems. [EPA-HQ-OAR-2021-0208-0550, p.1]

It is time to hold car manufacturers accountable and move forward with the strongest possible clean car standards. [EPA-HQ-OAR-2021-0208-0550, p.1]

Commenter: Mass Comment Campaign sponsoring organization unknown-7 (37)

I urge the U.S. Environmental Protection Agency to set strong greenhouse gas standards for light-duty vehicles that protect health and accelerate a transition to zero-emitting vehicles. [EPA-HQ-OAR-2021-0208-0551, p.1]

Please finalize near-term greenhouse gas standards that will achieve emissions reductions to at least equal to standards finalized during the Obama Administration. [EPA-HQ-OAR-2021-0208-0551, p.1]

Commenter: Mass Comment Campaign sponsoring organization unknown-8 (25)

EPA’s proposed rules do not require automakers to make sufficient progress toward replacing fossil fueled vehicles at the pace needed to achieve IPCC targets for 2030 and 2050. [EPA-HQ-OAR-2021-0208-0552, p.1]

The proposal is not even adequate to achieve the 50% zero emissions vehicle (ZEV) sales target by 2030 established by President Biden’s Executive Order of January 21, 2021. [EPA-HQ-OAR-2021-0208-0552, p.1]

Indeed, in order to achieve a zero emission economy by 2050, the stated goal of the Executive Order, the rule should mandate a regulatory framework to transition all automakers to 100% ZEVs by 2030. [EPA-HQ-OAR-2021-0208-0552, p.1]

Commenter: Mass Comment Campaign sponsoring organization unknown-9 (3,219)

EPA’s proposed rule to strengthen federal greenhouse gas (GHG) emissions standards for passenger cars and light trucks is a necessary step to address the climate crisis and protect our communities from harmful air pollution. But it is not enough. Please restore American leadership on climate by promulgating strong standards to eliminate pollution from all passenger vehicles. Together, we can protect Americans’ health, the climate, and our pocketbooks. [EPA-HQ-OAR-2021-0208-0640-A1, p.1]

Commenter: Mathews, Mary

[The following comments were submitted as testimony at the virtual public hearing on August 26, 2021. See Hearing Testimony – 26Aug2021, pp. 257-258.]

The previous Administration's rollback of clean car rules curtailed progress in improving air quality and moderating climate change. To make up for lost time for Waukegan and for all of our communities, the League of Women Voters of Lake County calls for standards that are at a minimum as strong as those finalized in 2012 and without any loopholes and give-aways to automakers. Stricter fuel efficiency standards coupled with greenhouse gas reductions standards, and enforceable requirements are needed. Reducing carbon pollution and fighting climate change must be a top priority for the EPA. The League of Women Voters of Lake County requests the clean car standards be the strongest possible and effective as soon as possible to protect public health and combat the climate crisis. Let's move to zero emissions before it is too late.

Commenter: McQuire, Terry

[The following comments were submitted as testimony at the virtual public hearing on August 26, 2021. See Hearing Testimony – 26Aug2021, p. 222.]

I urge you to move as quickly as possible to finalize the strongest possible cleaner car standards.

Our communities can't take any more air pollution and we need EPA to act. Cleaner car standards that move us closer to zero emissions vehicles will have the added benefit of reducing other dangerous air pollutants.

Commenter: Melton, Karen

[The following comments were submitted as testimony at the virtual public hearing on August 26, 2021. See Hearing Testimony – 26Aug2021, pp. 252-253.]

I do appreciate that this Administration is acting to re-implement clean car standards but ask the EPA to create the strongest possible limits on vehicle pollution. These limits had already gone through the technical review process. They will ensure the greatest reductions in oil use and global warming emissions.

[The following comments were submitted as testimony at the virtual public hearing on August 26, 2021. See Hearing Testimony – 26Aug2021, p. 254.]

Alternative Number 2 is the better proposal in this regard.

Once again, I urge this Administration to set the strongest standards to make cars and light-duty trucks more efficient by going back to at least the Obama standards.

Commenter: Mercedes-Benz USA, LLC

Mercedes-Benz supports year-over-year stringency improvements in greenhouse gas (GHG) standards. The standards proposed in 2012 required dependency on credit accrual while transitioning fleets to zero-emission vehicles. Although the 2012 program offered incentives during its early phases, many incentive opportunities phase-out by later years of the program, MYs2022-2025. At the time of the 2012 proposal, the agencies slated electric vehicles for mass deployment by the end of MY2025. Instead, industry still sees stalled electric vehicle adoption, largely due to inadequate infrastructure and lack of consumer acceptance.

Mercedes-Benz intends to address two main points. First, the EPA’s proposed target for MY2023 tightens the stringency to ~10% less GHG emissions relative to MY2022. This jump will be challenging to meet, especially in light of EPA's previous proposal which proposed a significant relaxation of the standards. These types of stringency improvements require significant changeover within the US automotive fleet, and given Mercedes-Benz's existing widespread adoption of incremental technologies, the next step to meet these standards is full electrification. Full electric transition requires complementary programs to support EV adoption, including infrastructure demands, financial incentives, state and local investments, and policies which support the transition to a zero-emission future. [EPA-HQ-OAR-2021-0208-0523-A1, p.3]

Mercedes-Benz supports EPA's proposal to tighten greenhouse gas standards through MY 2026 and encourages EPA to adopt the preferred pathway. [EPA-HQ-OAR-2021-0208-0523-A1, p. 2]

Second, EPA requests comment on an alternative which by MY2026 is 5-10% more aggressive than the proposed target for MY2026. EPA's proposal already presumes that the lead-time is sufficient to make a great leap in compliance stringency in MY2023. In view of the clear evidence suggesting that full-electric changeover is required to comply with the proposed standards in later model years, we urge the agency to consider that for successful EV deployment, the EV market must have complementary policies in place for EV infrastructure and incentives. Mercedes-Benz supports EPA's direction as proposed, without the added 5-10% increase in stringency. [EPA-HQ-OAR-2021-0208-0523-A1, p.3]

Commenter: Metropolitan Mayors Caucus

We support the the most stringent GHG emission standards for light-duty vehicles feasible [EPA-HQ-OAR-2021-0208-0504, p.22]

I wish to express our appreciation for the Biden Administration's swift action to restore necessary emissions standards for light-duty vehicles. Precious time was lost in the rollback of emission standards of the previous administration, and we need more aggressive standards to catch up and meet ever more apparent emission reduction targets. [EPA-HQ-OAR-2021-0208-0504, p.1]

For these reasons, the Metropolitan Mayors Caucus urges EPA to swiftly adopt the most stringent GHG emission standards for light-duty vehicles feasible for model years 2023 through 2026 [EPA-HQ-OAR-2021-0208-0504, p.1]

Commenter: Metropolitan Washington Air Quality Committee (MWAQC)

Emissions from the transportation sector are one of the major contributors of GHGs in the region. As such, MWAQC, CEEPC, and the TPB believe that revising the GHG emissions standards for passenger cars and light duty vehicles through model year 2026 to be more stringent than the SAFE Vehicles Rule is appropriate, feasible, and needed in order for the region to achieve its greenhouse gas reduction goals. Additionally, the program's inclusion of flexibilities to incentivize the production and sale of vehicles with zero and near-zero emissions technology would support COG's policy priorities to meet the region's climate goals. [EPA-HQ-OAR-2021-0208-0208-A1][p.3]

Commenter: MI Air MI Health

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, p. 195.]

However, we also feel that it's critical to push even further and we call on you today to set much stronger standards covering cars, SUVs, and light trucks through at least 2030.

Commenter: Michalek, Jeremy and Whitefoot, Kate S.

Choice of Regulatory Alternative with Highest Net Benefits

We recommend that EPA should choose the regulatory alternative with the best estimated net benefits. EPA found that the net benefits of the 'Alternative 2' regulations are larger than those of the proposed regulations but did not choose this regulatory alternative and is instead proposing regulations that have lower net benefits. In the case of agencies choosing a regulatory alternative that does not have the maximum net benefits, a strong rationale should be provided. Such a strong rationale is not evident in the proposed rule. In discussing the choice of the proposed regulations, the proposed rule states that 'EPA recognizes that the additional penetration of electrification by 2026 [in Alternative 2] could be challenging for any manufacturers that are not currently investing in advanced technologies, such as EVs, for this timeframe, although with additional investment and product development, or greater reliance on the emissions ABT program including credit trading, this level of stringency may be achievable.' (p. 43777)

We raise the following concerns with this rationale and the choice of the proposed regulations:

(1) In choosing the proposed regulations over 'Alternative 2', EPA is effectively saying that achieving an 8% market share of plug-in vehicles (including PHEVs and BEVs) across the U.S. new vehicle fleet by MY 2026 is a feasible path, but achieving a 10% market share of plug-in vehicles is not feasible. However, the proposed rule does not provide evidence supporting this distinction.

(2) EPA's analysis of feasible compliance pathways for Alternative 2 does not incorporate the flexibilities associated with credit trading across manufacturers that would be available under the regulations. This credit trading allows manufacturers further flexibility to achieve the more stringent regulations and should be accounted for in consideration of the feasibility and cost-benefits of the alternative regulations.

(3) When considering feasibility of the regulations, EPA should consider the context of the industry as a whole. In previous joint rulemakings with the Department of Transportation's CAFE program, feasibility of the regulations was determined for the industry as a whole, not restricted to individual manufacturers:

'The law permits CAFE standards exceeding the projected capability of any particular manufacturer as long as the standard is economically practicable for the industry as a whole. Thus, while a particular CAFE standard may pose difficulties for one manufacturer, it may also present opportunities for another. NHTSA has long held that the CAFE program is not necessarily intended to maintain the competitive positioning of each particular company. Rather, it is intended to enhance the fuel economy of the vehicle fleet on American roads, while protecting motor vehicle safety and being mindful of the risk to the overall United States economy' (49 CFR p. 62668).

(4) If EPA believes that some manufacturers will need further lead time to invest in GHG-emission reducing technologies, a third alternative could be considered that adjusts the year-by-year stringency to start at the stringency level in the currently proposed regulation in MY 2021 and increase to the stringency level of Alternative 2 in MY 2026. We recommend that EPA calculate the net benefits of such an alternative against the proposed regulation and the other two alternatives and choose the alternative that has the highest net benefits. [EPA-HQ-OAR-2021-0208-0300-A1, pp. 4-5]

Commenter: Mid-America Regional Council (MARC)

The Air Quality Forum encourages the EPA to appropriately increase the stringency of the proposed standard for MY 2026 to set the stage for an ongoing GHG reduction program that will incorporate accelerating zero-emissions technologies and bring the strong, rapid and sustained reductions in GHG emissions needed to meet 2030 GHG reduction targets. [EPA-HQ-OAR-2021-0208-0265-A1, p.1]

Commenter: Minault, Kent

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, p. 240.]

I'm calling to urge EPA to adopt the second alternative and basically to treat the climate disruption as the crisis that it is.

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, pp. 241-242.]

But I urge you to take the most stringent stance you can take in regulating greenhouse gas emissions from transportation because that's the hard nut. We're progressing in a lot of areas, but if we don't lick transportation, then we'll lose the climate fight.

Commenter: Minnesota Pollution Control Agency (MPCA) and Minnesota Department of Transportation (MnDOT)

Emissions standards should push industries to advance new, cleaner technologies. In this case, EPA should set stringent standards that require the automotive industry to transition to widespread electrification and use of biofuels, beyond what the industry would do on its own without regulation, especially by model year (MY) 2026. [EPA-HQ-OAR-2021-0208-0211-A1, p.3]

EPA should adopt stringent national standards

EPA should finalize GHG emissions standards that at minimum restore the benefits of the standards finalized in 2012. EPA’s 'Alternative 2' has the greatest net benefits of the three approaches EPA modeled. Alternative 2, supplemented with the MY 2026 standard that is 10 grams/mile more stringent than the proposal appears to come the closest to achieving the GHG, particulate matter, and groundlevel ozone reduction benefits that would have been achieved under the 2012 standards. MPCA and MnDOT therefore support adoption of final GHG emissions standards that restore these benefits. [EPA-HQ-OAR-2021-0208-0211-A1, p.3]

Commenter: Moore, Cinthia

[The following comments were submitted as testimony at the virtual public hearing on August 26, 2021. See Hearing Testimony – 26Aug2021, p. 117.]

The EPA must set the strongest possible federal clean car standards through 2026, avoiding loopholes and putting automakers on track to meet ambitious pollution reduction goals.

Commenter: Moore, Kenneth

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, pp. 322-323.]

That's why I believe that the EPA must set the strongest possible federal clean car standards. Choosing to continue producing less-efficient vehicles just isn't wasteful, it's a moral travesty. It is critical that the United States move without delay toward a clean energy economy.

The EPA's rules can have a profound impact upon the sector that currently generates the largest percentage of climate pollution, transportation.

By adopting the strongest possible clean car standards, you will not only drive down vehicle pollution but you'll also spur the economy as new sustainable automotive technologies are brought online.

Commenter: Mothers and Others for Clean Air

I am writing to urge EPA to make the strongest vehicle emissions standards possible. [EPA-HQ-OAR-2021-0208-0491-A, p. 1]

I urge the EPA to require significant reductions in vehicle emissions as soon as possible. [EPA-HQ-OAR-2021-0208-0491-A, p. 1]

I am writing to urge EPA to make the strongest vehicle emissions standards possible.

I urge the EPA to require significant reductions in vehicle emissions as soon as possible. [EPA-HQ-OAR-2021-0208-0491-A, p. 1]

Commenter: Motor & Equipment Manufacturers Association (MEMA)

The proposed standards that EPA outlines are stringent and meaningful and provide the needed regulatory certainty for the industry. Supplier technology investments and developments are carefully planned according to production cycles and emissions standards so as to avoid stranded investments. It is imperative that EPA provide a stable roadmap of rules, targets, test cycles, and credit programs that are consistent and provide the industry adequate direction and stability. These standards, as well as standards set in post-2026, need to strike an appropriate balance between strengthening the U.S. supplier sector, continuing American technological leadership, providing greater consumer choice, and keeping vehicles affordable. Standards that continue to make progress will be those most likely to secure vehicle supplier technological investments.

As we outline further in MEMA's post-2026 recommendations, we emphasize that the overall goals of the pre-2026 proposal and the goals discussed in President Biden's Executive Order (EO) 14037 for post-2026,14 will require action from government and industries outside the motor vehicle industry. To even achieve the nation's short-term goals, the following key considerations must be addressed: consumer incentives allowing adoption of ZEV and GHG-reducing technology to be more financially feasible; consumer uptake of ZEVs; and, infrastructure to utilize and support ZEVs effectively.

Importantly for suppliers, a strategic plan should also include supply-side polices that aim to accelerate the development, commercialization, manufacture, and deployment of new, advanced technologies in the U.S. It is critical for the supplier industry to have increased access to government-provided resources, including investments and incentives for the research and development, and increased manufacturing, including funding for facility retooling and programs that further develop and sustain our skilled workforce. [EPA-HQ-OAR-2021-0208-0249-A1, p. 5-6]

Over a decade ago, vehicle suppliers committed to vehicle emissions technology innovation, ensuring vehicle manufacturers were able to meet the emissions standards set in 2012 for MYs 2017–2025. Consequently, MEMA supports EPA's vehicle GHG standards through MY2026 that are stringent but achievable and provide the needed regulatory certainty and stability for the industry. [EPA-HQ-OAR-2021-0208-0249-A1, p. 16]

Commenter: Muller, Melinda

I am a biologist and biology instructor. I am also a resident of the Pacific Northwest, where we experienced a deadly "heat dome" this past summer. Revised Clean Car Standards must be based on the urgency of climate change and the best available research about needed and effective mitigations. Transportation is the largest source of climate pollution in the U.S., accounting for nearly 30% of greenhouse gas emissions that are causing extreme weather events and other harms of climate change.

This proposal for new Clean Car Standards, while necessary progress, is not sufficient progress as written. [EPA-HQ-OAR-2021-0208-0500, p. 1]

A May report from the International Energy Agency asserts that globally ALL new cars sales must be electric by 2035 in order to achieve net-zero emissions by 2050 and limit warming to 1.5 C. [EPA-HQ-OAR-2021-0208-0500, p. 1]

The EPA rules on clean car standards must include the following if the rule is to be as effective as the climate crisis calls for:

1. Establishing a 2030 standard that achieves fleet average greenhouse gas emissions 60% or more below today's average;

2. Putting the nation on a trajectory to make all new cars and light-duty trucks zero-emission vehicles no later than 2035; and

3. Ensuring all new trucks and buses are zero-emission no later than 2040. [EPA-HQ-OAR-2021-0208-0500, p. 1]

Transitioning to cleaner cars reduces our dependence on oil and saves drivers billions at the pump. It also drives innovation and creates jobs in the auto industry manufacturing technology that reduces pollution and improves fuel economy.

As President Biden has said, time is running out to avoid the most catastrophic effects of climate change. This is a moment of essential opportunity to enact Clean Car Standards that meet the urgency of climate change. [EPA-HQ-OAR-2021-0208-0500, p. 1]

Commenter: National Association of Clean Air Agencies (NACAA)

EPA should adopt standards sufficiently stringent to, at a minimum, achieve the same level of emission benefits as under the standards adopted in the 2012 rule. Since the emission standards in the 2012 rule were adopted, clean vehicle technology and performance have progressed significantly, far more than anticipated and at lower cost, making a strengthening of those standards in this rulemaking feasible. [EPA-HQ-OAR-2021-0208-0255-A1, p.1]

As NACAA noted in its January 2021 transition paper to the Biden Administration,2 increasingly stringent standards to reduce emissions from passenger cars and light trucks are urgently needed. Such standards are critical components in an overall strategy to further reduce GHG and criteria pollutant emissions from passenger cars and light trucks, which are significant contributors to climate change as well as NAAQS nonattainment and maintenance problems in many areas of the U.S. [EPA-HQ-OAR-2021-0208-0255-A1, p.2]

EPA's Alternative 2, augmented with a MY 2026 standard that is 10 grams/mile more stringent, comes the closest to NACAA's recommendation of adopting standards sufficiently stringent to, at a minimum, achieve the same level of emission benefits as under the final standards adopted under the 2012 rule and put the nation on a clear trajectory to 50 percent of all new passenger cars and light trucks sold in 2030, and 100 percent of those sold in 2035, being ZEVs. [EPA-HQ-OAR-2021-0208-0255-A1, p.4]

As many states and localities continue to make significant investments and put forth bold efforts to ready the market to deploy LDV clean technology, we look to and encourage the federal government to step up and increase such efforts as well, and to use this rulemaking to, at a minimum, adopt EPA's Alternative 2, augmented with a MY 2026 standard that is 10 grams/mile more stringent, so that, together, we can create a pathway that will not only reduce air pollution and protect public health and the environment, but also create high-paying jobs, spur economic development and contribute to fuel security in our nation. [EPA-HQ-OAR-2021-0208-0255-A1, p.7]

Revised CO2 Emission Standards

EPA has proposed grams-per-mile (grams/mile) GHG emission standards that would increase the stringency of the 'SAFE 2' standards by about 10 percent in MY 2023 and 5 percent per year in MYs 2024 through 2026. The agency is also seeking comment on two alternatives to the proposed standards. For Alternative 1, EPA used the coefficients in the California Framework for the 2.7-percent effective stringency level as the basis for the MY 2023 stringency level and the 2012 rule MY 2025 standards as the basis for the MY 2026 stringency level, with linear year-over-year reductions between the two points for MYs 2024 and 2025. This alternative results in less stringent standards than EPA's proposal. For Alternative 2, EPA used the 2012 rule standards as the basis for the MY 2023-2025 targets, with the standards continuing to increase in stringency in a linear fashion for MY 2026. Alternative 2 adopts the 2012 rule stringency levels in MY 2023 and follows the 2012 rule standard target levels through MY 2025. EPA extended the same linear average year-over-year trajectory for MYs 2023–2025 to MY 2026 for the final standards under Alternative 2, resulting in more stringent standards than EPA's proposal. EPA is further requesting comment on MY 2026 standards that would result in fleet average levels that are 5 to 10 grams/mile more stringent than the MY 2026 standards under the proposed levels or the Alternative 1 or Alternative 2 levels.

EPA should set standards sufficiently stringent to, at a minimum, achieve the same level of emission benefits as under the final standards adopted under the 2012 rule. Further, these standards should create a pathway to 50 percent of all new passenger cars and light trucks sold in 2030 being zero-emission vehicles (ZEVs), including battery electric, plug-in hybrid electric or fuel cell electric vehicles, consistent with President Biden's August 5, 2021, Executive Order 14037, 'Strengthening American Leadership on Clean Cars and Trucks,'4 as well as lay the foundation for achieving, nationwide, a goal of 100 percent zero-emission new car and light truck sales by 2035, as is being pursued by countries such as Canada, the United Kingdom, Norway and the Netherlands as well as several states, including California, Massachusetts, New Jersey and New York, and various automakers. [EPA-HQ-OAR-2021-0208-0255-A1, pp. 3-4]

In the nine years since EPA adopted the emission standards in the 2012 rule there has been a significant expansion of ZEV technology and improvement in emissions performance. This progress has far exceeded what was anticipated in 2012 and has occurred at a lower cost than projected, thus supporting the feasibility of strengthening of the 2012 standards in this rule. In addition to these technology and performance improvements, other noteworthy factors lend further support for more stringent standards, including multiple studies and reports highlighting increasingly dire consequences of climate change; the increasing occurrence of climate-driven disasters; commitments by numerous auto manufacturers to strong electrification and ZEV targets and reductions in carbon emissions; commitments by numerous countries and U.S. states to accelerate the transition to a zero-emission transportation future; and the Biden Administration's 'Build Back Better agenda' as well as its ZEV commitments and intention to increase the United States' Nationally Determined Contribution for the upcoming COP-26.

Many state and local air agencies were counting on the benefits of the 2012 rule and nine years later these reductions are still urgently needed. EPA should do everything possible to recapture those benefits – including those related to climate change, ground-level ozone and particulate matter. Importantly, the record on which this proposal is based supports the technological feasibility, within the MY 2023 through 2026 timeframe, of standards at least as stringent as those in the proposal. Automakers have been successfully planning to meet the standards adopted in 2012 for nearly 10 years, as illustrated by the progress and commitments they have made, thus ensuring that there is more than adequate lead time available to meet the stringency of standards we recommend. [EPA-HQ-OAR-2021-0208-0255-A1, pp. 4-5]

Commenter: National Automobile Dealers Association (NADA)

EPA does not premise its proposal on information forecasting that there will be feasible and economically practicable changes in technologies and other improvements in light-duty vehicles manufactured and delivered to market in MYs 2023-2026. Nor does it base its proposal on new forecasts regarding the rate of customer acceptance and uptake of GHG reduction strategies. Instead, EPA opted simply to "[reconsider] how costs, lead time and other factors were weighed in the SAFE rule and [reached] a different conclusion as to the appropriate stringency of GHG standards."8 [EPA-HQ-OAR-2021-0208-0290-A1, p. 2]

Commenter: National Coalition for Advanced Transportation (NCAT)

NCAT strongly supports EPA adopting standards that would regain the GHG emissions reductions lost by the 2020 Rule by increasing the stringency of the standards as soon as feasible. Overall stringency is affected by the year-over-year reductions requirements and various flexibilities that may be afforded in EPA's standards. The conservative assumptions regarding electric vehicle cost and market penetration used in EPA's technical analysis supporting the Proposed Rule show the proposed standards should be even more stringent. The feasibility of the overall stringency increase in EPA's Proposed Rule is fully supported by the data and the agency's robust technical record that shows these proposed standards are clearly appropriate under Clean Air Act Section 202(a), as the minimum stringency EPA could adopt. NCAT strongly supports EPA's proposal to strengthen the MY 2023 to 2026 GHG emissions standards for light-duty vehicles to at least the stringency levels EPA has proposed, and urges EPA to adopt more stringent standards. And the technical record demonstrates that EPA should not adopt the less-stringent standard (Alternative 1) that it evaluated in the Proposed Rule. [EPA-HQ-OAR-2021-0208-0239-A1, p. 1-2]

THE LEAD TIME FOR THE PROPOSED RULE IS REASONABLE AND APPROPRIATE

EPA has reasonably determined that the lead time for the Proposed Rule, which would establish GHG emissions standards for MY 2023 through 2026 vehicles, is appropriate and consistent with the relevant statutory factors. Clean Air Act Section 202(a) provides that standards "shall take effect after such period as the Administrator finds necessary to permit the development and application of the requisite technology, giving appropriate consideration to the cost of compliance within such period."128 The Act affords EPA significant discretion to balance these factors and courts have been deferential to EPA in matters of lead time. 129 If Congress had wanted to impose more specific or longer lead time, it knew how to do so, as it did in other parts of the Clean Air Act. For example, elsewhere in the Clean Air Act Congress expressly imposed a two-year lead time requirement for state adoption of California vehicle standards and a four-year lead time requirement for heavy duty vehicle standards. 130 And Section 202(a) stands in stark contrast to the statutory provision that governs NHTSA's corporate average fuel economy standards, which specifies 18 months lead time.131

By the plain text of the statute, when determining adequate lead time the agency considers technological feasibility and economic practicability.132 With respect to technological feasibility, when EPA provides sufficient justification for the technological feasibility of the standards, the agency has provided adequate lead time.133 The robust technical record EPA has provided to support the Proposed Rule more than justifies the technical feasibility of the standards set forth in the proposal. See Section VI below for further detail on EPA's conservative assumptions with respect to electric vehicle technologies. In the Proposed Rule, EPA analyzed the technological feasibility of the standards, in light of the lead time, in great detail. 134 Based on its extensive technical analysis, EPA determined "the technologies needed to meet the proposed standards are already widely available and in use on vehicles—there is no need for development of new technologies for the time frame of these proposed standards."135 The existing technologies includes electric vehicles. As EPA explains, "compliance with the proposed standards will necessitate greater implementation and pace of technology penetration through MY2026 using existing GHG reduction technologies."136 These conclusions are entirely reasonable and supported by the record. Under the economic factor with respect to lead time, Section 202(a) requires that EPA give "appropriate consideration to the cost of compliance within such period."137 EPA has clearly met this statutory requirement as it thoroughly considered compliance cost in the robust technical record, as described in the Proposed Rule.138

Furthermore, as EPA explained in the Proposed Rule, the lead time afforded to manufacturers for these MY 2023 through 2026 standards is even more reasonable in light of the history of this rulemaking. 139 See Section II.B above. According to the Proposed Rule, the standards in EPA's Proposed Rule are slightly less stringent for MY 2023-2025 than those set in the 2012 Rule nearly a decade ago.140 Although those 2012 Rule standards were weakened in July 2020, that rule revision was immediately subject to litigation challenge and remained in place for only a few months before President Biden's Executive Order directing EPA to reconsider the 2020 Rule. Moreover, California vehicle standards, which have been adopted by 14 other states, are more stringent than EPA's Proposed Rule. California and the Section 177 States that have adopted these standards make up more than one-third of the U.S. auto market.141 California's zero emission vehicle standards are part of California's State Implementation Plan (SIP), approved by EPA. Although EPA later revoked California's Clean Air Act waiver (an unlawful action that EPA had never before taken with any waiver it had issued), the SIP remained in place and California and other Section 177 states challenged the revocation on, among other grounds, EPA's lack of authority to take that action. At that time, California made clear that it considered its regulations to remain in place and even threatened enforcement. Given this background, it was clear that there was a high probability of very quickly reverting to more stringent standards—either on the federal or state level.

The Clean Air Act gives EPA discretion to determine lead time when setting vehicle emission standards, and EPA has clearly exercised that discretion reasonably in the Proposed Rule.

EPA MUST ADOPT THE PROPOSED RULE AS A MINIMUM STRINGENCY LEVEL, AND EPA'S CONSERVATIVE ASSUMPTIONS REGARDING ELECTRIC VEHICLES SUGGEST THE RECORD COULD SUPPORT EVEN GREATER STRINGENCY

The Robust Technical Record Demonstrates that EPA Must Adopt Standards At Least as Stringent as the Proposed Rule

EPA is proposing to revise the MY 2023 through MY 2026 GHG standards to substantially increase the year-over-year stringency from the relaxed standards that were adopted in the 2020 Rule.142 Specifically, the MY 2023 fleet targets in EPA's Proposed Rule are intended to reflect an increase in stringency of approximately 10 percent over the 2020 Rule MY 2022 targets. This is followed by a 5 percent increase in stringency year-over-year in MY 2024 through MY 2026 fleet targets.143 This proposal is intended to be in sharp contrast to the average approximately 1.5 percent year-over-year stringency increase in MY 2023 through MY 2026 under the 2020 Rule.144

NCAT strongly supports EPA adopting standards that would regain the GHG emissions reductions lost by the 2020 Rule by increasing the stringency of the standards as soon as feasible. The feasibility of the overall stringency increase in EPA's Proposed Rule is fully supported by the data and the agency's robust technical record that shows these proposed standards are clearly appropriate under Clean Air Act Section 202(a), as the minimum stringency EPA could adopt. As EPA notes, EPA's determination of feasibility is supported by EPA technical analysis compiled over a decade, including the analyses for the 2010 and 2012 Rules, the mid-term evaluation, the supporting record for the 2020 Rule, and updated analysis for the Proposed Rule.145

EPA seeks comment on a less stringent standard than the Proposed Rule, which EPA refers to as Alternative 1.146 NCAT does not support the less-stringent Alternative 1, and it is not supported by the record. Rather, NCAT views EPA's main proposal for MY 2023 through MY 2026 GHG standards as the minimum stringency supported by the robust technical record. As EPA acknowledges, its proposal "does not rely on dramatically increased penetration of electric vehicles into the fleet during the 2023–2026 model years."147 Rather, EPA assumes a very modest increase in market share of electric vehicles and plug-in hybrid electric vehicles of up to 8 percent by MY 2026.148 Given the significant increase in electric vehicle market penetration over EPA's assumed MY 2017 baseline and the projected significant increase in the coming years, see Section IV, A above, EPA's proposal should be considered the minimum stringency level supported by the record. EPA should not adopt the less stringent standard that EPA evaluated in Alternative 1 or the Proposed standards.

Given EPA's Conservative Assumptions in Support of the Proposed Rule, the Record Supports Even Greater Stringency

The conservative assumptions regarding electric vehicle cost and market penetration used in EPA's technical analysis supporting the Proposed Rule demonstrate that EPA should adopt even more stringent standards. Overall stringency is affected by the year-over-year reductions requirements and various flexibilities that may be afforded in EPA's standards. As EPA itself has acknowledged, the inclusion of multipliers in any standard tends to diminish the overall stringency (and resulting emissions reductions) of the standard.149 Moreover, the conservatism of EPA's assumptions has a meaningful effect on the stringency of EPA's proposal. [EPA-HQ-OAR-2021-0208-0239-A1, p. 19-22]

Very conservative electric vehicle penetration assumptions suggest even greater stringency is warranted:

In the Proposed Rule, EPA projected that over the MY 2023 to 2026 period "the proposed standards could be met with gradually increasing sales of plug-in electric vehicles in the U.S., up to about 8 percent market share (including both electric vehicles (EVs) and plug-in hybrid electric vehicles (PHEVs)) by MY 2026."150 As shown in the data discussed in Section IV, A above, this assumption of electric vehicle market share is very conservative as electric vehicles are projected to grow as a share of the market at a much faster rate. In one year's time—between 2019 and 2020 the proportion of new car sales of electric vehicles grew by 1.9 percent, 151 and IHS Markit estimates that electric vehicles will make up 10% of new car sales nationwide by 2025.152 EPA even acknowledges that "there may be the potential for higher levels of electric vehicle penetration by MY 2026, which could enable EPA to consider a more stringent standard for MY 2026,"153 and EPA requests comment on this topic.154 As explained in NCAT's comments and the comments of many other stakeholders, the technical data indicates that there will be much higher electric vehicle penetration by MY 2026. EPA seeks comment on a proposed standard for MY 2026 that is 5 to 10 g/mile lower than the Proposed Rule.155 The conservatism in EPA's assumption regarding electric vehicle market penetration suggests that there is indeed room for EPA to adopt a more stringent standard. [EPA-HQ-OAR-2021-0208-0239-A1, pp.22-23]

In conclusion, NCAT strongly supports EPA's proposal to strengthen the MY 2023 to 2026 GHG emissions standards for light-duty vehicles to at least the stringency levels EPA has proposed, and urges EPA to adopt more stringent standards. NCAT believes that the record EPA developed absolutely supports, at a minimum, that proposed level of stringency and timing for implementing the MY 2023 to 2026 standards in the Proposed Rule. However, conservative assumptions about electric vehicle penetration and cost show that more stringent standards are warranted. [EPA-HQ-OAR-2021-0208-0239-A1, p. 24]

Commenter: National Parks Conservation Association (NPCA)

Because transportation now accounts for more GHG emissions than any other sector in the U.S.—with passenger vehicles making up the bulk of those emissions—we strongly urge EPA to move forward with the most stringent clean car standards feasible. [EPA-HQ-OAR-2021-0208-0291-A1, p. 1]

Only with bold action can the administration set America on a path towards achieving 60% reduction in passenger vehicle emissions by 2030 and 100% zero-emission vehicle sales by no later than 2035. The actions EPA takes now will have lasting impacts on our parks and communities for generations to come. We appreciate your consideration of our comments and ask that you please move forward with the most stringent standards feasible under Alternative 2. [EPA-HQ-OAR-2021-0208-0291-A1, p. 2]

Of the alternatives provided in the proposed rule, NPCA urges EPA to move forward with Alternative 2, which would reduce more pollution and has higher net benefits compared to EPA's preferred alternative. NPCA further supports requiring an additional 10 g/mile improvement for MY 2026. [EPA-HQ-OAR-2021-0208-0291-A1, p. 2]

Commenter: Natural Resources Defence Council (NRDC)

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, p. 25.]

This unprecedented moment demands strong action which is why EPA should finalize a rule at least as stringent as Alternate 2 which would achieve more emission reductions than the proposal.

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, p. 27.]

So NRDC urges EPA to finalize light-duty vehicle standards that maximize climate pollution reductions, deliver cleaner air, and help to secure a safer and healthier future.

Commenter: New Mexico Environment Department

First, NMED recommends the EPA adopt the standards in Alternative 2,3 which decrease the fleet average CO_2 target level to 169 g/mile by Model Year 2026 (MY2026), as opposed to the proposed standard which provides a target level of 171 gCO_2/mile. [EPA-HQ-OAR-2021-0208-0205-A1][p.1]

Second, NMED recommends the EPA increase the stringency of the fleet average compliance CO_2 targets for MY2026 by 10 g/mile more than the proposed rules (Table 8 and Figure 2),4 which in combination with Alternative 2 would reach a proposed fleet average target CO_2 level of 159 g/mile for MY2026. [EPA-HQ-OAR-2021-0208-0205-A1][p.1]

The total benefits of the more stringent standards far exceed the total cost of the program. Using a 3 percent discount rate, Table 139 shows that Alternative 2 has an estimated $34 billion net benefit in 2018 dollars. As shown in Table 1710 with the 3% discount rate, Alternative 2 has a $9 billion greater lifetime benefit in fuel savings to consumers, and $8 billion greater monetized environmental benefits than the EPA standard proposal. [EPA-HQ-OAR-2021-0208-0205-A1][p.2]

EPA's proposed standards can go into effect three years earlier - with Model Year 2023 - than New Mexico will be able to require compliance with the California advanced clean car standards. The New Mexico timeline for adoption is dictated, in part, by the required two-year waiting period for Section 177 states, such as New Mexico, under the Clean Air Act. EPA's proposed credit programs and technology incentives provide flexible pathways for the LDV manufacturers to meet EPA's tighter timeline. [EPA-HQ-OAR-2021-0208-0205-A1][p.3]

Commenter: New York State Department of Environmental Conservation

In light of the available technology and the transition to electric vehicles well underway, we question to need to provide manufacturers with more flexibility than provided by the prior standards. New York recognizes that EPA is attempting to rectify the past administration's backsliding of light-duty GHG Standards while at the same time providing all manufacturers with sufficient lead time. While New York generally supports the continuation of traditional credit flexibilities, providing too much compliance flexibility would effectively reduce the stringency and effectiveness of the proposed regulations, especially in the short term. [EPA-HQ-OAR-2021-0208-0238-A1, p.2]

It will also provide the average consumer close to $2000 in fuel savings over the life of a vehicle [EPA-HQ-OAR-2021-0208-0238-A1, p.3]

The proposed revised standards are not only technologically feasible but would achieve greater emissions reductions, public health benefits, and fuel savings to consumers over the life of the vehicles than would be achieved under the standards promulgated in the misguided SAFE rule in 2020. [EPA-HQ-OAR-2021-0208-0238-A1, pp.3-4]

Commenter: Newhouse, Richard

[The following comments were submitted as testimony at the virtual public hearing on August 26, 2021. See Hearing Testimony – 26Aug2021, pp. 76-77.]

In any case, I want the EPA to shift to their Alternative 2 which would save consumers more money, close loopholes which you've heard a lot about in the testimony, for automobiles that would undermine these standards.

[The following comments were submitted as testimony at the virtual public hearing on August 26, 2021. See Hearing Testimony – 26Aug2021, p. 78.]

The weaker proposal with additional loopholes for automobiles means that proposed standards would deliver only 75 percent of the savings of the original Obama/Biden standards. This is an unnecessary compromise, given the EPA's own analysis which indicates that loopholes around

EVs would deliver only the stated purpose of increasing EV sales. EPA's own Alternative 2 in the proposed rule eliminates many loopholes for automakers and includes slightly stronger standards that match the Obama/Biden-era standards from 2023 onwards that would deliver greatest savings.

[The following comments were submitted as testimony at the virtual public hearing on August 26, 2021. See Hearing Testimony – 26Aug2021, pp. 78-79.]

I feel very strongly about Alternative 2 as I think we owe it to our grandchildren to leave them a better world than the one we have now.

Commenter: Nissan North America, Inc.

Further, Nissan believes the ambitious standards proposed by EPA and NHTSA would likely require more electrification than estimated by the agencies. While the level of EV market development and implementation of critical EV market policies remains uncertain, considering more stringent standards than proposed is premature during this rulemaking time period. Nissan therefore urges the agencies to refrain from adopting more stringent standards than proposed for the period covering through model year 2026. Instead, the agencies, industry, and other stakeholders must focus their efforts on fostering the EV market in order to build a strong foundation for longer-term success in transforming the market. [EPA-HQ-OAR-2021-0208-0529-A1, p. 7]

Commenter: Northeast States for Coordinated Air Use Management (NESCAUM)

The climate crisis represents an increasingly clear and present danger to public health, the environment, and the economy. At the same time, the technologies needed to substantially reduce greenhouse gas (GHG) emissions from light-duty vehicles (LDVs) are already widely available and in use today, and the pace of technological innovation continues to accelerate. Strong national GHG standards are a critical building block for state efforts to substantially reduce GHG and criteria pollutant emissions from the transportation sector and accelerate the transition to electric vehicles (EVs). [EPA-HQ-OAR-2021-0208-0259-A1, p. 1]

As discussed more fully below, there is ample justification for EPA to finalize strong national GHG standards for LDVs that recover and restore the benefits of the national program that EPA adopted in 2012 and confirmed to be technologically feasible and appropriate in 2018. NESCAUM urges EPA to promptly adopt the most stringent GHG emission standards feasible for MYs 2023-2026, and to move swiftly to propose ambitious post-MY 2026 standards, to put the nation on track to rapidly electrify the entire light-duty fleet. [EPA-HQ-OAR-2021-0208-0259-A1, p. 2]

As EPA notes in its proposal, the shift to ZEV technologies is already underway, and it presents a strong potential for dramatic reductions in GHG and criteria pollutant emissions. This pivotal rulemaking presents EPA with the opportunity to exercise global climate leadership and put the United States on track to rapidly decarbonize the entire light-duty fleet, while serving as a critical building block for a comprehensive, multipollutant regulatory program. Strong federal GHG emissions standards will help mitigate the climate crisis while ensuring the competitiveness of the American automotive industry in a rapidly changing global marketplace, saving consumers money, and creating new economic opportunities. [EPA-HQ-OAR-2021-0208-0259-A1, p. 5]

For the reasons stated above, NESCAUM urges EPA to promptly adopt the most stringent GHG emission standards feasible for MYs 2023-2026, and to move swiftly thereafter to propose ambitious post-MY 2026 GHG standards, to put the nation on track to rapidly electrify the entire light-duty fleet. [EPA-HQ-OAR-2021-0208-0259-A1, p. 5.]

To accelerate the transition to widespread electrification, EPA should require more stringent standards, especially for MY 2026 given the additional lead time available. [EPA-HQ-OAR-2021-0208-0259-A1, p. 4]

NESCAUM urges EPA to promulgate final standards that would, at a minimum, restore the emission benefits provided under the national program adopted in 2012. EPA's 'Alternative 2' has the greatest net benefits of the three approaches EPA modeled. Alternative 2, augmented with a MY 2026 standard that is 10 grams/mile more stringent than its proposal, appears to come the closest to achieving the GHG and particulate matter emissions and ground-level ozone reduction benefits that would have accrued under the 2012 standards. Thus, NESCAUM strongly supports final GHG standards that restore these benefits. [EPA-HQ-OAR-2021-0208-0259-A1, p. 4]

Commenter: Olmstead, Thomas

The standards that EPA is proposing do not go far enough in meeting clean air and climate goals laid out by the Biden Administration in numerous executive orders (Executive Order 14037, August 5, 2021 Strengthening American Leadership in Clean Cars and Trucks; Executive Order 14008, January 27, 2021 Tackling the Climate Crisis at Home and Abroad; and Executive Order 13990, January 20, 2021 Protecting Public Health and the Environment and Restoring Science To Tackle the Climate Crisis).

Along with the proposed standards, EPA analyzed both a more stringent (Alternative 2) and a less stringent (Alternative 1) alternative. EPA should consider a third alternative (Alternative 3) that is more stringent than Alternative 2 and model the alternative with the NHTSA's Corporate Average Fuel Economy (CAFE) Compliance and EffectsModeling System (CCEMS) model. Alternative 3 would be based on the following:

- Incorporating more technology adoptions in future years like turbocharged engines (Turbo), gasoline direct injection (GDI), cylinder deactivation (CD), seven or more speeds, continuously variable transmissions (CVTs), stop/start, and alternative fuel vehicles;

- Lower CO_2 g/mile than the standards adopted in the 2012 rule

- Phaseout of the credits; and

- Ending the multipliers. [EPA-HQ-OAR-2021-0208-0190-A1, p. 1]

Commenter: Our Children's Trust

[W]e write to advise EPA to strengthen the federal greenhouse gas emission standards for passenger cars and light trucks for Model Years 2023-2026 beyond the proposed alternative and Alternative 2 so that they meet the urgency of the crisis and align with the kind of deep emission reductions scientists say are needed to protect the climate system and the constitutional rights of youth. [EPA-HQ-OAR-2021-0208-0281-A1, p.1]

Commenter: Pate, Susan

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, pp. 187-188.]

So I would like to just urge you to actually make the standards more stringent for auto emissions and remove that -- well, add the Alternative 2 so that nobody has a way to get out of meeting your standards.

Commenter: Pennoyer, Marguerite

[The following comments were submitted as testimony at the virtual public hearing on August 26, 2021. See Hearing Testimony – 26Aug2021, p. 29.]

his proposal and the broader actions on clean cars from the Administration are helpful, but we need the most stringent possible clean car and truck standards to truly make good on President Biden's commitments to address climate action and environmental justice.

[The following comments were submitted as testimony at the virtual public hearing on August 26, 2021. See Hearing Testimony – 26Aug2021, p. 30.]

Truck manufacturers have been bypassing so many of the air quality protections that have been engineered into their smaller cars. This is but one personal example among so many of why stronger standards are needed to drive innovation, ingenuity, and provide many more clean truck and car options that don't further jeopardize our clean air.

[The following comments were submitted as testimony at the virtual public hearing on August 26, 2021. See Hearing Testimony – 26Aug2021, p. 31.]

I support all EPA efforts to reduce greenhouse gas emissions for all cars, trucks, and larger vehicles that will protect the health of my family and my patients.

The EPA must set much stronger standards covering cars, SUVs, and light trucks through at least 2030 to drive the transition to zero emission vehicles that the nation needs and that President Biden has called for in his Executive Order.

The EPA must finalize this rule to cover the Model Years 2023 through 2026 and set up more health protective standards beyond that.

[The following comments were submitted as testimony at the virtual public hearing on August 26, 2021. See Hearing Testimony – 26Aug2021, pp. 32-33.]

Please finalize this proposal quickly and move forward with even bolder greenhouse gas and fuel efficiency standards for cars, light trucks, and SUVs into the future that will speed up this truly vital transition to zero emission vehicles.

Commenter: Peterson, Doug

Summary of My Specific Comments

First and foremost, I argue that the EPA is failing to fulfill its obligations under the Clean Air Act, placing far too much weight on concerns about the U.S. economy, feasibility, and regulatory flexibility and far too little weight on its solemn duty to protect our shared environment. My main argument includes a stern critique of the EPA's invalid cost benefit analysis, which greatly underestimates the benefits of controlling tailpipe carbon dioxide. Second, a great number of compliance credits are due to expire in 2021 and 2022, and the EPA appears determined to extend their expiration dates. I unequivocally oppose this rule change, believing that it will seriously undermine the stringency increases. Third, the EPA is seeking comment on the proposal to restore 2 the credit multiplier that allows zero emission vehicles to count as two ZEVs in the calculation of fleet performance. I oppose this rule change regarding battery electric vehicles (BEVs) and do not believe that capping the benefit is adequate to counteract the negative impact of restoring the multiplier. I do believe that the credit multiplier should be restored for fuel cell electric vehicles (FCEVs). Fourth, I support the plan to redraw the footprint curves that were altered when the Trump Administration was directing the EPA, returning them to their former shape. I also suggest that the curves be altered further to incentivize modest downsizing of our national fleet. Fifth, I support the plan to increase the overall stringency of the footprint curves and recommend that the stringency level be increased to the greatest extent possible, adopting Alternative 2 along with 10 grams per mile of additional stringency.

All my comments are consistent with my informed judgement that the footprint model fails to adequately control tailpipe CO2 and that the inherent limitations of the current regulatory framework can only be partially corrected by increasing stringency and applying rules that support the transition to zero emission vehicles. Given that the current framework is failing, it ought to be toughened to the greatest extent possible. Starting in 2027, the framework should be replaced with a more effective scheme that guarantees an orderly transition to ZEVs, with the sale of internal combustion vehicles ending in 2040. In the 2027 to 2040 timeframe, large vehicles driven by internal combustion engines should be phased out more rapidly than small ones, and we should continue struggling to improve the fuel efficiency of new ICE vehicles as their numbers dwindle.

The EPA is Not Adequately Controlling Tailpipe Carbon Dioxide

As the federal agency responsible for enforcing the Clean Air Act, the EPA is legally obligated to curtail, and eliminate as soon as possible, carbon dioxide emissions produced by light duty vehicles. The Supreme Court has ruled that carbon dioxide is a pollutant as defined by the Clean

Air Act and expressed its authoritative view that the EPA must make a determination as to the dangers posed by the buildup of carbon dioxide in the troposphere. The EPA has studied the issue, in keeping with the direction of the Supreme Court, and has determined that the buildup of CO_2 is indeed dangerous and needs to be regulated effectively.

The EPA could hardly determine otherwise. Measuring CO_2 levels in the well-blended troposphere is a straightforward procedure, and the measurements taken atop Mauna Loa in the state of Hawaii confirm that the concentration level of CO_2 is rising steadily. It is now over 50% higher than it was at the onset of the Industrial Revolution, higher that it has been for millions of years. Scientists have a strong understanding of radiative forcing and other forces that impact climate, and there is strong agreement that the relentless buildup of greenhouse gases in the troposphere is causing the extraordinary climate volatility we are witnessing around the globe, and the acidification of our oceans. The scientific community has its own thoughtful processes for assessing its level of certainty regarding new scientific findings and is extremely confident about the reality of anthropogenic climate change. Their certitude regarding anthropogenesis is the rough equivalent of their firm view that the Earth is a sphere that revolves around the sun. There are still large numbers of people living in the United States who do not believe in the basic science of climate change, but the EPA is obligated to act based on the best science available. The EPA has clearly made the correct determination regarding the profound dangers associated with carbon dioxide.

Sadly, the EPA has not implemented an adequate regulatory framework for light duty vehicles that is consistent with its own endangerment finding. The EPA is not allowed to shirk its legal obligations because effective mitigation strategies might be unpopular, or slow economic growth.

Carbon dioxide is clearly a dangerous gas that is the primary driver of climate change, and the EPA 3 has a duty to control it as part of the desperate international effort to restore climate equilibrium. If the EPA accepts the view that carbon dioxide is dangerous, there is no reasonable mitigation strategy that can be proposed other than one which unites our efforts with those of the rest of the world. If CO_2 is a problem at all, it is a global one. The regulation of excessive U.S. tailpipe emissions is crucial to the international CO_2 abatement effort, and the ongoing emissions from enormous, overpowered U.S. vehicles sends a strong message to the rest of the world that the United States has no intention of restraining its excessive carbon dioxide emissions. As the lead agency charged with administering U.S. environmental efforts, the EPA is obligated to craft policies that conform to the urgent goals of the Paris Climate Agreement.

Light duty vehicles powered by internal combustion engines create copious quantities of carbon dioxide, and this is especially true of the largest vehicles. Unlike other harmful trace pollutants, CO_2 is the fundamental component of auto exhaust, created in abundance whenever gasoline is ignited. The primary evidence that the EPA is failing to control the carbon dioxide from light duty vehicles is the undeniable fact that gasoline consumption in the United States is not going down. [EPA-HQ-OAR-2021-0208-0692-A1, p. 1-3]

The EPA's endangerment finding regarding carbon dioxide also obligates the agency to make a reasonable judgement about the urgency of the climate crisis and the appropriate pace of CO_2

abatement. Determining the necessary stringency level of the framework requires a correct ascertainment regarding the timeframe of the emission reductions that the framework might provide. It is not enough that the EPA make a showing that its regulations provide reductions; it needs to make a convincing case that the pace and scope of those reductions is sufficient to meet the challenge of the escalating crisis, contributing our nation's fair share to the international effort. We have already delayed for far too long. If we accept the IPCC's informed view that climate change is real and is a result of human activity, we must also accept their emphatic warning that carbon dioxide emissions must be reduced quickly. The EPA characterizes the GHG reductions provided by the proposal as being "very significant", but this simply isn't true. Compared to the nominal stringency increases of the SAFE rule, the EPA's proposal only provides a 6% average 4 reduction through 2050. Given the gravity of the crisis and the level of urgency expressed by the IPCC, the proposed scope and pace of improvement is entirely inadequate. It may well be true that the new framework currently taking shape for 2027 will provide faster, more dramatic reductions, but that start date is far off. We desperately need greater reductions in the near term, and this round of rulemaking provides an opportunity to make more meaningful gains right now.

The EPA argues unconvincingly when it claims that it must balance its obligation to protect air quality with issues involving feasibility, flexibility for automakers, and the health of the U.S. economy. Yes, the EPA must take these considerations into account, and it must also harmonize its regulations with those of the National Traffic Highway Safety Administration, an agency operating under the authority of different legislation addressing other concerns. But no, the EPA is not allowed to dismiss its primary obligations entirely in favor of these tangential concerns. The agency can take these concerns into account, but it cannot establish policies that are strictly determined by them, and that is what the agency is doing with respect to tailpipe carbon dioxide. The EPA's priorities are thoroughly out of balance, geared more toward political concerns than moral ones. The agency was established to protect the environment, not the U.S. economy and consumer choice. Its policies should embrace its duty to fulfill its core mission. The EPA's indifference to its primary responsibilities is reflected in the lengthy cost benefit analysis that helps form the justification for its proposal. All the attention placed on the theoretical benefits that will flow to consumers is also entirely inappropriate. It is in keeping with the EPA's warped view of its own priorities that the detailing of the proposal's environmental impact is not discussed in detail until after the EPA has hyped its economic and consumer benefits at great length. [EPA-HQ-OAR-2021-0208-0692-A1, p. 3-4]

Obviously, downsizing ICE vehicles would improve their fuel efficiency; the same basic law of physics applies to ZEVs. Over the course of the next three decades, it will be a great challenge to transition the national grid to clean electricity. Every effort should be made to conserve electricity any way we can. I write a biweekly column promoting the merits of BEVs, and I can't help but notice that the 9 industry is favoring large models here in the United States. Under current rules, BEVs with large footprints generate more compliance credits than BEVs with small footprints, and there are very few small BEVs being introduced on our shores. Small, efficient BEVs would use less electricity and conserve lithium, advancing worthy goals that the EPA should be considering. BEV adoption would accelerate more rapidly if there were more variety in the models available to consumers. Large, powerful BEVs are now seen as luxury cars for good reasons, status symbols rather than symbols of environmental concern. The EPA appears oblivious to all of this. To align the compliance credits generated by BEVs with the EPA's core mission, it might be wise to not use a ZEV's actual footprint to determine its value in the fleet performance calculation. A standard footprint the size of a small crossover could be used for all BEVs regardless of their actual size, and the generated credits could then be adjusted to account for upstream emissions. As the EPA begins to prepare for a world without internal combustion engines, they should be crafting policies that maximize the MPGe of BEVs and the fuel economy of vehicles fueled with green hydrogen, incentivizing the energy efficiency of both powertrains. The best and safest outcome would be a national fleet composed of BEVs and FCEVs optimized for energy efficiency that are similar in size and weight, roughly the size of four-passenger crossovers.

Conclusion

My comments have been very unequivocal regarding the failure of the EPA to enforce adequate, timely emission reductions from light duty vehicles. Know that the stern tone of my comments stem from my great concern regarding the escalating climate crisis. Unlike many climate activists, I do not believe that bad things only happen because of bad people. The crisis is the result of a complex technical problem that needs to be solved by sensible people acting together in a spirit of goodwill. I trust that the folks who work for the EPA have their hearts in the right place regarding their core mission. The tendency to prioritize tangential concerns appears to have developed over a long period of time and has now become institutionalized, and the inappropriate assumptions of the invalid cost benefit analysis are an unfortunate result of ossified attitudes about the superiority of quantitative methodologies. An unspoken rule has also developed prohibiting any restriction of consumer choice, and this is unfortunate. The challenge we are facing requires that we break loose from a business-as-usual approaches and reimagine the EPA's view of the constraints under which it operates. The EPA has the legal and moral authority to move aggressively on all fronts to mandate rapid, significant GHG reductions from all sectors, and now is the time for thoughtful, decisive action. It would help greatly if the legislative branch would cooperate with the EPA's core mission in a bipartisan fashion, but that looks highly unlikely in the near term due to obstructive extremists on both sides of the aisle. We do, however, have a pragmatic President with a genuine, passionate concern about the climate crisis, and the EPA is one of his most valuable tools for advancing his lofty climate goals.

I will conclude with one final thought about the special significance of light duty vehicle emissions. In order to defeat the scourge of climate change, we need to start doing a lot of things right, and there are many promising pathways that will ultimately lead us to victory. While it may appear that transportation is an especially problematic sector that will be very difficult to decarbonize, I do not see it that way. BEVs and FCEVs are proven, feasible alternatives to ICE vehicles with the potential to deliver desperately needed emission reductions relatively quickly. They will deliver the bulk of their benefits after our grids have been fully decarbonized and the production of green hydrogen has been ramped up, but these promising new vehicles are also extremely valuable in the near term. More than any other U.S. institution, the EPA is in position to actualize their potential to deliver rapid, substantial CO2 reductions. Gasoline consumption could theoretically begin to fall very soon. Make it happen. Be bold. [EPA-HQ-OAR-2021-0208-0692-A1, p. 12]

Finalize Alternative Two and 10 Grams Per Mile of Additional Stringency

I strongly favor increasing stringency to the greatest extent possible, and I applaud the EPA for considering comments regarding an increase of up to 10 g/mile of additional stringency above its most aggressive alternative proposal. Automakers have a wide variety of options for achieving the highest level of stringency, which I still consider inadequate given the severity of the climate crisis. Many of the largest automakers have already made substantial investments to build and market BEVs, and their plans could be accelerated even further within the 2023-2026 timeframe, adding new models to their fleet mixes that will substantially improve their average fleet performance scores. The highest stringency levels will prepare these automakers for the 2027 framework, which will hopefully include inescapable zero emission vehicle mandates like those being adopted by other nations. Toyota, Honda, and Hyundai are well positioned to lead the way with FCEVs, which would benefit from the restoration of the FCEV multiplier. Tesla will continue to thrive, generating plenty of excess compliance credits that will be available to automakers that wish to continue deploying a pay-to-pollute compliance strategy. There are also many cost-effective ways to continue making small efficiency improvements to ICE vehicles. Automakers can improve their fleet mixes, reducing the sales volume of models that fail to meet their footprint targets. They can make greater use of off-cycle credits, taking advantage of the proposed higher cap. They can build up their credit banks in 2021 and 2022 while the Trump Administration's lenient rules are in effect. Those who argue that achieving a large stringency increase is unrealistic are being disingenuous. It can be achieved, and it must be achieved.

I write extensively about BEVs, and I am very optimistic that BEV adoption is poised to accelerate rapidly here in the United States. Vehicle range and charging times are improving and are about to surpass important thresholds that will greatly improve consumer acceptance. Solid state batteries are close to becoming a reality, with enormous potential to improve BEVs even further. Consumers are just beginning to recognize the benefit of home charging, and early adopters are spreading the word about the actual infrequency of remote public charging. The high cost of batteries is coming down as automakers benefit from innovation and economies of scale. Supply chains for the raw materials used to build batteries are quickly being improved and expanded. Charging infrastructure is being put into place and is moving toward a higher percentage of efficient Level 3 chargers. There is an increasing amount of variation in the types of electric vehicles coming to showrooms, and automakers are developing standardized platforms that can easily be adapted to accommodate numerous BEV model variations at lower costs. Tesla has singlehandedly demonstrated that it can 12 market desirable products and deploy its own highly capable, proprietary charging infrastructure. The aggressive ZEV mandates of environmentally responsible nations guarantee that BEVs will soon be built and sold on a massive scale. If BEV adoption accelerates even slightly beyond current conservative projections, all automakers should be able to achieve extraordinarily strict average fleet requirements while still selling their most inefficient ICE vehicles. The automakers have it within their power to accelerate BEV adoption at the required pace, and the EPA should require that they do just that. [EPA-HQ-OAR-2021-0208-0692-A1, p. 11-12]

Commenter: Pien, Natalie

[The following comments were submitted as testimony at the virtual public hearing on August 26, 2021. See Hearing Testimony – 26Aug2021, p. 43.]

A livable planet can be achieved through net zero carbon emissions by 2050. This goal requires Alternative 2 for 100 percent zero emissions from vehicles and power plants by 2035.

In addition, Biden rejoined the Paris Agreement and Alternative 2 is essential to meet the commitment to cut greenhouse gas emissions in half by 2030.

[The following comments were submitted as testimony at the virtual public hearing on August 26, 2021. See Hearing Testimony – 26Aug2021, p. 45.]

Auto manufacturers are already phasing out ICE models in favor of EVs. Adopt Alternative 2 to reassure manufacturers that they are not taking a risk. Take the opportunity to transition our nation off fossil fuels. My husband and I have already embraced it. We purchased our first hybrid in 2010 and our first EV in 2019. With more charging stations, the need for a hybrid and its greenhouse gas emissions will be eliminated. Following the footsteps of our Canadian neighbors, by 2035 Canada will require 100 percent of all new light-duty cars and passenger truck sales to be zero emissions.

[The following comments were submitted as testimony at the virtual public hearing on August 26, 2021. See Hearing Testimony – 26Aug2021, pp. 45-46.]

In conclusion, I urge you to adopt the strongest possible standard as proposed in Alternative 2. It will close loopholes for automakers to avoid the standards all together.

Further, Alternative 2 is necessary to comply with Executive Order 12866 requiring agencies to choose the regulatory alternative that maximizes net benefits.

Commenter: Platt, Keari

As the proposed revision to the LDV GHG emissions standards are intended to meet President Biden's target to make 50% of all LDV sales zero-emissions by 2030, I support the proposed 10% increase in stringency. [EPA-HQ-OAR-2021-0208-0201-A1,p. 1]

Conclusion – Approval of 2023 Revised Emissions Standards For the above reasons, I support the EPA's proposed revision for the 2023 and newer LDV emissions standards. The proposed 10% stringency increase is not only reasonable and feasible, but it will ensure that all Americans from all income groups can purchase fuel efficient cars. This will in turn help the nation reduce is contribution to GHG emissions and global warming. [EPA-HQ-OAR-2021-0208-0201-A1,p. 2]

Commenter: Plug In America, the National Association of Electric Vehicle Drivers

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, p. 78.]

We commend EPA for acting quickly on the clean car standards and given the choices, we would advocate for Alternative Number 2, although we're concerned that it is not nearly ambitious enough.

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, pp. 79-80.]

We would urge to go beyond these alternatives and establish standards that aim for 25 percent electric vehicle market share for 2026 which would put us on track to achieve a hundred percent electric vehicle market share by 2035 as many countries and many states have already committed to do.

This change in the American automotive landscape needs to be more fully recognized. This is no longer 2012 when the Obama standards came out. Times have changed and this proposal needs to more closely reflect today's realities rather than just continuing a trend from 10 years ago.

As it stands, this proposal is going to seem dated and quaint by the time we reach Model Year '26. This is EPA's chance to step out of the business as usual trend line and really step into a more ambitious goal that we and many others will fully support with the agency and the Federal Government.

Commenter: Price, Heather

[The following comments were submitted as testimony at the virtual public hearing on August 26, 2021. See Hearing Testimony – 26Aug2021, p. 296.]

We really need a strong -- you know, when you're moving forward with these fuel standards, go as far as you can because we don't have much time. Make them really strong because we really need to get to zero, and that means electrify, electrify, electrify.

[The following comments were submitted as testimony at the virtual public hearing on August 26, 2021. See Hearing Testimony – 26Aug2021, p. 297.]

So please, please, please, make the strongest standards that you can.

Commenter: Rambo-Jones, Lynn

[The following comments were submitted as testimony at the virtual public hearing on August 26, 2021. See Hearing Testimony – 26Aug2021, pp. 108-109.]

The fact that the second timeline proposed is almost 30 years away frightens me. The fact that its goal is a policy reduction is even worse. Leaving federal service for a large industry paycheck is a common practice and could change the long-range plans and standards. We do not have the luxury of waiting for the timeline as proposed.

[The following comments were submitted as testimony at the virtual public hearing on August 26, 2021. See Hearing Testimony – 26Aug2021, pp. 110-111.]

Of course, I would advocate for the strictest possible standards with rewards going to auto companies that achieve results. The health benefits that would be reaped would result in reduced illness and deaths. It will improve some of the social injustice issues that have fallen on marginalized groups in the United States, but if more is not done now, America will not catch up with the progress made in a number of other countries, including China which is the beneficiary of all that Tar Sands we are endangering our standards to send to them.

There is not much glory in almost achieving standards from the Obama Administration tenure. We can't settle for half measures.

Commenter: Rauch, Molly

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, p.36.]

Alternative 2 is the stronger option that would reduce climate pollution faster, putting 400,000 extra electric vehicles on the road by 2026 and resulting in a 130 million metric tons fewer greenhouse gas emissions among other significant benefits, including billions in economic benefits. This is the better option and Moms want you to go with Alternative 2.

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, p. 34.]

On behalf of the more than one million members of Moms Clean Air Force, I'm asking EPA to finalize the strongest possible greenhouse gas emissions standards for light-duty vehicles.

Commenter: Remilien, Sandra

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, p. 120.]

Once again, I urge the EPA to set the strongest possible standards because they help with air pollution and lower greenhouse gas emissions. Alternative 2 saves $2,100 per vehicle. Please make our cars and light-duty trucks clean and efficient. Please make the clean car standards through 2030 stronger and for automakers to avoid these standards.

Commenter: Representative Padma Kuppa

[The following comments were submitted as testimony at the virtual public hearing on August 26, 2021. See Hearing Testimony – 26Aug2021, p. 145.]

I urge you to keep these standards as originally designed to ensure the greatest reductions in fossil fuel use and global warming emissions.

Commenter: Richards, Claire

[The following comments were submitted as testimony at the virtual public hearing on August 26, 2021. See Hearing Testimony – 26Aug2021, p. 267.]

I'm here to urge you to set the strictest possible clean car standards.

[The following comments were submitted as testimony at the virtual public hearing on August 26, 2021. See Hearing Testimony – 26Aug2021, p. 269.]

We need to slow the progression of climate change without delay within our infrastructure and systems. This means that the EPA must finalize an ambitious rule this year in 2021 without any loopholes.

Commenter: Rivian Automotive, LLC

We applaud the proposal’s year-over-year increases in stringency and welcome the Biden Administration’s vision on EV deployment but believe that the topline goals can be reached without many of the so-called “flexibilities” embedded in the current proposal that diminish the rule’s environmental and economic benefits. Overall, the proposed rule moves in the right direction, but we urge the agency to adhere to its own cost-benefit analysis and select Alternative 2 when it finalizes the regulation—the option with the greatest environmental and economic benefits and the one that will drive the most rapid electrification of America’s light-duty vehicles. [EPA-HQ-OAR-2021-0208-0274-A1, p. 1]

Rivian Welcomes U.S. EPA’s Efforts to Strengthen National GHG Emissions Standards but the Proposed Rulemaking Could be Stronger

Rivian’s mission to keep the world adventurous forever is made manifest in its commitment to the environment and addressing climate change. We strongly support a program of ambitious GHG regulation in the transportation sector as core to our values and vision for the world. Given transportation’s role as the country’s number one source of GHG emissions at a time when the urgency of the climate crisis has never been clearer, such a program is also vitally necessary. Rivian applauded EPA’s decision in early 2021 to review the U.S. emissions standards for passenger cars and light trucks and welcomes the strides made in the proposal now subject to public comment. The agency’s recently announced reconsideration of the revocation of California’s waiver to set its own unique vehicle emissions standards was just as important. Course-correcting these regulatory actions after drastic rollbacks and reversals is no easy task.

EPA’s proposed rule for federal vehicle emissions standards represents a significant step in the right direction given the recent and announced gains in vehicle efficiency and electrification. Rivian welcomes the increased stringency of the proposal, and we recognize that the EPA and the Biden Administration more broadly view this rule as just a steppingstone to a second rulemaking for MY 2027 and later that will seek to firmly move the auto industry past the tipping point to an EV future. Certainly, Rivian agrees that aggressive regulatory action will be necessary to accelerate the pace of change given our view that the country should set a goal to achieve 100 percent EV sales by 2030.

However, we believe that this acceleration can begin now. Our analysis of the proposed rule identified several provisions that appear likely to soften the regulation's impact and result in delays to the stated goals of this administration to reduce emissions and electrify transportation. These proposed provisions are not necessary given the rapidly growing availability of superior EVs in every market segment. A simpler regulatory framework aligned with the auto industry's recent investments and commitments will make the proposed rule even stronger, reducing emissions from the transportation sector at a faster pace to better protect our climate and public health.

To Maximize Emissions Reductions and Accelerate Transportation Electrification, EPA Should Select and Finalize Alternative 2 and Take Additional Steps to Strengthen the Rule

Agency staff detailed the results of an extensive cost-benefit analysis performed as part of its deliberations in the documents introducing and accompanying the proposed rule. EPA's own calculations show that Alternative 2, of the proposed alternatives, will deliver the greatest net benefits to Americans, including monetized climate, environmental, and public health benefits.1 Despite these clear findings, a less beneficial alternative was proposed as the preferred alternative and the proposal fails to adequately justify its selection. This is inconsistent with both the Biden Administration's stated goals and priorities and, perhaps most significantly, with the directive of Executive Order 12866, later reaffirmed by Executive Order 13563, that "in choosing among alternative regulatory approaches, agencies should select those approaches that maximize net benefits…"2 Accordingly, Rivian believes EPA should, and in fact is obligated to, select Alternative 2 in its final determination. Finalizing any of the other proposed alternatives would not be justifiable on cost-benefit grounds.

One of the reasons Alternative 2 delivers superior benefits is its elimination of advanced technology multipliers.3 These multipliers are intended to encourage the use of advanced technologies such as electric drivetrains and EPA originally established them in 2012 as "temporary regulatory incentives" that "would help bring low emission technologies to market…"4 A rapidly proliferating lineup of EVs in all body styles and vehicle segments, however, suggests that these incentives have more than succeeded and are no longer necessary. The auto industry has amply demonstrated its ability to develop and commercialize advanced technology vehicles.

While Alternative 2 appropriately eliminates the multiplier incentive, it includes several other "flexibilities" that undermine the environmental integrity of the proposal and would likely slow the auto industry's transition to EVs.5 Rivian encourages EPA to take several additional steps to strengthen Alternative 2 in the final determination. [EPA-HQ-OAR-2021-0208-0274-A1, p. 2-3]

Finalize Alternative 2 without Flexibilities for the Strongest Possible Rule

While some stakeholders are advocating for additional flexibility and less stringent standards in the shortterm, the rollback of the standards under the previous administration mean that we can ill afford to adopt anything less than the most ambitious standards possible. Adopting Alternative 2 without the added reductions in stringency that come with new “credit flexibilities” is needed to realize the proposed regulation’s economic and environmental benefits and maintain U.S. leadership in developing advanced vehicles. EPA should continue driving transportation electrification and job creation in the U.S. by building on what the auto industry has already committed to do in the coming years.

Rivian urges EPA to adopt Alternative 2 without additional flexibilities to ensure American competitiveness, accelerate electrification, and maximize the environmental and economic benefits of the rule. In addition, and through separate action, we also encourage EPA to move quickly to reauthorize California’s waiver under the Clean Air Act as part of a comprehensive, pro-climate slate of actions. [EPA-HQ-OAR-2021-0208-0274-A1, p. 6-7]

Rivian Believes the MY 2026 Standard Should be More Stringent

In its notice of proposed rulemaking, EPA sought comment specifically on the appropriateness of a MY 2026 standard approximately 5-10 g/mi more stringent than proposed. The proposal correctly cites a growing list of bold commitments to vehicle electrification by traditional automakers, rapidly developing charging infrastructure, and the relatively greater lead time for the out-year as reasons why a more stringent standard might be warranted.18 Recent sales data only strengthen the case for increased stringency in MY 2026. The auto industry is on pace to achieve record EV sales in calendar year 2021. Through August, automakers sold more than 374,000 plug-in vehicles—already setting a new calendar year record with four months remaining in 2021 and positioning the industry be well on its way to the approximately 8 percent sales EPA projects in MY 2026 under the current proposal. This is a moment to recognize the expected EV adoption rate in the proposed vehicle emissions standards. Coupled with the other actions Rivian recommends above, we believe it is appropriate to finalize the rule with a more stringent requirement in MY 2026. [EPA-HQ-OAR-2021-0208-0274-A1, p. 6]

Commenter: Sabetta, Tracy

[The following comments were submitted as testimony at the virtual public hearing on August 26, 2021. See Hearing Testimony – 26Aug2021, pp. 101-102.]

To reduce these harmful pollution levels and dire climate impacts and set us on the path to 100 percent zero emissions new vehicles by 2035, the near-term standards for climate pollution must be as strong as possible.

Please do not accept options that allow loopholes for automakers that may undermine otherwise strong pollution reduction targets.

[The following comments were submitted as testimony at the virtual public hearing on August 26, 2021. See Hearing Testimony – 26Aug2021, p. 2.2.]

I urge you to adopt the strongest standards possible for passenger cars and light trucks through 2026.

[The following comments were submitted as testimony at the virtual public hearing on August 26, 2021. See Hearing Testimony – 26Aug2021, p. 102.]

As you've heard, Alternative 2 would put 400,000 extra electric vehicles on the road by 2026 and result in 130 million metric tons fewer greenhouse gas emissions.

Commenter: Securing America's Future Energy

SAFE applauds EPA's decision to revisit the emission standards that the Trump administration relaxed just 18 months ago, and EPA's proposal certainly moves in the right direction by moving back towards the same trajectory that the Obama administration set in 2011. Yet, SAFE believes that EPA should not only choose the most stringent alternative (Alternative 2), which also generates the largest net economic benefits, but should explore adopting a more stringent standard designed to further accelerate the deployment of electric vehicles. EPA's analysis indicates that under this rule 8 percent of new vehicles in 2030 will be either electric or hybrid electric. Unfortunately, the reality of this proposed rule does not match the boldness of President Biden's vision, even as SAFE's analysis concludes that domestic automakers can shift a substantial share of the vehicle production to EVs without stranding past capital investment. Moreover, were EPA to properly account for the military costs we incur due to our dependence on oil, and were EPA to recognize the fuel savings and emissions reductions that can be generated by new safety technology, an even more stringent rule would be cost effective and likely generate even larger net economic benefits.

There is time for the automakers to move sharply towards the President's goal without stranding any current investment and in a manner that can protect auto workers' jobs. There is time for the federal government to more fully engage in the competition for global leadership in the automotive sector of the future. And most importantly, perhaps, there still is time to catch up to our economic competitors. But time is running short. SAFE encourages EPA to adopt alternatives whose stringency matches the President's vision, and build the foundation on which the United States can claim a position of global leadership in an electrified transpiration future. [EPA-HQ-OAR-2021-0208-0527-A1, pp. 2-3]

Stringency of the GHG Emissions Standard

In the proposed rule, EPA has identified three potential levels of stringency. EPA proposed standards for the Model Years (MY) 2023 – 2026 that are projected to achieve a fleet-wide average emission rate of 171 g/mile of CO_2 by 2026.[23] EPA set the stringency so that it would achieve, by 2023, the level of stringency of the California Framework and then decline linearly with stringency increasing 4.7 to 5 percent a year. For MY 2026, the standards would be about 3 percent more stringent than 2025, making it the most stringent standard ever.[24] Still, the standards would be slightly less stringent than the standard established in the 2012 Rule. EPA did not propose significant changes to the structure of the program, though it proposed limited changes to some of the flexibility mechanisms in the rule, including a limited extension of credit carry-forward for one or two years for credits generated between 2016 and 2020, incentives for hybrid pickup trucks, and an extension of the multiplier, though not in either of the alternative proposals.[25]

In Alternative 1, the less stringent alternative, EPA used the coefficients in the California Framework for the 2.7 percent effective stringency level for the MY 2023, and the 2012 rule's MY 2025 standards as the basis for the MY 2026 stringency level, with linear increases in stringency for the intermediate years. EPA selected this alternative as the least stringent standard it should consider because five automakers already agreed to this standard as part of the California Framework.[26] In Alternative 2, EPA adopts the 2012 rule stringency levels for MY 2023 through 2025, and then extends the rate of increased stringency through MY 2026.[27] EPA also sought comment on the adoption of an emissions rate for MY 2026 that was between 5 and 10 g/mile lower than the rate proposed and the rate in each alternative.[28]

In its analysis, EPA also identified the costs and benefits associated with each of the three alternatives. In each instance, the benefits of the alternative exceeded the costs. In EPA's proposed standard, EPA forecast net benefits between $86 and $140 billion. For Alternative 1, EPA forecast net benefits to be between $76 and $130 billion. For Alternative 2, EPA forecast net benefits to be between $110 and $180 billion. It appears that EPA did not estimate the net benefits of adopting an increased level of stringency in MY 2026.[29]

SAFE carefully examined the preamble to the rule and the supporting RIA. We could not find an explanation of why EPA selected the preferred alternative. There was no indication in the preamble to the proposal that automakers are not capable of meeting the more stringent standard. In fact, the standards established in 2012 were just recently relaxed, making it unlikely that automakers substantially changed their plans such that they could not meet the more stringent standards, which, as recently as 17 months ago, were already expecting to have to meet.

EPA also forecast that under its proposed standard the combined sales of EVs and PHEVs could grow to eight percent of the market by 2026.[30] Unfortunately, President Biden's vision of EVs constituting 50 percent of all new vehicle sales by 2030 [31] is not matched by the stringency of EPA's regulation. For there to be any possibility of EV sales approaching President Biden's goal, EPA must consider a more stringent standard.

SAFE, therefore, requests that EPA revisit its choice of alternatives and choose an alternative that generates the greatest net economic benefits. This approach is consistent with Executive Orders 12866 and 13563. EO 12866, which outlines the government's regulatory philosophy and principles directs agencies to 'assess all costs and benefits of available regulatory alternatives, including the alternative of not regulating,' and 'in choosing among alternative regulatory approaches, [ ] select those approaches that maximize net benefits.'[32] This approach was reaffirmed in EO 13563, which restated the federal government's general principles of regulation. It stated that 'agencies must, among other things: (1) propose or adopt a regulation only upon a reasoned determination that its benefits justify its costs . . . and (3) select, in choosing among alternative regulatory approaches, those approaches that maximize net benefits.'[33]

Some stakeholders may suggest that there is not time for the automakers to make a quicker transition without incurring substantial stranded costs. Analysis included pages 6 through 8 of Attachment 1 shows that each of the top 15 vehicle programs produced in the United States are expected to transition to a new program before 2030. In fact, as also reflected in that analysis, most of the conventional vehicles that will be produced in the United States in 2030 are part of programs that are early enough in their production cycle that the automakers can transition the program to electric platforms without stranding investment.

At an absolute minimum, EPA should select Alternative 2. It should, however, perform additional analysis of the opportunity to establish a standard of between 5 and 10 grams per mile more stringent in 2026, and select the more stringent standard if the analysis indicates that it will achieve greater emission reductions and there is no obvious obstacle to automakers meeting the more stringent standard. If EPA has sufficient flexibility under the Administrative Procedures Act, it suggests that EPA consider increased levels of stringency, perhaps combined with a reinstituted multiplier for electric vehicles, as explained below. [EPA-HQ-OAR-2021-0208-0527-A1, pp.9-10]

Commenter: Sainz, Columba

[The following comments were submitted as testimony at the virtual public hearing on August 26 2021. See Hearing Testimony – 26Aug2021, p. 226.]

President Biden has promised to address climate change and fight for environmental justice and EPA should finalize the strongest possible option and put America's families and health first.

Commenter: Scholar, Reverend

By setting standards that put the U.S. on a pathway to eliminate all passenger vehicle tailpipe pollution by 2035, Environmental Defense Fund estimates that the U.S. could:

1. Prevent as many as 98,000 premature deaths by 2050;

2. Reduce a total of more than 11.5 billion metric tons of carbon pollution by 2050; and

3. Provide more than $1.6 trillion in benefits to Americans, including pollution reductions and economic savings.

EPA’s proposed rule to strengthen?federal greenhouse gas (GHG)?emissions standards for passenger cars and light trucks is a necessary step to address the climate crisis and protect our communities from harmful air pollution. But it is not enough. Please restore American leadership on climate by promulgating strong standards to eliminate pollution from all passenger vehicles. Together, we can protect Americans’ health, the climate, and our pocketbooks. [EPA-HQ-OAR-2021-0208-0724-A1, p. 1]

Commenter: Seeman, Carolyn

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, pp. 185-186.]

Please adopt Alternative 2 which would lead to cleaner air.

For all of us with respiratory problems, stronger emission standards for cars are a matter of life and death.

We all need to do our part go make the world a healthier place to live.

Please reinstate the Obama/Biden federal standards with Alternative 2 and set even stronger ones through the next decade.

Commenter: Shevelew, Jonathan

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, pp. 117-118.]

If you accept 20-year targets that will eliminate any sense of urgency, then it will take the full 20 years for this transition to happen.

The EPA is noting already the need for a longer-term rule. So why once again are you going to kick that can down the road? Your current proposals don't even meet the goals of the Obama Administration. This is not earth-shattering news to vehicle manufacturers. They have known that this was coming for years but had no incentive to move towards EVs.

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, p. 118.]

By setting 2025 as the goal to eliminate GHG emissions from light-duty vehicles, it assures there will be no future diversions based on a changing political landscape.

Faced with severe penalties for noncompliance beginning in 2026, I have no doubt that the OEMs will find a way to make this happen.

Commenter: Shiffrin, Joyce

Hello, my name is Joyce Shiffrin, and I am sending you this e-message because I am urging and begging you to do whatever you can to have 400,000 new electric vehicles on the roads by 2026. Why is this particular issue pertinent to me? Because as many of us unfortunately know, climate change is imminent.

Therefore, we must ALL do whatever we can to change that. One way is for ALL of us to drastically cut down on (ideally, ELIMINATE) ALL fossil fuel production as well as consumption. [EPA-HQ-OAR-2021-0208-0405, p. 1]

Commenter: Singh, Varsha

[The following comments were submitted as testimony at the virtual public hearing on August 26, 2021. See Hearing Testimony – 26Aug2021, p. 298].

This proposal and the broader actions on clean cars from the Administration are a meaningful step in the right direction, but we really need the strongest possible clean air standards to truly make good on President Biden's commitment to address climate action and environmental justice.

[The following comments were submitted as testimony at the virtual public hearing on August 26, 2021. See Hearing Testimony – 26Aug2021, pp. 299-300.]

So, what I'm saying here in this public hearing is that we need stronger standards. There is a need for stronger standards. EPA's proposal is a necessary step towards addressing the previous Administration's rollback of cleaner car standards, but it's not only a start. You must finalize this rule by this year, 2021, because we really do not have time because the covered model year is 2023 to 2026, and set up more health protection standards beyond that. Please ensure that the standards result in the real-world reductions in greenhouse gas emissions, and please don't include any shortcuts for auto makers to cut corners. We know that car is necessary for every one of us, and we all are going to use cars, but what we require is an eco-friendly car.

Commenter: Smith, Arthur

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, pp. 316-317.]

The Biden Administration has pledged to put the U.S. on track to reduce greenhouse emissions by more than 60 percent by 2030. Alternative 2 is the better plan because it closes loopholes, saves consumers, and addresses the ongoing climate crisis.

Let's get on with it. By 2030, we should be able to convert to all renewable energy. Fewer electric cars versus hybrids are the best, most efficient transportation alternative and emit zero pollution. We must fix the source of electric power, however.

Commenter: Smith, Graham

We need a far faster reduction in CO2 emissions than proposed if we are to survive the current path of climate change. Please be far more aggressive in pushing the auto industry to do the right thing and cut tailpipe emissions. [EPA-HQ-OAR-2021-0208-0345, p. 1]

Commenter: Smith, Rita L.

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, p. 103.]

I urge the EPA to set the strongest possible federal clean car standards to ensure we are protecting families from vehicle pollution.

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, pp. 104-105.]

By implementing the strongest possible fuel economy standards, the EPA would be following through on the stated commitment to environmental justice because issuing stronger clean car standards will help address transportation-related impacts.

Commenter: South Coast Air Quality Management District

Regarding the request for comment on 5 to 10 g/mi greater stringency for MY2026, the District supports the greatest stringency and greatest degree of emission reduction that can be borne out by valid record support, while noting and agreeing with EPA that it has 'clear authority to set standards under CAA section 202 to be technology-forcing.' 86 FR at 43752. The proposal indicates that a greater acceleration in the transition to electrified vehicles bolsters the case for added stringency. [EPA-HQ-OAR-2021-0208-0215-A1, p.3]

Accordingly, the 10 g/mi greater stringency is reasonable and defensible on the mere point that the U.S. market should aspire to attain, or even keep pace with, these already materialized trends in the global market. Considering the state of development of the technology, anything less risks a failure of imagination and foresight.1 If the question is whether the U.S. can outperform an 8 percent market for electric vehicles (including PHEVs) by MY2026, the EPA should decisively land on greater stringency. To assume otherwise would suggest the United States in five years would still be behind where European Union sales are today, and that striking assumption appears untenable and should call for greater record justification. Notably, in Q1 2021 in California--the state with nation's largest vehicle market by virtue of population--plug-ins were already 10.8% of total vehicle sales.2 This trend will only increase and accelerate. Meanwhile, aggressive standards are warranted and needed to slash GHGs and further promote these trends. [EPA-HQ-OAR-2021-0208-0215-A1, p.3]

1 By way of analogy, consider that 50% of mobile phone using Americans shifted and adopted smartphones in the span of just 10 years (2011-2021). See Pew Research Center, Mobile Fact Sheet, April 7, 2021, https://www.pewresearch.org/internet/fact-sheet/mobile/

Commenter: Southern Environmental Law Center

The benefits of more stringent standards add up. Beyond the year-over-year increases in stringency, it is important to assess the cumulative impact the standards will have of GHG emissions reductions. The adoption of even the most stringent standards evaluated—Alternative 2—will not make up for GHG emissions reductions forgone due to the relaxation of the standards under the SAFE Rule, and it is critical that EPA maximize cumulative GHG emissions reductions under these standards. The alternatives analyzed by EPA have seemingly small differences in stringency for individual model years (the CO2 targets for the various alternatives differ between 2 and 6 grams per mile in any given model year[27]), but these differences add up: Alternative 2 would result in almost 300 million metric tons (MMTs) fewer GHG emissions through 2050 than the current proposal.[28] [EPA-HQ-OAR-2021-0208-0244-A1, pp. 4-5]

Stronger standards also make sense when considering the net benefits of the proposed rule. Alternative 2 is projected to deliver between $24 billion and $40 billion more in net benefits through 2050 than the current proposal.[29] Part of that benefit comes from fuel savings. Drivers are estimated to save between $150 billion and $290 billion through 2050 under Alternative 2 (as compared to between $120 billion and $250 billion under the proposed standards over that same period).[30] These savings make a real difference for drivers, especially for low-income households and households of color that generally spend a greater proportion of their income on transportation costs.[31] [EPA-HQ-OAR-2021-0208-0244-A1, p. 5]

For these reasons, EPA should, at a minimum, adopt Alternative 2 and the more stringent standards proposed for model year 2026. [EPA-HQ-OAR-2021-0208-0244-A1, p. 6]

Strong tailpipe GHG emissions standards represent one of the most valuable ways to begin to address the role of transportation in driving climate change. EPA should, at a minimum, adopt the more stringent Alternative 2 standards, as well as the stronger standards proposed for model year 2026. This will maximize the benefits and cumulative GHG emissions reductions from the regulations, and help to protect the environment and public health and safety.[EPA-HQ-OAR-2021-0208-0244-A1, p. 8]

In order to protect the environment and public health and safety, EPA should, at a minimum, adopt the more stringent Alternative 2 standards, as well as the stronger standards proposed for model year 2026. EPA's analysis shows that Alternative 2 would provide much greater overall benefits than its current proposal, and that compliance with the standards should be feasible for vehicle manufacturers [EPA-HQ-OAR-2021-0208-0244-A1, p. 2]

Commenter: Spencer, Sam

[The following comments were submitted as testimony at the virtual public hearing on August 26, 2021. See Hearing Testimony – 26Aug2021, pp. 152-153.]

It is far too weak to achieve the climate progress we need and contains loopholes that would allow auto manufacturers to continue to double down on gas-guzzling vehicles.

The proposal would also result in much less pollution reduction than the auto industry already agreed to in 2012, nearly a decade ago.

So for sprawling southern cities, like mine, that have to work with state legislatures that ignore climate science, it just isn't good enough. The EPA should finalize the strongest possible clean car standards to protect our communities from vehicle pollution, save drivers and sprawling cities like mine from spending more money at the pump and fight climate change.

You have a prime opportunity to strengthen these standards and protect our climate, public health, and the economy by ensuring clean car standards are as strong as possible and for my city, my family, and our neighborhoods, I sincerely hope you take it.

Commenter: St. Julien, Rene

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, p. 211.]

I support this Administration's swift action on clean cars but also urge the EPA to adopt their second alternative which would deliver greater savings to consumers and eliminate unnecessary loopholes for automakers.

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, p. 213.]

In conclusion, I would like to urge this Administration to be aggressive and set the strongest possible standards. They also need to prioritize Alternative 2 in the proposed ruling eliminating unnecessary loopholes for automakers.

Commenter: Stein, Karen

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, pp. 277-278.]

With my words in Spanish, I wish to underscore that limiting pollution from dirty vehicles is essential in achieving environmental justice. The EPA must set the strongest possible federal clean car standards and put automakers on track to meet the pollution reduction goals that the Intergovernmental Panel on Climate Change tells us we must achieve.

Commenter: Steitz, Jim

I urge you to set the most aggressive feasible auto efficiency standards, with an expansive view of what is technologically possible, not merely what automakers claim is economically feasible or compatible with their business model. Unless and until the oil and automotive industries lose the colossal subsidy of the free use of our atmosphere as carbon dumping ground, EPA must crack down on this ecological catastrophe through its existing regulatory authority. In setting new auto efficiency standards, the controlling, central organizing concern of EPA must be mitigating the existential threat of climate change. The need of human civilization to reduce carbon emissions must override all immediate economic objections from automakers, the oil industry, dealerships, or any other parties that may have financial objections to strong standards, but whose lives are not literally in jeopardy, as are those of our children. The selection of Alternative 2 and reinstatement of standards set by the Obama Administration should be considered a perfunctory minimum policy. In fact, EPA should look to the analysis of the International Energy Agency from May, outlining the most economically and technically plausible way to keep climate change below catastrophic levels. IEA found that internal combustion vehicle sales must end by 2035. Any EPA policy that does not force automakers onto this path does not acknowledge reality. [EPA-HQ-OAR-2021-0208-0422, p. 1-2]

Moreover, there must be no opportunity for evading the mileage standards by shifting around sales volume among categories. Auto efficiency standards for three decades have been undermined by the farcical classification of SUV's as 'light trucks.' Manufacturers then promote these quasi-military vehicles to satisfy masculine vanity or illusions of personal safety, neither of which are related to the category's original purpose of actual work vehicles [EPA-HQ-OAR-2021-0208-0422, p. 2]

The standards must commence immediately, with mileage improvements in the next vehicle year, not be backloaded to let manufacturers stall for time and lobby to weaken the standards later. The past three decades of feckless haggling with industry over carbon emissions demonstrates that targets for a decade or more away are consistently ignored, either as someone else's concern, or a nuisance for the government relations office to fix. [EPA-HQ-OAR-2021-0208-0422, p. 2]

Commenter: Stellantis

A three to fivefold increase in demand for electric vehicles is required to achieve the proposed requirements. The following supplemental policies and initiatives are critical to remove the barriers to electric vehicle acceptance and accelerate market demand in order to protect jobs:

- Update Federal EV Incentives and Apply at Point of Purchase

- Expand and Scale Charging Network to EV Volumes Required by Proposed Rule

- Implement Fleet Purchase Requirements

- Develop Domestic Battery Supply Chain (raw materials, manufacturing, and recycling)

- Increase Research & Development

- Improve Fuels and Implement a Nationwide Low Carbon Fuel Standard

- Increase Consumer Awareness of EVs [EPA-HQ-OAR-2021-0208-0532-A1, p. 6]

The EPA Proposed Rule is More Stringent by MY2026 than the Original Standards Set in 2012 by the Obama Administration

In 2012, EPA and NHTSA issued final and augural rules respectively covering MY2022-2025; the '2017 and Later Model Year Light-Duty Vehicle Greenhouse Gas Emissions and Corporate Average Fuel Economy Standards' ('2012 final rule').8 The agencies concluded at that time, and again after the midterm evaluation, that these standards were appropriate and that they could be achieved with very little strong electrification (high voltage electrification as in HEVs, PHEVs, and BEVs).

In 2020, the EPA and NHTSA finalized a joint rule, 'The Safer Affordable Fuel-Efficient (SAFE) Vehicles Rule for Model Years 2021–2026 Passenger Cars and Light Trucks' ('SAFE rule'),9 which revised greenhouse gas and fuel economy standards stating that assumptions made in the 2012 final rule were inaccurate. The SAFE rule revised standards for MY2021-2026 based on updated assumptions for market conditions and acceptance of electrification.

Separately, California withdrew the provision that deemed OEMs compliant with California's GHG requirements if they met federal standards, and instead negotiated a unique, nation-wide settlement agreements (i.e., 'California Framework Agreement') with some OEMs. This

Framework includes standards that are more stringent than the SAFE rule, but provides some relief compared to California's standalone GHG regulation. The EPA proposal (as defined) provides greater overall emission reductions than the California Framework.

Below is a chart comparing a fleet average light-duty footprint standard under the EPA NPRM proposed rule to the SAFE rule, California Framework, and 2012 final rule. [Figure 1 can be found on p. 8 of Docket number EPA-HQ-OAR-2021-0208-0532-A1]

The EPA proposed rule gets industry to a more stringent MY2026 endpoint than the California Framework, and the 2012 Final Rule (Obama). The stringency ramp rates proposed with the EPA rule are unprecedented, achieving a 10% reduction in MY2023 followed by 5% per year in MY2024-2026. [EPA-HQ-OAR-2021-0208-0532-A1, pp. 8-9]

Time is Needed to Transition the Fleet and Close the Gap to Current Standards

Stellantis supports the proposed rule because it allows time for industry to catch up to the standards. There is a significant market and industry challenge to achieve the necessary electrification to meet the requirements proposed and establish a pathway to 40-50% market penetration by 2030. This challenge is demonstrated by the magnitude of growth required to achieve these levels from today's starting point of 2.5%, as well as the need for immediate increases in the EV market to meet even the current requirements. [EPA-HQ-OAR-2021-0208-0532-A1, p. 11]

Shown in Figure 2 below from the 2020 EPA Trends Report, 11 of 14 major manufacturers underperformed their MY2019 standard and relied on the use of banked or purchased credits.17 [EPA-HQ-OAR-2021-0208-0532-A1, p. 11] [Figure 2 can be found on p. 11 of Docket number EPA-HQ-OAR-2021-0208-0532-A1]

In addition, as shown in the figure below, Industry's overall deficit to standard increased from 1 g/mi in MY2018 to 7 g/mi in MY2019 and third party analysis project the deficit will continue in MY2020 for the fifth consecutive year.18 This is a clear indication that the additional time afforded In the proposed rule is needed to grow the market demand for more efficient electric vehicles, before even more stringent standards, requiring higher rates of electrification, can be implemented. [EPA-HQ-OAR-2021-0208-0532-A1, p. 12] [Figure 3 can be found on p. 12 of Docket number EPA-HQ-OAR-2021-0208-0532-A1]

Establishing a pathway that can close the gap to current requirements, meet the EPA proposed rule and achieve 40-50% electrification by 2030 requires an unprecedented transition of the new vehicle fleet

It takes the automotive industry (and Stellantis) 2 to 4 years to introduce a new product. 'Top Hats', or vehicle renewals that only involve changes to the visible surfaces on the interior and exterior of a vehicle can be developed in as little as 2 years. In contrast, a brand new vehicle that includes a new powertrain, chassis, body architecture and electronic architecture; can take more than 4 years from concept to volume production. [EPA-HQ-OAR-2021-0208-0532-A1, p. 12]

OEMs historically have justified powertrain business cases over at least a ten-year time horizon, straddling two or more vehicle programs. This time horizon is driven by the need to introduce new technology, but constrained by the large levels of capital needed for the design, engineering, testing and validation of engine and transmission programs as well as the capital investment required for the machining and assembly lines for drivetrain components and assemblies.19 [EPA-HQ-OAR-2021-0208-0532-A1, p. 12]

As mentioned above, Stellantis is committed to an electrified future, targeting over 40% of sales in the United States to be plug-in hybrid or full battery electric vehicles by 2030. To achieve this ambitious vision, focus must remain on transformational electrification investments, starting now in order to minimize the time and maximize the success of this transition. [EPA-HQ-OAR-2021-0208-0532-A1, pp. 12-13]

More Stringent Alternatives than the Proposed Rule Add Risk

The EPA should not adopt the more stringent alternatives discussed in the NPRM since the EPA proposed rule is more stringent than the current rule, as well as the California Framework and 2012 final rule by MY2026, and requires at least three to fivefold growth in EV sales.

As shown in the figure below, the more stringent alternative (Alternative 2) proposed by EPA includes a steeper ramp rate in MY2023 than the already unprecedented 10% jump in the proposed rule. Additionally, EPA also proposes an added 5-10g/mi stringency for MY2026 – introducing an extra 6% jump in stringency in the final year. [Figure 4 can be found on p. 13 of Docket number EPA-HQ-OAR-2021-0208-0532-A1]

These more stringent alternatives add unnecessary risk to an already ambitious proposed regulation. The current demand for electrified vehicles is 2.5% and most OEMs (and industry on average) are not meeting standards on the books today. Even EPA's own modeling conservatively estimates that demand for EV's will need to at least triple by MY2026 to meet the proposed rule, whereas NHTSA modeling predicts a fivefold increase. Stellantis believes even more EV growth will be needed.

More stringent options propose high ramp rates earlier in the program at a time when industry is investing in EV technology and challenged to meet current standards. These alternatives place more strain on the supporting infrastructure and incentive programs. Additionally, increasing stringency an additional 6% in the final year does not significantly impact net CO_2 savings for the entire MY2023-2026 rulemaking period, but does add significant risk by introducing a single year jump in stringency at the end of the program.

EPA should avoid this additional risk and not adopt the more stringent Alternative 2 and instead move forward with the already ambitious targets as proposed without an additional 5-10g/mi increase in MY2026. [EPA-HQ-OAR-2021-0208-0532-A1, pp. 13-14]

Stellantis Supports EPA's Proposed Rule with Improvements to Flexibilities Stellantis supports EPA's proposed approach that retains MY2021-2022 SAFE standards, with an additional 10% reduction in MY2023, followed by 5% annual reductions through MY2026. These ambitious and challenging standards surpass fleet g/mi targets of the SAFE rule, California Framework and the Obama 2012 final rule standards by MY2026, delivering significant CO2 savings and relying on unprecedented growth in electrification far beyond the 2.5% penetration level seen today. [EPA-HQ-OAR-2021-0208-0532-A1, p. 2]

Stellantis Supports the EPA Proposed Rule with Improvements

Stellantis supports the EPA proposed rule for GHG. It strikes the right balance of core program stringency to aggressively reduce GHG emissions and fuel use, while not going so far as to dramatically shrink the light-duty vehicle market which would reduce the environmental benefits of a compliant new vehicle fleet. [EPA-HQ-OAR-2021-0208-0532-A1, p. 8]

Stellantis does not support EPA's other, more stringent, alternative or the addition of 5-10g/mi of added stringency in the final year. The preferred alternative strikes a better balance of ambitious targets with time to transition product line-ups necessary to support the projected mix of electrified vehicles by MY2026. [EPA-HQ-OAR-2021-0208-0532-A1, p. 2]

Commenter: Sturza, Taisia

[The following comments were submitted as testimony at the virtual public hearing on August 26, 2021. See Hearing Testimony – 26Aug2021, p. 171.]

That EPA must act to make clean car standards as strong and far-reaching as possible. It would be a win for the American people and all those looking to spur job creation, economic growth, family cost savings, and public health protection at the time when we need it most.

I urge the EPA Administration to be leaders in achieving a zero emissions future with strategic and aggressive goals to help mitigate the impact of air pollution on our health and therefore our livelihoods and our future.

Commenter: Tafoya, Ian

[The following comments were submitted as testimony at the virtual public hearing on August 26, 2021. See Hearing Testimony – 26Aug2021, p. 189.]

I am here today to ask you to go as strong as you possibly can. We need downpayment since even beyond tax incentives for us to truly make this change.

I've been involved in transportation electrification planning processes here at my Public Utilities Commission and through our conversations with business owners and people that is what they want.

Commenter: Terwilliger, Phyllis

[The following comments were submitted as testimony at the virtual public hearing on August 26, 2021. See Hearing Testimony – 26Aug2021, p. 34.]

The EPA must, must set the strongest possible federal vehicle emission standards to ensure we are protecting families from pollution and reversing climate change.

Commenter: Tesla

As EPA notes, the agency seeks, inter alia, comments as to whether 'there may be the potential for higher levels of EV penetration by MY 2026, which could enable EPA to consider a more stringent standard for MY 2026.' As described below, EPA's proposal has vastly underestimated the rapid and growing deployment of electric vehicles (EVs). Consequently, the agency proposes standards low in ambition and easily accomplished, due to unneeded compliance flexibilities that erode the level of greenhouse gas (GHG) emissions reductions that would be achieved by this rulemaking. Such reductions are critical to sufficiently protect the public health and welfare in view of the progressing understanding of climate science around climate-induced impacts.

Based on internal modeling that Tesla has confirmed with government and non-governmental experts, the proposed changes will make the GHG standards weaker than the Trump SAFE Rule's outcomes in Model Year (MY) 2021 and MY 2022 by making available new flexibilities without any accompanying increases to the standards' stringency for these model years. Additionally, from MY 2023 to MY 2026 the equivalent of 30% of EPA's proposed stringency is lost to the new and expanded compliance flexibilities. In contrast to these proposed outcomes, there are compelling grounds for EPA to adopt a rule whereby, starting in MY 2023, the standards should be made much more stringent, all proposed compliance flexibilities should be removed, and the final standards should put the country on a trajectory to achieve 100% EV sales by 2030.

As President Biden recently stated in a speech in the wake of Hurricane Ida, 'They all tell us this is code red; the nation and the world are in peril.' Unfortunately, this EPA proposal needs to be strengthened to get to the level of ambition required to meet the President's clarion call for action, especially considering the proven technological capability of automakers to meet much more stringent standards.[EPA-HQ-OAR-2021-0208-0278-A1][p.1]

As proposed, the EPA's new light duty vehicle (LDV) standards take an initial step backwards even for the standards which are well underway. EPA's proposal is neither sufficiently stringent through MY 2026 to meet the agency's statutory burden of protecting the public health and welfare from the impacts caused by climate change, nor does it support the level of EV deployment necessary to meet the Administration's near-term 2030 decarbonization goals. If implemented as proposed, the rules will: (1) increase carbon emissions near term; (2) result in a low-ambition deployment of the best available light duty emission-reducing technology (electric vehicles); and (3) further erode U.S. leadership in the manufacturing of advanced vehicle technologies. Such an outcome would not be justified in view of the extensive record supporting far more ambitious targets.

While the topline of EPA's proposal is anchored to the need to meet an increase in stringency in MY 2023 of about 10 percent compared to the SAFE rule MY 2022 levels, due to extensive compliance flexibilities offered, the actual near-term stringency achieved by the proposed rule would be significantly reduced. In granting one and two-year retroactive extensions to the existing bank of MY 2016 and 2017 credits coupled with increased and new 'flexibilities,' EPA takes a step backwards in overall carbon reduction for the next several years. Given these flexibilities, Tesla internally models that the proposal will result in a significant step backwards in stringency for MY 2020-2022, with higher actual fleet wide g/mi emissions levels than even the SAFE rule stringency attempts to deliver for these years. See Figure 1. Such a result adds to carbon emissions in these early years. In the MY 2023, fleet average is slightly reduced from SAFE MY 2023 levels but at level that falls significantly short of EPA's advertised 10% stringency reduction. [EPA-HQ-OAR-2021-0208-0278-A1][pp.3-4] [Figure 1 can be found on p. 4 of EPA-HQ-OAR-2021-0208-0278-A1]

While the proposal on its surface appears to improve upon the overall stringency from MY 2024-2026, when factoring in a conservative use of the expanded compliance flexibilities the cumulative stringency falls short of past standards and does not catch up to the levels of compliance required by the LDV standards originally put in place starting in MY 2017.26 In that regard, EPA has released a proposal that – despite the significant advancement and deployment of electrification technology that has occurred in the last decade – is less ambitious than what the agency deemed appropriately protective in late-2011. Emblematic of this inadequate ambition is the EPA's proposal use of a MY 2017 baseline.27 This baseline simply ignores the accelerating deployment of EVs, including the Tesla Model 328 and Model Y29 both of which have become some of the top selling vehicles in U.S. after the MY 2017 baseline year used by EPA. In fact, in the first half of 2021, EV sales in the U.S. doubled and outpaced rising ICE vehicles sales.30 Similarly, in July 2021, EVs represented 5% of all light duty vehicle sales and 20% of all U.S. passenger car sales.31 In light of this rapid market expansion, the agency's proposal does not reflect real world experience in envisioning only 'minor increases' in ZEV penetration in MY 2026 at rates below what already exists in many non-U.S. markets.32 [EPA-HQ-OAR-2021-0208-0278-A1][pp.4-5]

Given the acceleration of public health and welfare impacts associated with climate change, it is incumbent upon the EPA to recognize the appropriate role EV technology plays today and how widespread commercial availability of EVs in the U.S. today should inform the implementation of a far more stringent standard. Accordingly, for the reasons described herein, the EPA should amend its proposal using Alternative 2 as a starting point, add 10 g/mi of stringency, and take the following additional steps to increase its overall stringency:

• Eliminate the one and two-year lifetime retroactive extensions of previously earned and expiring credits;

• Eliminate the Alternative Vehicle Technology multiplier which serves to diminish real life delivery of EVs (as is proposed in Alternative 2);

• Eliminate the proposed Advanced Technology Incentive for Full-Size Pick-ups; and

• Eliminate the Expansion of Off-Cycle Crediting volumes and eliminate all off-cycle crediting, at a minimum, after MY 2025.

These changes will significantly reduce emissions, result in increased deployment of the best available emissions reduction technology (ZEVs) consistent with the emissions reduction technology requirements of the Clean Air Act standard setting mandate under section 202, and ensure the Administration is meeting it statutory mandate to protect the public health and welfare.

As currently formulated, the EPA's proposal represents indifferent and diminished views of the status of electrification in the light duty sector, fails to recognize the pace and acceleration of EV deployment that will occur between now and MY 2026, and perpetuates, albeit perhaps unintentionally, a general disregard for the superior emissions and efficiency benefits delivered by EV technology. The result is a proposed rule that fails to meet a reasonable level of protection for addressing the public health and welfare impacts from air pollutant emissions and climate change. While Tesla also believes it is essential for EPA to establish longer-term rules of the road as well that actively embrace a more wholesale transition to EVs, and that the time for doing so is ripe, our comments here are focused on those elements of the proposal that impede what these rules purport to accomplish immediately and in the short term.

The EPA is in a position to create the benchmark for North American emission standards. For example, it is not uncommon for Canada to align its standards with the EPA. Addressing the weaknesses introduced by the compliance flexibilities could push other countries to further accelerate emissions reductions in the transport sector. On the other hand, Canada has already announced plans to require 100% ZEV sales by 2035.33 If EPA's final rules are seen to be insufficiently stringent to reach the 2035 goal, Canada could establish its own rules, which could perversely impact the ability for U.S.-based manufacturers to export compliant products to Canada. Finalizing a much more stringent rule is essential to put the country back into a position of international leadership and to deliver on the President's stated goal of 50% emission reductions by 2030 and reach mid-century decarbonization. [EPA-HQ-OAR-2021-0208-0278-A1] [p.5]

President Biden has himself established goals 'that 50 percent of all new passenger cars and light trucks sold in 2030 be zero-emission vehicles'44 and asserted that to respond to the climate crisis 'will require both significant short-term global reductions in greenhouse gas emissions and net-zero global emissions by mid-century or before.'45 Given the long fleet vehicle turnover time,46 the EPA's proposal that would result in a 7.8% fleet penetration for EVs (including PHEVs) is wholly inadequate given the state of EV technology and the urgency to reduce GHG emissions from the transportation sector.47 A recent analysis has shown that to achieve the Administration's emissions reduction goal the U.S. fleets needs to achieve, as Tesla urges, between 95- 100% light-duty EV sales by 2030.48 Others analyses point out that rapid electrification during the decade of 2025-2035 is essential to staying within the needed carbon budgets.49

Stringent performance standards are critical to accelerating the electric transformation of the light duty sector. As the EPA notes:

Title II emission standards have stimulated the development of a broad set of advanced automotive technologies, such as on-board computers and fuel injection systems, which have been the building blocks of automotive designs and have yielded not only lower pollutant emissions, but improved vehicle performance, reliability, and durability. In response to EPA's adoption of Title II emission standards for GHGs from light-duty vehicles in 2010 and later, manufacturers have continued to significantly ramp up their development and application of a wide range of new and improved technologies, including more fuel-efficient engine designs, transmissions, aerodynamics, and tires, air conditioning systems that contribute to lower GHG emissions, and various levels of electrified vehicle technologies.50

Despite recognizing how past stringency has ramped up electrification technologies, the EPA's proposal fails to reflect the need for rapid electrification, instead settling for stringency levels that will result in only 'relatively minor increases in penetration of plugin electric vehicles,'51 in contrast to the demonstrated availability and cost effectiveness of this emissions reduction technology.

As the only U.S.-based manufacturer of EVs that exports its vehicles abroad, Tesla believes maintaining the stringency of the current performance-based LDV standards is also essential to ensuring U.S. manufacturers' ability to compete abroad and build greater export markets. Ensuring stringent long-term standards will create stability and an investment environment that propels domestic manufacturers like Tesla to invest continually in technology and to expand manufacturing for both the U.S. and foreign EV markets. As the Department of Energy (DOE) has concluded, without specific support of EV deployment the U.S. will lag other countries and the country needs to 'move fast to catch up.'52 [EPA-HQ-OAR-2021-0208-0278-A1][pp.7]

Indeed, other regions and countries have implemented and/or proposed performance standards that establish decarbonization trajectories that are markedly more aggressive than the EPA's proposal. Despite being the world's second largest vehicle market, the U.S. lags dramatically behind other countries in both EV fleet penetration and the stringency of the performance standards that advance the deployment of advanced technology vehicles. In the first half of 2021, EVs accounted for 12% of all passenger cars sold in China53 because of a comprehensive national plan for EV deployment including more stringent efficiency standards.54 In the fast half of 2021, 1 million EVs were also sold in Europe, accounting for 15% of new cars.55 In 2020 the E.U. established emissions standards at 95 g CO2/km (152.9 g/mi56), with a 15% cut coming in 2025,57 and has adopted a proposal to accelerate GHG emissions reductions with a next generation of light duty standards that will achieve a 55% reduction in CO2 emissions from new passenger cars by 2030, relative to 2021, and a full phase-out of new combustion engine vehicles – including PHEVs - by 2035.58

While EPA's proposal requests comments as to whether the investments being made now for expanded EV products allow for more stringent MY 2026 standards,59 individual country markets – including in North America – have demonstrated that EV market sales rates can achieve high percentages of total vehicles sales now.60 According to the World Economic Forum, thirteen countries had over 10% of electric vehicles make up new light vehicle sales in 2020.61 In 2021, all regions and most countries have seen strong increases in EV sales, with growth rates 3 to 8 times higher than for total light duty vehicle markets.62 Indeed, this market share reached 14% in the first half of 2021 in Europe (EU+EFTA+UK).63 Importantly, these figures demonstrate that manufacturers, when operating in markets with more stringent performance standards, can and will deliver the vehicles and electrification technology now in volumes far greater than EPA has proposed to achieve five years into the future in MY 2026. Moreover, new and expanded charging and consumer incentives currently under Congressional consideration could drive new EV deployment in the U.S. up as high as 61% of total vehicle sales in 2030.64 Simply put, failure to amend the proposal to put in place more stringent standards risks the U.S. failing further behind other countries in its share of EV sales.65 [EPA-HQ-OAR-2021-0208-0278-A1][pp.8]

The Protective Nature of Clean Air Act Section 202(a)(1) Requires EPA to Implement Standards with Greater Stringency Than Proposed

The Clean Air Act (CAA), and Section 202(a) in particular, is directed at protecting public health and welfare. See 42 U.S.C. § 7401 (identifying the Act's purpose as to 'protect and enhance the quality of the Nation's air resources so as to promote the public health and welfare and the productive capacity of its population.'); 42 U.S.C. § 7521(a)(1) (providing that the Administrator shall prescribe and from time to time revise 'standards applicable to the emission of any air pollutant from any class or classes of new motor vehicles or new motor vehicle engines, which in his judgment cause, or contribute to, air pollution which may reasonably be anticipated to endanger public health or welfare.'). The Proposed Rule recognizes that 'the purpose of adopting standards under CAA section 202 is to address air pollution that may reasonably be anticipated to endanger public health and welfare. Indeed, reducing air pollution has traditionally been the focus of such standards.'66 As courts have recognized, given the overriding goal of the statute to protect public health and welfare, EPA should 'plac[e] primary significance on the 'greatest degree of emission reduction achievable,'' and consider other factors such as 'cost . . .energy and safety factors as important but secondary factors.'67

However, even though the Proposed Rule asserts that, '[i]n light of the statutory purpose of section 202,' EPA is 'placing greater weight on the emission reductions and resulting public health and welfare benefits,'68 in actuality the proposal's level of stringency is not sufficient to align with the protective nature of the Act and Section 202.

In 2012, when MY 2012-2025 standards were first established 'mobile sources addressed in the endangerment and contribution findings under CAA section 202(a)—light-duty vehicles, heavy-duty trucks, buses, and motorcycles—accounted for 23 percent of all U.S. GHG emissions in 2010.'69 As EPA now acknowledges, this contribution has now grown to represent 29 percent of all U.S. GHG emissions.70 As one recent analysis has shown, to make up for the carbon pollution attributable to the SAFE Rule rollbacks new LDV standards need to be much stronger by MY 2026 than those proposed in 2012.71 Thus, it strains credulity that the agency is proposing MY 2023-2026 standards that are weaker and less protective than those proposed in 2012 when the transportation sector's contribution to U.S. GHG emissions has risen and superior mitigating automotive technology – electric vehicles – has become readily commercially available and provides the most effective means of emissions reductions. As such, the EPA's proposal fails to meet the agency's statutory burden of protecting the public health and welfare.

Courts have found that EPA's authority to regulate light duty vehicles via CAA Section 202 is not conditioned on evidence of a particular level of mitigation; only a showing of significant contribution is required – a showing the agency completed in 2009 with the Endangerment Finding.72 However, in exercising this authority by proposing new regulations, the agency must reasonably ensure its action meaningfully achieves a level of emissions reduction that contributes to mitigating the endangerment at hand.

Here, the agency's proposal falls short. The agency has proposed a standard with less emissions reductions and stringency than regulations completed in 2012 and reaffirmed in January 2017. As a result, despite nearly a decade of new, commercial deployment of EV technology and acceptance, the agency is not ameliorating the accelerating public health and welfare impacts from climate but sliding backwards.73 This is particularly troubling given the EPA, as it should, acknowledges in the proposal:

In light of the statutory purpose of section 202, the Administrator is placing greater weight on the emission reductions and resulting public health and welfare benefits, as well as the savings in vehicle operating costs for consumers, and proposing significantly more stringent standards for MYs 2023–2026 compared to the standards established by the SAFE rule.74 [EPA-HQ-OAR-2021-0208-0278-A1][pp.8-9]

Reducing the Stringency of the GHG Standards in the Face of Increased Pollution Impacts Would Be Arbitrary and Capricious

In light of EPA's recognition of the increasing impacts of GHG emissions, adopting standards less protective than the Obama-era standards would be arbitrary and capricious. Agencies are obligated to articulate a satisfactory explanation for their actions, including a rational connection between the facts found and the choice made.90 Therefore, '[i]llogic and internal inconsistency are characteristic of arbitrary and unreasonable agency action.'91 Here, the adoption of standards less stringent than the Obama-era runs counter to the recognized increase in evidence of and scientific consensus around the impacts of GHG emissions in the time since the Obama standards were adopted. EPA cannot reduce the stringency of the GHG standards while at the same time recognizing that the impacts necessitating those standards have increased, as has the imperative for decisive action. That internal inconsistency is 'illogical on its own terms.'92

Indeed, in the January 2017 mid-term evaluation EPA found that the Obama-era standards were readily achievable, even predicting only 2-4% electrification by MY 2025.93 Now, however, the proposal projects 4.6% electrification by MY 2023, and 6.4% by MY2025, yet proposes reduced stringency.94

In addition, EPA's failure to adequately consider how the Proposed Rule's flexibilities would impact the stringency of the standards also is arbitrary and capricious. When an agency decides to rely on a cost-benefit analysis as part of its rulemaking, as EPA is proposing to do here, a 'serious flaw undermining that analysis can render the rule unreasonable.'95 EPA claims that the GHG standards are stringent but ignores the ways in which the stringency will be significantly reduced by certain flexibilities when the rule is applied in the real world, as described below. EPA's failure to consider the impact of these added flexibilities on the stringency of the standards is a serious flaw that would render the rule unreasonable. [EPA-HQ-OAR-2021-0208-0278-A1] [p.11]

Conclusion

For the reasons set forth above, described herein, the EPA should amend its proposal using Alternative 2 as a starting point, add 10 g/mi of stringency, and take the following additional steps to increase its stringency:

- Eliminate the one and two-year lifetime extensions of previously earned and expiring credits;

- Eliminate the Alternative Vehicle Technology multiplier which serves to diminish real life delivery of EVs (as is proposed in Alternative 2);

- Eliminate the proposed Advanced Technology Incentive for Full-Size Pick-ups; and

- Eliminate the Expansion of Off-Cycle Crediting volumes and eliminate all off-cycle crediting, at a minimum, after MY 2025.

Tesla believes these changes will significantly reduce emissions, result in increased deployment of the best available emissions reduction technology (ZEVs), maintain U.S. manufacturing leadership in EV technology, and ensure the Administration is meeting it statutory mandate to protect the public health and welfare from the significant and accelerating impacts from air pollution and climate change. [EPA-HQ-OAR-2021-0208-0278-A1][p.23]

Commenter: Tomcik, Patrice

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, p. 257.]

I'm asking the EPA to finalize the strongest possible greenhouse gas emissions standards for light-duty vehicles in order to protect children's health in the future.

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, p. 259.]

Please finalize the strongest possible climate pollution limits on cars and light trucks to help protect our children's health and futures.

Commenter: Toyota Motor North America, Inc. (Toyota)

To be clear, achieving the proposed standards and laying the foundation to reach the Administration's 2030 electrification objectives requires complementary market development and sustainment measures, including non-discriminatory consumer tax credits, infrastructure investments for electric vehicle charging and hydrogen refueling, critical mineral supply chain development, and a robust system to recycle end-of-life vehicle batteries. Toyota stands ready to work with lawmakers, federal and state regulators, and others to support and implement these complimentary measures provided they maintain a level, competitive playing field.

The attached comments focus on EPA's technology and market assessments, modeling approach, and potential adjustments to regulatory flexibilities. While EPA has a somewhat limited role in many of the complimentary measures needed to promote consumer acceptance of electrified vehicles, Toyota suggests minor revisions within EPA's regulatory authority that we believe better recognize the challenge of these standards, while providing regulatory tools to incentivize more rapid electrification of the fleet toward our 2030 objectives. [EPA-HQ-OAR-2021-0208-0531-A1, p. 1-2]

EPA has Underestimated the Level of Electrification Needed to Meet the Standards
The proposed GHG standards present a formidable challenge in attaining the levels of electrification being projected for compliance. EPA estimates the share of BEVs, FCEVs, and PHEVs will need to grow from an average of 2.4 percent[1] today to 8 percent (NHTSA is projecting 12 percent for its proposed CAFE regulation) by 2026. Efforts to build the market must start now to more than triple the share of these technologies in just four years. For perspective, it's taken conventional hybrids 20 years to eclipse 3 percent of the U.S. market, even though hybrids require no new infrastructure, have no range anxiety issues, can be refueled virtually anywhere, and require no behavioral changes.

As described below, Toyota believes the task is even greater than projected by EPA because more electrification will be needed to comply with the proposed standards, which overestimate the likely contribution of ICE vehicle improvements and thus underestimate the level of BEV, FCEV, PHEV, and conventional hybrid volumes likely needed for compliance.

EPA has Overestimated the GHG Performance from ICEs

Toyota has provided extensive information, in public comments and under CBI, on the effectiveness of CO2 reduction technologies including those for advanced gasoline engines.[2] The data has consistently documented that even advanced ICE-only powertrains will fall short of the proposed standards and that while future advancements are possible, a point of diminishing returns is in part driving the transition to electrified powertrains, including conventional hybrids. EPA notes manufacturer plans and announcements of "a rapidly growing shift in investment away from internal-combustion technologies and toward high levels of electrification".[3]

EPA projects roughly 87 percent of the 2026 model year fleet will continue to be conventional gasoline powertrains. We are confused by EPA's statement that "the standards can be met largely with the kinds of advanced gasoline vehicle technologies already in place in vehicles within today's new vehicle fleet …".[4]

This position is at odds with findings from the most recent evaluation of U.S. fleet performance conducted by IHS Markit using manufacturer-supplied data. This baseline study assessed the percentage of 2020 model year vehicles capable of meeting the proposed GHG standards. As Figure 1 illustrates, only electrified powertrains (HEV, PHEV, BEV and FCEV) can attain the proposed targets for the 2024 model year and later passenger cars and 2025 MY and later light trucks. Most gasoline engine technologies modeled by EPA are already being used in the 2020 model year fleet. A more widespread adoption of top-performing gasoline engine technologies through 2026 model year will not result in fleet compliance.

The Focus is on Successful Outcomes

Pointing out these ICE limitations in no way diminishes Toyota's general support for the proposed standards, but rather is intended to stress that compliance will require a more substantive shift to electrified powertrains, including conventional hybrids. We need to begin working together now to chart a path for near-term market readiness and growth of electrified powertrains.

Success Depends on Converting Growing Consumer Openness to Vehicle Purchases

Shifting Consumer Tastes

Electrified powertrains must become more accessible to mainstream consumers for a carbon neutral future to be realized. Toyota market research has found consumer attitudes are shifting to a greater openness about alternative powertrains as seen if Figure 2. That growth in consumer openness is also being observed in vehicle segments that have traditionally been less inclined toward alternative powertrains. The changing attitudes appear to stem from increasing consumer exposure to electrified powertrains via the growing availability of vehicle models, styles and types, and the media attention created through manufacturer and government announcements.

Figure 2 – Growing Consideration of Alternatively Fueled Vehicles

Challenges Coming into Sharper Focus

While the openness to electrification is growing, converting that openness to purchase intent and ultimately vehicle sales remains a challenge. As mentioned previously, the market share for BEVs, PHEVs, and FCEVs has averaged 2.4% percent over the 2018 – 2021 period. Potential buyers still see obstacles to ownership because of price, range anxiety, charging time, lost utility and host of other factors presenting a more expensive and less convenient proposition compared to their current vehicle as seen below (Figure 3). A general lack of knowledge and misunderstanding contribute to these purchase barriers. [EPA–HQ–OAR–2021–0208-0531-A1, pp 1-6]For the reasons outlined in Sections 2 and 3 above, any additional increase in stringency beyond the proposed standards would create significant risk that threatens the feasibility of the standards. Toyota does not support either Alternative 2 or the 5 to 10 g/mi stringency increase in the 2026 model year standards for which EPA has sought comment. [EPA-HQ-OAR-2021-0208-0531-A1, p. 8]

Commenter: Trombetta, Nick

[The following comments were submitted as testimony at the virtual public hearing on August 26, 2021. See Hearing Testimony – 26Aug2021, p. 219.]

We must take the recent IPCC Report seriously and enact the strongest possible regulation on car emissions.

Commenter: Uberuaga, Michelle

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, p. 284.]

So for these reasons, I urge the EPA to set the strongest possible federal clean car standards. We need to keep U.S. automakers on track to meet ambitious pollution reduction goals as soon as possible.

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, p. 286.]

Strengthening car standards is a simple step and we can and must continue to do more to protect communities from air pollution and climate change.

Commenter: Union of Concerned Scientists (UCS)

Given the deeply flawed justification for the LDV standards currently on the books, President Biden's Executive Order (EO) 13990 directing EPA to reconsider these standards was a welcome action. We appreciate both the recognition of the inadequacy of these regulations and the speed with which the administration is moving forward to address these shortcomings—UCS strongly supports protecting public health and the environment and agrees that policy must be based on the best available science to adequately address the climate crisis. Unfortunately, EPA's proposed replacement for MY2023-2026 falls short of this goal.

Of the proposed alternatives, Alternative 2 comes closest to the level of stringency that would best support the agency's mandate under the CAA. However, even this proposal should be strengthened in MY2026 to support EO 14037 and better ensure that the industry is prepared for the requirements which will be needed beyond MY2026 to address climate change and achieve a net-zero economy by 2050.

In our comment, we support the need to take action immediately, as EPA proposes, while providing data in support of going even further in order to better address greenhouse gas emissions from LDVs, the largest single source of global warming emissions in the United States today. Not only does this information support moving forward with Alternative 2, but it also supports reducing the scope of incentives proposed by EPA—such incentives are not necessary to support a short-term strengthening of the greenhouse gas program and risk an erosion of the benefits of the program that could jeopardize the long-term ability to adequately deal with climate change and support the administration's critical goal for half of all new LDVs sold in 2030 to be zero-emission vehicles (ZEVs). [EPA-HQ-OAR-2021-0208-0277-A1, pp.2-3]

Commenter: Valentine, Lucia

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, pp. 265-266.]

The transportation sector is the largest source of carbon pollution in the U.S. and the EPA must set the strongest possible federal clean car standards throughout 2026, avoiding loopholes and putting automakers on track to meet ambitious pollution reduction goals.

The EPA proposal includes several options for how much and how quickly to limit climate pollution from cars and light trucks. Preferred alternative identified by EPA is not the strongest option and includes some loopholes to automakers that may undermine other pollution reduction targets.

Option Number 2 would put 400,000 extra vehicles on the road by 2026 and result in 130 million metric tons of greenhouse gas emissions. In order to set us on the path to 100 percent zero emissions by 2035, the near-term standards for climate pollution must be as strong as possible.

Commenter: Venner, Marie

[The following comments were submitted as testimony at the virtual public hearing on August 26, 2021. See Hearing Testimony – 26Aug2021, pp. 17-18.]

However, it is important to finalize standards for Model Years 2023 to 2026 before working on pollution standards for later years. Also, please go with your Alternative Number 2 as that would put 400,000 extra EVs on the road by 2026 and result in a 130 million metric tons fewer GHG emissions. I was concerned to see and urge you not to go with your initial preferred alternative as it includes some loopholes to automakers that may otherwise undermine strong pollution reduction targets. EPA should finalize the strongest possible option.

Commenter: Verdin, Langston

[The following comments were submitted as testimony at the virtual public hearing on August 26, 2021. See Hearing Testimony – 26Aug2021, p. 266.]

This proposal and the broader action on clean cars from the Administration are a meaningful step in the right direction, but we need the strongest possible clean car standards to truly make good on President Biden's commitments to address climate action and environmental justice. As a parent of a 12-year-old with asthma, I urge the EPA and the Administration to finalize this proposal quickly and move forward with bold greenhouse gas and fuel efficiency standards for cars, light trucks, and SUVs that accelerate the critical transition to zero emission vehicles.

Commenter: Villalpando Paer, Natalir

[The following comments were submitted as testimony at the virtual public hearing on August 26, 2021. See Hearing Testimony – 26Aug2021, pp. 203-204.]

The EPA has a responsibility to make sure we all live in healthy communities. The EPA must set the strongest possible federal clean car standards through 2026, avoiding loopholes and putting automakers on track to meet ambitious pollution reduction goals.

Making sure regulations for our cars are the best for all of us is recognized and manufacturers have a responsibility for the effects of the engines they produce and the air we all breathe.

[The following comments were submitted as testimony at the virtual public hearing on August 26, 2021. See Hearing Testimony – 26Aug2021, p. 204.]

It is time to think of a future when children will give that first breath into worst quality air because we were not bold enough. We need to recognize that not moving forward to fight climate change is already creating inequalities, health problems, and a strain on the health system for all of us.

We need to do everything we can to ensure our children can continue to play outside all summer and we cannot address the climate crisis without moving decisively to zero pollution vehicles.

That is why I urge the EPA to set the strongest possible pollution standards for cars.

Commenter: Volkswagen Group of America, Inc. (Volkswagen)

Volkswagen committed to achieve CO2 reductions through 2026 in its Framework Agreement with California and the other Section 177 States. Volkswagen appreciates EPA's consideration of the programmatic goals and flexibilities that were included in the agreement with California. We are confident that this proposal from EPA will be capable of delivering comparable levels of overall CO2 reductions and that this will help continue the path into future standards with additional long-term CO2 reductions. [EPA-HQ-OAR-2021-0208-0237-A1, p.7]

Commenter: Whyte, Yolanda

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, p. 144.]

Therefore, since traffic has now become the main source of air pollution, the strongest clean car standards are urgently needed, especially since many of the health impacts mentioned earlier are preventable.

Therefore, I urge EPA to set the strongest standards on the fastest timeline to protect our health, especially for the most vulnerable who cannot defend themselves or be able to speak today.

Commenter: Williams, Emerson

[The following comments were submitted as testimony at the virtual public hearing on August 26, 2021. See Hearing Testimony – 26Aug2021, pp. 249-250.]

The proposed rule before us today is not only not new, it is wholly inadequate.

[The following comments were submitted as testimony at the virtual public hearing on August 26, 2021. See Hearing Testimony – 26Aug2021, pp. 250-251.]

Further, these standards are still decades behind the rest of the developed world. In 2009, the EU implemented standards to reduce their emissions to 153 grams CO_2 per mile by 2020. They have since updated these goals and far surpassed our efforts.

China likewise enacted the Euro 4 standards in 2010 which includes very strict standards for CO_2 as well as other pollutants. Both regions also have strict enforcement mechanisms which this proposed rule is decidedly lacking.

I understand my statement today may come across as accusatory and unsympathetic to the work done to bring us here. I assure you that is not my intent. Rather, I am very upset by the extraordinary lack of leadership and urgency I continue to see around environmental issues.

We simply do not have the luxury of slowly ramping up standards or relying on the supposed promises of the capitalist market that caused this impending global disaster.

In conclusion, I recommend EPA go back and write a new rule, a rule that sets zero emissions standards to be met no later than 2030, a rule with strong enforcement mechanisms.

[The following comments were submitted as testimony at the virtual public hearing on August 26, 2021. See Hearing Testimony – 26Aug2021, p. 250.]

This refreshed rule originates from Executive Order 14037 which states in part America must lead the world on clean and efficient cars and trucks by setting a goal that 50 percent of all new passenger cars and light trucks sold in 2030 be zero emission vehicles. This proposed rule, even if the second alternative were implemented, falls terribly short of this order. In fact, with the second alternative implemented, the allowed combined cars and trucks grams CO_2 per mile by 2026 is 161. This means we are yet again passing the buck to the next EPA, next Administration, etcetera, and it is a huge burden to pass on.

To reach the goals expressed in the Executive Order, this future they will need to implement standards to remove 161 grams CO_2 per mile in only four years, nearly triple the reductions in this proposal.

Commenter: Wisconsin Department of Natural Resources

EPA should finalize its more stringent alternative (Alternative 2), to both maximize GHG reductions and minimize the need to mitigate any increases in criteria pollutant emissions.

In its rule, EPA proposes to increase the stringency of its emissions standards in MY 2023 by about 10 percent (from the existing SAFE rule standards in MY 2022), followed by stringency increases thereafter of nearly 5 percent per year from MY 2024 through MY 2026. In addition to this preferred alternative, EPA is also requesting comments on whether it should instead finalize a less stringent alternative (Alternative 1) or a more stringent alternative (Alternative 2).

EPA should finalize the more stringent Alternative 2. EPA's preferred alternative, although a vast improvement over the SAFE rule, does not restore the standards to the levels EPA deemed to be achievable back in 2012 – almost ten years ago. In contrast, Alternative 2 not only reinstates the 2012 standards for MYs 2023 through 2025, it increases the stringency of the standards further beginning in MY 2026. Of the options EPA is considering, Alternative 2 best recognizes the urgent need for GHG emission reductions and the significant changes that have occurred in the automotive manufacturing sector since 2012 that include a rapid shift in investment away from internal-cumbustion technologies. Specifically, Alternative 2 reflects what EPA has heard from key stakeholders, including automotive manufacturers and the automotive suppliers, that the significant investments being made now to develop and launch new electric vehicle (EV) product offerings and expanding EV charging infrastructure could lead to greater EV market penetration than otherwise assumed in EPA's proposal. The compliance flexibilities that EPA would retain in Alternative 2 (i.e., the extension of credit carry-forward for MY 2016-2020 credits, the increase of off-cycle menu cap from 10 to 15 g/mile, and the reinstatement of full-size pickup incentives for strong hybrids or equivalent technologies for MYs 2022-2025) help ensure the technical attainability of this alternative. EPA's analysis also shows that the increased costs associated with Alternative 2 would be more than offset by increased fuel savings and other benefits, resulting in larger net economic benefits than the preferred alternative.4 [EPA-HQ-OAR-2021-0208-0223-A1, p.2]

Note that WDNR recommends that EPA further increase the stringency of this alternative by 10 g/mile starting with MY 2026 (see comment #2). [EPA-HQ-OAR-2021-0208-0223-A1, p.2]

EPA should increase the stringency of MY 2026 standards by an additional 10 g/mile. EPA requests comment on standards for MY 2026 that would result in fleet average target levels that are in the range of 5-10 g/mile lower (i.e., more stringent) than the levels proposed. To maximize the benefits of this rule, in addition to proceeding with Alternative 2, EPA should finalize MY 2026 standards that are 10 g/mile lower than that standard. As noted by EPA in its proposal, rapid changes in the automotive sector, particularly the accelerated transition to electrified vehicles, makes this more stringent standard technologically feasible, particularly given the compliance flexibilities contained within the rule (see comment #1). Note that EPA should ensure any increases in the NOx, VOC and SO2 emissions associated with this change are fully mitigated (see comments #3 [p.3] and 4[p.4]). [EPA-HQ-OAR-2021-0208-0223-A1, p.2]

Commenter: Wiste, Leah

[The following comments were submitted as testimony at the virtual public hearing on August 26, 2021. See Hearing Testimony – 26Aug2021, p. 86.]

The current proposal falls dangerously short. The proposed standards are full of loopholes and rely on voluntary commitments from the automakers, the same automakers who got an $80 billion government bailout in 2009, agreed to stronger emissions reductions under President Obama and then reneged on that commitment when the political winds changed. Too much is at stake for us to rely on the voluntary commitments of this monster untrustworthy industry now.

Commenter: Witt, Anthony

[The following comments were submitted as testimony at the virtual public hearing on August 26, 2021. See Hearing Testimony – 26Aug2021, p. 167.]

The second alternative would deliver greater savings to consumers, an average of $2,100 per vehicle, and eliminate auto manufacturer loopholes.

[The following comments were submitted as testimony at the virtual public hearing on August 26, 2021. See Hearing Testimony – 26Aug2021, pp. 167-168.]

Auto manufacturers will not produce vehicles with drastically higher fuel efficiency unless they're required to do so. We need to set high standards and eliminate loopholes that would prevent us from achieving these goals. The Administration's ‘voluntary targets’ and the U.S. automakers ‘shared aspirations’ are not sufficient. To achieve the goal of reducing greenhouse gas emissions from new faster vehicles sales by more than 60 percent, we need to set the strongest possible standards for 2026.

I urge the Administration to set the strongest standards possible because they're necessary and they work.

I urge you to reinstate the federal standards with your Alternative 2 and set even stronger ones through 2030.

I ask you to ensure that there are no loopholes for automakers to get around these standards.

[The following comments were submitted as testimony at the virtual public hearing on August 26, 2021. See Hearing Testimony – 26Aug2021, p. 167.]

I fully support the strengthening of the clean cars standards with the adoption of the EPA's second alternative.

Commenter: World Resources Institute (WRI)

Our comments focus on EPA’s estimates of the market share obtained by zero-emission vehicles (ZEVs) through model year (MY) 2026 and the implications of those projections for the emissions reductions that would result from the proposal compared with what could be achieved by fully accounting for ZEV market trends as well as available technology to reduce emissions from internal combustion engine vehicles (ICEVs). In summary, WRI concludes:

• EPA’s proposal is based on a substantial underestimate of the likely ZEV market share.

• Much greater emission reductions could be achieved with available technology than would result from the proposal or either of the alternatives considered by EPA.

• If ZEV sales follow the trajectory projected by independent analysts assuming current policies ICEVs would be able to emit 204-216 gCO_2/mile in MY2026, which represents no improvement compared to the emissions rate EPA assumed for ICEVs in MY23 under the proposal.

• If ZEV sales follow the trajectory projected by independent analysts assuming tax credit extensions and charging infrastructure investments consistent with proposals under active consideration in Congress, ICEVs would be able to emit 265 gCO_2/mile in MY2026, which is 35 g/mile more than ICEVs were allowed to emit in MY2020. [EPA-HQ-OAR-2021-0208-0207-A1, p. 1]

Based on these observations WRI recommends that:

• EPA should update its projections of ZEV market shares to reflect current trends in battery prices, automaker investment plans and EV market development. EPA should also consider higher penetration scenarios that would occur if Congress enacts additional incentives and infrastructure investments and should update the final rule to reflect any enacted legislation.

• EPA should set light duty vehicle standards at levels that reflect these updated ZEV market share projections and EPA's current projections of technology penetration rates for ICE vehicles. Such standards would be significantly more stringent than either the proposal or Alternative 2.

• Given the uncertainty regarding future ZEV market shares, EPA should set standards for ICE vehicles (in addition to fleet-average standards) that ensure continued year-over-year emissions reductions from ICE vehicles regardless of the ZEV market share. [EPA-HQ-OAR-2021-0208-0207-A1, p. 1-2]

EPA's proposed MY2023-MY2026 greenhouse gas emissions standards are fundamentally flawed because the agency failed to update its compliance model to reflect recent advances in ZEV technology. EPA should finalize revised standards that reflect the level of performance that would be achieved with ZEV market penetration rates consistent with the rapidly declining cost of batteries and expanding ZEV model offerings. EPA should also consider scenarios based on enhanced consumer incentives and charging infrastructure investments and be ready to reflect any such legislation enacted by Congress. EPA should also set standards for ICEVs that ensure year-over-year emissions rate reductions regardless of future ZEV market shares. [EPA-HQ-OAR-2021-0208-0207-A1, p. 5]

Under the proposed fleet-wide target of 171 g/mile in MY2026, and assuming that all ZEVs are credited with an emissions rate of -20 g/mile (as EPA assumes for Tesla in the RIA), ICEVs would have an effective emissions rate target of 187 g/mile under EPA's projection of a 7.8% ZEV market share in MY2026. 5 Based on the same algebra, under the proposal the effective emissions rate target for ICEVs would be 204 g/mile, 216 g/mile, or 265 g/mile if ZEV penetration follows the BNEF, RhG–C, or RhG–I scenario, respectively.

Conversely, assuming the ICEV fleet has an average emissions rate of 187 g/mile, the performance implied by the proposed standards and EPA's ZEV market share projection of 7.8% in MY2026, appropriate standards would result in fleetwide emissions targets of 156 g/mile, 148 g/mile, or 119 g/mile if ZEV penetration follows the BNEF, RhG–C, or RhG–I scenario, respectively.

The results of these calculations assuming more conservatively that ZEVs are credited with an emissions rate of 0 g/mile are similar: ICEVs effective emissions rate target in MY2026 would be 185 g/mile, 201 g/mile, 211 g/mile, or 255 g/mile if ZEV penetration follows the EPA, BNEF, RhG–C, or RhG–I scenario, respectively.

Conversely, assuming ZEVs are credited at 0 g/mile and the ICEV fleet has an average emissions rate of 185 g/mile, the performance implied in this case by the proposed standards and EPA's ZEV market share projection of 7.8% in MY2026, appropriate standards would result in fleetwide emissions targets of 158 g/mile, 150 g/mile, or 124 g/mile if ZEV penetration follows the BNEF, RhG–C, or RhG–I scenario, respectively.

The upshot of this analysis is that under more reasonable ZEV market penetration projections the appropriate standards would result in fleetwide emissions rates well below those projected for the proposal or either alternative considered by EPA. Conversely, if EPA finalizes standards at the proposed levels (or either alternative) ICEVs would most likely not have to reduce their emissions rates after MY2023. Indeed, if ZEV market shares follow a trajectory based on enhanced incentives and charging infrastructure investment, ICEVs would be allowed to increase their emissions rates above the MY2020 standard. [EPA-HQ-OAR-2021-0208-0207-A1, p.3]

Recommendations

In order to have a rational basis for setting emissions standards that allow averaging across ICEVs and ZEVs EPA needs to update its battery cost assumptions and likely additional assumptions related to ZEV adoption rates. For example, consumer preferences evolve as ZEVs become more prevalent and ZEV adoption has been shown to be influenced the prevalence of charging infrastructure as well as the availability of consumer rebates. 6

With updated ZEV assumptions EPA should set emissions standards that reflect the ICEV emissions reduction technology penetration rates used in the proposal as well as updated ZEV penetration rates more consistent with independent projections, such as the BNEF and RhG projections presented here. Such standards would likely be in the range of 119 g/mile to 158 g/mile in MY2026, significantly more stringent than either the proposal or Alternative 2. ZEV penetration rate scenarios consistent with enhanced purchase incentives and charging infrastructure investments would yield fleet-wide targets at the lower end of this range. (To the extent that EPA concludes that this update requires a reproposal we recommend finalizing the Alternative 2 MY2023 standards considered in the current proposal to provide adequate lead time, and reproposing standards for MY2024-MY2026.)

Due to the dynamic nature of ZEV technology and the ZEV market, future ZEV market penetration rates are far more uncertain than the cost and performance of available ICEV emissions reduction technologies, which EPA notes have not required significant updates since EPA's 2012 rulemaking. For example, 2026 ZEV market share in the three scenarios presented here range from 15% to 33%, and additional scenarios published by RhG that assume more robust policy support range up to 40%.7

Because the actual ZEV penetration rate can have such a dramatic impact on the implied emissions target for ICEVs and the achievable fleet-wide emissions rate, particularly given EPA's approach of not counting upstream emissions in electricity generation, EPA should set additional standards that apply to the ICEV fleet independent of future ZEV adoption. This is necessary to ensure that the final set of standards achieve all reasonably available emissions reductions and consumer fuel cost savings given that even in the most optimistic scenario 60% of passenger vehicles sold in MY2026 will be ICEVs.

The standards set for ICEVs should reflect available emissions reduction technologies, but could be somewhat less stringent than what would be reflective of the ICEV technology penetration rates projected for compliance with the proposal. For example, EPA could set the ICEV standards to reflect the ICEV technology penetration rates projected for Alternative 1. This would provide flexibility for OEMs while ensuring that the emissions rates of ICEV vehicles decline year-over-year. [EPA-HQ-OAR-2021-0208-0207-A1, p. 4]

5 Calculated as (171 – (-20)*(ZEV%))/(1-ZEV%)

Commenter: Wyman, Stephen

It is clear that without specific, defined and regulated direction, from the EPA, vehicle manufacturers are more inclined to respond to pressure from powerful voices in industries that want to maximize profit margins, from oil and gas products, for as long as is possible... Consequences be damned. The EPA must delineate a specific direction or significant progress in reducing GHG emissions from vehicles may not soon be forthcoming.

I implore the EPA to create a rigorous regulatory regimen, devoid of loopholes, to expedite reduced GHG emissions from vehicles. [EPA-HQ-OAR-2021-0208-0307, p. 1]

Commenter: Zero Emission Transportation Association (ZETA) and EVHybridNoire (EVHN)

ZETA and EVHN fully support ambitious standards to cut GHG emissions and expand stringency beyond the most ambitious option presented in the proposed rulemaking (Alternative 2) with the elimination of extended credits. ZETA's members and EVHN's partners are already demonstrating that EV innovation and job creation go hand-in-hand. We urge the EPA to accelerate this transition and expedite the economic and environmental benefits of light-duty vehicle electrification with stringent standards without exception.

It has been made abundantly clear that without the electrification of the transportation sector, there is no way the United States will meet its climate targets.1 To that end, the proposal does not recognize the rate at which electrification of the transport sector is accelerating, and it fails to put the country on track to achieve the President's stated objective of ensuring 50% EV and plug-in hybrid electric vehicle (PHEV) sales by 2030 without additional incentives from Congress, which is still less than half of ZETA's EV sales target for 2030.

The baseline proposed standards to achieve 171 g/mi in 2026 fall short of the necessary GHG targets to meet the EPA proposed reduction targets set in 2012. According to internal modeling from ZETA's members, the EPA proposal falls short of the 2012 CAFE standards when compliance flexibilities are extended by 6.2 g/mi in 2026. Extending credit multipliers, advanced technology vehicles (ATV) credits, hybrid pickup truck credits, and the off-cycle cap increase result in GHG reductions that are higher than the SAFE rule through 2022, and fall short of the proposed reduction by a cumulative 3.3 g/mi.

The proposal also fails to achieve the stringency necessary to meet the electrification goals set by states and experts. An analysis by Rhodium Group found that to achieve 100% zero-emission vehicle (ZEV) sales by 2035, consumer incentives combined with GHG standards of approximately 90 g/mi in 2031 are required, which is 48% higher than the EPA proposal in 2026. That translates to a 12% improvement each year from 2027 to 2031 to achieve the Biden Administration's goal.2

Alternative 2 will also result in greater public health savings by the Agency's own analysis. While the proposal will generate $86 billion in net savings, Alternative 2 will generate $110 billion by 2050. This is a direct result of the standards in Alternative 2 creating a market for an additional 400,000 EVs to be on the road by the end of the rule period in 2026. In terms of economic benefits, Alternative 2 will result in $29 billion less in social harms, and $57 billion less spent on gasoline by American drivers.3

While the standards set forth in Alternative 2 will achieve greater emissions reductions and save taxpayers money than the EPA proposal, it still falls short. While the proposed stringency of the Alternative 2 standards is a step in the right direction, ZETA and EVHN recommend that the Agency implement a rule that is more stringent and will result in greater emission reductions than any of the proposals analyzed. To achieve this outcome, the EPA should take further steps to close loopholes and eliminate many of the flexibilities — including the advanced technology vehicle multiplier which will not incentivize, but rather suppress, the actual deployment of EVs. Taking this action and working with congressional leaders to expand consumer incentives will help move federal EV sales further toward 100% by 2030. [EPA-HQ-OAR-2021-0208-0275-A1, pp. 2-4]

ZETA and EVHN encourage the EPA to ambitiously cut GHG emissions by implementing the proposed rulemaking in Alternative 2 along with eliminating extended credits and loopholes. ZETA's members are already demonstrating that EV innovation and job creation go hand-in-hand. We urge the Biden administration to accelerate this transition and expedite the economic, environmental, and public health benefits of light-duty vehicle electrification. [EPA-HQ-OAR-2021-0208-0275-A1, p. 4]

Commenter: Zewadski-Bricker, Edith

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, p. 230.]

In your wisdom, from the depths of your soul, as the voice of conscience, that little Jiminy Cricket on your shoulder, decide in favor of the strictest emissions standards and the highest of vehicle efficiency that will exceed the Obama/Biden federal standards.

<u>EPA Response</u>

EPA received many comments supporting, opposing, or recommending changes to the proposed or alternative standards. As discussed in greater detail in Preamble III.D, in evaluating the proposal and alternatives, EPA considered differences in costs, cumulative CO2 emissions reductions and combined BEV+PHEV technology penetration projections.

The following responses address similar comments made by multiple commenters.

EPA received many comments in support of the proposed or more stringent standards. Numerous commenters either urged EPA to require greater stringency, or specifically requested EPA to finalize proposed Alternative 2, often with the additional 10 grams/mile of increased stringency for MY 2026 upon which EPA had sought public comment. Several commenters (such as the California Attorney General) argued that feasibility of more stringent Alternative 2 is not an issue in 2026 because increased stringency in the latter years of the program does not raise the same lead time concerns as the early years. However, some comments (including the Alliance For Automotive Innovation, Honda, JLR, Mercedes-Benz USA, Stellantis, Toyota, and UAW) supported the proposed standards, but opposed the more stringent alternatives (predominately due to concerns of increased EV penetration required, and complementary measures commenters feel are necessary – these topics are addressed in separate paragraphs below). EPA acknowledges Stellantis' concerns of increases in stringency (beyond that of the proposal) early in the program and EPA has chosen to retain the stringency level of the proposed standards for MY 2023 and MY 2024. Stellantis claims that more stringent MY 2026 standards would add risk by introducing a single year jump in stringency. EPA explains why more stringent standards for 2026 are feasible and appropriate in Preamble II, III, and VI.

After considering all of the comments and our updated technical analysis, EPA selected final standards that are a combination of the proposed standards for MYs 2023 and 2024, Alternative 2 standards for MY 2025, and Alternative 2 minus 10 g/mi standards for MY 2026 and later vehicles, based on our consideration of emission reductions, technological feasibility, costs, lead time (including manufacturer refresh and redesign opportunity) and other factors. See Preamble Sections II and VI for details on the final standards and their basis, including why we are finalizing the proposed standards for MYs 2023 and 2024 and more stringent standards than the proposed standards for MYs 2025 and 2026. A more detailed comparison of the per-vehicle costs (4.1.3), GHG emission reductions (5.1), and technology penetrations (4.1.4) for each alternative can be found in the RIA. For a more detailed discussion of how EPA considered refresh and redesign cycles in our analysis, refer to RIA 4.1.

While supportive of the proposed standards, the Alliance for Automotive Innovation, Mercedes-Benz USA, Stellantis, and Toyota commented that complementary policies are needed to encourage broader EV adoption to achieve the necessary levels of EV penetration. Many of the comments we received concerning the need for complementary policies, either in the context of complying with this rule or to facilitate a longer-term outlook beyond the time frame of the rule, are addressed in Section 12.1 of this RTC document. For example, Stellantis provided a list of policies that should be pursued to facilitate automaker ability to comply with the proposed standards. Most of the policy items are outside EPA's purview and instead require Congressional or State and Local action. The one item within EPA's purview is low carbon fuel standards, but EPA did not propose or solicit comment on any fuel standards, and this comment is outside the scope of this rulemaking. For additional response to commenters' suggestions of complementary policies please see RTC Section 12.1.

Many commenters expressed concerns that the proposal's projected BEV penetration rate of 8 percent by MY2026 was too low, while other commenters such as the Alliance for Automotive Innovation, Mercedes, Honda and Toyota expressed concerns over the level of electric vehicle penetration that will be required to meet the proposed standards. At the same time, the Alliance noted a projection for the industry from August 2021 that the industry will achieve new vehicle sales of 23 percent electric vehicles by 2026, which is higher than EPA's projection of 17 percent in that same time frame. Based on our updated analysis, EPA's final standards are projected to result in an increased EV/PHEV penetration rate in MY2026 of 17 percent. We believe this updated rate is appropriate and a reasonable projection which the industry can achieve especially given the public announcements about manufacturers' plans to transition to electrified vehicles.[3] As we also note in Preamble I.B, this rate of penetration is comparable or conservative when compared with recent independent market forecasts.[4,5,6] A recent survey of automobile executives found that they anticipate just over 50% of U.S. automobile sales will be all-electric by 2030.[7] These factors, as well as continuing advancements in EV technology, support our projections on the level of BEV+PHEV penetration during the time period of the rule (see Preamble VI). To the degree that commenters cite consumer acceptance as a potential barrier to EV adoption, in addition to our response to comments on this topic in Section 17 of this Response to Comment document, EPA notes that consumer acceptance of EVs has improved over time as more models have become available and consumers have become more familiar with the technology. For example, Toyota commented that "market research has found consumer attitudes are shifting to a greater openness about alternative powertrains," and "changing

[3] In their comments the Alliance for Automotive Innovation state that "According to recent estimates shared by IHS Markit in August 2021, auto manufacturers are planning sales of battery electric and plug-in hybrid electric vehicles to reach approximately 23 percent of new light vehicle sales in the U.S. market in 2026."

[4] Bloomberg New Energy Finance (BNEF), BNEF EV Outlook 2021, Figure 5. Accessed on November 1, 2021 at https://about.bnef.com/electric-vehicle-outlook/ (Figure 5 indicates U.S. BEV+PHEV penetrations of approximately 7% in 2023, 9% in 2024,11% in 2025 and 15% in 2026).

[5] IHS Markit, "US EPA Proposed Greenhouse Gas Emissions Standards for Model Years 2023-2026; What to Expect," August 9, 2021. Accessed on October 28, 2021 at https://ihsmarkit.com/research-analysis/us-epa-proposed-greenhouse-gas-emissions-standards-MY2023-26.html (Table indicates 12.2% in 2023, 16% in 2024, 20.1% in 2025 and 24.3% in 2026).

[6] Rhodium Group, "Pathways to Build Back Better: Investing in Transportation Decarbonization," May 13, 2021. Accessed on November 1, 2021 at https://rhg.com/research/build-back-better-transportation/ (Figure 3 indicates EV penetration of 11% to 19% in 2026 under a current policy scenario).

[7] KPMG 22nd Annual Global Automotive Executive Survey 2021. Accessed on the internet on 12/08/2021 at: https://assets.kpmg/content/dam/kpmg/xx/pdf/2021/11/global-automotive-executive-summary-2021.pdf

attitudes appear to stem from increasing consumer exposure to electrified powertrains via the growing availability of vehicle models, styles and types, and the media attention created through manufacturer and government announcements." Similar comments can be found in Section 17. For example, Consumer Reports cites evidence of growing consumer interest in electric vehicles, indicated by 71 percent of U.S. drivers saying they would consider buying one in the future, and almost a third considering it for their next purchase.[8] A recent survey of U.S. adults showed that 43 percent would be likely consider purchasing or leasing an EV over the next decade.[9] This suggests that consumer acceptance will continue to improve over time as OEMs continue to introduce this technology, and that OEMs have the ability to promote consumer acceptance by promoting these products just as they promote their other products. We also note that EPA's standards do not require manufacturers to produce EVs or any other type of technology; rather, our modeling estimates one possible technology pathway to meet the standards. For the final standards, projected technology penetration rates for EVs and PHEVs are presented in Preamble III.B and RIA 4.1.4. However, standards are performance-based, and do not mandate a specific penetration of EVs and PHEVs. As shown in more detail in Chapter 4 of the RIA, together with moderate levels of electrification, the final MY 2026 standards can be met by continued adoption of advanced ICE technologies already existing in the market. Additionally, other flexibilities are in place for those manufacturers that choose to comply without achieving these levels of electrification. In light of these considerations, EPA believes that the MY 2026 standards (as well as the MY 2023-2025 standards) are feasible and provide sufficient lead time for manufacturers.

A variety of commenters urged EPA to eliminate, retain or modify some or all of the proposed manufacturer compliance flexibilities. EPA is finalizing a more limited set of optional manufacturer flexibilities than proposed, as discussed in greater detail in Preamble II. Refer to RTC Chapter 4 for additional responses.

Several commenters were supportive of the additional stringency of Alternative 2 minus 10 g/mi in 2026, to better align with goals they identified such as those in EO 14037 (50% of new vehicle sales electric by 2030) and the Paris Agreement. EPA agrees that Alternative 2 minus 10 g/mi standards in MY 2026 are appropriate, as discussed in Preamble II.A.

Several stakeholders provided comment on alternatives identified in the NPRM (including the effects of multipliers), specific to their impact on EV penetration. For example, EDF commented that "EPA should consider strengthening the standards by 10 g/mi in MY 2026 in a way that incentivizes greater ZEV deployment". Likewise, the ICCT argued that strengthening the 2026 standards would increase required EV penetration. Other commenters were in favor of eliminating the advanced technology multiplier as a means of promoting higher EV penetration. As previously stated above, EPA projects an increase in the penetration of EVs commensurate

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[8] Preston, B., "Consumer Reports Survey Shows Strong Interest in Electric Cars," December 18, 2020. Accessed on December 9, 2021 at https://www.consumerreports.org/hybrids-evs/cr-survey-shows-strong-interest-in-evs-a1481807376/

[9] Morning Consult National Tracking Poll #2103182, March 30 – April 02, 2021. Accessed on December 9 at https://assets.morningconsult.com/wp-uploads/2021/04/14162626/2103182_crosstabs_MC_ENERGY_EVS_Adults_v1_NP-3.pdf

with the more stringent standards in its final rule. Preamble Sections II.B.1.ii.a and b provide a detailed discussion on the advanced technology multipliers.

Finally, some commenters (EDF and UCS) provided their own modeling analysis of the standards as part of their submission. As described in Preamble VI.A, the analyses are consistent with EPA's conclusions that first, the standards can be met for MYs 2023-2024 with a combination of technology adoption following the trajectory of existing regulations for those MYs, and the use of banked credits; and second, that it is appropriate to finalize standards in MY2026 that are more stringent than the proposed standards. For reference, EPA has updated its own analysis of benefits and costs of the final rule and the alternatives it considered (Preamble I.D, VI and VII, and chapters 6 and 10 of the RIA).

The following responses address comments of specific commenters.

The Alliance commented that the NPRM modeling showed changes to vehicles in the MY 2018 through 2021 timeframe, years clearly in the past. EPA has updated the analysis in the final rule to include a MY 2020 base fleet rather than a MY 2017 base fleet, to ensure that the modeling is based on actual fleets as of MY 2020, which is the latest available data; we believe this update addresses this concern. EPA recognizes that its modeling assumes some degree of redesign in MY 2021 and MY 2022, but EPA believes the level of refresh/redesign assumed in these MYs is consistent with industry practice (see RIA Table 4-3). EPA does not believe that it would be realistic to assume that manufacturers would make no progress in MYs 2021 and 2022 beyond meeting the no-action SAFE standards, particularly given the existence of the California Framework Agreements. Further, our modeling shows just 1.7 g/mi improvement in 2-cycle CO_2 in MY 2021 and a 4.2 g/mi improvement in MY 2022 relative to the no-action scenario along with less than one additional gram of CO_2 credit via the averaging and/or banking program in each of those years. As for MY 2022, we believe that although those vehicles are being sold, time exists for auto makers to achieve additional reductions beyond current plans via shifting more sales to credit-generating vehicles (most advantageous for auto makers would be additional existing BEV and PHEV sales) as this strategy is not constrained by refresh and redesign schedules. In any case, EPA recognizes that the modeled emissions improvement for these years may vary somewhat from what individual manufacturers achieved, but, taking into consideration the averaging, banking and trading flexibilities of the program, EPA continues to believe that on balance the modeling is reasonable and the standards are appropriate in light of the cost of compliance and the availability of technology.

In response to the Center for Biological Diversity, Earthjustice, and Sierra Club, and the Michalek and Whitefoot, concerns regarding EPA's benefit-cost analysis (that EPA's cost-benefit analysis did not support the choice of the proposed alternative), we note that EPA follows applicable guidance and best practices when conducting its benefit-cost analyses, including OMB Circular A-4, EPA's Guidelines for Preparing Economic Analyses. For more information on how EPA quantifies the benefits of reducing GHG emissions, see section 14.1 of this Response to Comments document, as well as Section 3.3 of the RIA. .We consider our analysis methodologically rigorous and a best estimate of the projected benefits and costs associated with the final rule. Further, we note that the Clean Air Act does not require EPA to establish standards based on maximized net benefits. The Administrator gives consideration to several factors including emission reductions, technological feasibility, lead time and costs. Michalek and Whitefoot claimed that EPA has decided, by rejecting proposed Alternative 2, that a 10 percent penetration of plug-in electric vehicles is not feasible. EPA in fact does believe that a greater than 10 percent level of EV penetration is feasible, and our final analysis projects a 17 percent plug-in vehicle penetration by MY 2026. We also acknowledge the Center for Biological Diversity's comment describing previous instances where EPA adopted standards with short lead times.

Center for Biological Diversity, et al. and World Resources Institute recommended that EPA adopt anti-backsliding measures (e.g., for ICE vehicles) in case EV penetrations exceed the projected levels: CBD commented: "EPA should adopt mechanisms to maximize GHG reductions across the fleet to guard against the effects of underestimating EV penetrations... an unanticipated growth in EV adoption could lead to fewer GHG reductions than projected by the agency." In response, EPA has set fuel neutral, performance-based standards and considers electrification to be one of many technologies available to manufacturers toward meeting those standards. The final rule continues the performance-based fleet averaging approach that we have used for prior GHG standards. EPA did not consider standards which would apply vehicle or technology specific emissions limits as the commenter suggests. An averaging approach provides the greatest flexibility to meet a given level of overall emissions. If limits are placed on individual vehicles, the standards would need to be set at a lower numeric value to achieve the same emissions reduction benefits as this rule, but potentially at higher cost due to the additional constraints placed on the manufacturers' design decisions. Furthermore, EPA did not propose or solicit comment on setting a separate set of standards unique to ICE vehicles as a backstop in the event that BEV penetrations are higher than projected. The nature of fleet-wide averaging banking and trading is that high BEV penetrations could allow for ICE vehicles overall to do less to reduce GHG emissions. However, provided the standards are met, the projected fleetwide emission reductions will be achieved. EPA may further consider this issue in the future rule for 2027 and later model years.

The Competitive Enterprise institute (CEI) asserted that the range of alternatives considered in the proposal was insufficient, that Alternative 1 with stringency similar to the California Framework was arbitrary, and that less stringent alternatives should have been considered. EPA disagrees that the choice of Alternative 1 was an arbitrary lower bound for the proposal. Consistent with OMB Circular A-4, EPA included in the NRPM alternatives that were more and less stringent than the proposed alternative. EPA concluded that the proposed alternative was preferable to Alternative 1 considering the balance of factors, mainly, the greater emissions reductions. Our conclusion regarding the balancing of factors of any alternative with lower stringency would be even less favorable than Alternative 1, which was already excluded as being less favorable than the preferred alternative.

Elders Climate Action (ECA) asked that EPA set a zero emission standard for new motor vehicles and establish a phase-in schedule for the standard that includes a 30% ZEV sales target for MY 2026 to begin charting a regulatory path that will transition the auto industry toward achieving 100% production and sale of ZEVs in the U.S. by 2030. EPA did not propose or seek comment on a zero emissions standard or a ZEV sales target and has adopted more stringent, performance-based emissions standards for MYs 2023-2026, as described in Preamble II and VI.

GM commented, in response to a solicitation of comment in the NPRM, that the technical record is insufficient to comment on a potential additional stringency increase of 5 to 10 g/mi for the 2026 MY standards. EPA disagrees that there was insufficient information available to comment on the proposed additional stringency. EPA provided numerical upper and lower bounds for the range of stringencies being considered, and clearly defined the basis from which the additional stringency would be measured (Alternative 2). EPA also understands, based on extensive and longstanding engagement with vehicle manufacturers, that manufacturers have in-house modeling capabilities and do not rely on EPA projections for evaluating technology adoption pathways and the impact of standards on their future vehicle fleets and product plans, including developing compliance pathways and costs and associated advanced technology penetration requirements. In fact, other commenters, such as two NGO organizations (UCS and EDF), submitted independent modeling analyses in response to EPA's request for comment on a 5 to 10 grams/mile additional stringency for MY 2026, using publicly available modeling tools. Secondly, modeling information was made available in the docket at proposal. As detailed in the RIA Chapter 4 (and in the proposed RIA), the CCEMS model projects technology pathways, including BEV and PHEV market penetrations, for the final standards as well as alternatives of differing stringencies. To the extent GM believes it could not reasonably extrapolate from the extensive modeling presented for Alternative 2 or use other modeling tools for purposes of commenting, it could have used the CCEMS model. The CCEMS model was available at proposal, and our input and output files and all post-processing analysis files were available in the docket for this rulemaking.

Regarding GM's comment that EPA's analysis should include the impact of BEV and PHEV penetration in the context of the Nationally Determined Contribution and the Paris Agreement, EPA disagrees, as that target (and associated analysis of that target) is outside the scope of this rulemaking.

EPA received comments regarding provisions for intermediate volume manufacturers and small volume manufacturers (SVMs). Jaguar Land Rover North America suggested that EPA consider an alternative compliance option for intermediate volume manufacturers allowing them to comply with less stringent standards since they comprise only a small portion of the US fleet. The Alliance suggested that EPA improve the process for considering and approving SVM petitions. EPA notes that it did not propose or solicit comment on any aspect of or changes to the SVM standards regulations, or on an intermediate volume manufacturer program, so these comments are outside the scope of this rulemaking. EPA will consider the Alliance comments regarding the process of approving SVM applications as part of implementing the existing SVM GHG standards program.

The National Association of Clean Air Agencies (NACAA) and others urged EPA to set standards that would achieve the same level of emission benefits (which is an ambiguous phrase but EPA understands to mean "emission reductions") as the 2012 final rule. As discussed in section VI of the preamble to the final rule, EPA sets emission standards based not only on emission reductions but also technological feasibility, costs, lead time and other factors. That said, the final standards are projected to achieve more GHG emission reductions through 2050 than would occur were the 2012 standards to remain in place (see RIA Figure 5-4).

Many individual commenters expressed concerns that EPA is not doing enough to protect the environment and to reduce GHG emissions. These commenters support finalizing the most stringent set of standards possible, and many of them further support applying these standards as early as possible. EPA believes that the final standards strike the right balance between environmental goals and other goals such as concern for the continued viability of auto makers, auto suppliers, and the US economy. EPA is required to set standards considering not only emission reductions but also technological feasibility, costs, lead time and other factors.

Stellantis also argued that manufacturer underperformance relative to the MY 2019 standards, and manufacturer reliance on credits to achieve compliance, suggests that more time is needed to achieve the levels of electrification needed to meet the proposed standards. EPA does not agree with this comment that more time is needed. Past underperformance relative to standards does not mean the standards were unachievable or inappropriate based on the timeframe for compliance. A manufacturer's noncompliance with standards in one or more model years may be the result of product planning decisions and risks taken by the manufacturers and consideration of that manufacturers CO2 credit bank and the availability of banked CO2 credits which could be purchased from other manufacturers. Manufacturers historically have made use of the full suite of current EPA program flexibilities to achieve compliance, including credit trading. These flexibilities are an important part of the program. Credits may have been earned early in the GHG program, i.e., voluntary overcompliance resulting in early emission reductions and banked credits. Some manufacturers, more than others, have chosen to rely on credit purchases to facilitate compliance. Other manufacturers have chosen to focus on adding technology and earning credits for later use or potential sale. Both paths are available under the GHG program. The commenter also argues that stringency beyond the timeframe of the proposed standards does not significantly impact net CO2 reductions during the MY 2023 to 2026 implementation period. EPA disagrees with this characterization of the impact of CO2 reductions attributed to our standards. EPA MY 2026 standards continue for all model years beyond 2026 until such time as EPA revises the standards in a subsequent rulemaking, so the increased stringency carries forward and results in considerable GHG reductions relative to the less stringent alternatives considered in the proposal, as the fleet turns over. The final standards' increased stringency compared to the proposal results in a 50 percent increase in the amount of CO2 reductions projected to be achieved through 2050. See Preamble Section IV.

Tesla commented about the flexibilities in the proposal and that the flexibilities made the SAFE standards even less stringent in MY 2021 and 2022. EPA responds to such issues and describes the final program's flexibilities in Preamble II.B and VI. Tesla takes issue with EPA's use of a MY 2017 base fleet, to which we have been responsive by updating the final rule analysis to use a MY 2020 base fleet which contains an updated representation of Tesla actual sales (nearly 300,000 Tesla vehicle sales). The commenter also urged EPA to strive for greater stringency than the proposed standards -- this EPA has done by adopting Alternative 2 standards for MY 2025 and Alternative 2 standards with additional 10 grams/miles CO2 stringency for MY 2026 and beyond.

Toyota questioned EPA's projection that roughly 87 percent of the 2026 model year fleet would be comprised of conventional gasoline powertrains. EPA's analysis shows that MY2026 standards can be met without the introduction of new ICE technologies that are not already existing in the market. The commenter was apparently confused regarding EPA's discussion of 'technologies already in place in vehicles within today's new vehicle fleet' and misinterpreted the statement to mean that the vehicles themselves will necessarily be the same. This is incorrect. EPA's analysis shows that gasoline technologies that exist in the fleet today, together with electric vehicle technologies that exist today, can be implemented by manufacturers to meet the standards. Further, the commenters reference an IHS-Markit study (summarized within Figure 1 within their comments) which they did not include as an attachment to their comments or include a citation to publicly available data or a publicly available study, thus EPA was not able to evaluate the veracity of the underlying cost and effectiveness data from the study that was used to create Figure 1 within the Toyota comments.

Mr. Williams expressed concern that the stringency of the proposal is not in line with the goal of 50% electric vehicle sales by 2030 as expressed in Executive Order 14037. Also, several commenters supported the rule; in the final rule, EPA is revising the MY 2025 and MY 2026 standards to be more stringent (as described in Preamble II) in consideration of many factors, including updated analyses, public comments received, and recent developments within the automotive industry. As described in the Preamble I.A.2, EPA plans to initiate a rulemaking to establish multi-pollutant emission standards for MY 2027 and beyond.

2.3. Footprint Curve Shapes and Cutpoints

Commenters Included in this Section

Aluminum Association
Anonymous Public Comment 2
Center for Biological Diversity, et al.
Manly, Hugh
National Automobile Dealers Association (NADA)
Peterson, Doug
Thomas, Gary
Wolf, Barry

Commenter: Aluminum Association

The continued use of footprint-based standards in setting GHG gram/mile emission targets for separate car and light truck vehicle classes is wholly appropriate, as these standards have proven to be a valuable means of incentivizing automakers to focus on fuel efficiency/ emissions improvement across all vehicle classes through greater use of lighter, yet stronger materials. As larger vehicles comprise an ever-growing portion of US light duty vehicle sales, the footprint-based approach provides an incentive for reducing weight in such vehicles, where weight reduction is the most beneficial in terms of GHG emission reduction and fleetwide safety. [EPA-HQ-OAR-2021-0208-0233-A1, p.3]

Commenter: Anonymous Public Comment 2

Regarding the revised emissions standards for vehicles, I am encouraged by the shift towards more accurate real-world testing of emissions. Especially after the scandals of the past decade, these changes are welcome. However, I feel troubled by the emission targets for vehicles themselves.

As a citizen residing in New Hampshire (using a VPN right now though), I am able to observe a variety of different population densities and the resulting demographics' choices regarding vehicles. My family currently owns a 2018 Ford Explorer, a 2007 Ford Mustang, and a 2011 Subaru Outback. We are a pretty average family both in terms of monetary class and housing density - we live in suburbs next to Manchester, NH. Around the neighborhood such types of vehicles are quite average. Furthermore, in more spacious suburban neighborhoods, I have noticed an even higher average size of vehicles. There are many Chevy Traverse's and Ford Explorer's, etc. The issue is that these vehicles are not usually needed for the short journeys they are often utilized for. Due to a more lenient approach regarding civilian SUV's and Pickup Trucks compared to passenger Sedans in these revised regulations, I believe that such wasteful and large un-needed vehicles will become even cheaper compared to more tightly-restrained cars. These cars will cost civilians more to repair and fill versus an alternative sedan or electrified SUV (which would be more attractive options if the price difference was higher between the two classes).

Even in the city of Manchester itself, large SUV's and Pickups are quite high in ratio. In places like rural Plymouth, sensible hatchback owners must share the streets with drivers of large Pickup trucks, which are thought by the public to be almost a necessity when away from cities due to Americans' need to carry extra un-needed space. In every scenario, the ratio of large vehicles ought to be reduced.

Thus, I propose that the emissions targets for the Sedans and SUV's / Pickups should be the same. It may be said that larger vehicles can't achieve as good gas mileage as smaller vehicles. This is true to an extent but it has already been proven by hybrid F-150's, the F-150 Lightning, the Kia Niro, the Cybertruck, the Rivian, and other similar vehicles can, with today's technology, easily incorporate electric power which strongly reduces emissions while maintaining competitive prices. In 2023 and beyond, this point will become even more valid as the price of batteries decreases. In fact, the company BYD in China has already achieved an electric vehicle fleet (including SUV's) that is the same price as ICE counterparts. Furthermore, the cost for electric Sedans will go down as well. Not only will an equal emissions target encourage electric drivetrain adoption, it will encourage people to buy those cheap Sedans instead of moderateprice SUV's, leading to more efficient transport. And electric Sedans tend to have more space than ICE Sedans due to their frunks and floor batteries anyhow.

Also, by comparing the emissions targets between the USA and European nations it seems that even the Sedan targets lag behind. It would be foolish to assume everyone will buy a small electric British car, but perhaps the difference should be split. I propose a maximum of 160 CO2 grams/mile which would take into account the larger American car sizes and give a bit extra.

And finally, I believe that your estimates for an 8% BEV market share in 2026 is not accurate, as disruptive adoption rates curve exponentially in an S shape. As prominent car enthusiast Sandy Munroe has pointed out, the US car makers are far behind Asian competition. So even if American car companies slow down EV adoption due to lax emission standards, Chinese automakers are poised to invade the market and make the switch for us well before 2030 (Not to mention Tesla!). So having a stricter emissions target would encourage the US automakers to avoid the fate of the Japanese auto invasion of the 20'th Century (or at least lessen its impact)

To conclude, because of the un-needed large SUV and Pickup surge, I do not believe it necessary to be lax on the already overpopulated car segment by decreasing the strength of emissions targets for the segment. Furthermore, the small vehicle target itself should be stricter (about 160 CO2 grams/mile), because not only are electric powertrains affordable now, they will continue to get cheaper and be integrated into more vehicles either by the USA or China (and we would prefer to maintain our automaking industry!). If you have taken the time to read my long and somewhat poorly composed comment, I thank you very, very much. Please consider what I have to say as I believe the ramifications of these guidelines may directly benefit American cardriving families like mine, and indirectly benefit our American economy. [EPA-HQ-OAR-2021-0208-0575, p. 1]

Commenter: Center for Biological Diversity, et al.

EPA should consider adopting a mix-shift backstop.

In each of their vehicle standard rulemakings since 2009, and again in this Proposal, EPA and NHTSA have acknowledged that their standards are for individual vehicles and vary based on vehicle-type (i.e., car or truck) and vehicle size (or "footprint"), and that, as a result, the projected level of fuel savings and GHG reductions in the rules are estimates and likely will not actually be met, as the real-world fleet will likely differ from the agencies' projections. Average Fuel Economy Standards Passenger Cars and Light Trucks Model Year 2011, 74 Fed. Reg. 14,196, 14,409-12 (March 30, 2009); Light-Duty Vehicle Greenhouse Gas Emission Standards and Corporate Average Fuel Economy Standards, 75 Fed. Reg. 25,324, 25,363(May 7, 2010) (2010 Rule); 2012 Final Rule, 77 Fed. Reg. 62,624, 63,020-23. Proposal, 86 Fed. Reg. at 43,731 FN.36. For that reason, commenters have urged EPA to set a "backstop," or minimum standard below which actual performance may not fall.

Commenters have repeatedly pointed out that, because the targets in attribute-based standards assume a particular fleet mix between passenger vehicles and light trucks during the years of the rulemaking, changes to that fleet mix will alter the fuel efficiency actually achieved. Further, particular features in the compliance curves and different stringency levels for passenger vehicles and light duty trucks incentivize manufacturers to re-classify their passenger cars as light trucks, shifting the fleet mix to trucks and lowering the overall fleet performance. Manufacturers can also manipulate the standards by adding size to vehicle footprints to qualify for weaker standards. See 2010 Rule, 75 Fed. Reg. 25,362-70, 25,608-610; 2012 Final Rule, 75 Red. Reg. 63,029-23.

EPA and NHTSA have agreed that these concerns are well-founded. E.g., 2010 Rule, 75 Fed. Reg. 25,363. NHTSA agrees that it has the authority to set backstops, complementing the Congressionally-mandated backstop for domestic passenger cars, and EPA agrees it has the same authority to set backstops under section 202(a) of the Clean Air Act. E.g., 2012 Final Rule, 75 Fed. Reg. 25,368. See also Center for Biological Diversity v. NHTSA, 538 F.3d 1172, 1205-06 (9thCir. 2007). While acknowledging that implementing additional backstops is squarely within their discretion, the agencies did not do so because they remained confident their projections would be met and believed the attribute-based standards did not create sufficient grounds for manufacturers to shift their vehicle mix toward the light truck fleet segment. They stressed that "insufficient time" had passed "in which manufacturers have been subject to the attribute-based standards to assess whether or not backstops would in fact help ensure that fuel savings anticipated by the agency . . . are met." 2012 Final Rule, 77 Fed. Reg. 63,022. And they twice committed to revisit the issue in their next rulemaking to assess whether this analysis remained correct. 2010 Rule, 74 Fed. Reg. 25,610; 2012 Final Rule, 77 Fed. Reg. at 63,022.

It is now clear that the fleet mix has dramatically shifted towards higher-emitting light trucks, despite the attribute-based system. Since 2013, the fleet mix has shifted from 50 percent cars to only 33 percent cars in MY2019.186 In part because of that shift, the fleet average real-world results are lower than those the agencies have projected.

Given the agencies' recognition of this issue and their prior commitments to conduct ongoing assessments of the need for a backstop, we urge EPA to explain why it has not considered one for the instant rulemaking, and to provide assurances that it will also consider it for MY 2027 and later standards. [EPA-HQ-OAR-2021-0208-0651-A1, p. 76-77]

Commenter: Manly, Hugh

Cars over 15ft produce 3x the exhaust waste, and 4x the heat than smaller vehicles do. This is why the UK stopped making vehicles, longer than 14ft.8in and now mass produces, the Mini-Morris for local and export use,which, is 30x more energy efficient than a Cadillac. The GAG rules can be easily met by shorter vehicles,but not by larger ones,start there. [EPA-HQ-OAR-2021-0208-0660-A1, p. 1]

Commenter: National Automobile Dealers Association (NADA)

Despite its concerns regarding the substantive basis the proposed new mandates, NADA supports EPA's intent to retain the SAFE rule's footprint-based structure for both passenger cars and trucks, as mandated by the Energy Independence and Security Act (EISA),32 and to retain related passenger car and light truck fleet definitions. Retail and fleet consumers demand vehicles that meet a wide-variety of needs and duty-cycles, ranging from short daily commutes, to the commercial transport of persons and goods, to the weekend trailering of horses and snowmobiles. Consumers need and desire personal transportation choices from diesel pickups with off-road capabilities to two-seater sports cars with small turbo-charged engines. OEMs must be enabled to build more fuel-efficient vehicles across the broadest possible light-duty passenger car and truck spectrum. [EPA-HQ-OAR-2021-0208-0290-A1, p. 9]

Commenter: Peterson, Doug

You can talk from here to tomorrow about all that is being done to improve the efficiency of light duty vehicles, but in the end there is no denying that our best efforts are failing. The footprint model insulates automakers from any obligation to downsize their vehicles or manage the horsepower necessary for them to accelerate quickly, two vehicle attributes that are known by the EPA to increase the amount of CO_2 our jumbo vehicles emit. North American vehicles are, on average, much larger that vehicles in other countries, and more powerful. Our nation's per capita gasoline consumption is excessive. The Corporate Average Fuel Economy program that was refined under the Obama Administration in consultation with the automotive community has only resulted in slow incremental improvements to fuel economy that are entirely inadequate for fulfilling the EPA's legal and moral obligations. The EPA's 2020 Automotive Trends Report includes ample statistical evidence that fuel efficiency is improving slowly, and that these minor incremental gains are being offset by changes in the national fleet mix favoring larger and larger vehicles. This is the inevitable result of the impotent footprint model and the lenient system of compliance credits that form the basis of the EPA's ineffective regulatory framework. Increases in highway speeds and vehicle miles traveled are two other factors that increase gasoline consumption, but the EPA does little to reverse these destructive trends, seeing them as outside its administrative domain. If consumer desire for larger vehicles, faster highway speeds, and greater vehicle miles traveled can offset the slow, meager benefits provided by the EPA's regulatory framework, that framework is patently inadequate and needs to be strengthened. [EPA-HQ-OAR-2021-0208-0692-A1, p. 3]

The Footprint Curves Should Be Altered to Incentivize Modest Downsizing

I support the EPA's decision to restore the footprint curves to their original shapes, as this will increase the stringency of the framework. All my comments are consistent with my firm belief that the framework is far too lenient and needs to be strengthened. I need not elaborate on why the Trump Administration's alteration of the curves increased the leniency of the framework. We all understand the function of the footprint curves.

I am going to go out on a limb and suggest that the footprint curves be altered even further to incentivize modest downsizing of the largest light duty vehicles, particularly full-size pickup trucks and SUVs. This could be accomplished by altering the footprint curves, gradually decreasing the maximum amount of carbon dioxide the largest vehicles are allowed to produce. It could also be accomplished by gradually lowering the threshold footprint size at which a vehicle is no longer allowed to emit a greater amount of carbon dioxide. Either adjustment to the curves, or a combination of the two, would encourage downsizing by making it more difficult for the largest vehicles to meet their standards.

The current framework based on footprints was designed to discourage downsizing, and this has become the framework's fatal flaw. The desire to maintain the perceived safety benefits of large vehicles has more to do with politics than it does with logical arguments about road safety. In a two-car collision between vehicles of different sizes, the larger vehicle provides an added measure of safety to its occupants at the expense of the smaller vehicle's occupants. Research on the relationship between vehicle size and safety is extraordinarily complex, but it currently doesn't much matter what the truth is; the general public sees larger vehicles as being safer, and this is the reason why downsizing has been shunned. Many parents prefer a larger vehicle out of concern for the safety of their children, and this understandable consumer preference generates a powerful political force that disallows regulations that might encourage downsizing. The ongoing inflationary trend toward larger and larger vehicles appears to be closely related to public concerns about safety; individual car buyers, particularly parents, search out ever larger vehicles to keep up with the larger vehicles purchased by others. The automakers benefit from the upsizing trend, and their advertisements are clearly designed to capitalize on parental insecurity regarding the safety of their children.

If the EPA had its priorities in the right place and was insulated from purely political considerations, they would be working to reverse the environmentally destructive trend toward larger and larger vehicles. Other countries drive vehicles that are, on average, considerably smaller than ours, and there is little evidence that their roads are less safe because of their reasonably sized fleets. Larger vehicles inevitably produce greater quantities of carbon dioxide, so the EPA has a valid reason to encourage at least a small amount of downsizing as it strives to advance its core mission. There is some statistical evidence that our roads would be safer if there were less variation between the largest and smallest vehicles. It seems especially disingenuous that the automakers 11 argue against downsizing, feigning concerns about safety. Their advertisements often glorify excessive acceleration capabilities, depicting people operating vehicles with reckless abandon, and their advertised specifications highlight top speeds that far exceed legal limits. The automakers can't have it both ways. They either care about public safety or they don't. A nationwide effort to reduce highway speeds would save lives and substantially reduce emissions, but no such effort is even contemplated because it would be very unpopular. Given that climate change involves dangers of its own that will ultimately threaten public safety, it would seem reasonable to implement new footprint curves that encourage a moderate degree of downsizing, aiming to reduce the size and weight of the largest passenger vehicles. If zero emission vehicles are to be phased in systematically after 2027, a steady, coordinated effort to downsize the national fleet, including ZEVs, would reduce gasoline consumption and electricity consumption. The EPA would be wise to begin that downsizing effort immediately in order to maximize these valuable environmental benefits. [EPA-HQ-OAR-2021-0208-0692-A1, p. 10-11]

Commenter: Thomas, Gary

I've never understood how a pickup truck or SUV is any different from a car when it comes to pollution regulations. Most of the uses are the same as those for a passenger car with the occasional use for towing or hauling large objects. It seems to me that this agency's inability to understand that obvious fact has lead the pickup truck and SUV manufacturers to not adapt their hybrid and electric vehicle knowledge to the much bigger vehicle market that the EPA is currently ignoring. When the American public is buying more SUVS and pickups than conventional cars but have fewer regulations and pollute more, I think it's time to change the thinking and regulations for ALL vehicles to be the same [EPA-HQ-OAR-2021-0208-0349, p. 1]

Commenter: Wolf, Barry

Please, considering people now use large SUVs and pickup trucks as commuter vehicles, do not be lenient with those vehicles' carbon dioxide emissions. Please institute a fleet wide 100 grams CO_2/mile standard beginning with the 2025 model year and getting stricter by 20% every year after that. Please do not provide less strict rules for the most polluting and now most often purchased class of vehicles (big SUVs and pickups). [EPA-HQ-OAR-2021-0208-0339, p. 1]

EPA Response

Several commenters expressed views on the shape and structure of the footprint standards curves. Multiple commenters argued that the usage of most pickup trucks and SUVs is similar to that of passenger vehicles and they should be held to the same standards. The Center for Biological Diversity, et al. commented on the differences in the standard curves between passenger vehicles and light trucks, and the observations of the overall fleet mix shifting more towards light trucks in recent years. They also requested that EPA explain why it has not considered a backstop to prevent further fleet shift to light trucks, and that EPA consider this approach for future standards. Mr. Peterson commented that the footprint curves should be altered to incentivize modest downsizing.

As indicated in Preamble II.A, EPA retains the footprint-based structure for both passenger cars and light-trucks in this final rulemaking. EPA is restoring the upper cutpoint for light trucks (which was changed in the SAFE rule) to 74.0 sq ft, which is the original value from the 2012 rule. In response to Center for Biological Diversity, et al., EPA did not propose or solicit comment on establishing a backstop which CBD argues is needed to prevent additional fleet mix shift to light trucks. EPA believes that a significant restructuring of the footprint curves, such as eliminating the separate curve for light trucks or a "backstop" to prevent fleet shifting, would not be appropriate given that this rule is only revising standards for model years 2023-2026, and model year 2023 can begin as early as January 2, 2022. EPA is also planning to initiate a new rulemaking to establish multi-pollutant emission standards for MY 2027 and beyond, and looks forward to engaging with all stakeholders (including those that commented on these issues) on this issue and others to inform the development of these future standard.

3. Technological Feasibility of the Standards

<u>Commenters Included in this Section</u>

Advanced Engine Systems Institute (AESI)
Alliance For Automotive Innovation
American Council for an Energy-Efficient Economy (ACEEE)
Bay Area Air Quality Management District
Begley, Amanda
BorgWarner Inc.
California Air Resources Board (CARB)
California Attorney General Office, et al.
Chicago Metropolitan Agency for Planning
Climate Group EV100
Dream Corps Green for All et al.
Environmental Law and Policy Center (ELPC)
International Council on Clean Transportation
Manufacturers of Emission Controls Association (MECA)
Motor & Equipment Manufacturers Association (MEMA)
National Association of Clean Air Agencies (NACAA)
National Automobile Dealers Association (NADA)
National Coalition for Advanced Transportation (NCAT)
New York State Department of Environmental Conservation
Northeast States for Coordinated Air Use Management (NESCAUM)
Piper, Edward
Representative Padma Kuppa
South Coast Air Quality Management District
Southern Environmental Law Center (SELC)
Tesla
Trevino, Erandi
U.S. Chamber of Commerce ('the Chamber')
Volkswagen Group of America, Inc. (Volkswagen)

Commenter: Advanced Engine Systems Institute (AESI)

Available Advanced Technologies

There are numerous, robust technologies whose costs have declined and which remain available for deployment such as were highlighted by EPA in the 2020 Trends Report. AESI believes that vehicle manufacturers are well positioned to comply with the Preferred Proposal (38.2 mpg real world average) proposed by 2023-2026 LD GHG standards. 2) The Potential of Advanced Hybridized Powertrains Hybridized powertrains are an obvious technology to be further exploited as they are presently only deployed on roughly 7% of vehicles. Current popular hybrid models reduce CO_2 broadly by an average of about 30% while employing batteries of only 1 to 2 kWh. The latest new generation hybrids continue to show further efficiency improvements as they incorporate the latest IC engine, battery, electric motor and powertrain developments. Specific new generation MY2021 hybrids have shown an ability to reduce CO2 by as much as 70% compared to the previous vehicle generation. As hybrids do not rely upon local grids, their benefits apply equally across all 50 U.S. states making hybridization an ideal technology to ensure the most efficient legacy fleet possible. [EPA-HQ-OAR-2021-0208-0267-A1, p. 2]

Commenter: Alliance For Automotive Innovation

Comments on Potential Future Technology Additions

Aside from the previous discussion of HCR2, which is a prominent issue in EPA's analysis with respect to technological feasibility, Auto Innovators provides the following comment and guidance for current and near-future analysis.

The Agencies should maintain a performance-neutral approach when estimating technology benefits.

Vehicle design parameters are never static. With each new generation of a vehicle, manufacturers seek to improve vehicle utility, performance, and other characteristics based on research of customer expectations and desires, and to add innovative features that improve the customer experience. The Agencies have historically sought to maintain the performance characteristics of vehicles modeled with fuel economy-improving technologies. Auto Innovators encourages the Agencies to maintain a performance-neutral approach to the analysis, to the extent possible. Auto Innovators appreciates that the Agencies continue to consider high-speed acceleration, gradeability, towing, range, traction, and interior room (including headroom) in the analysis when sizing powertrains and evaluating pathways for road-load reductions. All of these parameters should be considered separately, not just in combination. (For example, we do not support an approach where various acceleration times are added together to create a single "performance" statistic. Manufacturers must provide all types of performance, not just one or two to the detriment of others.)

Tire rolling resistance improvements

Auto Innovators discourages the addition of 30% tire rolling resistance reductions ("ROLL30") to the analysis at this time. Performance neutrality for cold weather traction, hot weather performance, wet weather traction, load handing (for addition weight of batteries, for instance), wear and durability, and noise, vibration, and harshness can be challenging to achieve for 20% tire rolling resistance reduction, and the technology pathway to ROLL30 for many vehicles remains unclear.

Aerodynamic improvements

A 20% aerodynamic improvement relative to 2015 baseline vehicles remains challenging to achieve for many body styles, given form drags, and other regulations, like side view mirror requirements. Auto Innovators does not recommend considering additional aerodynamic improvements (such as 25 percent aerodynamic improvements, etc.). Some additional reductions in aerodynamic forces may be possible if side view mirrors were no longer required by NHTSA and Federal Motor Vehicle Safety Standards. [EPA-HQ-OAR-2021-0208-0571-A1, p. 61-62]

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

Stronger standards are achievable

Standards that go above and beyond the proposed standards are achievable, without resorting to any of the counterproductive incentives previously discussed. Fuel efficiency and electrification technology has advanced significantly since the MY 2017-2025 standards were finalized in 2012 and electric vehicles are now a mature technology. EPA itself also makes the claim in the NPRM that automakers are more than prepared to meet the proposed standards; noting that they have continued to invest in new technology and have been doing so since the 2012 Final Rule (2021b, p. 177-178). We believe that due to the availability of banked credits, existing electrification options, and declining costs of electrification stronger standards are achievable. We also believe stronger standards will set the United States up to meet 2030 goals and continue to advance fuel efficiency technology. [EPA-HQ-OAR-2021-0208-0251-A1, pp. 10-11]

Commenter: Bay Area Air Quality Management District

However, a relative improvement is not enough. The technology to meet all standards considered in the NPRM is available now. [EPA-HQ-OAR-2021-0208-0283-A1, p.2]

Commenter: Begley, Amanda

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, p. 246.]

These standards will continue to promote innovation throughout the automotive industry and will ensure that the U.S. remains an industry leader. These standards have already gone through a rigorous technical review process which found that auto manufacturers have the technology to meet the standards.

Commenter: BorgWarner Inc.

In summary, regulatory standards should be technology neutral and performance based to encourage advanced technology development and drive innovation. There are multiple pathways to achieve compliance in the future. All technology pathways with practical 4 applications should be included as potential technology solutions to assist the U.S. in achieving its environmental goals. EPA should allow for a review of increased stringency should technology pathways demonstrate earlier readiness to maximize environmental benefits. With one of the broadest portfolios of propulsion products, BorgWarner understands the interrelation between vehicle electrification and emissions reduction. We have a long history of setting trends with our products to meet the needs of the industry and customers all over the world. Focusing on the rate of improvement that results in rapid adoption of high-volume technology solutions is good for consumers, the industry, government initiatives, and most importantly, the environment. [EPA-HQ-OAR-2021-0208-0260-A1, p. 3-4]

Commenter: California Air Resources Board (CARB)

All the proposed standards – the preferred alternative, the more stringent alternatives, and thus necessarily the less stringent alternative - are technologically feasible. [EPA-HQ-OAR-2021-0208-0643-A6, p.1] The solutions are at hand. The ingenuity of engineers and scientists has improved vehicle emission technology and significantly reduced emissions of greenhouse gases and other pollutants. In many instances these improvements pay for themselves in fuel savings, and in all ways their benefits to public health and welfare far outweigh their costs. Automobile manufacturers are already including in their vehicles the technologies to meet these proposed standards, including in other markets. The proposed standards will ensure they accelerate deployment here. [EPA-HQ-OAR-2021-0208-0643-A6, 2]

All the proposed standards – the preferred alternative, the more stringent alternatives, and necessarily the less stringent alternative - are technologically feasible considering the cost of compliance and the time provided to apply the requisite technology. [EPA-HQ-OAR-2021-0208-0643-A6, p.6]

CARB agrees that manufacturers have developed the technology to meet U.S. EPA’s more stringent alternative, identified in the proposal as Alternative 2, to return to the National Program standards. The technology exists to extend and improve those standards for model year 2026 by an additional 10 grams of carbon dioxide per mile. [EPA-HQ-OAR-2021-0208-0643-A6, p.7]

Manufacturers have Followed a Trajectory of More Stringent Standards.

In response to comments on the SAFE Rules and actions, including from CARB, U.S. EPA has revised its prior analysis of technologies for meeting the GHG emission standards.76 U.S. EPA correctly recognizes in the proposal that over the past decade, auto manufacturers have developed and deployed a variety of technologies to sufficiently reduce greenhouse gas emissions from vehicles to meet the National Program standards adopted in 2012. U.S. EPA improved its analysis for the proposal by recognizing numerous emission-reducing technologies have been incorporated into vehicles at lower costs than previously projected.

These technologies include high-compression ratio engines, cooled exhaust gas recirculation, and fixed-cylinder deactivation.77 In particular, U.S. EPA has allowed advanced high-compression ratio engines to be adopted on all engines with less than 8 cylinders. Unlike the analysis supporting the Final SAFE Rules, there are no 'skip flags' for such engines in the modeling supporting the proposed standards, where the modeling previously inappropriately precluded many 6- and 4-cylinder engines from adopting this technology. Consistent with U.S. EPA’s assessments through the Final Determination, the analysis supporting this proposal reflect the capability of more improvement from advanced high-compression ratio engines beyond what was originally derived from first-generation production engines like the early Mazda SkyActiv Atkinson-cycle engines deployed in model year 2014.

U.S. EPA also recognizes that about half the vehicles in model year 2020 already have direct injection in spark-ignition vehicles and planetary automatic 8-speed transmissions, a third have turbochargers, and a quarter have continuously variable transmissions.78

CARB agrees with U.S. EPA that the costs for meeting the proposed standards have remained in line with previous estimates, and if anything, are less than previously estimated. U.S. EPA's estimated average per-vehicle cost to meet the preferred alternative's standards in model year 2026 of $1,044 is a reasonable estimate and an eminently reasonable cost to achieve the benefits of more stringent standards.79 [EPA-HQ-OAR-2021-0208-0643-A6, p. 29]

As CARB explained in its comments to U.S. EPA on its proposal to restore its waiver for California's GHG emission and ZEV standards, manufacturers are well-positioned to meet those California standards.84 Entering the first model year of the Final SAFE Rules, 2021, manufacturers as an industry will be on a trajectory to comply with California's standards at or below previous cost projections. The same technologies similarly leave automakers well-positioned to meet more stringent federal GHG emission standards. [EPA-HQ-OAR-2021-0208-0643-A6, p.30]

Further, as Gary W. Rogers, Vice President of Advanced Technology at Roush Engineering explains in the accompanying expert report,86 manufacturers are already incorporating at a rapid and increasing rate advanced technologies that reduce emissions, improve performance, and provide additional features that consumers prefer.

These technologies have been developed to meet regulatory and consumer demand across the global market in which auto manufacturers compete. Globally, despite the Final SAFE Rules, emission standards and customer demand for cleaner transportation technology have remained strong. The Roush report illustrates the GHG emission standards in Asia, Europe, and Canada continue to require annual emission reductions more stringent than and on a similar trajectory as the National Program standards.87 Manufacturers have continued to reduce the pollution from their products offered domestically and regularly incorporate advanced technologies from foreign markets in offerings here.

Manufacturers are also able to adjust, within a given model year and within their normal product planning, the emissions performance of the vehicles they offer to meet fleetwide GHG emission standards. Automotive manufacturers routinely offer variations of the same model vehicles with different combinations of powertrain components. This allows them to offer a range of pricing and features. As shown in the Roush report, models from several manufacturers that sell well can meet standards that are more stringent, in many cases by more than 10 percent, with existing and imminent vehicles and components that are already schedule for production.88

Moreover, the expansion of mild hybrid technologies at declining costs enables even greater improvements, to say nothing of the growing sales of these technologies89 and zero-emission vehicles, which are discussed below. And the potential to reduce emissions while offering benefits to consumers of those technologies continue to expand, such as by offering the capability to power external devices.90

A confluence of factors shows that U.S. EPA can expect manufacturers to be well positioned to comply with its proposal. Technologies continue to advance, costs continue to decline, and global regulatory, consumer, and investor demands motivate manufacturers to plan their products to meet stringent GHG emission standards – including the preferred alternative and Alternative 2 standards being considered here. [EPA-HQ-OAR-2021-0208-0643-A6, pp. 30-31]

Commenter: California Attorney General Office, et al.

EPA must give due regard to the facts that the necessary technologies have already been developed and brought to market and that automakers have had to plan for substantially more stringent standards in large portions of the global market as well as in the United States. [EPA-HQ-OAR-2021-0208-0245-A1, p.2]

Second, as the records for the MTE, the SAFE standards, and this proceeding consistently show, none of the standards in EPA's current proposal requires the development of new technologies or raises questions about whether existing technologies can be applied to vehicles. The technologies necessary to meet even the most stringent standards included in this proposal have already been developed and are widely deployed in vehicles on the market today. E.g., 86 Fed. Reg. at 43,728 ('Auto manufacturers are currently implementing an increasing array of advanced gasoline vehicle GHG emission-reducing technologies at a rapid pace throughout their vehicle fleets.'); id. at 43,731 ('The technological achievements already developed and applied to vehicles within the current new vehicle fleet will enable the industry to achieve the proposed standards even without the development of new technologies beyond those already widely available.'). [EPA-HQ-OAR-2021-0208-0245-A1, p.25]

Second, with more stringent regulations covering large segments of the global market in which automakers operate, the industry has continued to expand the application of GHG-reducing technologies in those market segments.126 There is a long history of automakers transferring those applications across market segments, and those transfers (and plans for transfers) have continued even in the face of the SAFE 2 standards.127 Thus, automakers are well-positioned to quickly comply with increases in stringency due to the ability to continue and/or speed up the transfer of technologies deployed in other market segments to the vehicles they offer here. [EPA-HQ-OAR-2021-0208-0245-A1, p.27]

Commenter: Chicago Metropolitan Agency for Planning

The proposed rule also acknowledges and speeds the deployment of the technological advancements that have already been made since the EPA established these emissions standards [EPA-HQ-OAR-2021-0208-0219-A1, p.3]

Commenter: Climate Group EV100

Through the Climate Group's EV100 initiative, members have committed to convert over 5 million vehicles to electric and zero-emission and to deploy charging at over 7,000 locations. However, members routinely describe leading barriers to getting more EVs on the road include the lack of correct vehicle types and uncertain and undeveloped policy landscape among other challenges. [EPA-HQ-OAR-2021-0208-0200-A1, p. 1]

Commenter: Dream Corps Green for All et al.

Strong GHG emission standards for passenger vehicles help lower transportation costs for low-income drivers and advance long standing environmental justice goals. [EPA-HQ-OAR-2021-0208-0285-A1, p.1]

Commenter: Environmental Law and Policy Center (ELPC)

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, p. 291.]

EPA makes clear in the NPRM that the proposed standards will be met with existing technology. Even Alternative 2, while stronger, will not spur innovation and fuel-saving technologies because loopholes will allow auto manufacturers to do more of the same with the climate paying the price.

Commenter: International Council on Clean Transportation

While ICCT supports the proposed rule, the cost of compliance is overstated due to the use of outdated technology data and information. Vehicle efficiency technology has been consistently improving for decades. This technology trend shows no signs of slowing down, as supported by a variety of recent comments and publications. For example:

• The EPA Fuel Economy Trends report1 documents rapid development and deployment of many technologies that are now commonplace in the market.2 [EPA-HQ-OAR-2021-0208-0522-A1, p. 2]

• Section 1.2.1 (pages 1-6 through 1-9) of EPA's draft RIA for its proposed rule summarizes updated technology analyses and data from EPA's TSD for EPA's 2018 MTE Analysis. [EPA-HQ-OAR-2021-0208-0522-A1, p. 3]

Further, two recent reports 78 demonstrate that further technology improvements are coming that can boost ICE efficiency well beyond even HCR2 efficiency levels, and a third shows the declining costs of a 48-volt mild hybrid and BEVs9.

The EPA draft RIA (DRIA) acknowledges that technologies have improved since the publication of the TSD in 2016 for the November 2016 Proposed Determination. For example, the DRIA states:

‘EPA has continued its independent evaluation of advanced engine and transmission technologies and update and improve our assessment of light-duty vehicle GHG emissions over the intervening 4 years since publication of the TSD. The results of these analyses have been published in over a dozen peer-reviewed technical and journal papers.’ (see DRIA 2021 page 2-10) [EPA-HQ-OAR-2021-0208-0522-A1, p. 3]

As documented in the following sections, technology effectiveness and cost have continued to improve. Thus, if technology costs and benefits were updated with the latest information, it would show that the proposed standards and Alternative 2 are even more feasible and lower-cost than EPA’s analysis indicates. [EPA-HQ-OAR-2021-0208-0522-A1, p. 4]

Even if EPA chooses to not incorporate the full extent of new data and information into the final rule for MY2023-2026, EPA should at least acknowledge that the technology assessments in the proposed rule are out of date, explain that this causes the costs of more stringent standards to be overstated, briefly summarize new technology developments, and commit to incorporating the latest data and information into future rulemaking. [EPA-HQ-OAR-2021-0208-0522-A1, p. 4]

2 Specific technologies reported in the 2020 EPA Trends Report are port fuel injection, gasoline direct injection, multivalve, variable valve timing, cylinder deactivation, turbocharging, stop/start, hybridization, and electric vehicles

Commenter: Manufacturers of Emission Controls Association (MECA)

The Proposed Standards are Attainable

MECA stresses that technology-neutral, performance-based regulations continue to be a proven strategy for meeting environmental goals through a diversity of competing, cost-effective technology solutions.

MECA agrees with staff’s conclusion that the original LD GHG standards set in 2012, provide a basis for the proposed 2023-2026 standards. MECA concurs with the agency’s conclusion that the broader deployment of commercially available technologies for combustion engines and electrified powertrains, in addition to those recently announced for market introduction can be used by manufacturers to attain compliance with the proposed standards.

Furthermore, MECA agrees with EPA that the costs of the technologies needed to comply with the proposed standards have remained approximately consistent or have declined since EPA first estimated them in 2012. Overall, MECA members have continued to commercialize engine and powertrain technologies to allow vehicle manufacturers to comply with the agencies Preferred Proposal (ca. 38.2 mpg real world average).[EPA-HQ-OAR-2021-0208-0261-A1, p.2]

Commenter: Motor & Equipment Manufacturers Association (MEMA)

MEMA agrees with the EPA that the improvements proposed through MY2026 are feasible and achievable through deployment of currently available technologies. MEMA supports the proposed standards and the program's performance-based approach. The framework for MYs 2023ï€¬2026 encourages a wide range of electrification technologies while also requiring further technology advances and innovation to ICE technologies thereby encouraging a broader spectrum of advanced technologies. These existing technologies, including advances in the ICE and electrification, are solutions that vehicle suppliers started investing in and developing after the 2012 final rule and will continue to develop and improve.

These innovations in the ICE and the advances made in battery electric vehicles (BEVs), plug-in hybrid electric vehicles (PHEVs), and fuel cell electric vehicles (FCEVs) indicates that EPA's proposed standards can be achieved. Moreover, these targets can be achieved at around the same cost as previous EPA estimates.9 This approach, along with the proposed credit programs, will sustain long-term supplier technological investments.

The EPA's rule and analyses account for the availability of innovative, advanced GHG emission reducing technologies for gasoline-fueled vehicles.10 MEMA agrees that vehicle manufacturers are "implementing an increasing array of advanced gasoline vehicle GHG emission-reducing technologies."11 The EPA explains that the feasibility of the proposed standards does not rely on dramatically increased penetration levels of PHEVs and BEVs in the fleet during MYs 2023–2026, rather only about 8 percent by MY2026.12 EPA also suggests that the majority of vehicles produced in MYs 2023–2026 time frame will be gasoline-fueled vehicles (i.e., ICE vehicles).13 MEMA supports continued innovation and increased efficiency of the ICE. [EPA-HQ-OAR-2021-0208-0249-A1, p. 4-5]

Commenter: National Association of Clean Air Agencies (NACAA)

However, EPA does not reflect the impacts of these commitments in the standards it proposes. Instead, the agency acknowledges in the proposal that the technologies needed to meet the proposed standards are already widely available and in use on vehicles, that very little electrification is necessary and that there is no need for development of new technologies for the timeframe of the proposed standards. Further, EPA states that rather than necessitating new technology, compliance with the proposed standards will necessitate greater implementation and pace of technology penetration through MY 2026 using existing GHG reduction technologies. Instead of this approach, which fails to take advantage of the already-planned availability of ZEVs, EPA should increase deployment of ZEVs and more ambitiously build on technology readiness rather than allow it to serve as the ceiling for the proposed standards. [EPA-HQ-OAR-2021-0208-0255-A1, p.4]

Technological Readiness of the Auto Industry in Meeting Revised GHG Standards

NACAA agrees with EPA's assessment, in Section VI(A)(1) of the proposal, of the technological readiness of automakers to meet revised GHG emission standards beginning in MY 2023 and ramping up through 2026: '…the technologies needed to meet the proposed standards are already widely available and in use on vehicles – there is no need for development of new technologies for the time frame of these proposed standards. Instead, compliance with the proposed standards will necessitate greater implementation and pace of technology penetration through MY2026 using existing GHG reduction technologies. In addition, as we discuss further below, our assessment shows that a large portion of the current fleet (MY2021 vehicles), across a wide range of vehicle segments, already meets their proposed MY2023 footprint-based CO2 targets' (see 86 Fed. Reg. 43,781). Given this level of readiness, EPA should enact more ambitious emission standards, as NACAA recommends above. [EPA-HQ-OAR-2021-0208-0255-A1, p.8]

Commenter: National Automobile Dealers Association (NADA)

EPA Has Not Demonstrated That Its Proposed Standards Are Technologically Feasible, Economically Practical, or Cost Beneficial.

NADA has long supported continuous motor vehicle emission improvements, but in the context of the constraints inherent in a "push" approach to achieving such improvements. Even assuming OEMs and their suppliers will be able to conduct the research, development, design, and manufacturing necessary to produce vehicles that meet specific GHG emissions mandates, it is critical that EPA remind itself that OEM regulatory obligations end when compliant vehicles are delivered to the 16,000 independent franchised businesses licensed to sell or lease them to the motoring public. And importantly, real life GHG emission reductions cannot be achieved (and related policy benefits cannot be realized) unless and until prospective purchasers buy (or lease) and use those new vehicles.

NADA does not have access to product plans and other proprietary OEM information available to EPA. Consequently, NADA does not purport to suggest what levels of GHG reduction are technologically feasible and economically practical for MYs 2023-2026. Rather, NADA generally defers to the OEMs on these issues and recognizes that they will endeavor to conduct the vehicle research, design, and manufacturing that can incorporate technologies necessary to meet appropriate MY 2023-26 standards. However, given that many OEMs have been unable to comply with EPA's GHG standards since at least MY 2016 (but for the application of credits),16 NADA believes serious questions exist regarding their ability to meet the proposed mandates in a cost effective, economically practicable manner that will bring vehicles to market which preserve consumer choice and feature preferences. The fact that a select few OEMs have entered into agreements with the State of California regarding GHG emissions moving forward or have announced aspirational targets to become carbon neutral or to aggressively market zero-emission vehicles, does not make EPA's proposed GHG mandates technologically feasible or economically practical.17 [EPA-HQ-OAR-2021-0208-0290-A1, p. 3]

Commenter: National Coalition for Advanced Transportation (NCAT)

Electric Vehicle Model Availability and Range Improvements

The electric vehicle industry is advancing in terms of the number of manufacturers producing electric vehicles and their commitments to an all-electric future, the diversity of models available, and the range now offered for models.

OEM Electric Vehicle Commitments: Automakers with existing electric vehicles offerings are planning to add new models. A few examples of these investments:

• Ford announced plans to invest $29 billion in electric vehicles through 2025.30

• BMW announced $30 billion in investments for "future-oriented technologies."31

• GM announced it would spend $20 billion on its next generation of all-electric and autonomous vehicles through 2025.32 And in 2021, GM increased this commitment to $35 billion.33 GM plans to be carbon neutral in its global products and operations by 2040, with a goal to eliminate tailpipe emissions from new light-duty vehicles by 2035.34

• Volvo has announced plans to be fully electric by 2030.35

• Honda set a goal to be fully electric by 2040.36

Several major automakers have recently announced commitments to releasing their first electric vehicle models. Land Rover plans to launch its first electric vehicle in 2024 and add five more models by 2026.37 Its parent company Jaguar set a 2025 target for going all-electric.38 Mazda's first electric vehicle will be released in California this fall,39 and by 2030, it plans to offer at least hybrid options for all of its models.40 And Subaru announced an electric vehicle to be released in 2022.41

Atlas Public Policy estimates that U.S. automakers and manufacturers have committed approximately $100 billion to electric vehicle programs, much of which supports U.S. factories and jobs.42 Globally, that number is $230 billion.43

Vastly Expanded Model Availability: This boom in the electric vehicle market has led to increases in consumer choice, including in larger model classes. For example, NCAT member Tesla introduced the Model Y compact SUV in 2020. The Model Y has already become one of the top selling vehicles in the U.S. In the first half of 2021, the Model Y was the 2nd best-selling SUV in California. 44 NCAT member Rivian recently produced the first electric pickup truck, the R1T, for customer delivery.45 Rivian also expects to begin deliveries of a full-size SUV, the R1S, and delivery vans by the end of 2021. Ford has received over 100,000 pre-orders for its electric F-150 pickup model.46 Other companies have also planned to release light-duty electric trucks: Tesla's Cybertruck, GMC's Hummer, and Chevrolet's Silverado.47

Significant Range Increases: Across manufacturers, battery technologies and vehicle design have improved the range of electric vehicles. Consumer Reports called range increases "[o]ne of the most significant changes" in the electric vehicle market.48 A 2018 Center for American Progress report noted that of the 14 MY 2018 battery electric vehicle models, just four listed a range of more than 200 miles.49 The contrast between 2018 and 2021 is stark: of the 41 MY 2021 battery electric vehicle models, 33 list a range of more than 200 miles, and 10 list a range of more than 300 miles.50 Vehicles currently on the road have batteries with "high levels of sustained health"—although all batteries deteriorate, "the loss is arguably minor" year-over-year. 51 This trend will only improve. As range increases, the relative amount of charging that can be done at home increases. For battery electric vehicles with 300 mile range, the Argonne National Laboratory estimates that 94% of charging can be done at home.52 [EPA-HQ-OAR-2021-0208-0239-A1, p. 7-10]

Commenter: New York State Department of Environmental Conservation

In California's Advanced Clean Cars Midterm Review, GARB noted that various truck, SUV, and passenger car configurations available in 2016 were able to meet 2020 or later greenhouse gas standards with a conventional gasoline powertrain. Based on the multi-year design and engineering process for automotive vehicles, manufacturers have already designed their vehicles to meet the greenhouse gas standards established in 2012 and should not have any issues meeting the proposed revised standards, which are generally less stringent than the 2012 standards until model year 2026. In August 2020, five auto manufacturers, collectively representing one-third of the U.S. light duty vehicle market, voluntarily signed on to the California Framework Agreement. Under the agreement, the five auto manufacturers committed to supporting annual reductions of vehicle greenhouse gas emissions through the 2026 model year at rates similar to those previously established in 2012, indicating that at minimum the standards set by the California Framework Agreement, slightly less stringent than the proposed, are feasible. New York agrees that the proposed standards are feasible. Further, many manufacturers have made recent announcements of their intentions to produce ZEVs exclusively, or at least most of their product offerings, by 2035. [EPA-HQ-OAR-2021-0208-0238-A1, p.2]

The proposed revised standards are not only technologically feasible but would achieve greater emissions reductions, public health benefits, and fuel savings to consumers over the life of the vehicles than would be achieved under the standards promulgated in the misguided SAFE rule in 2020. [EPA-HQ-OAR-2021-0208-0238-A1, pp.3-4]

Commenter: Northeast States for Coordinated Air Use Management (NESCAUM)

NESCAUM's agrees with EPA's finding that the proposed GHG standards are readily achievable with technologies that are currently in use. [EPA-HQ-OAR-2021-0208-0259-A1, p. 3]

The 2019 Framework Agreements offer additional support that the technologies needed to meet the proposed GHG standards are readily available. Under those agreements, several manufacturers voluntarily agreed to comply with California's GHG emission reduction targets through model year 2026 across their national vehicle fleets, notwithstanding the unjustified weakening of federal standards in the SAFE Vehicles Rule. [EPA-HQ-OAR-2021-0208-0259-A1, p. 3]

EPA's proposal highlights recent commitments by many automakers to aggressively pursue zero-emission technologies. However, the impact of these commitments is not apparent in the proposed standards. Instead, EPA's proposed standards can be met with very little electrification. EPA's proposed rule also acknowledges that the technologies needed to meet the proposed standards are already widely available and currently in use and that there is no need to develop new technologies to meet the proposed standards. Rather than forcing new technologies, EPA acknowledges that compliance with the proposed standards will only require greater implementation and pace of technology penetration through MY 2026 using existing GHG reduction technologies. In NESCAUM's opinion, industry's technological readiness should serve as the floor, and not the ceiling, for the proposed standards. [EPA-HQ-OAR-2021-0208-0259-A1, p. 3]

Commenter: Piper, Edward

I recommend not adopting this proposal.

Besides performance, fuel economy, and pollution control; other desirable vehicle characteristics are durability, serviceabilty, and repairability. High fuel economy standards and pollution controls lead to more complex or specialized propulsion systems. How long with these systems go between repairs? What will the replacement parts cost? How easy will it be to make repairs? What specialized equipment and training will be necessary to make these repairs? Can repairs be made by third party repair shops or by customers, or only by dealers? If repairs are available outside of dealers, will those making these repairs have to sign intellectual property agreements to get the information necessary to make these repairs (undesirable)? Will third party suppliers be allowed to manufacture replacement parts? The repair and replacement costs (frequency of repair, repair time, parts costs, labor costs, vehicle life, and replacement costs) need to be included in the cost of the proposed change. [EPA-HQ-OAR-2021-0208-0520, p. 1]

I recommend weaking CAFE and pollution requirements (although not prohibiting better fuel economy and pollution control) and accepting the climate consequences of the use of hydrocarbon fuels in vehicles and adapt to these consequences. I also recommend we maintain our existing hydroelectric energy sources (essentially solar energy with the battery built in) and research the production of hydrocarbon fuels through carbon capture. [EPA-HQ-OAR-2021-0208-0520, p. 1]

Commenter: Representative Padma Kuppa

[The following comments were submitted as testimony at the virtual public hearing on August 26, 2021. See Hearing Testimony – 26Aug2021, p. 145.]

Here in Michigan, we've invested in innovation throughout the automotive industry and work hard to ensure that the U.S. remains an auto industry leader. These standards have already gone through a rigorous technical review process which found that auto manufacturers have the technology to meet the standards.

Commenter: South Coast Air Quality Management District

EPA can readily find that the technological capabilities for meeting these standards, including by use of zero emissions technologies, far exceed what EPA anticipated in 2012 (or even what EPA ignored in 2017 as it began its illegal rollback); thus, the technological feasibility of the proposal is emphatically clear, and the proposed stringency is fully supportable. [EPA-HQ-OAR-2021-0208-0215-A1, pp.2-3]

Commenter: Southern Environmental Law Center (SELC)

While the proposed rule mentions that 'EPA is afforded considerable discretion under section 202(a) [of the Clean Air Act] when assessing issues of technical feasibility and availability of lead time to implement new technology,' [24] EPA further notes that no new technology is needed in this case; existing technology utilized in today’s fleet could be used to meet the proposed standards.[25] Moreover, EPA states that Alternative 2 may be feasible '[c]onsistent with . . . discussions regarding feasibility, compliance costs, and lead time' for the proposed standards.[26] These factors provide support for the adoption of Alternative 2, which utilizes the 2012 Rule stringency levels starting in model year 2023, as well as the adoption of the stronger standards proposed for model year 2026. [EPA-HQ-OAR-2021-0208-0244-A1, p. 4]

[24] Revised 2023 and Later Model Year Light-Duty Vehicle Greenhouse Gas Emissions Standards, 86 Fed. Reg. at 43752. Under section 202(a) of the federal Clean Air Act, the standards 'shall be applicable to such vehicles . . .for their useful life' and take effect 'after such period as the Administrator finds necessary to permit the development and application of the requisite technology, giving appropriate consideration to the cost of compliance within such period.' 42 U.S.C. § 7521(a). These determinations “are subject to the restraints of reasonableness.” NRDC v. EPA, 655 F.2d 218, 322 (D.C. Cir. 1981).

Commenter: Tesla

Electric Vehicle Technology Is Efficient, Reduces Oil Dependence, Saves Consumers Money, and Facilitates the Safest Vehicles on the Road.

In its proposal, EPA also indicates several additional elements the agency looks at when assessing the technical feasibility of the proposed standards, including the impacts on emissions reductions (GHG and non-GHG), oil conservation and energy security, consumer fuel savings, broader auto industry impacts, other energy impacts, and safety. In all these categories EVs reign as the superior technology.

First, as described above, EVs are recognized as the best tailpipe emissions reduction technology not only for mitigating GHGs, but also for reducing the criteria air pollutants that cause over ten million excess deaths annually.156 Numerous studies continue to show EVs can play a leading role in reducing U.S. air pollution, represent an opportunity to achieve large public health benefits in the U.S. in the short term, and have been estimated as providing public health-related benefits on average of over $10,000 per 150,000 miles driven.157 Replacing just 25% of the ICE vehicles on the road with EVs would save approximately $17 billion annually by avoiding damages from climate change and air pollution.158

Second, EV technology can support setting standards that result in positive impacts on U.S. oil conservation and energy security. Numerous assessments conclude that increasing deployment of EVs will hasten the onset of peak fossil fuel demand and lead to falling oil demand.159 Recently, the DOE has found that EVs displaced 500M gallons of gasoline in 2020, and over 1.9B gallons cumulatively since 2011.160 This displacement will only continue to grow. As the International Energy Agency recently noted, 'In addition to being two- to four-times more efficient than conventional internal combustion engine models, EVs can reduce reliance on oil-based fuels and, if running on low-carbon power, can deliver significant reductions in greenhouse gas emissions. Plus, with zero tailpipe emissions, EVs are well suited to help solve air pollution issues.'161

Third, stringent standards that result in accelerated deployment of EVs will save consumers substantial money from fuel savings.162 Indeed, DOE has found that EVs have the lowest annual fuel costs for MY 2021 of all available vehicles technologies.163

Fourth, the basic characteristics of EV design, including small or no motors in front, large crush space for energy absorption, lack of combustible fuel, and low centered batteries that result in extremely low center of gravity and nearly perfect weight distribution, mean EVs are the safest vehicles in the world. Tesla produces the safest vehicles on the road and has proven that manufacturing highly efficient, fully electric vehicles enhances, rather than sacrifices, safety. Recently, Tesla Model X, 3 and Y have all received five-star ratings in all categories as rated by NHTSA's New Car Assessment Program (NCAP).164 Moreover, via numerous Over the Air (OTA) software updates Tesla has and will continue to improve the safety of Tesla vehicles already on the road.

In short, EV technology meets and exceeds any and all criteria by which EPA should analyze vehicle technology and set standards stringency. EVs improve emissions reductions, are readily available, save consumers money over the lifetime of vehicle operations, provide superior vehicle safety, and manufacturers have been on notice on the need to deliver the technology for well over a decade. EPA must factor EVs into its standards in its final rule, and there should be no impediments to it doing so. [EPA-HQ-OAR-2021-0208-0278-A1][pp.18-19]

Commenter: Trevino, Erandi

[The following comments were submitted as testimony at the virtual public hearing on August 26, 2021. See Hearing Testimony – 26Aug2021, p. 194.]

The other thing that I wanted to say is that one of the reasons why this is so important is because again it's one easy solution that we have the technology for. It's already out there. It's something. It's sort of just low-hanging fruit at this point because carbon emissions from vehicles, we accept such a large portion of our air pollution, it's one of the most important things that we can tackle at the present moment.

Commenter: U.S. Chamber of Commerce ('the Chamber')

The President's Executive Order, 'Strengthening American Leadership in Clean Cars and Trucks,'1 not only set an ambitious goal that 50 percent of light duty sales be zero-emissions vehicles, but it also recognized the need to resolve other important variables needed to achieve this goal. The Executive Order references the need for expanding key charging infrastructure and spurring innovation. These efforts are all needed and more.

In the Chamber's view, effective development and implementation of light-duty vehicle standards requires a comprehensive approach that considers factors well beyond the standards themselves. Facilitating programs and policies are necessary in order to advance a cleaner, stronger transportation system—not just the roads and bridges that are the foundation of America's infrastructure, but the vehicles and enabling systems that are necessary to modernize transportation in America.

With respect to greenhouse gas emissions, the transportation sector is of growing interest and importance. While immense technological progress has been made—passenger vehicle fuel economy has improved almost every year since 2005—challenges remain, as the transportation sector now represents the largest source of greenhouse gas emissions since surpassing the power sector in 2016, according to the Energy Information Administration.

Tackling this challenge will not be easy. The tremendous success that the industry has had incorporating catalytic and other post-combustion emissions treatment technologies onto the existing internal combustion engine platform led to 98-99% reductions in tailpipe emissions compared to the 1960s. However, doing the same for greenhouse gas emissions from light-duty vehicles is complex due to the platform changes, but also the ancillary infrastructure, supply chains, and consumer preferences that must be navigated. In addition, fleet turnover is generally slow, and balancing unpredictable technological and market factors is difficult. Because of this, regulatory certainty is paramount, particularly in the light-duty passenger vehicle sector.

The Chamber's Global Energy Institute examined these challenges facing the light-duty passenger vehicle sector in a 2019 report, Divided Highway, the findings of which remain just as relevant today.2 The report highlights the importance of a workable path forward on vehicle fuel economy and greenhouse gas standards that provide regulatory certainty, continued progress on mileage and emissions reductions, and preserving the unified national program for vehicle sales.

At the time of this comment filing, Congress is considering bipartisan infrastructure legislation that would provide an important foundation for enabling achievement of these goals. Passage of the bill is important to overcoming challenges associated with adoption of higher efficiency vehicles. For example, while more than 40 models of zero emissions vehicles (ZEVs) are currently available in the U.S., sales represent less than two percent of the light-duty market, illustrating the necessity in understanding technological, market, and policy factors that could improve adoption.

The Chamber believes that our clean energy future is dependent on a vibrant, healthy auto sector that can plan for and invest in the technologies necessary to accelerate progress on emissions reductions and continue building safe and affordable vehicles for American consumers.

As manufacturers continue to address ongoing challenges related to supply chain disruptions and pandemic-driven market uncertainties, the need to advance a harmonized, flexible, and achievable rulemaking that preserves a unified national auto market is more important than ever. As the EPA considers finalization of this proposal and development of associated follow-on rulemakings, the Chamber urges careful consideration of the broad spectrum of factors likely to influence progress toward the aforementioned goals. Ultimately, this broader perspective is critical to settling on a balanced approach that considers market and technological realities, provides regulatory certainty for auto manufacturers and the supply chain, and accelerates both emissions reductions and vehicle electrification. [EPA-HQ-OAR-2021-0208-0524-A1, pp. 1-3]

Advance government research and development to support and accelerate vehicle technology innovation

Finally, over the longer term it is imperative that the federal government fully fund the Energy Act of 2020 and conduct the research and development needed to drive innovation in battery and vehicle technology. The development of processes that would reduce demand for strategic materials through efficiency improvements, recycling, or identification of substitutes holds great promise to contribute to supply chain security. Moreover, the development of new and improved vehicle technologies -- such as increased efficiency, improved component materials, and electric vehicle or hydrogen fuel cell powered drive trains -- is essential to long-term emissions reduction from light duty vehicles.

EPA should work closely with the Department of Energy in these research and development efforts. Specifically, section 7001 of the FY2021 Omnibus Appropriations Act (which included the Energy Act) authorizes $23 million for DOE research on recovery of rare earth elements and critical materials from coal and coal byproducts, while section 7002 calls for $125 million for research on critical materials recycling, innovation, efficiency, and alternatives, including establishment of an innovation hub to coordinate and integrate crosscutting activities. Additionally, the Better Energy Storage Technology (BEST) Act—included in the same legislation— authorizes $50 million for the Department's Advanced Manufacturing Office and Vehicle Technologies Office to address critical supply chain matters, including enhancement of recycling and reuse capabilities.

In addition, the bipartisan Infrastructure Investment and Jobs Act (IIJA) currently under consideration would provide more than $7 billion to address vehicle- and battery-related supply chain vulnerabilities. This includes $3 billion for battery manufacturing and recycling grants, $3 billion for battery material processing grants, $125 million for battery recycling R&D, and $10 million for the lithium-ion battery recycling prize. Passage of this bipartisan legislation is a top priority for the Chamber, and would provide a foundation upon which to ease supply chain security vulnerabilities that threaten implementation of ambitious vehicle electrification goals. [EPA-HQ-OAR-2021-0208-0524-A1, pp. 6-7]

It is clear that there are many challenges to developing and implementing ambitious climate policy, such as the EPA GHG and NHTSA CAFE standards, that extend beyond the automotive sector's simply designing more efficient light duty cars and trucks. Across the government, coordination is needed in many areas, such as securing the supply chains for strategic minerals and streamlining permitting processes for needed infrastructure and mining to support any ambitious standards.

Not only is coordination needed in areas such as federal permitting and supply chain security, but coordination between government agencies and states is essential to help support the planning and long-term investment needed to implement sound regulatory policy. Without sufficient collaboration among relevant federal agencies and stakeholders, discordant regulatory action will inject more uncertainty into markets and disrupt efforts to plan, invest, and deliver continued fuel economy and emissions gains. [EPA-HQ-OAR-2021-0208-0524-A1, pp. 7-8]

Commenter: Volkswagen Group of America, Inc. (Volkswagen)

Volkswagen projects that with the increased consumer adoption of EVs and with the successful execution of our US electrification strategy, the standards proposed by EPA through 2026 will be achievable. The enhanced flexibilities proposed by EPA to incentivize and support electrification will be critical to the success of this regulation and to the overall market transition to electrification in the United States. We appreciate that the proposal reflects many of the same elements incorporated within the Settlement Agreement between California Air Resources Board and Volkswagen Group of America, Inc.1 ('Framework Agreement'). We feel that this proposal, similar to the agreement with California, strikes a balance between meaningful CO2 reductions and pragmatic incentives that will help support our shared long-term vision for vehicle electrification [EPA-HQ-OAR-2021-0208-0237-A1,pp.1-2]

EPA Response

We received many supportive comments that the proposed standards are technically feasible (AESI, ACEEE, Bay Area Air Quality Management District, Begley, Amanda, California Attorney General Office, et al, Chicago Metropolitan Agency for Planning, MECA, MEMA, NCAT, New York State Department of Environmental Conservation, Representative Padma Kuppa, South Coast Air Quality Management District, Tesla, Erandi Trevino, Volkswagen).

We received one comment regarding vehicle types and uncertainty within the policy landscape (Climate Group EV100). We anticipate that the final standards will provide such regulatory certainty.

In response to the comments regarding aerodynamic improvements (Alliance), EPA continues to believe that manufacturers have a wide variety of technologies that are available and that have been increasingly added to additional vehicle models to reduce drag losses, as appropriate to the functional characteristics of the vehicle. We do not expect that cargo vans, large SUVs or light-duty pickup trucks will necessarily achieve the same aerodynamic performance as passenger cars, but within a given segment, there remain opportunities to achieve reductions in aerodynamic drag compared to less aerodynamically-optimized model generations that exist within the same segment. EPA did not include aerodynamic improvements beyond AERO20within the analyses for the proposed rule or this final rule , which is consistent with the

Agency's approach in previous analyses and the recommendations from 2015 and 2021 NAS reports.[10,11,12,13,14]

In response to the Alliance's comments on tire rolling resistance improvements, EPA did not include tire rolling resistance improvements beyond ROLL20 within the analysis for the proposed rule or this final rule, which is consistent with previous EPA analyses and 2015 NAS 2015 recommendations.[11,12,13] The 2021 NAS report describes the potential for introduction of ROLL30 technologies after 2025, and EPA will continue to monitor the development of tire technologies and update its analyses of tire rolling resistance in future rulemakings as new technologies become available.[14] Table 3-1 provides a summary of the technology penetrations of specific levels of aerodynamic improvements and tire rolling resistance improvements for MY2026 that are outputs of compliance modeling with CCEMS for the final rule. For more information regarding CCEMS, see Chapter 4 of the RIA.

Table 3-1: Model Year 2026 Aerodynamic (AERO) and tire rolling resistance (ROLL) technology penetration combined-fleet percentage results from the CCEMS analysis for this final rule.

Technology in CCEMS Analysis	MY2026 No-action Case	MY2026 Action Case (Final Standards)
AERO0	13%	5%
AERO5	16%	2%
AERO10	15%	6%
AERO15	42%	53%
AERO20	14%	34%
ROLL0	0%	0%
ROLL10	3%	3%
ROLL20	97%	97%
Notes: AERO*x* refers to to a percentage reduction in the coefficient of drag (C_d) relative to a baseline C_d by vehicle class for MY2015 (e.g., AERO20 represents a 20% reduction in C_d by specific vehicle class).[15,16] ROLL*x* refers to a percentage reduction in the coefficient of rolling resistance (C_{rr}) relative to a baseline C_{rr} of 0.009 (e.g.,ROLL20 represents a 20% reduction or a C_{rr} of approximately 0.0072).		

[10] AERO20 represents a 20% reduction in drag coefficient below the model year 2015 average drag coefficient for each vehicle class within CCEMS.
[11] U.S. EPA, CA-EPA/ARB, U.S. DOT/NHTSA. Draft Technical Assessment Report: Midterm Evaluaton of Light-Duty Vehicle Greenhouse Gas Emission Standards and Corporate Average Fuel Economy Standards for Model Years 2022-2025. EPA-420-D-16-900, July 2016.
[12] U.S. EPA. Proposed Determination on the Appropriateness of the Model Year 2022-2025 Light-Duty Vehicle Greenhouse Gas Emissions Standards under the Midterm Evaluation: Technical Support Document. EPA-420-R-16-021, November, 2016.
[13] National Academies of Sciences, Engineering, and Medicine 2015. Cost, Effectiveness and Deployment of Fuel Economy Technologies for Light-Duty Vehicles. The National Academies Press.
[14] National Academies of Sciences, Engineering, and Medicine 2021. "Assessment of Technologies for Improving Light-Duty Vehicle Fuel Economy 2025-2035". Washington, DC: The National Academies Press. https://doi.org/10.17226/26092
[15] For average MY2015 baseline C_d by vehicle class, see Table 7.1 in National Academies of Sciences, Engineering, and Medicine 2021. Assessment of Technologies for Improving Light-Duty Vehicle Fuel Economy 2025-2035. Washington, DC: The National Academies Press. https://doi.org/10.17226/26092.
[16] For examples of specific technologies corresponding to specific percentage aerodynamic improvements, see 85 FR 24552, Table VI-132.

In response to BorgWarner's comment supporting a future review of the standards and an increase in the stringency of the standards if a future analysis of technology pathways demonstrates earlier readiness, EPA is planning to initiate another rulemaking to establish multi-pollutant emission standards over the longer term, for MY 2027 and later (see the Preamble to this rule at section I.A.3), consistent with the direction of Executive Order 14037, "Strengthening American Leadership in Clean Cars and Trucks." EPA will again review GHG emission-reducing technologies as part of the regulatory impact analysis for the MY2027 and later light-duty GHG standards rulemaking. With respect to the near term, the Agency has confidence in our technical analysis of the final standards, including our estimates of potential technology pathways through the relatively near-term time frame of the MY2026 standards and does not believe further technical review of the MY2023-2026 standards is necessary. It is also important to maintain regulatory certainty for manufacturers during the relatively short time period covered by this rule.

In response to comments from several commenters regarding the feasibility of setting lower standards than the proposed standards, in particular "Alternative 2" standards or standards more stringent than "Alternative 2" (e.g., comments from CARB, ELPC, NACAA, NESCAUM and SELC), EPA's final standards are the proposed standards for MYs 2023 and 2024, Alternative 2 standards for MY 2025, and Alternative 2 minus 10 g/mi standards for MY 2026 and later (see the Preamble to this final rule, sections II.A, II.B, and VI.). In response to comments that the analysis in the NPRM showed levels of EV penetration that were generally too low (NESCAUM, NACAA, ELPC) or costs that were overstated (ICCT), EPA has reviewed the battery costs used within the proposal and revised the battery costs for this final rule to better reflect:

- Current and anticipated automotive Li-ion battery chemistries
- Modern battery pack, module, and cell topologies
- Economies of scale from higher production volumes that better reflect current and anticipated EV sales volumes.

When taken together, the changes in the analysis for the final rule result in battery cost reductions of approximately 25% relative to the battery costs used within the analysis for the proposed rule. For more information on EPA's updated automotive lithium-ion battery costs, please refer to RIA Chapter 2.3.4 and Chapter 4.1.1.2. The per-vehicle reduction in costs for BEVs within the analysis for the final rule resulted in increased combined PHEV and BEV technology penetration, approximately 14% in 2025 and 17% in 2026, which are consistent with publicly available EV market forecasts of 12%-20% in 2025 and 16-24% in 2026.[17,18] Other, non-battery costs are consistent with previous EPA analyses, as are per-vehicle technology costs

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[17] IHS Markit Automotive Research and Analysis. US EPA Proposed Greenhouse Gas Emissions Standards for Model Years 2023-2026; What to Expect. August 9, 2021. Accessed on the Internet on 10/29/2021 at https://ihsmarkit.com/research-analysis/us-epa-proposed-greenhouse-gas-emissions-standards-MY2023-26.html
[18] Loren McDonald, EVAdoption, LLC. EV Sales Forecasts - US EVs (BEV & PHEV) Sales and Sales Share Forecast: 2021-2030. Accessed on the Internet on 10/29/2021 at https://evadoption.com/ev-sales/ev-sales-forecasts/

(see RIA Chapters 1.2.2 and 4.1.3). We disagree that the specific vehicle technologies analyzed are outdated (ICCT).

NADA commented that while it does not have access to vehicle manufacturer product plans and other proprietary OEM information available to EPA, does not purport to suggest what levels of GHG reduction are technologically feasible and economically practical for MYs 2023-2026, and generally defers to the OEMs on these issues, NADA nonetheless believes serious questions exist regarding OEMs' ability to meet the proposed mandates in a cost effective, economically practicable manner that will preserve consumer choice. In response to these NADA comments, we disagree and note that several OEMs and the Alliance submitted comments supporting the proposed standards. In addition, EPA has demonstrated that the proposed and, more importantly, final standards are technologically feasible at reasonable cost and preserve consumer choice (see sections VI.A., VI.B., and VI.C. of the Preamble to this final rule). We also note the NADA comments did not provide details or data supporting their claims, so no further response is necessary.

In response to comments on the repair and replacement costs of vehicle powertrain technologies that reduce GHG emissions (Edward Piper), we disagree that powertrains that reduce GHG emissions necessarily increase the costs of maintenance relative to a no action case. The commenter did not provide any data to support the supposition that GHG-reducing technologies necessarily increase maintenance costs or that any reduction in costs could potentially exceed the benefits of reducing GHG emissions. Reduced brake wear from regenerative braking in BEVs, PHEVs, and HEVs, reductions in scheduled lubricant and cooling system maintenance for BEVs, and the elimination of belt accessory drives in BEVs would suggest reduced maintenance costs for many GHG reducing technologies. This appears to be confirmed by a recent study from Argonne National Laboratories (ANL).[19] We will continue to study maintenance costs for vehicle electrification and other GHG-reducing technologies as additional vehicles with these technologies enter the fleet and we will consider updating future cost analyses using data on cost of ownership from ANL and other relevant sources.

Regarding comments that implementation of the light-duty vehicle GHG standards require an approach that goes beyond the standards themselves (the Chamber), the comments primarily address incentives and programs that are outside EPA's authority or the scope of this rulemaking, though EPA agrees that such programs may facilitate adoption of EVs. For a full response to comments regarding such complementary policies comments, please reference section 12.1 of this response to comments document. As discussed in Preamble Section I.A.2, EPA is planning to initiate a rulemaking to establish light-duty multi-pollutant emission standards for MY 2027 and later.

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[19] Burnham, Andrew, Gohlke, David, Rush, Luke, Stephens, Thomas, Zhou, Yan, Delucchi, Mark A., Birky, Alicia, Hunter, Chad, Lin, Zhenhong, Ou, Shiqi, Xie, Fei, Proctor, Camron, Wiryadinata, Steven, Liu, Nawei, and Boloor, Madhur. Comprehensive Total Cost of Ownership Quantification for Vehicles with Different Size Classes and Powertrains. United States: N. p., 2021. Web. doi:10.2172/1780970.

4. General Comments Regarding Flexibilities

Commenters Included in this Section

Allergy & Asthma Network, et al.
Alliance For Automotive Innovation
Alliance of Nurses for Health Environments
American Council for an Energy-Efficient Economy (ACEEE)
American Lung Association
American Lung Association (Sacramento, CA)
BorgWarner
Cantley, Jennifer
Center for Biological Diversity, Earthjustice, and Sierra Club
Center for Biological Diversity, et al.
Consumer Reports (CR)
Cooper, Almeta
DENSO International America, Inc. (DENSO)
Dream Corp Green for All
Dugan, Maureen
Edison Electric Institute (EEI)
Environmental Law and Policy Center (ELPC)
Environmental Law & Policy Center (ELPC), et al.
Environmental Protection Network (EPN)
Gentherm, Inc.
ITB Group, Ltd. (ITB)
Lish, Christopher
Mass Comment Campaign sponsored by Center for Biological Diversity (77,692)
Mass Comment Campaign sponsored by Consumer Reports (19,038)
Mass Comment Campaign sponsored by Natural Resources Defense Council (NRDC) (26,929)
Mass Comment Campaign sponsored by Sierra Club (13,699)
Mass Comment Campaign sponsoring organization unknown-3 (2,178)
Mass Comment Campaign sponsoring organization unknown-4 (195)
Mass Comment Campaign sponsoring organization unknown-6 (39)
Melton, Karen
Muller, Melinda
National Parks Conservation Association (NPCA)
New York State Department of Environmental Conservation
Nissan North America, Inc.
Pennoyer, Marguerite
Peterson, Doug
Rauch, Molly
Sierra Club
Stellantis
Tesla

Toyota Motor North America, Inc. (Toyota)
Union of Concerned Scientists (UCS)
Zero Emission Transportation Association (ZETA) and EVHybridNoire (EVHN)
Zewadski-Bricker, Edith

Commenter: Allergy & Asthma Network, et al.

US EPA must ensure real-world emissions benefits. We call on US EPA to avoid excess credit schemes and loopholes that impact the total tons of benefits achieved by the rule. While Alternative 2 represents a more stringent standard, it includes various crediting provisions that would ultimately diminish the real-world GHG benefits and associated health and societal benefits. Alternative 2 includes fewer credits than the central proposal, but it would still offer a range of loopholes and credits that diminish the stringency of the rule. We urge US EPA to reduce credit options in the final rule to ensure real-world benefits and emission reductions occur as projected. [EPA-HQ-OAR-2021-0208-0296-A1, p. 2]

Commenter: Alliance For Automotive Innovation

Comments on Technology Incentives, Credits, and Regulatory Flexibilities. Auto Innovators appreciates and supports the inclusion of technology incentives that encourage the production and adoption of certain higher cost / market-challenged GHG-reducing technologies, credits for technologies such as off-cycle and air conditioning system improvements which provide onroad benefits, and regulatory flexibilities such as the fleet averaging and credit banking and trading program that allow better alignment of product plans to compliance requirements. These collective flexibilities have reduced compliance costs while enabling greater environmental benefits and/or encouraging the development and marketing of technologies expected to play a much greater role in GHG reductions in the future.

Such flexibilities do not “squander” emissions benefits as some stakeholders assert. Rather, they help to ensure a well-balanced program that achieves its near-term goals and enables greater future emissions reductions. EPA has taken care in past rulemakings and in this proposal to evaluate the costs, benefits, and emissions impacts of various flexibilities to ensure policy decisions are well-informed. In such evaluations, it is important for EPA and other stakeholders to understand that it is unlikely that any given manufacturer will fully utilize all potential flexibilities. Each manufacturer creates its own product plan and compliance strategies, utilizing flexibilities as each sees fit. [EPA-HQ-OAR-2021-0208-0571-A1, p. 16]

Commenter: Alliance of Nurses for Health Environments

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, p. 23.]

And lastly, while the top line numbers of the proposal look like they will lead to meaningful emissions reductions, the standards are undermined by unnecessary give-aways to automakers that reduce their benefits and delay progress towards cleaner technology.

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

Incentives counterproductive to the primary goal of reducing emissions should not be included in EPA rule

EPA has included many provisions that would change the effective stringency of the proposed rule. While some of these changes are improvements over the SAFE rule, many of the proposed credit provisions would have the effect of weakening the standards for model years 2023-2026. [EPA-HQ-OAR-2021-0208-0251-A1, p.2]

Tables 2 and 3 highlight the estimated impacts of the above incentive proposals on the effective stringency of the rule. Year-by year-changes are presented in table 2. The individual impacts of the incentives and the change in the level of emissions savings compared to the proposed rule are presented in table 3. [EPA-HQ-OAR-2021-0208-0251-A1, p.9] [Tables 2 and 3 can be found at docket number EPA-HQ-OAR-2021-0208-0251, pp. 9-10]

Commenter: American Lung Association

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, p.19]

Secondly, we must maximize the real-world emission reductions from this program. We are concerned about loopholes and credits that reduce the actual emission reductions from the vehicles on the road. EPA must not allow these credits to undermine the emission reductions.

Commenter: American Lung Association (Sacramento, CA)

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, p. 254.]

We call on U.S. EPA to ensure that crediting and other loopholes are not allowed to reduce the emission reductions or real-world benefits of the final rules.

Commenter: BorgWarner Inc.

Industry needs flexibilities such as multipliers and off-cycle credits in order to achieve compliance, as well as the ability to leverage all available technologies to ensure a successful shift to electrification. This pace of annual improvement requires flexibilities to be included that both benefit the environment and the economy. It enables industry to respond with a variety of cost-effective solutions that could be rapidly adopted in high volumes, invest in R&D and workforce training, and avoid stranded capital. [EPA-HQ-OAR-2021-0208-0260-A1, p. 1-2]

Commenter: Cantley, Jennifer

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, p. 274.]

When I say avoiding loopholes, this is another important issue for Nevadans as we hold 25 percent of the world's lithium for the EV vehicles that will be producing the batteries for these EV cars.

Commenter: Center for Biological Diversity, Earthjustice, and Sierra Club

EPA's Proposed Credit Flexibilities Undercut Real-World Compliance and Should be Limited or Ended. EPA should not create or extend regulatory loopholes that allow automakers to continue producing high emission fleets that avoid or delay significant emissions reductions. While the credit system is intended as a tool to help manufacturers smooth annual compliance levels in light of their multi-year production plans, manufacturers have routinely used them to delay technological improvements. Emissions reductions will continue to be eroded if EPA re-adopts or increases the credit programs described below. At a minimum, should EPA finalize any of them, it should make abundantly clear that they will apply only in this unusual circumstance where lead time is shorter and the MY 2023 nominal stringency appears steeper than usual; do not set any precedent for later rulemakings; and will not be adopted in its forthcoming rule for MY 2027 and beyond.

In recent years, the emissions reductions that generated the credits were achieved through the adoption of existing and economically feasible technologies. Instead of fostering the development of ever cleaner emissions technologies, the glut of credits that still exists today delays making these advances. For example, between 2012 and 2018, the industry generated 96 Teragrams worth of credits, and by 2016 the industry average tailpipe emissions exceeded federal standards by 8 g/mi due to the use of previously earned credits.30 Since 2016, the industry average emissions as measured from the tailpipe remained above federal standards as manufacturers continue to utilize the early year credits.31 As of MY 2019, the tailpipe emissions of 15 of the 20 largest manufacturers, including Ford, GM, and Fiat-Chrysler, exceeded the federal standards.32 [EPA-HQ-OAR-2021-0208-0270-A1, pp.5-6]

Commenter: Center for Biological Diversity, et al.

EPA Should Eliminate or Reduce the Proposed Additional Credits. Beginning with the 2010 Final Rule, EPA adopted several types of credits manufacturers may use to meet the light duty vehicle fleet greenhouse gas standards. Proposal, 86 Fed. Reg. at 43,753. Some credits (the "averaging, banking and trading" credits) are designed to assist automakers in adjusting their multi-year product development cycles to meet stringency increases that occur every year. For instance, during years when automakers first introduce new, less polluting vehicles, their average fleets exceed the standard, and credits awarded for that over-performance can be used to smooth compliance shortfalls for up to five future years, during some of which automakers may not be selling new vehicles meeting increased stringencies. See id. Automakers may also apply these over-performance credits to remedy up to three years of planned or unanticipated past underperformance. EPA does not propose to change the averaging, banking and trading credits, and Commenters support that decision in connection with this Proposal. Other types of credits, however, have proliferated over the years even though they dilute or erode the standards' real-world results, and would do so again if readopted or increased, as EPA proposes here.

Commenters believe that the proposed credits discussed below are not required to ease any lead time concerns. As discussed in Section 5 above, Dr. Cooke's modeling shows that automakers can comply with the most stringent proposal, Alternative 2, through 2024 by complying with the standards that already govern them now – either the 2020 Final Rule or the California Framework agreement – and by some increases in their performance in MY2024, primarily through increases in EV penetration at rates consistent with automakers' announcements. 138 This is so even when the model also excludes the proposed credit life extensions, and even though Alternative 2 itself excludes all EV multipliers. Dr. Cooke's model does include the proposed off-cycle credit extension and the extension of treating EV emissions as zero to reach these conclusions. The model, however, is constricted by features of the Volpe model that do not take account of or disallow modeling other compliance scenarios requiring no or little additional lead time.

For example, as discussed above, the model does not reflect an accelerating trend in the automotive industry: automakers are currently preparing to launch new vehicles in the MYs 2022-2025 time frame at rates 50 percent higher than their historical averages, replacing some 80 percent of the fleet.139 Sixty percent of the new vehicles feature a hybrid-electric or electric powertrain option, including more than 90 standalone electric models. Id. These launch plans are entirely in line with automakers' own assertion that they did not alter their 2012 production and compliance plans in response to the 2020 Final Rule because of continuing regulatory uncertainty.140 Dr. Cooke's model also excludes the effects of a combination of existing compliance strategies that are available for automakers to take through MY 2024 to improve their performance with little or no lead time. These include increasing the sales incentives for and marketing of existing vehicles that already significantly exceed the standards, and the shifting of currently in-use trims and packages for many models, which can result in greenhouse gas emissions reductions of up 25%-30% per vehicle.141

The Volpe model—and thus Dr. Cooke's work—also excludes automakers' ability to remedy any remaining deficits from MYs 2023 or 2024 by exceeding the standards in later years and utilizing the three-year credit carry-back feature. Yet, as discussed above, this is a well understood compliance strategy.

For these reasons, we believe automakers may be well-positioned to comply with Alternative II even without any of the additional credits EPA has proposed. We strongly urge EPA to evaluate whether any of the additional credits discussed below are necessary to address any lead time concerns; if not, EPA should not finalize any of them, as they would increase emissions and exacerbate the climate crisis. We note that historically, previous credit extensions have enabled automakers to delay compliance significantly. At a minimum, EPA should make clear that whatever additional credits it finalizes are solely intended to accommodate these specific, unusual circumstances, where lead time is more limited and the MY 2023 nominal stringency appears steeper than usual, and will not be adopted in its forthcoming rule for MY 2027 and beyond. [EPA-HQ-OAR-2021-0208-0651-A1, p. 59-60]

Commenter: Consumer Reports (CR)

In order to achieve these goals CR provides the following recommendations for strengthening the standard:

Reign in credits and loopholes that undermine the real-world benefits of the rule [EPA-HQ-OAR-2021-0208-0602-A1, p.5]

CR also recommends that EPA further limit credits and multipliers that reduce the effectiveness of the rule. [EPA-HQ-OAR-2021-0208-0602-A1,p.5]

Top line stringency levels are important, but equally important is ensuring that automakers actually deliver real world performance that comes close to matching those stringency levels. Various credits and multipliers can reduce the real world benefits delivered by the standards. [EPA-HQ-OAR-2021-0208-0602-A1, p.11]

Commenter: Cooper, Almeta

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, p. 77.]

Please reject any alternative that contains big loopholes for automakers and that may undermine otherwise strong pollution reduction targets by 2026.

Commenter: DENSO International America, Inc. (DENSO)

Support for Credits, Incentives, and Flexibilities. DENSO is committed to supporting our customers in their application of technology to improve the fuel economy performance and reduce the greenhouse gas emissions of their products to match consumer preferences, while meeting regulatory requirements. While there are challenges and sometimes tradeoffs to allowing multiple pathways to compliance, we believe a balance can be found to achieve successful regulatory programs that include credits, incentives, and other flexibilities. Around the world, successful fuel economy and emissions programs offer credit and incentive programs to support the deployment of technologies, which would otherwise take multiple years to penetrate the market. DENSO encourages the agencies to continue to offer flexible options supporting emerging technologies. [EPA-HQ-OAR-2021-0208-0282-A1, p. 3]

Commenter: Dream Corp Green for All

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, p. 308.]

There are too many loopholes and bonus credits even in the existing program and stricter standards and less potential for gaining the system will be needed to reach a 60 percent reduction in emissions by 2030.

Commenter: Dugan, Maureen

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, p. 300.]

Close the loopholes and don't give credence to the industry's specious claims that this cannot be done.

Commenter: Edison Electric Institute (EEI)

Regulatory Flexibilities Are Impactful and Necessary. Regulatory flexibilities are a practical and longstanding method of helping affected sources, both mobile and stationary, comply with environmental regulations in efficient, cost-effective, and commonsense ways. The broad and continued success of the CAA and the other environmental statutes is largely due to these flexibilities: namely, EPA has set standards and then provided compliance pathways that enhanced options available to industry instead of limiting the methods and manners that sources have used to meet those standards. EPA's own most recent report acknowledges this reality: since the 1990 amendments, the many flexible compliance regimes promulgated by the Agency have resulted in significant emissions reductions and a marked reduction in unhealthy air quality days, all at lower than predicted costs to industry.13 Many of the regulatory programs enacted by EPA to attain and maintain the NAAQS in the past three decades have contained significant regulatory flexibilities—from market-based trading,14 to wide ranging averaging provisions,15 to creative permit terms,16 to innovative methods of estimating reductions from new industry activities.17 In sum, EPA sets targets, and American industry engineers the least cost and most effective way to get there.

The SAFE Vehicle Rule reversed this trend by eliminating many existing and long-relied-upon compliance flexibilities utilized by the automakers. These flexibilities allow industry to find least cost, innovative solutions to environmental problems. With this rule, the Agency returns to utilizing compliance flexibilities that will allow automakers to comply with both EPA's GHG tailpipe standards that lowers costs and provides more consumer choice. 86 Fed. Reg. at 43,731.

Commenter: Environmental Law and Policy Center (ELPC)

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, pp. 289-290.]

It is, however, hard to decipher how the veritable smorgasbord of so-called flexibilities undermines the top line targets EPA sets out and therefore the benefits. Flexibilities allow automakers to stall gasoline vehicle improvements and fail to significantly boost the electric vehicle market given automakers already announced plans.

Light truck vehicles with dismal fuel economy dominate the market today. The market is now 50/50 as EPA assumes. These vehicles will be on the road guzzling gas and spewing climate pollution well beyond 2030. Each year that automakers can exploit flexibilities and ship out gas-guzzling trucks with little or no change undermines our ability to mitigate the climate crisis. EPA must shut down this smorgasbord and strengthen Alternative 2 to meet the climate moment.

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, p. 291.]

EPA makes clear in the NPRM that the proposed standards will be met with existing technology. Even Alternative 2, while stronger, will not spur innovation and fuel-saving technologies because loopholes will allow auto manufacturers to do more of the same with the climate paying the price.

Commenter: Environmental Law & Policy Center (ELPC), et al.

While we support EPA's proposal to strengthen vehicle emissions standards, we note there are flaws in the proposal which potentially undermine its climate goals and which should not be finalized: EPA's proposed rule goes beyond allowing automakers to use credits —which reallocate the burden of emission reductions, while achieving the same overall reductions—to allow for 'flexibilities' that as a practical matter will increase emissions.

EPA's proposed rule, unfortunately, also contains 'flexibilities,' such as 'multipliers' that allow automakers to generate credits without reducing emissions, and other loopholes. As EPA acknowledges, inclusion of such flexibilities undermines the proposed rule's topline targets and therefore its emissions-reduction benefits.[22] EPA should not include in its final rule any flexibilities that allow for credits to be generated without emissions reductions. These excessive technology credits and loopholes will allow automakers to stall gasoline vehicle improvements and will fail to significantly boost the electric vehicle market given automakers' announced plans. [EPA-HQ-OAR-2021-0208-0567-A1p, 4]

EPA makes clear that its proposed standards will be met with existing technology.[25] And loopholes will allow automakers to do more of the same with the climate paying the price. Adopting Alternative 2, along with the additional 10 g/mi stringency in MY 2026 and without the multipliers and other loopholes, will spur innovation, drive deployment of emissions-reducing technologies, and help sustain clean car manufacturing jobs across the Midwest and beyond. [EPA-HQ-OAR-2021-0208-0567-A1, p. 5]

Commenter: Environmental Protection Network (EPN)

EPA also proposes a variety of other provisions to the flexibilities provided to manufacturers, ranging from changes to the off-cycle credit provision to extensions of credit life for certain credits. As with all issues for the proposal, the way to analyze these proposed changes is to ask whether they are needed and important for achieving the MY 2030 and 2035 electrification goal, or whether they hinder or delay reaching that goal. EPA should explicitly evaluate these proposed changes in that light and explain any decisions in those terms. As with the standards and other flexibilities, any changes from the proposal should be to increase the overall stringency of the program, not to relax it. The proposal is already the bare minimum level needed considering the longer-term goals. [EPA-HQ-OAR-2021-0208-0213-A1, pp. 10-11]

Manufacturers may raise concerns that some limited or unique situations exist where the lead time is not adequate for specific vehicle models. Even if there are such situations, the discussion above shows that the lead time is appropriate for broad segments of the industry, covering all kinds of manufacturers and all kinds of vehicle models. Limited and unique situations for certain specific models are not a basis for delaying the standards beyond MY 2023 or changing the level of the standards.

If EPA believes these situations call for some sort of relief, then the proper approach is not to delay the standards or change their level. At most EPA should consider providing a narrow administrative avenue for limited, temporary relief for individual vehicle models, where a manufacturer demonstrates there are severe technical or other problems that make compliance with their fleet average standard highly unlikely, notwithstanding reasonable preparation by the manufacturer since 2012 and considering all the flexibilities and other circumstances discussed above. EPA could consider providing limited and temporary relief on a case-by-case basis. [EPA-HQ-OAR-2021-0208-0213-A1, p. 11-12]

If EPA decides to consider a temporary relief program, the agency should consider a case-by-case application process where a manufacturer demonstrates, for specific models and volumes of production, that it is highly impractical for them to comply with the otherwise applicable fleet-average standard, based on changes that the manufacturer made in its design and production plans for those models after March 30, 2020. That is the date the final rule relaxing the stringency of the MY 2021 to 2025 standards was signed and released to the public. Prior to that date, a manufacturer had no legally-recognized basis to change its design and production plans. While a manufacturer may have envisioned and expected changes in the stringency of the MY 2021 to 2025 standards, any change in design or production plans taken considering a manufacturer's projections of what EPA's 2020 final rule might contain was, at best, a business decision to take a risk on what the future action of EPA might be. Until March 30, 2020, the GHG standards for these model years remained unchanged from those adopted in 2012. It would not be appropriate for EPA to provide additional lead time to a manufacturer prior to March 2020 based on a business decision to prematurely change plans without knowing what, if any, changes EPA might make. In determining whether temporary relief should be allowed, EPA should consider all the compliance flexibilities provided in the GHG program. EPA should require a manufacturer to demonstrate that notwithstanding these flexibilities, it is highly impractical for a manufacturer to comply with the otherwise applicable fleet-average standard given the specific circumstances involving the models at issue. EPA should only provide temporary relief if there is a clear and convincing demonstration of the need for such relief. In addition, EPA should impose appropriate conditions on the temporary relief, such as production volume limits and limits on emissions levels, so the relief is narrowly tailored to the need and to limit the amount of adverse environmental impact. For example, assuming a manufacturer makes a clear and convincing demonstration of need, EPA could consider a temporary and limited adjustment of the footprint attribute curve as it applies to a specified volume of the specific model or models at issue. This adjustment would become part of how the manufacturer shows compliance with their overall fleet-average standard. [EPA-HQ-OAR-2021-0208-0213-A1, p. 13]

Commenter: Gentherm, Inc.

We support continued improvement in fuel efficiency and CO_2 emissions reductions along with flexibilities in technology credits. This will encourage innovation and provide OEMs with greater options for improving vehicle performance and efficiency. [EPA-HQ-OAR-2021-0208-0216-A1, p. 7]

Commenter: ITB Group, Ltd. (ITB)

The ITB Group supports continuous improvement in vehicle fuel efficiency and CO_2 emissions. Performance-based standards encourage technology-agnostic development of high-value solutions. Such solutions are expected to benefit the environment as well as the health and welfare of the United States citizens and reduce potential dependency on petroleum. Technology credit flexibilities are an important and cost-effective pathway to reducing vehicle fuel consumption and CO_2 emissions. Furthermore, technology credits provide additional flexibilities for auto manufacturers to meet their specific fleet requirements in the most cost-effective way while reducing national fuel usage and CO_2 emissions. [EPA-HQ-OAR-2021-0208-0222-A1, p. 1]

Commenter: Lish, Christopher

The new standard allows too many giveaways, or “credits,” to the automobile industry, which could cut short our carbon pollution reductions by a large margin. Excessive loopholes allow automakers to keep selling gas guzzlers that erase much of the benefits from electric vehicles, while failing to boost the electric vehicle market as quickly as needed. The standards adopted should not contain needless credits or other loopholes that reward automakers for reductions that aren’t matched in the real world. Furthermore, your proposed rules deliver less carbon pollution reductions and fuel savings than the Obama-era standards. [EPA-HQ-OAR-2021-0208-0218-A1, p. 2]

Commenter: Mass Comment Campaign sponsored by Center for Biological Diversity (77,692)

I urge you to write new long-term rules that: Close loopholes that allow manufacturers to avoid making real improvements; [EPA-HQ-OAR-2021-0208-0560-A1, p.1]

Commenter: Mass Comment Campaign sponsored by Consumer Reports (19,038)

We are calling on the Administration to eliminate loopholes for automakers that would undermine our nation's Clean Car Standards. [EPA-HQ-OAR-2021-0208-0602-A2, p.1]

Commenter: Mass Comment Campaign sponsored by Natural Resources Defense Council (NRDC) (26,929)

The new standard allows too many giveaways, or "credits," to the automobile industry, which could cut short our carbon pollution reductions by a large margin. [EPA-HQ-OAR-2021-0208-0558, p.1]

Commenter: Mass Comment Campaign sponsored by Sierra Club (13,699)

Moreover, the standards must not be undermined by complex credit schemes that reward automakers for reductions on paper that aren't matched in real world emission benefits. Excessive loopholes allow automakers to keep selling gas guzzlers that erase much of the benefits from electric vehicles, while failing to boost the electric vehicle market as quickly as needed. [EPA-HQ-OAR-2021-0208-0196-A1, p.1]

EPA must strengthen the final rule by accelerating the trajectory towards pollution-free vehicles and eliminating the credit scheme. [EPA-HQ-OAR-2021-0208-0196-A1, p.1]

Commenter: Mass Comment Campaign sponsoring organization unknown-3 (2,178)

We need strong standards that are not riddled with loopholes so we can drastically reduce carbon pollution driving the climate crisis. [EPA-HQ-OAR-2021-0208-0547, p.1]

Commenter: Mass Comment Campaign sponsoring organization unknown-4 (195)

EPAs proposed rule, unfortunately, contains flexibilities that allow automakers to generate credits without reducing emissions, and other loopholes. As EPA acknowledges, inclusion of such flexibilities undermines the standards benefits. The EPA should eliminate these loopholes in the final rule to ensure automakers put pollution-cutting technology to work especially on high-emitting SUVs and other trucks that will be on the road for a decade or more. [EPA-HQ-OAR-2021-0208-0548, p.1]

Commenter: Mass Comment Campaign sponsoring organization unknown-6 (39)

Any standards adopted should achieve at least the same total emission reductions as those undertaken by the Obama-Biden administration and should not contain needless credits or other loopholes that reward automakers for reductions that arent matched in the real world. [EPA-HQ-OAR-2021-0208-0550, p.1]

Commenter: Melton, Karen

[The following comments were submitted as testimony at the virtual public hearing on August 26, 2021. See Hearing Testimony – 26Aug2021, p. 254.]

The impacts of climate change we see all around the world today should tell you that we are way past the point where we can be creating loopholes and credit schemes to benefit automakers who are looking for ways to stall on efficiency improvements.

Commenter: Muller, Melinda

The new standard allows too many giveaways, or "credits", to the automobile industry, which could cut short our carbon pollution reductions by a large margin. [EPA-HQ-OAR-2021-0208-0500, p. 1]

Commenter: National Parks Conservation Association (NPCA)

Finally, NPCA requests that the final rule should not include unnecessary loopholes or credits, such as multipliers, that allow manufacturers to avoid real world reductions. [EPA-HQ-OAR-2021-0208-0291-A1, p. 2.]

Commenter: New York State Department of Environmental Conservation

DEC strongly supports ambitious standards but questions the need for some of the proposed compliance flexibilities that could potentially diminish the stringency of the program in the near term. [EPA-HQ-OAR-2021-0208-0238-A1, p.1]

In light of the available technology and the transition to electric vehicles well underway, we question to need to provide manufacturers with more flexibility than provided by the prior standards. New York recognizes that EPA is attempting to rectify the past administration's backsliding of light-duty GHG Standards while at the same time providing all manufacturers with sufficient lead time. While New York generally supports the continuation of traditional credit flexibilities, providing too much compliance flexibility would effectively reduce the stringency and effectiveness of the proposed regulations, especially in the short term. [EPA-HQ-OAR-2021-0208-0238-A1, p.2]

Commenter: Nissan North America, Inc.

Short-Term Flexibilities Necessary for Near-Term Challenges. Nissan supports the maintenance and expansion of compliance flexibilities for manufacturers under both the GHG and CAFE programs. The automotive industry development cycle is planned several years in advance, and manufacturers have already accounted for these credits in their fleet planning. Given the myriad supply chain issues and uncertainties affecting the automotive industry, and indeed the world, as a result of the COVID-19 pandemic and the semiconductor shortage, compliance flexibilities are critical for withstanding the current challenges facing the industry and for ensuring that manufacturers can continue to invest in developing EV and other clean technologies, particularly in the near term as the market for zero emission technologies continues to become established. Some of the key flexibilities that Nissan encourages EPA and NHTSA to consider are discussed below. [EPA-HQ-OAR-2021-0208-0529-A1, p. 8]

Commenter: Pennoyer, Marguerite

[The following comments were submitted as testimony at the virtual public hearing on August 26, 2021. See Hearing Testimony – 26Aug2021, pp. 30-31.]

Please ensure that these standards don't include any shortcuts or loopholes for automakers to cut corners so that we see significant and genuine reductions in greenhouse gas emissions. Please do not allow unnecessary give-aways or complex credit scheme for automakers that look good on paper but that negate real-world benefits and delay progress toward newer and cleaner technologies.

Commenter: Rauch, Molly

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, p.36.]

EPA's proposal details several options. The preferred alternative, the quote unquote preferred alternate, includes loopholes for automakers that may undermine the pollution reduction targets.

Commenter: Sierra Club

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, p. 29.]

While I'm pleased to see the EPA has taken steps to strengthen the current standards, I'm disappointed to see that the agency is still offering loopholes which would allow automakers to double down on gas guzzlers.

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, p. 32.]

We're also deeply concerned about the loopholes that the proposal contains that would allow auto manufactures to double down on gas-guzzling vehicles.

Commenter: Stellantis

Establishing a pathway to 40-50% electrification by 2030 means that consumer willingness to adopt plug-in vehicles is even more critical. Recognizing this challenge, adjustments to the program flexibilities are needed to help us bridge the gap between the current market acceptance of EVs and this regulatory proposal. Motivating manufacturers to deploy the lowest emitting technologies in the near term will accelerate low and zero-emissions vehicles as a mainstream solution for light-duty transportation needs. [EPA-HQ-OAR-2021-0208-0532-A1, p. 8]

Commenter: Tesla

Each of the EPA's Proposed Compliance Flexibilities Are Unnecessary, Reduce Stringency, and Should Be Eliminated. In 2020, Tesla generated almost $1.6 billion in revenue selling zero-emission regulatory credits to other manufacturers.165 Proceeds from such sales will go towards building new factories to produce EVs that will continue to displace ICE vehicles. While it is common practice today for ICE vehicle manufacturers to purchase regulatory credits from other companies (such as Tesla) to offset their total CO2 emissions, it is not a sustainable strategy. For the U.S. to meet its decarbonization goals and to mitigate the public health and welfare impacts from climate change, EPA's proposal should be amended to meet increasingly more stringent regulatory requirements that has all auto manufacturers rapidly scaling up delivery of high-quality EVs. Unfortunately, the flexibilities built into the EPA's proposal do the opposite. The various flexibilities expand the crediting systems in ways that penalize past investment in electrification and will dampen actual near-term delivery of EVs, without a sufficient basis for doing so. Accordingly, the flexibilities provided in the proposal should be eliminated.

Commenter: Toyota Motor North America, Inc. (Toyota)

Toyota Supports Flexibilities that Can Accelerate the Shift to Electrification. Most of the necessary investments discussed above in infrastructure, R&D, and consumer incentives essential to building a viable electrification market fall outside of EPA‘s (and NHTSA's) authority and control. This makes it important for EPA (and NHTSA) to leverage the flexibility provisions under existing authority. We appreciate EPA's holistic approach and support regulatory flexibilities that help manufacturers manage compliance and push desired technologies into a growing but uncertain market.

As EPA noted, technology incentives available in the GHG program can help manufacturers get advanced technologies into the market more quickly than without those incentives. 13 While concerns have been raised about lost environmental benefits associated with regulatory flexibilities, we share EPA's policy position that any near-term loss needs to be balanced with the potential for significant longer-term, sustainable payoffs from electrified powertrains successfully transitioning from the current early adopter stage to one of self-sustained growth.

Further, EPA fully accounts for the potential environmental impacts in the benefit-cost analysis. EPA "recognized that they would reduce the effective stringency of the standards, but believed that it was worthwhile to have a limited near-term loss of emissions reduction benefits to increase the potential for far greater emissions reduction and technology diffusion benefits in the longer term."14 Such a pragmatic approach should also apply to the incentive expiration dates and benefit caps intended to limit potential near-term environmental losses. The temporary nature of the proposed provisions helps limit any losses. [EPA-HQ-OAR-2021-0208-0531-A1, p. 8-9]

Commenter: Union of Concerned Scientists (UCS)

Not only does this information [in the UCS comment submission] support moving forward with Alternative 2, but it also supports reducing the scope of incentives proposed by EPA—such incentives are not necessary to support a short-term strengthening of the greenhouse gas program and risk an erosion of the benefits of the program that could jeopardize the long-term ability to adequately deal with climate change and support the administration's critical goal for half of all new LDVs sold in 2030 to be zero-emission vehicles (ZEVs). [EPA-HQ-OAR-2021-0208-0277-A1, pp.2-3]

Proposed flexibilities undermine the greenhouse gas emissions program. EPA has proposed a number of changes to so-called 'flexibilities' in the greenhouse gas emissions program. Each of these changes results in increases in emissions, most frequently from windfall credits that over credit manufacturers for emissions reductions strategies they are already deploying. Such actions result in a direct erosion of the consumer and climate benefits of the rule. Many of these flexibilities were deployed under the original 2012 standards and set to expire, so we have historical evidence of their impacts.

Given the relatively weak stringency of the proposal, EPA should not move forward finalizing any of the proposed changes in flexibilities under the Preferred Alternative. By pre-charging the credit banks, the agency risks a repeat of the error with the early credit program that allowed the industry to strategically choose not to meet the standards over the past four years, and yet the credit bank has still not yet significantly dissipated.43 Should the agency move forward with some of these proposed credits, it should do so only in a specific, limited way in support of stronger alternatives that require them.

As we deal with the climate crisis, we need certainty from EPA's regulations. These proposed flexibilities amount to loopholes, which undermine the regulation and could significantly erode the projected benefits of the rule at a time when every metric ton of greenhouse gas reduction is needed. [EPA-HQ-OAR-2021-0208-0277-A1, p.23]

Commenter: Zero Emission Transportation Association (ZETA) and EVHybridNoire (EVHN)

ZETA and EVHN discourage the inclusion and extension of overly generous crediting, which creates potential loopholes for meeting the proposed standards, particularly for technologies that are no longer contributing to reductions in emissions from the transportation sector. Any system that indirectly encourages the production of combustion engine vehicles will delay the drawdown of carbon emissions and lock us into more global warming and deadly criteria emissions. This is determined in the Agency's own Environmental Impact Statement, which shows the emissions and public health benefits of Alternative 2 compared to the proposal.5

Extending many of these loophole credits will encourage traditional automakers to not comply with the stringent standards. Analysis from the Union of Concerned Scientists shows that these extensions could result in an additional 130 million metric tons of GHG emissions compared to Alternative 26 and be a lost opportunity compared with more stringent standards. Rather than artificially expanding the lifetime of older technologies, the standards should be pushing the entire auto industry toward electrification. [EPA-HQ-OAR-2021-0208-0275-A1, p. 3]

Commenter: Zewadski-Bricker, Edith

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, pp. 228.]

Now is not the time to pander to the automakers with complex credit schemes and tax loopholes that can be manipulated in the name of profits.

EPA Response

EPA acknowledges that many commenters commented generally in opposition of EPA's proposed credit and incentive provisions, many characterizing them as "loopholes." Other commenters, mostly auto manufacturers and automotive suppliers, generally supported these proposed compliance flexibilities as necessary to meet the proposed standards, especially in the near-term. For the Final Rule, EPA has narrowed these provisions as discussed in detail in sections II.A.4 and II.B of the preamble to focus them on MYs 2023-2024. More detailed comments regarding the proposed flexibility provisions and EPA responses to those comments are provided below (where not otherwise covered in the preamble).

The Environmental Protection Network (EPN) had several suggestions for types of flexibilities that EPA should consider in place of those proposed, along with a suggestion that EPA set more stringent standards than those proposed. EPA did not propose or seek comment on the concept suggested by the commenter of providing flexibility to individual vehicle models in limited circumstances, and thus the comment is outside the scope of the proposal. Such a program would be resource intensive to implement as it would involve responding to potentially many industry requests for vehicle model-specific flexibility.

5. Credit Averaging, Banking, and Trading (ABT)

<u>Commenters Included in this Section</u>

Alliance For Automotive Innovation
American Council for an Energy-Efficient Economy (ACEEE)
American Honda Motor Company (Honda)
California Air Resources Board (CARB)
Center for Biological Diversity, et al.
Center for Climate and Energy Solutions (C2ES)
Chemours Company (Chemours)
Edison Electric Institute (EEI)
Environmental Defense Fund (EDF)
Environmental Law & Policy Center (ELPC), et al.
Gentherm, Inc.
Hyundai America Technical Center, Inc. (Hyundai)
Institute for Policy Integrity
ITB Group, Ltd. (ITB)
Lucid USA, Inc. (Lucid)
Mercedes-Benz USA, LLC
Motor & Equipment Manufacturers Association (MEMA)
New York State Department of Environmental Conservation
Nissan North America, Inc.
Peterson, Doug
Rivian Automotive, LLC
Southern Environmental Law Center
Tesla
Toyota Motor North America, Inc. (Toyota)
Union of Concerned Scientists (UCS)

Commenter: Alliance For Automotive Innovation

Credit Averaging, Banking, and Trading ("ABT") Flexibilities. Auto Innovators supports the proposal to expand carry-forward of credits generated in MYs 2016-2020.

Auto Innovators supports EPA's proposal to expand credit carry-forward provisions for MYs 2016-2020. Credit carry-forward allows manufacturers who over-comply in earlier years to carry those carbon reductions into future model years to account for product cadence or technology schedules. A limited expansion of credit carry-forward provisions may provide some additional flexibility for a limited number of manufacturers, and in theory could provide some additional credit market liquidity during the rapidly tightening standards in MYs 2023-2026. Credit carry-forward flexibility has been a key component of compliance since MY 2016 when the industry (on average) first moved from general over-compliance to consuming credits on an annual basis.

Carry-forward credits do not reduce the environmental benefits of the standards. These credits represent tons of emissions avoided in advance of requirements. As such, it is appropriate to allow their use as a flexibility for meeting later requirements.

EPA should consider additional deficit carry-forward (i.e., credit carry-back) provisions. Credit carry-back is an additional ABT mechanism that has proven useful for manufacturers to cover previous year deficits with future year credits. EPA is not directly proposing to adjust the existing credit carry-back mechanism within the GHG NPRM, but Auto Innovators recommends that EPA consider a modification under the broad scope of the GHG NPRM. Our proposal is to supplement the extended carry-forward with a limited allowance for a one-time extended credit carry-back provision. This proposal could provide manufacturers with an additional compliance flexibility through MY 2026 to address the proposed rapid increases in regulatory stringency and an uncertain EV market in the near-term. With regards to future rulemakings covering MY 2027 and later, Auto Innovators also recommends that EPA consider a broader extension of the credit carry-back to five years matching the longer carry-forward allowance.

Credit carry-back is an important mechanism for manufacturers, who may be facing near-term challenges with compliance, but have plans for later introduction of fuel-saving technologies (e.g., vehicle electrification) that can offset the deficits in later years. Like credit carry-forward, credit carry-back flexibility creates no loss in GHG benefits over the duration of the regulated time period. As illustrated in the 2020 Trends Report, an increasing number of manufacturers are not meeting MY 2016- 2020 targets and the overall volume of credits available to cover shortcomings is diminishing.107 With continuing compliance shortfalls and reduced availability of credits, more manufacturers may have to start carrying forward deficits into future model years. These manufacturers will need to plan additional technology for the future, to not only cover future standards, but to also create sufficient carry-back credits to cover historic deficits.

As noted throughout these comments and within EPA's technology projections, an increasing number of manufacturers are expected to rely on higher levels of electrification as investment portfolios shift into this long-term technology trend. Electrification plans will need to be executed within the three-year carry-back time window and at sufficient volume to generate credits to cover earlier deficits. There is an element of timing risk associated with electrification because much of the supply base and industrial capacity, while planned, is yet to be physically constructed or running at scale. Readiness delays with critical supply infrastructure could arise from many different angles including material capacity readiness, factory permitting, construction delays or workforce readiness. Any one of many potential delays could affect launch dates or volumes, which would put credit carry-back plans at risk. Timing delays would not necessarily impact overall GHG benefits associated with the future vehicles, but delays could result in manufacturers facing a "4th" year of deficits, potentially triggering enforcement proceedings.

Auto Innovators recommends that EPA consider adding an allowance for a limited extension of the credit carry-back allowance. A provision could be added to the regulation to provide a pathway for manufacturers, who may be at risk of exceeding the three-year window to cover a model year deficit to petition the Administrator for one additional model year of credit carry-back. The petition could be required to demonstrate circumstances that may delay or otherwise impact future credit generation. If approved, EPA could grant a conditional allowance for one additional year of credit carry-back. The restriction to a narrow window of extension would limit any negative effects of deferring GHG improvements for longer. Further limits could include mechanisms such as limiting a manufacturer to only one such application through MY 2026 and a limitation of the allowance to credits from a single future model year. Auto Innovators believes this additional flexibility would provide a pragmatic level of additional flexibility for manufacturers, who may face future delays in the yet to be built electrification supply chain, while not impacting overall GHG reductions. [EPA-HQ-OAR-2021-0208-0571-A1, p. 32-34]

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

Currently any credits that automakers earn for overcompliance with a given model year's emission standards may be banked for up to 5 years. This limited lifetime is essential to ensure that any early miscalibration in emission standards does not propagate too far into the future. Credits that don't expire would effectively tie EPA's hands in setting future standards, as the agency would have to design standards that are both feasible for new entrants but also strong enough to force those automakers with extensive banked credits to make real improvements in emissions.

EPA proposes to retroactively extend the lifetime of MY 2016 credits to 7 years and MY 17-20 credits to 6 years (EPA 2021b)4. ACEEE strongly opposes this retroactive extension of credit lifetimes. Not only have automakers have already designed and sold these vehicles under the expectation of a 5-year credit lifetime, they additionally lobbied for a decrease in the 2012-rule stringency under the prior administration.

Automakers should not be further rewarded with additional credit extensions. Automakers generated credits worth 20.5 million metric tons (MMT) of CO_2in MY 2016. The extension of MY 2016 credits is particularly significant as those credits are set to expire in MY 2021, along with over 100 million earned early action credits from MYs 2009-2011 (EPA 2020a; 2021a). The existing pool of early action credits is more than sufficient to cover compliance for MY 2021 and this extension, therefore, allows all the MY 2016 credits to be carried forward to MY 2023, rather than expiring unused. The adjustment to the MY 2022 standards as part of the SAFE rule adopted in 2020, after MY 2022 vehicles had already been designed, also makes it unlikely that any of these credits will be needed for compliance before MY 2023. The reduction in stringency for MY 2021, under the same conditions, will also provide a large number of credits to use for MY 2022. If all these credits were applied to MY 2023, these credits would reduce the stringency of the proposed 2023 standard by over 6 g/mi per vehicle5.

The proposed lifetime extensions for MY 2017-2020 credits would also substantially weaken the proposed standards. Extending the lifetime of the 21.8 MMT of credits generated in MY 2017 would allow up to a 7 g/mi increase in average emissions rate in MY 2023, beyond the increase due to the 2016 credit extension. Together, the 2016 and 2017 credits would allow a reduction in improvement in MY 2023 from 10% to just 4%6.

The MY 2018-2020 credit extensions would allow up to a 10 g/mi increase in emissions in MYs 2024 and 7 g/mi in MYs 2025-2026.7 This is summarized in Table 1 [Table 1 can be found at docket number EPA-HQ-OAR-2021-0208-0251, p. 8].

This scenario is made even more likely by the increase in MYs 2021 and 2022 credits earned due to the SAFE rule. The weak standards for MYs 2021 and 2022 should lead to an increased credit balance in those years, given that vehicles for those model years were designed prior to the adoption of the SAFE rule. These additional credits could be used for MYs 2023-2026/2027 or saved until MYs 2026 and 2027. As a result, EPA is enabling automakers to save the credits earned during the SAFE rule, instead of spending them in the early years of compliance with the proposed rule, furthering the damage associated with the SAFE rule. Overall, ACEEE found that the credit extensions would reduce the emissions savings from the proposed rule by 22%.[EPA-HQ-OAR-2021-0208-0251-A1, pp.7-9]

Retain the 5-year lifetime for MY 2016-2020 credits [EPA-HQ-OAR-2021-0208-0251-A1, p. 15]

8 MY 2022 emission target is unchanged from SAFE rule. All credits extended into MY 2022 are also extended to MY 2023 and credit usage and changes in achieved fleet emissions are assumed to take place then.

Commenter: American Honda Motor Company (Honda)

Extended Credit Carry Forward. In order to help support compliance flexibility, the agency proposes extending the current 5-year credit carry forward provision by two additional years for Model Year 2016 credits, and by one additional year for Model Year 2017-2020 credits.

Honda has previously13 supported the concept of extended credit carry forward for Model Year 2016- 2020 credits, and does so here as well. Considering industry-wide fleet average performance over the past few years, as noted in the EPA Trends Report, it is not unreasonable to expect that the pace of environmental progress called for in the proposed regulations may present compliance challenges for some if not many automakers. A robust credit market is one way to ensure that manufacturers continue to have a path to compliance, and that environmental gains continue to be realized, even in the face of challenging standards. [EPA-HQ-OAR-2021-0208-0565-A1, p.5]

Honda respectfully requests that the agency consider additional regulatory flexibility in this space, for the following reasons:

• Credits generated under the ABT program reflect actual emissions reductions. Because GHG emissions persist in the earth’s atmosphere for roughly a century, the benefits of avoided emissions are equally lasting. Extending credit lifetimes beyond a 6-7 year period would not undermine the scientific integrity of the ABT program.

• As widely reported in the media over the past 18 months, the automobile industry is facing severe global supply chain issues that continue to disrupt vehicle production volumes, launch dates and compliance strategies. Slight modifications to the proposed credit carry forward provisions could provide much needed compliance flexibility during an exceedingly challenging compliance planning time.

• The agency's proposed targets include significant g/mi reductions (increases in stringency) in Model Years 2023 and 2026. While companies that signed up to the California Framework agreement can reasonably be expected to meet MY2023 stringencies, Model Year 2026 is likely to prove difficult for most, if not all, manufacturers.

In summary, while we strongly support the broad concept of extended credit carry forward of MY2016- 2020 credits, industry's navigation of the MY2023-2026 window will present very real cost, timing, and logistical challenges. As such, we see rationale for extending the credit carry forward provisions beyond those specified in the proposed rule. For example, a more flexible program could be (a) one in which two-year extensions are granted to model years 2016 through 2020 or, (b) under a slightly more conservative approach, two-year extensions to MYs2016-2019, while limiting MY2020's extension to just one year. The latter design would help telegraph to regulated parties the temporary nature of this approach to ABT, and that standard ABT rules would likely resume under future regulatory programs. We believe each of these alternatives remain aligned with the spirit and intent of the agency's proposed credit carry forward modification, while providing an important additional degree of compliance flexibility. [EPA-HQ-OAR-2021-0208-0565-A1, p.6]

Commenter: California Air Resources Board (CARB)

As we elaborate below, the credit-based structure of the rule, the availability of those credits, and the averaging times involved all readily support multiple paths for compliance. The proposal includes several options for credits and flexibilities for meeting these standards. Indeed, some of these flexibilities may be undue: Some should be adopted, but some should not, as we explore in detail in these comments. [EPA-HQ-OAR-2021-0208-0643-A6, p.7]

[S[hould not extend the life of credits [EPA-HQ-OAR-2021-0208-0643-A6, p.7]

In this section we discuss evidence supporting this point. We also discuss why U.S. EPA should not unduly protect credit banks earned as windfalls against the weak SAFE standards and make recommendations on how ZEV-only manufacturers' credits can further support U.S. EPA's proposal. [EPA-HQ-OAR-2021-0208-0643-A6, pp. 28-29]

And under the federal standards, the credit banks that automakers have amassed provide a trajectory and assurance they will remain in compliance with the standards.85 The flexibility offered by these provisions is discussed further in the next section. [EPA-HQ-OAR-2021-0208-0643-A6, p.30]

The Credit Provisions Support Meeting the Standards in the Given Lead-Time. Beyond the question of whether manufacturers have developed the technology to meet the proposed standards and its cost, the structure and design of the standards provide manufacturers with options for meeting them in any given year. While recognizing that more stringent standards than those currently in place are feasible, CARB recognizes the value of providing a variety of means to comply. CARB supports credit averaging, banking, and trading options that enable compliance to be determined over multiple periods and credits for innovation. CARB supports the continued use of such provisions so long as they maintain the effective stringency of the standards to reduce real-world emissions.

U.S. EPA also requested comment on whether the proposal would disrupt manufacturer plans to over-comply with current standards and produce credits to sell to other manufacturers, by raising the regulatory baseline. Fundamentally, this issue should not be a primary consideration, as the core need is to reduce emissions, not to protect potential windfall credit revenues created by the unduly weak current standards. The statute does not require that U.S. EPA protect windfall profits at the expense of public health.

Moreover, there is not a credible argument that such credit windfalls are needed for compliance nor that some manufacturers may have already developed plans that were reliant on such credit windfalls. Manufacturers must plan first to ensure they comply with their own obligations and have done so.91 Primarily, these obligations were defined by the National Program standards before the Final SAFE Rule emission standards. By necessity, each manufacturer had developed a path to compliance with those standards. The uncertainty and turmoil brought about from 2018 through 2020 from the SAFE standards proposals, litigation, and final standards that were not released until the 2020 calendar year happened much too late in the product planning cycle to allow manufacturers to make wholesale changes to their original plans. If anything, the SAFE standards inequitably disrupted manufacturer plans by providing an unexpected benefit only to manufacturers that had delayed technology deployment as long as possible, thereby taking the riskiest path to compliance and the worst for public health. No manufacturers will credibly be able to claim that they have dramatically changed their plans since the Final SAFE rule was finalized in 2020 such that U.S. EPA must now act to protect windfall credits.

But such a reliance scenario could only happen in two very unlikely instances – first, if a manufacturer had carried massive deficits into those years and needed overcompliance to avoid penalties, or second, if it planned to generate credits to offset even greater shortfalls in future years.

The first scenario requires assuming a manufacturer dramatically fell short of the weak Final SAFE Rule emission standards. But because those standards were, as conceded in the SAFE proceedings, below the expected level of manufacturer compliance, this is not at all likely. The second scenario is equally implausible. Under the Final SAFE emission standards, the standard remains constant from 2026 model year on so overcompliance in 2025 and 2026 model year would also mean continued overcompliance in subsequent years. Technology continues to improve, and manufacturers have publicly committed to deeper decarbonization of their fleets, so there is not a need to protect credits against the lax Final SAFE standards. To the extent this was intended to ease compliance for anticipated future GHG standards, such action would be highly speculative, not only to the stringency of such standards, but also to the timing of their adoption and to whether credits earned under the current standards would even be allowed towards compliance with the future standards.

This issue of manufacturer compliance planning presents itself in yet another way in the proposal, where U.S. EPA proposes to extend the years for which credits under the 2016 through 2020 model years may be used.92 U.S. EPA proposes these extensions to ease the transition to the more stringent standards and contends that existing provisions that provide a finite life for credits provides precedent for this proposal to reset those lifetimes. CARB disagrees with both premises.

When manufacturers planned their products to generate the credits, they were aware of the constraints on their use and available terms. Because these credits were earned before the Final SAFE Rules went into effect, they reflect manufacturer planning to meet the more stringent standards then in effect with improved technology after those credits had expired.

Furthermore, extending the credit life is not necessary to facilitate compliance. In the time available, manufacturers can incentivize sales of vehicles with more of the necessary technologies if they are needed to meet the proposed standards, including additional zero-emission technologies. As discussed above and in the Roush Engineering report, many manufacturers offer high-sales volume vehicles in a variety of configurations, many of which have emission rates that are more than 10 percent lower than other configurations. Manufacturers can adjust the technical content, additional features attractive to consumers, pricing, and incentives to use these attributes of their existing products to meet more stringent standards without significant additional research or development investment or changes to vehicle design. [EPA-HQ-OAR-2021-0208-0643-A6, pp. 31-33]

Commenter: Center for Biological Diversity, et al.

EPA should not extend the carry-forward life for MY2016-2020 credits. EPA has proposed to extend the number of years that banked MY 2016-2020 vintage credits may be carried forward by up to two years, making expired MY 2016 credits usable through MY 2023, and soon-to expire MY 2017-2020 credits usable through MY 2023-2026. Proposal, 86 Fed. Reg. at 43,764. The agency states that it is doing so to address the unusual current circumstances, where lead time is shorter than in some previous rulemakings and the nominal stringency increase for MY 2023 is nominally steeper.

Automakers factor banked credits into their production and compliance planning for the following five-year period. But automakers’ production planning does not, and cannot, rely on expired credits; retroactively granted credit life extensions thus do nothing to spur the development or application of more advanced technologies or vehicle electrification: they constitute windfalls. Moreover, some banked credits have been earned even though they were already untethered from any real-world emissions reductions, such as is the case for multiplier credits, and thus would constitute double-windfalls. Retroactive credit life extensions are also not required due to lead time concerns, as Dr. Cooke's modeling establishes for both the Proposal and Alternative 2.

We therefore urge EPA not to extend the lifetime of MY 2016-2020 credits as proposed—or, at a minimum, not to extend them beyond MY 2024. [EPA-HQ-OAR-2021-0208-0651-A1, p. 64-65]

Commenter: Center for Climate and Energy Solutions (C2ES)

The extensions of credit carry-forward included in this proposal provide significant flexibility for automakers and reduce the effective stringency of the standards. While C2ES supports compliance flexibilities for the private sector and incentives to accelerate the deployment of zero-emissions technologies, these should not come at the cost of necessary reductions in emissions. [EPA-HQ-OAR-2021-0208-0287-A1, p.4]

Commenter: Chemours Company (Chemours)

EPA should increase the transparency of data concerning the generation, holding and sale of GHG emission credits, making additional information on such activities available to the public. While EPA's supporting technical documents provide a good overview of the current credit market for LDVs, additional, more granular detail (consistent with claims of Confidential Business Information) is needed to fully understand how credits are being generated and utilized. Such transparency would benefit the efficiency of the credit market as well allow for further assessment of the relative performance of various credits.[EPA-HQ-OAR-2021-0208-0232-A1, p. 3]

EPA Should Increase Transparency of Vehicle GHG Credit Market. EPA's 2020 Automotive Trends Report58 provides helpful information concerning how vehicle manufacturers comply with EPA vehicle standards. Among the information provided is a breakdown, by manufacturer, of the footprint and standards for each vehicle in a manufacturer's fleet, trends in compliance, the relative production of EVs and PHEVs, advanced technology credits earned per manufacturer and adoption of alternative refrigerants.59

While the data in Tables 5.1 – 5.19 in the Trends Report is valuable in understanding the overall credit position of different manufacturers, EPA should also provide public access to the underlying data upon which the tables were generated. Nearly all the data in the Trends Report is based on vehicle manufacturer's direct submissions to EPA and from testing either performed by EPA or the vehicle manufacturers themselves.60 And while EPA has provided additional ability to download data from supplemental data tables, EPA notes that "[t]he full database used for the analysis is not publicly available."61 This lack of availability is apparently based on a claim of Confidential Business Information ("CBI") by manufacturers.

EPA should further review what data may be made available to the public concerning vehicle emission credits, consistent with its obligations and regulations regarding the treatment of CBI.62 To the extent that additional underlying data on credits can be released by EPA, it should be to increase the transparency of EPA's proposed rule and help to inform both the commercial marketplace and consumers of relevant information concerning vehicle performance, approaches to controlling GHGs and the compliance strategy for different vehicles.

A more fulsome release of emission data which identified specific regulated parties is not unprecedented. For example, EPA's Clean Market Division allows access to Air Markets Program Data, including customized data inquiries.63 Public inquiries can be made down to the level of allowance transaction totals, transaction types, the facility involved in the transfer, transaction date, and the vintage of allowances including serial numbers.64 While Chemours recognizes that CBI considerations may limit access to all data on which the Trends Report is based, EPA should during the remaining course of this rulemaking seek to expand the level of information available to the public regarding credits generated, held and transacted in compliance with LDV GHG standards. [EPA-HQ-OAR-2021-0208-0232-A1, p. 13-14]

EPA should also strive to implement greater transparency with regard to the generation, use and trading of vehicle GHG credits. While care must be taken to protect confidential business information, the current amount of information available is insufficient to allow the broader market and the public to understand how the generation and use of credits is occurring. Because credits are interwoven with the overall compliance of vehicle OEMs with GHG emission targets, clearly understanding how the credit market is functioning is vital information for all market segments and the general public to understand. [EPA-HQ-OAR-2021-0208-0232-A1, p. 18]

Commenter: Edison Electric Institute (EEI)

Of the many compliance flexibilities historically available to automakers, fleet averaging has allowed for emissions reductions in a cost-effective way that also serves to expand the vehicle options available to customers. These flexibilities can allow for greater environmental benefits, more cost-effective compliance and expanded customer options. [EPA-HQ-OAR-2021-0208-0284-A1, p. 9-10]

Similarly, the inclusion of averaging, banking, and trading is well-supported for all the reasons discussed, supra. EPA proposes to retain these provisions with certain carry-forward limitations. See 86 Fed. Reg. at 43,733. Averaging, banking, and trading provisions are important tools that allow automakers to average ZEV across their fleet in a way designed to produce lowest-cost regulatory compliance. The inclusion of these provisions is, therefore, appropriate and essential to programmatic success. [EPA-HQ-OAR-2021-0208-0284-A1, p. 12]

Commenter: Environmental Defense Fund (EDF)

Background on GHG Credits. Each model year, manufacturers are required to calculate both their individual corporate average GHG standard and their corporate average GHG performance. This is done separately for passenger cars and light trucks. The corporate average GHG standard is essentially the sales weighted average of each vehicle model's GHG target taken from the footprint curves. Corporate average GHG performance is, similarly, the sales-weighted average of each vehicle model's emissions over the 2-cycle test, adjusted for off-cycle emission controls, advanced technology vehicle multipliers (e.g., PHEVs and BEVs), air-conditioning efficiency and refrigerant credits less any debits accrued for exceeding the methane and nitrous oxide emission standards. If GHG performance exceeds (is numerically lower than) the standard, credits are earned. If GHG performance fails to meet the standard, deficits (or negative credits) are accrued. The basic formula for determining the number of credits in a given model year is:

Credit= sales * (corp. avg. GHG standard - corp. avg. GHG level) * lifetime VMT / 1,000,000

The credit is calculated in terms of megagrams of GHG. The lifetime VMTs for passenger cars and light trucks are specified in the GHG regulations. If "Credit" in the above equation is positive, it is termed a credit. If "Credit" is negative, then it is termed either a negative credit, a debit or a deficit. Credits are earned, traded and used by individual manufacturers, all of which must be reported to EPA. The current and proposed expiration dates for banked credits are as follows: [Table 2 can be found at docket EPA-HQ-OAR-2021-0208-0688-A1, p. 12]

For example, under current law, GHG credits earned during MY 2018 can be used through the end of MY 2023. Under EPA's Proposal, these credits could be used through the end of MY 2024. Deficits can be carried forward for a maximum of three years.

Credits are earned and deficits are accrued for passenger cars and light trucks separately. Credits earned for one vehicle class can be used to address a deficit in the other vehicle class on a megagram basis. Because credits for passenger cars and light trucks are treated separately, a manufacturer could earn credits for their car compliance in a given model year and sell these credits to another manufacturer even though they accrued a deficit for their truck performance in the same model year, and vice versa. In practice, this allows manufacturers to extend the life of their credits, assuming that credits from previous model years are available for use or purchase (which has historically been the case).

Since credits and deficits are earned by individual manufacturers, it is possible and very likely that even if the vehicle fleet as a whole barely meets the GHG standards, some manufacturers will be earning credits and others accruing deficits. As described above, it is even possible that individual manufacturers will earn credits for their cars and accrue a deficit for their trucks. As the deficits can be made up with banked credits from previous model years, the credits just earned can be used to compensate for future deficits. This requires that GHG compliance be tracked by manufacturer and vehicle class and model year.

MY 2010-2019 Bank of Credits. The EPA 2020 Fuel Economy Trends Report (2020 Report) provides a detailed description of each manufacturer's credit bank levels at the end of MY 2019, as well as the year in which they expire. The current level of banked credits for all manufacturers (less deficits) is 229 million megagrams. This is equivalent to 73 g/mi GHG for an industry-wide fleet of 15,000,000 vehicles using an average of the lifetime mileages of cars and trucks. In other words, the current, industry-wide reserve of credits is very large.

Roughly two-thirds of this reserve (151 million megagrams) is due to expire after MY 2021. These credits were earned in MYs 2010-2016. EPA is proposing to extend the life of credits earned in MY 2016 from the end of MY 2021 to the end of MY 2023. The 2020 Report does not distinguish between the number of credits earned prior to MY 2016 and those earned in MY 2016, which would have differing expiration dates under the Proposal. For the purpose of this analysis, the number of banked credits earned industry-wide in MY 2016 was conservatively estimated by assuming that they equal the lesser of:

1) the credits earned in MY 2016 (i.e., the maximum possible level), and

2) the total level of banked credits at the end of MY 2019 less those expiring in later model years (which were presented in the 2020 Report).

Another way to put this assumption is that, for each manufacturer and vehicle-class combination, we assume that manufacturers act to maximize the life of their credits. This assumption is reasonable. EPA allows manufacturers to carry a net deficit credit balance for 3 years. Credits do not earn interest or carry interest charges. Thus, there is no risk for a manufacturer to carry a deficit balance for their car or truck performance while carrying a positive credit balance for the performance of the other vehicle class. If the manufacturer is able to use or purchase credits of an earlier vintage to cover its credit deficit at a reasonable price, it is reasonable to assume that a manufacturer would do so, enabling the manufacturer to carry its newly earned credits for up to five years when the value of credits is likely to be higher for both itself and other manufacturers due to more stringent GHG standards.

Table 3 shows each manufacturer's credit balance at the end of MY 2019. Manufacturers not producing MY 2020 vehicles (i.e., not contained in NHTSA's MY 2020 baseline fleet) were omitted, but the total GHG credit balance held by those omitted manufacturers was only 182,000 megagrams, less than 0.1% of the industry-wide balance. [EPA-HQ-OAR-2021-0208-0688-A1, p. 11-13] [Table 3 can be found at docket EPA-HQ-OAR-2021-0208-0688-A1, p. 13]

Framework manufacturers do not need these pre-MY 2021 credits for compliance with EPA's Proposal for two reasons. First, they should earn substantial credits under the 2020 Rule in MY 2021 and 2022, which requires fewer emissions reductions than those specified in the Framework Agreements; and those specified reductions are comparable to those required to meet EPA's Proposed Standards for MYs 2023 and 2024. Second, we compared the credits that some of the Framework manufacturers might need to comply with the 2020 Rule and the Proposed Standards, respectively, over MYs 2021-2024 to those being generated by other Framework manufacturers over this timeframe. These manufacturers together have ample credits to facilitate compliance through MY 2024.

In order to achieve the emissions reductions contemplated by the Framework Agreements through MY 2024, Framework manufacturers may use up to 4 million megagrams of credits from their current credit banks – only a small fraction of the 34 million megagrams of pre-MY 2021 credits held by these manufacturers. Thus, we conclude that Framework manufacturers can make the vast majority of their pre-MY 2021 credits available to non-Framework manufacturers without implicating their own ability to apply credits to meet their voluntary commitments under the Framework Agreements. This means that credits earned by Framework manufacturers could be sold to non-Framework manufacturers for use toward compliance with the Proposed Standards.

In light of Agreement provisions limiting use of credits generated under the federal standards, we assume here that the Framework manufacturers will not sell any federal credits accrued under the Framework (i.e., credits earned in MYs 2021 and beyond) to non-Framework manufacturers. This is a conservative assumption regarding the ability of non-Framework manufacturers to acquire credits to comply with the proposed EPA standards. [EPA-HQ-OAR-2021-0208-0688-A1, p. 14]

22 Some automakers may only need to do a subset of these actions. See EDF analysis infra, at 9.

Commenter: Environmental Law & Policy Center (ELPC), et al.

EPA allows an automaker that over complies with the standards in a given year to earn credits, which it can then either use to offset its own undercompliance in a different year or trade to another manufacturer to offset that manufacturers' undercompliance. Such a system ensures that the entire U.S. automobile fleet's emissions meet the overall standards and emissions reductions goals. [EPA-HQ-OAR-2021-0208-0567-A1, p. 4]

Commenter: Gentherm, Inc.

Support the limited credit carry-forward proposal. Gentherm supports the limited credit carry-forward proposal that provides additional flexibility for credits earned during MY2016 to MY2020. This provision simply preserves credits which might be lost for future compliance. There is limited lead-time before 2023 for automakers to make technology changes to ensure compliance with the tighter requirements proposed by the EPA. The proposed extension of credit life may help bridge the 10 percent decrease in top line stringency for MY2023 and generally provide flexibility for industry to meet proposed targets. [EPA-HQ-OAR-2021-0208-0216-A1, p. 7]

Commenter: Hyundai America Technical Center, Inc. (Hyundai)

Credit bank carry-forward extension and carry-back provision. Hyundai supports the credit bank carry-forward and carry-back provisions to provide flexibilities to account for unexpected variations in vehicle sales. [EPA-HQ-OAR-2021-0208-0603-A1, p.8]

Commenter: Institute for Policy Integrity

EPA should carefully assess whether a more tailored application of any of its credit extensions would further increase net benefits and equity while still preserving sufficient flexibility for manufacturers. [EPA-HQ-OAR-2021-0208-0299-A1, p. 1]

Similarly, EPA should also more critically evaluate the trade-offs resulting from its proposed extension of multiplier credits and the credit carry-forward period and consider the forgone benefits to public health and consumer fuel savings associated with these compliance flexibilities. To the extent that these extended compliance flexibilities are intended to provide additional lead time for manufacturers to comply with the MY 2023 standards, EPA should evaluate whether such flexibility is needed beyond the first model year of its proposed standards. As detailed below, we do not believe EPA is required to provide significant lead time for standards (such as the proposed standards) that do not require significant technology investment and development. EPA should consider whether scaling back even some of the multiplier credits or carry-forward period, or limiting their application to MY 2023, would increase net social benefits while still preserving more than enough compliance flexibility to satisfy the requirement for lead time. [EPA-HQ-OAR-2021-0208-0299-A1, p. 3.]

Second, manufacturers have access to significantly more compliance flexibilities under the Proposed Rule than they did under EPA's past criteria pollutant standards, including credit trading, credit multipliers, a large bank of available credits, and credit carryback provisions that allow automakers to make up for any possible shortfalls in earlier model years by increasing their efforts in subsequent years. Thus, even if automakers do not quite meet the MY 2023 standards, they have several years of lead time to adjust their production in MYs 2024–2026 and apply any credits earned in those years backwards to MY 2023. In addition, automakers are sitting on a significant bank of credits earned in past model years that can be applied toward any shortfalls in MY 202354 (and indeed, EPA has proposed extending the lifetime of those credits to provide even more flexibility55). [EPA-HQ-OAR-2021-0208-0299-A1, p. 8.]

Commenter: ITB Group, Ltd. (ITB)

ITB also supports the limited credit carry-forward proposal that provides additional flexibility for credits earned during MY2016 to MY2020. This provision simply preserves credits that might be lost for future compliance. There is limited lead time before 2023 for automakers to make technical changes to ensure compliance with the tighter requirements proposed by the EPA. The proposed extension of credit life may help bridge the 10 percent decrease in top-line stringency for MY2023 and generally provide flexibility for the industry to meet proposed targets. [EPA-HQ-OAR-2021-0208-0222-A1, p. 1]

Commenter: Lucid USA, Inc. (Lucid)

To promote a faster path towards the full electrification and net zero goals that President Biden has announced, as well as the interim goal of 50% electrification in the Executive Order that the President issued last month, EPA should limit and/or phase out certain flexibilities under the GHG regulatory program. EPA has over-expanded credit carry-forward for model years 2023-2026. While Lucid understands that some degree of flexibility in the use of credits is important to facilitate the transition to more stringent standards, the proposed increase in flexibility (particularly to meet the requirements for model year 2023) weakens the stringency jump in the standards. Although the proposed standards are more stringent than the Trump standards, the increased flexibilities proposed in the NPRM would effectively make the standards less stringent than the standards issued under the Obama Administration until Model Year 2026. [EPA-HQ-OAR-2021-0208-0528-A1, pp. 4-5]

Commenter: Mercedes-Benz USA, LLC

Mercedes-Benz supports EPA's proposal to adopt a one-time credit carry-forward provision from MYs2016-2020 credits and MYs2017-2020 from five to seven years and five to six years, respectively. [EPA-HQ-OAR-2021-0208-0523-A1, p.2]

Proposed Extension of Credit Carry-forward. EPA is proposing a one-time extension of credit carry-forward for credits generated in MYs2016 through 2020 from five to seven years and credits generated in MYs2017-2020 from five to six years. Mercedes-Benz supports EPA's credit extension proposal as another opportunity for EPA to provide flexibilities to manufacturers in their compliance strategies, particularly within later years of the GHG program, where we believe credits will be critical for fleet compliance to bridge the gap between internal combustion engine vehicles and the all-electric transition. [EPA-HQ-OAR-2021-0208-0523-A1, p.4]

Commenter: Motor & Equipment Manufacturers Association (MEMA)

Extended Credit Carry-Forward Proposal. EPA's current program limits credit carry-forward to five years (and carry back three years). EPA is proposing a limited extension of credit carry forward for credits generated in MYs 2016–2020. Credits received in MY2016 extend from five years to seven years, and from MYs 2017–2020 from five years to six years. EPA explains that, because of the transition to more stringent standards from MYs 2023–2026 and the stringency increase between MYs 2022–2023, an extremely steep step with a relatively limited lead time, it is appropriate to provide a limited amount of additional flexibility for carry-forward credits.31

MEMA supports the carry-forward proposal that provides additional flexibility for credits earned during MYs 2016–2020. This extension will help bridge the 10 percent decrease in MY2023 and generally help the industry in meeting the proposed targets. MEMA also supports the credit carryforward returning to the normal five years in the existing averaging, banking, and trading (ABT) regulations in the post-2026 program. [EPA-HQ-OAR-2021-0208-0249-A1, p. 10]

Commenter: New York State Department of Environmental Conservation

More specifically, New York recommends against extending the credit carry forward beyond 5 years for 2016-2020 credits. The current 5-year credit carry forward is adequate and provides a buffer for unanticipated compliance shortfalls. Extending credit carry forward to 6 or 7 years is unnecessary considering most manufacturers did not revise their product plans to comply with the misguided SAFE Rule and have numerous technology options available today. Extending credit carry forward will limit adoption of these technologies, thereby reducing the program's effectiveness. [EPA-HQ-OAR-2021-0208-0238-A1, p.2]

Commenter: Nissan North America, Inc.

GHG Credit Life. In general, Nissan supports EPA's proposal to extend the life of GHG credits generated between model years 2016 and 2020 under the averaging, banking, and trading ("ABT") provisions; however, Nissan encourages EPA to go further. EPA's current proposal offers only a one-year extension for credits generated between model years 2017 through 2020, and no extension for credits generated after model year 2020. The ABT mechanism has been a key compliance flexibility under the GHG regulations and would become more necessary under the increasingly stringent standards in the future. Extending credit life would enable automobile manufacturers to invest appropriate resources at the appropriate time without eroding overall industry GHG benefits. EPA should therefore extend the life of all model year 2015 and later GHG credits through at least model year 2026 to provide manufacturers with necessary compliance flexibility. Extending the applicable life of GHG credits attained by overachieving the standards with the early introduction and ever-growing use of ZEVs would be consistent with the Administration's environmental policy. Early production of EVs has played an important role in laying the ground for the initial EV market. Such early action was instrumental for the long-term future of the EV market, and allowing the use of credits generated by such early environmental action is appropriate. [EPA-HQ-OAR-2021-0208-0529-A1, p. 9]

Commenter: Peterson, Doug

The Expiration Dates of Existing Compliance Credits Should Not Be Delayed. It is unclear to me whether the EPA intends to consider objections to the proposal to delay the expiration of compliance credits. As you can see, I intend to object. It seems to me that it would make a mockery of the rulemaking process if this very destructive alteration to the agreed upon regulatory framework were allowed to become part of the finalized 2023-2026 rule without input from all stakeholders. The issue of the credit expirations should be vetted publicly, as the proposed change has great significance that is closely related to the stringency increases and the effort to accelerate the adoption of zero emission vehicles. This is not a trivial matter about how the EPA chooses to administer the CAFE standards, subject to its administrative discretion alone. The enormous glut of credits expiring at the end of the 2021 model year has undermined the stringency of the CAFE standards for far too long already, coddling the most irresponsible automakers with its pay-to-pollute "flexibility".

According to the EPA's 2020 Automotive Trends Report, a whopping 151,139,573 megagrams of compliance credit are scheduled to expire at the end of the 2021 model year. 21,747,811 megagrams of credit are scheduled to expire at the end of 2022. It was originally agreed that earned and purchased credits would expire after five years. The enormous number of credits expiring in 2021 was created because additional leniency was extended to automakers that allowed them to delay all credit expirations through 2021, a questionable extension in its own right. The five-year lifespan of credits was a sensible way to balance the need for flexibility with the need to enforce the 6 increasing stringency of the footprint targets, and it should never have been tampered with. Some argued that the credits should never expire, and this was wisely rejected, but delaying expiration through 2021 has provided the same outrageous flexibility benefit. An enormous glut of compliance credits quickly became available at the beginning of the CAFE program, far more than enough to keep all automakers in compliance whether they met their standards or not. No automaker has ever come close to falling out of compliance. When fourteen out of twenty automakers failed to meet their standards in 2019, it generated an industry-wide credit deficit of 23,821,639 megagrams. The enormous portion of the credit glut expiring in 2021 is over six times as great as the discouraging 2019 shortfall. If a glut of this magnitude is allowed to persist, the stringency increases that the EPA is proposing will be severely undermined in the near term. Any automaker wishing to exceed its footprint targets can do so by using banked credits or paying more responsible automakers for their excess credits, and history shows that they will. The CAFE program is now only generating small incremental improvements in fuel economy, and between 2018 and 2019 it apparently generated no improvement whatsoever, with industry performance holding steady at 253 grams per mile. Delaying these expirations any further is indefensible. Plenty of credits will still be available to provide a reasonable amount of flexibility if we allow these credits to expire, as originally planned, after five years.

Over half of the industry credit deficit in 2019 was due to one irresponsible automaker, Chrysler, know then as Fiat Chrysler Automobiles (FCA), now embedded in the Stellantis conglomerate. FCA's 2019 fleet was assigned a very lenient target of 275 due to the large footprints of its popular models, and it fell far short, performing at an abysmal 303. Their poor performance generated a deficit of 13,345,869 megagrams, which was roughly 56% of the entire industry shortfall that year. The failure of FCA's fleet of over 2 million vehicles was almost completely offset by one small automaker that only sold 125,538 vehicles, Tesla, which earned 11,070,481 credits exploiting the overly generous rules governing electric vehicles. Since the onset of the supposedly rigorous 2012 CAFE standards, FCA has openly ignored its responsibility to improve the fuel efficiency of its fleet, maintaining compliance year after year with purchased credits. They ended 2019 with an enormous bank of 47,069,423 credits, more than any other automaker, having purchased 82,128,881 credits over the years. General Motors has purchased 10,677,251 credits during the same timeframe. The EPA is not authorized by the Clean Air Act to collect civil penalties from automakers as an alternative to meeting their emission standards, but the ability to purchase compliance credits from other automakers provides the same destructive pay-to-pollute benefit. Delaying the expiration of the credits that expire in 2021 extends inappropriate leniency to the brands of Chrysler, by far the most irresponsible large automaker, which has 19,348,175 purchased credits set to expire that year.

The EPA's justification for maintaining the glut of compliance credits is highly questionable. The proposal states that the expirations are being delayed in order to compensate for the large stringency increase that will occur in 2023 and then be followed by more increases the following three years. The argument includes the silly notion that automakers only had two years to plan for the large 2023 stringency increase, and that extra flexibility is in order to compensate for the lack of notice, two years being seen as a short period of lead time for automakers to make adequate plans. None of this makes any kind of sense. Automakers do indeed make their plans well in advance, and Trump's rollbacks weren't even finalized until 2020, and they were subject to the uncertainties of legal challenges. It is not as if automakers adjust their fleet mixes and model designs at the drop of a hat to please the EPA. Most automakers sell as many gigantic gas-guzzlers as they possibly can 7 no matter what the EPA decides, counting their ample banks of compliance credits after the EPA does its yearly calculations. Their ongoing advertisement campaigns are more than enough proof that they hope to maximize the sales of their largest, most profitable models, just as they always have. If it looks like they might be running low on credits, they can purchase more from Tesla, which is sure to have plenty for sale, or from Honda, the most responsible large, conventional automaker. The automakers don't have to change their plans one bit. If these credit expirations are delayed, the credit glut will be maintained at a very high level. While they are using up credits that would otherwise expire, automakers will be building up their credit banks quickly in 2021 and 2022 as the Trump Administration's nominal stringency increases go into effect. By the time 2023 rolls around, the credit glut will have exploded. The only reasonable argument for delaying the expirations is that the glut is already so enormous that it doesn't really matter if it gets even bigger. I emphatically reject that idea. The glut needs to be brought under control.

The leniency of the Trump standards will be accompanied by increasing EV adoption, inflating the glut of credits even further as more and more automakers begin to enjoy the excessive windfall credits generated by their own electric vehicles. Ford already has orders for over 120,000 F-150 Lightning EVs. General Motors might be selling electric Hummers along with its popular Mustang Mach-E. If the current rules regarding EVs remain in place, these vehicles will generate an extraordinary number of compliance credits, removing any restraint the stringency increases might place on the conventional models in their fleets that fail to meet their footprint targets. There simply is no rational justification for delaying the scheduled expiration of these credits. The glut of credits is going to be larger than it has ever been, severely undermining the stringency increases. The CAFE framework was designed to act like a cap-and-trade system. It wouldn't really matter which automakers improved efficiency and which did not, nor did it matter which models in an automaker's fleet provided emission reductions as long as some did. Compliance credits could be earned, purchased, and banked to provide flexibility. As long as the stringency of the footprint curves continued to increase, collective carbon dioxide reductions would be insured. A company could evade improving its fleet by purchasing compliance, but not forever. Eventually, the tightening of the footprint targets would leave its fleet further and further behind and its pay-to-pollute strategy would become unsustainable. Sounds reasonable.

But the EPA cannot deny that the framework is not functioning according to its theoretical design. Electric vehicles are generating far more compliance credits than they deserve because they are not held accountable for their upstream emissions, earning an automatic zero on their two-cycle tests. The generous credit windfall has then been doubled because of the credit multiplier. The theoretical cap-and-trade system leaks carbon dioxide, failing to deliver an actual cap on CO2 emissions. While it may be true that all automakers have been forced to take the standards seriously to some degree, real-world fuel economy improvements have fallen far short of the CAFE program's promises. Fuel economy was supposed to double from 27 mpg to 54 mpg by 2025, preventing huge quantities of CO2 from entering the troposphere. But by the EPA's own admission, real-world fuel economy only improved 7% from 2012 to 2019. These meager gains averaging roughly 1% a year occurred while the Obama Administration's supposedly stringent rules were in place, and during this same period annual gasoline consumption increased from 3.2 to 3.4 billion barrels. The failure of the program is due to the inherent leniency of the footprint model, the overly generous credits generated by BEVs, and the excessive flexibility of credit trading. Automakers appear to keep up with the standards, but when all is said and done the program fails to deliver. Delaying the 8 expiration of credits compounds that failure when the EPA should be looking to correct it. The Earth needs these emission reductions right now, and U.S. gasoline consumption is not going down. [EPA-HQ-OAR-2021-0208-0692-A1, p. 5-8]

Commenter: Rivian Automotive, LLC

Do Not Extend Credit Carry-Forward. Credit averaging, banking, and trading provisions have historically been a reasonable and important compliance flexibility, particularly when the vehicle emissions standards finalized in 2012 were promulgated. At the time, industry was required to achieve unprecedented emissions reductions and various flexibilities were appropriate to aid in the transition to a newly ambitious regulatory paradigm.

In a much different context, EPA now proposes to extend the conventional five-year "carry-forward" window for credits earned in MY 2016-2020. The proposal argues that an extension of the carry-forward provision is warranted as part of the rulemaking in part to help "address any potential lead time issues" manufacturers could face in meeting the newly revised standards and that "there is precedent for extending credit carry-forward."6 These arguments are unpersuasive. Simply because there is precedent does not mean that an action continues to make sense. Additionally, the existing program of less stringent vehicle emissions standards—the "SAFE Rule"—was only finalized in March 2020. Automakers adhered to the previous 2012 standards, more stringent even than the current EPA proposal, until that time. Given the brief period that has elapsed since finalization of the SAFE Rule, it seems unlikely that automakers would experience any lead time issues developing and tooling compliant product portfolios. They likely would not have had sufficient opportunity to unwind business plans previously developed to meet the standards of the 2012 rules, which in turn should be adequate to the task of complying with EPA's current proposal. Extending credit carry-forward is therefore unnecessary. [EPA-HQ-OAR-2021-0208-0274-A1, p. 3]

Commenter: Southern Environmental Law Center

EPA must also ensure that the credit structure adopted is carefully designed so that the stringency of standards is not unnecessarily diluted. To this end, EPA should strongly consider discounting credits generated during model years 2021 and 2022 and should not extend the five year carry-forward period for such credits, due to the substantial weakening of the GHG emissions standard under the Trump administration's SAFE Rule. [EPA-HQ-OAR-2021-0208-0244-A1, p. 2]

When utilizing compliance flexibilities, EPA must ensure the credit structure does not unnecessarily dilute the stringency of the standards. The credit system is a long-standing component of the federal tailpipe emissions standards. It allows vehicle manufacturers to average, bank, and trade credits generated for overcompliance with the standards in order to design compliance strategies that best suit their unique fleet composition. These existing compliance flexibilities mean that even manufacturers that have not invested in EVs and other advanced technologies to-date have ample ways to comply with the more stringent standards being considered.

It is critical that EPA carefully construct the credit system in a way that balances compliance flexibility and innovation incentivization with the inevitable loss of stringency of the standards resulting from the use of credits. This is especially important during the transition from the substantially weaker SAFE Rule standards for model years 2021 and 2022. As noted in EPA's analysis and discussed above, it is unlikely that many vehicle manufacturers have altered their design and engineering plans developed to comply with the 2012 Rule. This means manufacturers may generate a substantial amount of overcompliance credit while the SAFE Rule is in effect during model years 2021 and 2022. Not discounting credits generated during these model years would be problematic and is likely to effectively weaken the GHG emissions standards for many years in the future. For these same reasons, EPA should not extend the five-year carry-forward for credits generated in these model years.[EPA-HQ-OAR-2021-0208-0244-A1, p. 6]

In order to ensure the stringency of the standards, EPA should also adopt several changes to the standards' compliance flexibilities. The substantial relaxation of GHG emissions standards under the Trump administration's SAFE Rule means EPA should discount credits generated during model years 2021 and 2022, and should not extend the five-year carry-forward period for such credits. [EPA-HQ-OAR-2021-0208-0244-A1, p. 8]

Commenter: Tesla

EPA Should Not Extend the Lifetime of Previously Earned Credits. In its proposal, EPA extends the lifetime of existing credits generated in MY 2016 by two years and MY 2017 and beyond by one year. Such a proposal rewards manufacturers that have not adequately moved to deploy technologies in the U.S. to meet the past performance standards. This is highlighted by the fact that in 2011 auto manufacturers received 'a one-time carry-forward of unused MY 2010-2016 credits through MY 2021.'166 Allowing MY 2016 and MY 2017 credits to extend out for use in compliance years MY 2022 and 2023 undercuts the near-term stringency of the agency's proposal. Tesla's modeling estimates the extension of the MY 2016 and 2017 credit bank will result in a reduction in stringency of 4.3 g/mi in MY 2023. See Figure 1. Tesla notes that the one-year extension of the credit lifetime for model years beyond MY 2017 will further reduce stringency by another ~5 g/mi.

Additionally, the credit lifetime extension will also lessen the immediate value of earned credits in the trading market as underperforming manufacturers now may have greater opportunity on when to deploy credits. Operating under a consistent set of credit lifetime regulations, manufacturers over complying have been able to enter a robust credit marketing, basing credit value and need, in part, on a five-year lifetime. Under the proposal, the immediacy of the market will diminish, meaning less revenue and opportunity for overperforming manufacturer that seeks to utilize credit revenue sales to invest in increased manufacturing of advanced technology vehicles.

Like the other proposed flexibilities, this proposed change in credit lifetime reduces the standard's stringency, diminishes the level of investment going back into advanced manufacturing, and only serves to reward those manufacturers that delay deploying advanced technologies. Moreover, it retroactively undermines the value of Tesla's existing credits and penalizes Tesla's settled expectations as to the value of those credits.167 As courts have repeatedly reaffirmed, agencies generally may not promulgate retroactive rules,168 and when a regulation interferes with a party's reasonable investment-backed expectations, as the proposed rule would here, such action could rise to the level of a taking in violation of the Fifth Amendment.169 [EPA-HQ-OAR-2021-0208-0278-A1][pp.19-20]

167 In doing so, EPA's proposal upends Tesla's reliance interests related to the expected value of those credits. EPA's failure to consider those reliance interests would be arbitrary and capricious. See Dep't of Homeland Sec. v. Regents of the Univ. of California, 140 S. Ct. 1891, 1913 (2020) ('When an agency changes course … it must be cognizant that longstanding policies may have engendered serious reliance interests that must be taken into account. It would be arbitrary and capricious to ignore such matters.').

169 Whether a taking has occurred is determined by consideration of the extent to which the government action interferes with reasonable investment-backed expectations, along with the economic impact of the action and the action's character. See Ruckelshaus v. Monsanto Co., 467 U.S. 986, 1005 (1984) (quoting PruneYard Shopping Center v. Robins, 447 U.S. 74, 83 (1980)).

Commenter: Toyota Motor North America, Inc. (Toyota)

Averaging Banking Trading – Extended Credit Life Needed to Manage Stringency Jump. The proposal notes Averaging Banking and Trading allows more stringent standards than otherwise could be considered by providing manufacturers an important tool to resolve lead time and feasibility issues, and that the targeted extension of credit carry-forward is appropriate considering the stringency and implementation timeframe of the proposed standards. 20 Toyota agrees extending the life of credits manufacturers have earned from 2016 to 2020 model year can help manage the short lead time provided to comply with the proposed 10% stringency jump between 2022 and 2023 MY and the required annual improvements that follow. Well established design cycles dictate product cadence and limit the opportunities for new technology to be introduced between now and 2026 model year. About one-fifth of the fleet is redesigned each year, and therefore the compliance burden of rapidly increasing standards will fall significantly on a few models, many which are already well into product development. We agree with EPA that "it is again appropriate in the current context to provide a targeted, limited amount of additional flexibility to carry-forward credits into the 2023-2026 MYs, to ease the manufacturers' transition to these more stringent standards". 21 [EPA-HQ-OAR-2021-0208-0531-A1, p. 11-12]

Commenter: Union of Concerned Scientists (UCS)

Industry's ability to bank and use credits for compliance. A significant strategy for industry compliance with the greenhouse gas emissions standards to date has been to rely upon the use of overcompliance credits, either from a manufacturer's own credit bank (via credit transfers) or a competitor's (via credit trading). Credits generated through overcompliance are generally expected to have a lifetime of five years,15 and manufacturers have up to three years to address any deficits (including through credits carried back from model years following the deficit).

There are a number of flexibilities around the banking and trading provisions that enable liberal usage of credits. For example, credits and deficits are generated at the passenger car or light truck fleet level—this allows a manufacturer to use credits banked in prior years to offset deficits from a fleet in a given year, even if the other fleet generates credits. The net result of this is to effectively extend the lifetime of banked credits.16 Additionally, unlike the Corporate Average Fuel Economy (CAFE) program, credits are freely transferrable between fleets with no limit, which allows more flexibility if one fleet is at a significant deficit for an extended period of time. And finally because Tesla is an all-electric manufacturer, one now building and selling a significant share of credits as a result of the MY2017-2021 EV multipliers and a manufacturer which will continue to earn credits under any near-term standard, there will be a non-trivial trove of credits for some manufacturer(s) to purchase during this rule, should compliance be found challenging.17 [EPA-HQ-OAR-2021-0208-0277-A1, p.6]

Credit lifetime extension. EPA is once again proposing to extend the lifetime of credits beyond the five-year timeframe. It is worth considering both the impact of previous extensions and the necessity of this one. Both topics are discussed below.

The impact of the ‘one-time’ credit extension for MY2010-2015. While finalizing the MY2017-2025 greenhouse gas standards, EPA finalized a ‘one-time CO2 carryforward beyond 5 years, such that any credits generated from MYs 2010 through 2016 will be able to be used to comply with light duty vehicle GHG standards at any time through MY 2021.’65 The agency claimed extending the credit lifetime in this way ‘allows additional flexibility, encourages earlier penetration of emission reduction technologies sooner than might otherwise occur, and does so without reducing the overall effectiveness of the program.’66 However, this turned out to be incorrect.

The impact of the MY2010-2015 credit lifetime extension was compounded by the awarding of early credits for MY2009-2011, for which vehicles already planned (and even sold!) by manufacturers received retroactive credits. All told, this gave industry an absolutely massive cache of free credits at the start of the program, totaling 209 million Mg, of which 119 million Mg are eligible for the credit lifetime extension.67

The majority of early credits should have expired, limiting the damage of the credit bonanza EPA gave away at the start of the program. Unfortunately, the agency’s decision to grant a one-time extension has allowed at least 60 million credits to stick around beyond their expiration according to UCS analysis—because these credits were earned for status quo performance, the impact of this extended life only further diminished the stringency of the program.

The data speaks quite clearly to the impact of this credit extension: right when the program was meant to be more binding and spur technology advancement, manufacturers actually did less because they had amassed a tremendous credit bank from which they could simply draw upon in lieu of additional technology deployment. Even without the early credit program and one-time credit lifetime extension, manufacturers would have remained in compliance with the greenhouse gas program (Figure 14) [Figure 14 can be located at docket number EPA-HQ-OAR-2021-0208-0277-A1, p. 35].

The fall-out of artificially allowing manufacturers to kick the can down the road rather than comply is perhaps most clear when looking at a company like Toyota—Toyota amassed the largest number of early credits, and its light truck fleet has been running a deficit since 2012, largely because they neglected to make major improvements to an engine platform used throughout its light truck fleet.68 Toyota has used its large credit bank to offset these deficits, and yet the company has so many credits left over that they have recently been selling them to companies like Stellantis and Mercedes, who have relied on such credits for compliance for nearly the entire time this program has been in place rather than take the step of selling efficient vehicles as required.69

Modeling of the proposed credit lifetime extension. As at the start of the greenhouse gas program, EPA is once again proposing a credit lifetime extension, claiming that the provision 'provides greater flexibility for manufacturers in using the credits they have generated through overcompliance.'70 However, the manufacturer with the largest credit balance for MY2016-2019 is FCA, whose credits come not from overcompliance but from purchasing credits from Tesla explicitly to avoid significant technology improvements to its vehicle fleet. Moreover, while no doubt any given industry loophole would 'provide greater flexibility for manufacturers,' EPA did not actually establish whether or not such an extension is necessary for compliance with its proposed rule, since the agency did not model the extension.71

UCS modeling indicates that the credit lifetime extension is needed neither to comply with the Preferred Alternative nor Alternative 2 (Figure 15). Even under suboptimal credit utilization (not shown), the Volpe model was able to comply with the Preferred Alternative with the same level of technology adoption as outlined in § I.c. Under optimal credit utilization, the industry is able to comply without the credit lifetime extension and still enter MY2027 with a credit bank of 44 million Mg, plenty of sufficient headroom to handle additional increases in stringency. For Alternative 2 that bank is reduced to just under 12 million Mg. [Figure 15 can be located at docket number EPA-HQ-OAR-2021-0208-0277-A1, p. 37]

Because our modeling indicates that the credit lifetime extension is neither necessary for compliance with the Preferred Alternative nor the more stringent Alternative 2, the extension serves primarily as a loophole and risks repeating the type of harm caused by the first credit lifetime extension, which has delayed technology deployment. [EPA-HQ-OAR-2021-0208-0277-A1, pp. 34-37]

15 The 2012 regulations allowed credits earned for MY2010-2015 not to expire until after MY2021, in a 'one-time CO_2 carryforward beyond five years' (77 FR 62648).

16 For example, say Manufacturer A has a bank of 10,000,000 credits earned in MY2016. In MY2021 A's passenger car fleet generates a deficit of 10,000,000 credits, while their light truck fleet generates 8,000,000 overcompliance credits, yielding a net deficit of 2,000,000 credits. If credits were applied to the manufacturer's fleet in total, just 2,000,000 credits would be applied from MY2016, the remaining 8,000,000 credits in MY2016 would expire (after five years), and no credits would be earned for Manufacturer A in MY2021. Instead, the transfer is applied at the passenger car fleet level—all 10,000,000 MY2015-vintage credits are applied, so none expire.

And that leaves 8,000,000 credits earned by the light truck fleet to be banked for use up through MY2026, even though the manufacturer actually was at a net deficit in MY2021.

17 In 2019, Tesla earned over 11 million Mg of greenhouse gas credits, and in total has sold nearly 40 million Mg (EPA-420-R-21-003). Tesla has previously sold credits to Fiat-Chrysler (now Stellantis), General Motors, and Volkswagen—other large manufacturers could certainly avail themselves of this strategy as well in the future.

EPA Response

EPA is adopting a one-year credit carry-forward extension from five to six years for MY 2017-2018 credits, to allow their use through MYs 2023-2024, respectively. Comments regarding EPA's proposed credit carry-forward extension as well as EPA's response to those comments are provided in section II.A.4 of the preamble.

EPA received comments from the Alliance that EPA should allow manufacturers to petition EPA for an additional fourth year of credit carry-back to provide a pathway for manufacturers who may be at risk of exceeding the three-year window to cover a model year deficit to petition the Administrator for one additional model year of credit carry-back. The Alliance is concerned that there may be issues with supply base and industrial capacity that could negatively impact EV launch dates or volumes, which could put credit carry-back plans at risk. In response, EPA did not propose or seek comment on changing the current 3-year carry-back provision. Therefore, EPA is not making any changes in the Final Rule to this provision. Further, EPA believes that three years is a sufficient period of time to plan for and make up any deficit. The three-year credit carry-back provision is a way for manufacturers that planned to meet their fleet average standards but fell short for unforeseen reasons in a model year to avoid being found out of compliance for that model year. Manufacturers are allowed to cover the deficit with future credits earned over the next three years. EPA believes that a manufacturer that enters a carry-back situation should make up the deficit in the three years provided and that providing the possibility of a fourth year may encourage manufacturers to plan not to make up the deficit until the third or even a possible fourth year.

Chemours commented that EPA should make available additional information regarding credits. EPA disagrees with Chemours comment that the "current amount of information available is insufficient to allow the broader market and the public to understand how the generation and use of credits is occurring." At its discretion, EPA releases an annual report that details the generation and use of credits in the GHG program including the type of credit and amount of credits generated by each manufacturer. It also provides the number of credits used by the manufacturer or traded to another manufacturer.[20] It is unclear to EPA what additional information Chemours is seeking. Chemours states "Because credits are interwoven with the overall compliance of vehicle OEMs with GHG emission targets, clearly understanding how the

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[20] See "The 2020 EPA Automotive Trends Report, Greenhouse Gas Emissions, Fuel Economy, and Technology since 1975," EPA-420-R-21-003 January 2021.

credit market is functioning is vital information for all market segments and the general public to understand." EPA has occasionally been asked for more details on specific credit trades, especially on the price of credits. EPA, however, does not require manufacturers to provide that information to EPA, only the volume of credits traded in a given model year. The price paid by one manufacturer to another as part of credit trading is not relevant for determining compliance.

Doug Peterson commented that extended credit carry-forward "should be vetted publicly, as the proposed change has great significance that is closely related to the stringency increases and the effort to accelerate the adoption of zero emission vehicles and that it should not be subject to EPA's administrative discretion alone." In response, the credit carry-forward provisions are specified in EPA's regulations and EPA sought to change those regulations through this notice and comment rulemaking, providing interested stakeholders an opportunity to comment. The credit carry-forward period is clearly specified in the regulations and not subject to EPA administrative discretion. In fact, EPA has modified extended carry-forward from the proposal, making the extension narrower, after considering comments as part of the rulemaking process.

Mr. Peterson commented also that "since the onset of the supposedly rigorous 2012 CAFE standards, FCA has openly ignored its responsibility to improve the fuel efficiency of its fleet, maintaining compliance year after year with purchased credits." Mr. Peterson also commented that "EPA is not authorized by the Clean Air Act to collect civil penalties from automakers as an alternative to meeting their emission standards, but the ability to purchase compliance credits from other automakers provides the same destructive pay-to-pollute benefit." The commenter is correct that EPA does not have authority under the CAA to collect civil penalties in lieu of compliance, However, EPA disagrees with the characterizations that purchasing GHG credits is not legitimate way to meet the GHG standards. Under the credit trading provisions of the GHG program, the environment is on net "whole" in that in order for one manufacturer to purchase credits (in lieu of adding GHG-reducing technologies), another manufacturer must over-comply (by adding more GHG-reducing technologies). Contrary to the commenter's point, FCA has not ignored its responsibility under the GHG program since it has complied with the GHG program through mechanisms provided in the regulations. Purchasing credits is a legitimate way to meet the standards. Also, purchasing credits generated by another manufacturer though overcompliance differs fundamentally from paying fines in CAFE since CAFE fines are not based on overcompliance by another manufacturer.

In response to Southern Environmental Law Center comment that credits generated in MYs 2021-2022 should be discounted, EPA does not believe that discounting is necessary in light of the more stringent standards EPA is adopting for MYs 2025-2026. EPA is finalizing standards for MYs 2025-2026 that are significantly more stringent than proposed. As part of the modeling and analysis of the more stringent final standards, EPA has taken into consideration the opportunity for manufacturers to generate credits in MYs 2021-2022 and believes that standards are appropriate without such discounting (see section III of the preamble).

EPA's response to Tesla's comments regarding the potential impact of a credit life extension on the value of credits is provided in preamble section II.A.4. Regarding Tesla's comments on reliance interests, EPA has narrowed the multiplier credits from proposal to final rule to focus those credits on MYs 2023-2024, where lead time is shortest, which directionally responsive to Tesla's concerns. To the extent that regulatory changes affecting the price of credits in an open market can be considered cognizable reliance interests, EPA has generally considered those interests and determined that the standards are reasonable given the circumstances, as discussed in sections III and VI of the preamble. EPA's action is not retroactive, as it only affects when credits are available in future model years.

6. Advanced Technology Multiplier Incentives

6.1. Multiplier Incentives

Commenters Included in this Section

Advanced Engine Systems Institute (AESI)
Alliance For Automotive Innovation
Alliance for Vehicle Efficiency (AVE)
Aluminum Association
American Council for an Energy-Efficient Economy (ACEEE)
American Honda Motor Company (Honda)
BorgWarner Inc.
California Air Resources Board (CARB)
Center for Biological Diversity, Earthjustice, and Sierra Club
Center for Biological Diversity, et al.
Center for Climate and Energy Solutions (C2ES)
Chemours Company (Chemours)
City of Albuquerque, NM
Consumer Federation of America
Consumer Reports (CR)
DENSO International America, Inc. (DENSO)
Edison Electric Institute (EEI)
Electric Drive Transportation Association (EDTA)
Environmental Protection Network (EPN)
Ford Motor Company
Gentherm, Inc.
Hyundai America Technical Center, Inc. (Hyundai)
Illinois et al. Corn Growers Associations
Institute for Policy Integrity
ITB Group, Ltd. (ITB)
Jaguar Land Rover North America, LLC (JLRNA)
Kreucher, Walter
Lucid USA, Inc. (Lucid)
Manufacturers of Emission Controls Association (MECA)
Mercedes-Benz USA, LLC
Michalek, Jeremy and Whitefoot, Kate S.
Minnesota Pollution Control Agency (MPCA) and Minnesota Department of Transportation (MnDOT)
Motor & Equipment Manufacturers Association (MEMA)
National Association of Clean Air Agencies (NACAA)
National Automobile Dealers Association (NADA)
National Parks Conservation Association (NPCA)
New Mexico Environment Department
New York State Department of Environmental Conservation
Nissan North America, Inc.

Olmstead, Thomas
Peterson, Doug
Rivian Automotive, LLC
Securing America’s Future Energy
Sierra Club
South Coast Air Quality Management District
Southern Environmental Law Center
Stellantis
Tesla
Toyota Motor North America, Inc. (Toyota)
Union of Concerned Scientists (UCS)
Valero Energy Corporation (Valero)
Volkswagen Group of America, Inc. (Volkswagen)
Volvo Car Corporation
Zero Emission Transportation Association (ZETA) and EVHybridNoire (EVHN)

Commenter: Advanced Engine Systems Institute (AESI)

Advanced Technology Multiplier Credits. EPA has recognized that advanced ZEV technologies have been around for many years and are no longer new. As a result, the 2012 midterm review and subsequent SAFE LD GHG rules phased out advanced technology multiplier credits for PHEVs, BEVs and FCEVs in MY 2022. The current multipliers provided for advanced technologies do not reflect actual in-use CO2 reduction benefits and therefore ultimately result in fewer advanced technology vehicles offered in the market. The numerous EV production commitments by OEMs suggest that the continued extended use of multipliers could reduce technology introduction for ICE, electrified and electric powertrain, while having minimal cost or environmental impact before they are fully phased out in MY 2025. [EPA-HQ-OAR-2021-0208-0267-A1, p. 2]

Commenter: Alliance For Automotive Innovation

Advanced Technology Vehicle Production Multipliers. Auto Innovators supports EPA’s proposal to extend the advanced technology vehicle production multipliers, particularly those for EVs (“EV Multipliers”). This existing policy flexibility has proven effective in incentivizing increased production and sales of EVs. Auto Innovators is aligned with EPA in recognizing that EV Multipliers have provided, and can continue to provide, a meaningful incentive for manufacturers to help drive additional EVs into the marketplace and to help overcome ongoing market headwinds. Auto Innovators agrees with EPA that electrification will play an increasingly important role, not only for the duration of this rule, but also for 2027 and later. Helping to bring technology to market that will be critical in delivering long-term, sustainable GHG reductions, even at the potential cost of near-term reductions, is a prudent policy choice for the current period during which EVs face higher incremental costs and ongoing challenges with public fueling infrastructure.

EV Multipliers have proven to be a successful incentive. EV Multipliers were originally limited to MYs 2017-2021. Through MY 2021, EVs were expected to be an emerging technology with limited customer acceptance due to higher upfront costs and a lack of sufficient public charging infrastructure. To help overcome these market barriers, the EV Multiplier provided a compliance incentive attractive to manufacturers, which in turn helped drive investment and deployment of volume beyond what might otherwise have been achieved. As EVs were expected to be low-volume through MY 2021, EPA did not cap or otherwise limit the potential effect of the EV Multiplier as there was not a concern for excessive program degradation. Through MY 2019, the 2020 Trends Report demonstrates that the EV Multiplier is being broadly used by many Comments from Alliance for Automotive Innovation Docket ID Nos. EPA-HQ-OAR-2021-0208 and NHTSA-2021-0053 September 27, 2021 17 manufacturers, and that the overall levels of credits, while meaningful, are not excessively detracting from GHG reductions.46 This illustrates that EPA met the two goals of creating a flexibility that is useful and not excessive in impact.

EV Multipliers remain a valuable tool to incentivize deployment of electric vehicles. Some stakeholders oppose the adoption of EV Multipliers on the principle that excessive crediting of electric vehicles will allow manufacturers to cease improvements in conventional technology or to even “backslide” on emissions.

A recent unpublished paper by Dr. Kenneth Gillingham47 provides an analysis of the potential impacts of EV Multipliers and potential problems with excessive crediting. Auto Innovators has not fully assessed the modeling presented within the paper, but the paper appears to provide an intuitive assessment that as EV costs (and manufacturer profitability) begin to converge with conventional ICE vehicles, the policy value of an EV Multiplier diminishes and could lead to increased overall fleet emissions. It is important to note, however, that the author appears to focus on cost parity and does not account for challenges with “utility” parity, meaning effects associated with market friction such as consumer concern over lack of public charging or concern with limited EV range or capability are not considered. Environmental advocates have cited this paper in opposition to EV Multipliers. In response, we draw EPA’s attention to a key takeaway: when EVs are less profitable in the near-term and market share is low, there is “substantial induced innovation” and EV market share is likely to increase with higher EV Multipliers.48 We posit that this is the very condition which EV technology and markets have experienced through MY 2021 (i.e. much higher costs and low market share) and that EVs may continue to experience, albeit at a potentially reduced level of disparity, through MY 2026.

Auto Innovators acknowledges that EPA must balance the incentivizing effect of an EV Multiplier in helping to overcome market barriers such as higher costs and limited refueling infrastructure against lower GHG and other benefits. EPA has accounted for these impacts in its benefit-cost analysis. EPA has also outlined the need to examine technology and market conditions anticipated for MYs 2022-2026 relative to today’s conditions.49

Furthermore, EPA will need to consider the impact of a continued EV Multiplier on broad market success for the time period following this rule. Auto Innovators believes that while many of the underlying conditions of higher costs and consumer concerns will improve through MY

2026, some will linger in the marketplace and therefore, the multiplier will still play an important role in helping to drive additional EV volume into the market.

Recent market data reveals that across the U.S., the overall adoption rate of electric vehicles remains relatively low at 2.5 percent new vehicle market in 2020.[50] One of the root causes of low adoption has been the higher costs associated with electric drive technology. For example, the National Academies of Sciences, Engineering, and Medicine ("NASEM") reported that in 2018 "[t]he incremental cost for BEVs are at least $8,500 for the medium car (i.e., $36,800 BEV150 versus $28,300 conventional) to about $26,000 for the long-range SUV (i.e., $57,000 BEV300 versus $31,000 conventional)."[51] These values from NASEM indicate cost disparities on an order of one third to over two thirds of the cost of conventional vehicles. This is far from price parity. Even with rapid reductions in annual costs over the past few years, manufacturers and consumers have faced significantly higher costs for EVs.

In the GHG NPRM, EPA describes that due to projected growth and expansion of the EV marketplace, electric vehicles should, through MY 2026, begin moving from an emerging technology into a transitional growth phase.[52] Manufacturer investment and increasing industry scale is expected to deliver cost reductions through the time period covered by the GHG NPRM. The NASEM Report projects that anticipated prices for EVs for segments such as small and medium cars could approach parity by 2024-2026,[53,54] but this would be for shorter range models, which are less attractive in the marketplace. For more popular segments such as crossover, SUV, and pick-up trucks, with ranges of 200+ miles, NASEM projects that these segments may not achieve price parity until 2026-2030,[55] beyond the time period covered by this NPRM. The U.S. new vehicle market has shifted heavily into these segments[56] and further capability associated with increased towing, cold weather performance, and off-road capability may delay these projected price parity timelines even further than what is reported by NASEM. As such, for the duration of this rule, it can be broadly summarized that while improving, there is projected to remain a lingering price disparity between EVs and conventional models. This disparity continues to support the basis of the EV multiplier to deliver "substantial induced innovation."

Separate from the issue of cost, there are several points of friction that EVs have and may continue to struggle to overcome. NASEM includes a summary of EV purchase avoidance reasons in its report.[57] At the top of the list is location and availability of public charging infrastructure. Auto Innovators recognizes the efforts of many stakeholders, including many of our members, who have committed to expanding and improving the public charging experience. We are confident that efforts to broaden the availability of public charging will eventually help overcome this consumer concern. National recharging plans such as those envisioned within recently proposed Congressional funding bills will help to address this concern from consumers. Nevertheless, these remain significant and demonstrated barriers to adoption, and new charging networks will take many years of planning and construction to come online in the volumes needed to support ubiquitous availability. These are issues that, even with improving EV price parity, may continue to dampen consumer interest and further delay broad market adoption of EVs. Again, EV Multipliers have and will continue to prove to be a valuable compliance incentive that will help drive volume into the market even in the face of these headwinds.

The California Framework Agreements provide a model for EV Multipliers. The California Framework Agreements,58 which EPA cites as helping to demonstrate the feasibility of the proposed standards,59 provide a potential model for EV Multipliers. Those agreements provide enhanced EV Multipliers in MYs 2020-2021 relative to the current EPA GHG rules, and EV Multipliers in general for MYs 2022-2026.60 The agreements also incorporate a cumulative cap on credits equivalent to approximately 23 g/mile over MYs 2022-2025 (about 5.8 g/mile/year) or 32 g/mile over MYs 2022-2026 (about 6.4 g/mile/year).61

In contrast, EPA proposes new EV Multipliers for MYs 2022-2025 (one year less) and a much lower credit cap of 10 g/mile over four years (less than half that included in the California Framework Agreements).62 We believe the inclusion of EV Multipliers for MY 2026 and a higher cap would better recognize the current state of EV technology and markets, and incentivize additional EV production.

Auto Innovators recommends that EV Multipliers be included through at least MY 2026. We suggest that EPA include an EV Multiplier in MY 2026, and reconsider the need for such incentives beyond MY 2026 based on technology and market development in a subsequent rulemaking. This approach would better recognize the uncertain state of the EV market and complementary policies. It would also recognize the heterogeneity of manufacturer EV product plan development, where some manufacturers have already begun introductions and others are still developing EVs and would be most influenced by later incentives. Including EV Multipliers through MY 2026 would also be consistent with the California Framework Agreements, which EPA cites in support of its assessment of the feasibility of the proposed standards.63

Auto Innovators agrees that an EV Multiplier credit cap should be calculated on a cumulative basis. Presuming adoption of an EV Multiplier credit cap, Auto Innovators agrees with EPA's proposed approach to apply the cap on a cumulative basis. The proposed approach provides some flexibility for manufacturers that may not be as prepared as others to immediately introduce additional EVs.

If EPA accepts our recommendation to include an EV Multiplier in MY 2026, the cumulative cap should be increased. As previously described, Auto Innovators believes that an EV Multiplier will remain an appropriate policy tool to increase EV production in MY 2026. If EPA accepts our recommendation to include an EV Multiplier for MY 2026, we believe a higher cap should also be adopted to account for that additional model year to maintain the incentive value of the EV Multiplier.

The EV Multiplier credit cap should be increased in general. A cumulative credit cap of 10 g/mile provides little incentive to increase EV production unless the entire incentive is taken in a single or very limited years. Auto Innovators believes additional EV production can be incentivized by a higher credit cap while still balancing with the policy goal to maximize near-term GHG benefits. More specific concepts to balance the incentive aspects of an EV Multiplier with current technology and market conditions, and with the environmental impacts of such an incentive, may be provided by individual manufacturers in their own comments.

EV Multiplier credits should not be considered a means of increasing standard stringency. Auto Innovators is recommending that the EV Multiplier cap be increased in general, and potentially increased as a conforming change to the recommended inclusion of an EV Multiplier in MY 2026. However, we believe EV Multiplier credits should not be considered as a means of increasing or reason to increase the stringency of the standard.

Including EV Multiplier credits in an evaluation of the potential feasible levels of a GHG standard would effectively remove their value as an incentive, replacing it with a de facto requirement. In addition, not every manufacturer may make use of such incentives at the same time or to the same degree, depending on their product plans and how quickly they can be shifted based on the presence of such an incentive. EPA should keep EV Multipliers as an incentive to achieve the desired policy goal of increasing EV production and market share beyond that which would otherwise occur under the proposed standards. Therefore, Auto Innovators recommends that an increase in the cap should not result in more stringent standards. [EPA-HQ-OAR-2021-0208-0571-A1, p. 16-21]

Commenter: Alliance for Vehicle Efficiency (AVE)

AVE supports EPA's goal of offering advanced multiplier credits up until 2026 and recommends EPA offer additional performance-based credits to automotive manufacturers (OEMs) for any vehicle that exceeds the standards ahead of EPA's compliance timeline.

AVE supports performance-based credits to incentivize rapid adoption of emission-reducing technology in ICE vehicles. [EPA-HQ-OAR-2021-0208-0256-A1, p. 2]

Advanced Technology Multiplier Credits. AVE supports EPA's goal of offering advanced multiplier credits up until 2026 and recommends EPA offer additional performance-based credits to OEMs for any vehicle that exceeds the standards ahead of EPA's compliance timeline.

AVE continues to support performance-based standards that incentivize the development, and accelerate the adoption of, multiple emission reducing technologies to market. Performance-based credits would provide OEMs with greater flexibility and incentive to invest in cost-effective pathways to meet, or exceed, future standards.

The credits EPA is proposing will impact a small percentage of the U.S. fleet. By steering OEMs towards specific technologies that may only affect about 8% of the fleet by 2026 with extensive credits, EPA risks losing immediate and more extensive environmental improvements in exchange for estimated environmental gains years from now. EPA instead has an opportunity to accelerate the adoption of advanced vehicle technologies and reduce emissions from the vast majority of vehicles that will be sold between model years 2023 to 2026 with performance-based credits. [EPA-HQ-OAR-2021-0208-0256-A1, p. 3]

Commenter: Aluminum Association

The Association supports the continued incentivization of advanced vehicle technologies including the performance incentive on pickup trucks that allows for manufacturers to exceed their targets by faster adoption of new technologies and fuel efficiency solutions, including the wider use of mass reducing materials across their portfolio to extend vehicle range and/or support battery downsizing to reduce battery costs [EPA-HQ-OAR-2021-0208-0233-A1 p.4]

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

The current regulations allow for a multiplier2 to be applied for BEVs and PHEVs through MY 2021. EPA proposes to extend these multipliers through MY 2025, albeit with a cap of 2.5 g/mi per fleet year. Automakers can additionally take advantage of up to 10g/mi per fleet year, so long as the sum of the credit for MYs 2023-2026 is not greater than 10 g/mi. This incentive awards credits for EVs in excess of actual emission reductions, with the result that each EV sold serves to reduce the emissions benefit of the standards. Keeping these provisions in the final rule would reduce the actual stringency of the rule by almost 3 g/mi annually for the four years it would be extended if manufactures take full advantage of the multipliers.

EPA initially adopted multipliers to encourage the development and deployment of EV technology. Circumstances have changed since then; almost every major automaker has announced plans to have a full range of EV options, produced at scale, in the next decade. Many of these automakers have committed to moving to a fully electric vehicle line-up and phasing out conventional vehicles. EV technology is clearly no longer in its infancy and extending the life of the EV multiplier will only serve to increase total emissions. EPA, in this NPRM, even admits that this incentive has only improved EV sales by approximately 0.5% a small benefit that is clearly not worth the increase in emissions (EPA 2021b)3.

Research has even shown that providing generous EVs credits can actually depress the market for EVs (Gillingham 2021). This is because the increased pool of accumulated credits, earned from the production of a small number of vehicles, lessens the need to produce more efficient vehicles to meet assigned targets. This can be seen in a simple mathematical example where an automaker plans to produce four vehicles and needs to meet a goal of 125 g/mi. If their EVs are treated as having zero emissions and the automaker's conventional vehicles have emissions of 200 g/mi, then they need to make two EVs to be in compliance without the presence multipliers. If EVs are given a multiplier of two, as is currently proposed, then the automaker only needs to make one EV to sell three conventional vehicles. While the real automotive market is more complex, the reality remains that treating advanced efficiency technologies, like EVs, as more than one vehicle artificially reduces the manufacturer's average emissions rate and allows the manufacturer to comply with the standard with fewer efficient vehicles. For these reasons, ACEEE strongly opposes the extension of the EV and PHEV multiplier credits. [EPA-HQ-OAR-2021-0208-0251-A1, pp. 5-6]

Eliminate the advanced technology multipliers for plug-in vehicles and full-sized pick-up trucks. [EPA-HQ-OAR-2021-0208-0251-A1, p.14]

2 This multiplier allows an electric vehicle to be counted as multiple vehicles for fleetwide average emission calculations and credit purposes. A multiplier of 2 allows one ZEV to be counted as 2 vehicles.

3 Page 110 of the NPRM 'We have also analyzed the impact of the advanced technology multipliers on BEV and PHEV penetration rates and have found that the impact on the fleet is less than 0.5 percent in any MY 2023 through 2026 (see RIA Chapter 4.1.3)'

Commenter: American Honda Motor Company (Honda)

Policy Incentives Supporting Further Electrification. Honda understands and supports the administration's desire to encourage a transition to electrified vehicles. These technologies can offer revolutionary, rather than evolutionary, levels of emissions reduction, and are widely regarded as necessary to drive transportation sector emissions to levels in line with mid-century climate goals.

Honda has ambitious plans to electrify its fleet. In April, our global CEO Toshihiro Mibe outlined Honda's vision to realize corporate carbon neutrality by 2050, driven in part by the electrification of our entire auto lineup in major markets around the world, including North America. Our company has set a vehicle sales target of 100% ZEVs in all major markets by 2040, with intermediate targets of 40% by 2030 and 80% by 2035. [EPA-HQ-OAR-2021-0208-0565-A1, p.6]

While these commitments are serious, sincere, and very much underway, it is important that the agencies not approach such announcements as foregone conclusions. Market adoption of electrified technologies currently average about 2 percent in the U.S.,14 placing a profoundly challenging and still uncertain industry transition in front of us in order to meet future climate goals. Industry's commitment to these technologies requires significant sustained investment, a challenge exacerbated by other capital-intensive headwinds such as connected, automated and shared mobility. Indeed, the number of strategic alliances being formed amidst such a competitive industry is informative of the immense costs and challenges associated with this transition. Policy incentives, such as sales multipliers, remain critical in spurring ongoing investment in the face of these challenges.

The agency has, for many years, recognized advanced technology multipliers as a viable tradeoff between near-term and long-term goals: 'The agency recognizes that the temporary regulatory incentives will reduce the short-term benefits of the program, but…believes that it is worth a limited short-term loss of benefits to increase the potential for far-greater game-changing benefits in the longer run.'15 We concur with this position.

At the same time, Honda shares concern about emissions benefits erosion resulting from excessive use of multipliers, and supports a thoughtfully designed program including an appropriate usage cap. Honda supports capping the benefit of advanced technology multipliers to avoid excessive programmatic erosion, but believes it is appropriate to increase their magnitude beyond proposed levels. The agency proposes a cap of 10 g/mi over a four-year (MY22-25) window, averaging 2.5 g/mi per year. By contrast, the California Framework agreement provides twice that level of incentive, at 30 g/mi over a six-year window (MY21-26), an average of 5 g/mi per year. We believe a sales multiplier incentive closer to that of the Framework agreement will drive further electrification in the face of market uncertainty, such that hopefully there will not be need for sales multipliers in subsequent (MY2027+) regulatory constructs. One alternative the agency may also wish to consider is pairing an increased cap with a lower multiplier value (e.g., 2.0x, 1.75x, etc.) for each technology. Doing so would limit programmatic erosion while continuing to incentivize higher volumes of electrified product in the market. [EPA-HQ-OAR-2021-0208-0565-A1, p. 7]

Some parties have cautioned that multipliers can amount to 'giveaways' if applied to vehicles that are already planned, pointing to industry electrification announcements as evidence for the lack of need of multipliers. Honda disagrees with this position. Planning cycles in the auto industry dictate that strategic decisions and investments be made well in advance of having a complete picture of future market landscapes. This presents strategic challenges for any vehicle technology, let alone a transition seeking to overcome the inertia of a century of petroleum use. While Honda is planning a suite of activities to help build a market for these products, again, the market is not guaranteed. Policy levers such as advanced technology multipliers can play an important role in driving continued investment in the face of market uncertainty. As shown in Figure 2 [Figure 2 can be found at docket number EPA-HQ-OAR-2021-0208-0565-A2, p. 8], multipliers have the potential to bring the cost-effectiveness of long-term technologies more in line with those of shorter-term technologies.16 This can help facilitate a virtuous cycle in which reduced technology costs, passed along to consumers, can further assist market uptake. [EPA-HQ-OAR-2021-0208-0565-A1, p. 8]

Commenter: BorgWarner Inc.

EV and PHEV Incentives. In principle, we support technology-neutral standards that focus on end objectives without picking winning and losing technologies. BEVs, PHEVs, HEVs and FCEVs are vehicles that offer environmental benefits at some cost to the consumer. Consumer acceptance has improved and continues to improve, but still needs significant encouragement due to factors such as BEV range and charging time, FCEV fuel availability, and infrastructure. Incentives to manufacturers and consumers are consistent with public policy objectives of encouraging these new technologies. These incentives can take the form of direct subsidies to the consumer, EV multipliers, and disregarding any upstream CO2 of electric vehicles for the manufacturers. While these incentives are by nature market distorting, BorgWarner recognizes that these incentives have been necessary to encourage the development of new technologies. However, consistent with our belief that technology-neutral regulations promote the most effective solutions to achieve societal goals, we strongly support the phase-out over time of any incentives for a particular technology. Therefore, we support the proposal to extend the advanced technology multiplier incentives for MYs 2022– 2025 with lowered credits and a sunset in MY2025. [EPA-HQ-OAR-2021-0208-0260-A1, p. 3]

Commenter: California Air Resources Board (CARB)

Specifically, U.S. EPA:

• should retain its proposed cap on the available advanced technology vehicle production multiplier credits for battery-electric vehicles (BEV), plug-in hybrid electric vehicles (PHEV), and fuel-cell electric vehicles (FCEV);

• but should decrease the per vehicle multipliers for model years 2023 through 2025;

• should not provide any multipliers for model year 2022 because of the relaxed emission standards; [EPA-HQ-OAR-2021-0208-0643-A6, p.7]

The Proposed ZEV Multipliers Should be Reduced. Although ZEV sales are projected to increase, they currently remain a minority portion and could benefit from continued incentives. U.S. EPA's emission standards incentivize various advanced technologies for reducing emissions through credit from production multipliers. The proposed standards would revive these kinds of incentives for advanced technologies to promote market penetration that were a feature of the National Program standards through model year 2021.109 These incentives took the form of production multipliers for electric vehicles, plug-in hybrid electric vehicles, fuel cell vehicles, and natural gas vehicles. The SAFE Final Rule allowed these multipliers to lapse, with the exception of natural gas vehicles for which it increased and extended the multiplier. The proposal would revive and extend the multipliers for model year 2022 through model year 2025 for BEVs, FCEVs, and PHEVs, and end the multiplier for NGVs after model year 2022.

CARB supports the appropriate use of multipliers to incentivize clean technology. But incentives for BEVs, PHEVs, and FCVs are not appropriate under the relaxed SAFE Final Rule standards for model year 2022 that will remain in place. This would effectively weaken the program for model year 2022 even more than was already done under the SAFE Final Rule, setting the nation even further behind in much needed GHG reductions. The multipliers should not be reinstated for that year, contrary to the proposal.

For model years 2023-2025, the proposed per car advanced technology vehicle multipliers are too generous to sufficiently incentivize zero-emission technology. Based on simple calculations, the proposed cap will be met with BEV sales of far less than 2% per year of manufacturers' fleets. Nationwide, many manufacturers already are selling ZEVs at or near these levels and as discussed above, manufacturers are poised to produce ZEVs in greater percentages. The multipliers should be set to require manufacturers to increase their production of ZEVs to receive the maximum credit allowance. For example, a BEV multiplier at 1.3 for model years 2023 and 2024 and 1.15 for model year 2025 would require a manufacturer to average BEV sales of approximately 8% per year to reach the full credits under the cap. Similarly, multipliers of 1.1 and 1.05, respectively, would require a manufacturer to average BEV sales of approximately 25% per year to meet the cap.110 U.S. EPA should revise the per car multipliers for BEVs, PHEVs, and FCEVs downward to effectively require a sales level that is above what typical manufacturers are expected to produce in order to properly incentive and reward those that achieve higher sales rates. The proposed cap should stay the same. This will adequately incentivize and reward increased ZEV sales in these key transitional years. [EPA-HQ-OAR-2021-0208-0643-A6, pp. 36-37]

Commenter: Center for Biological Diversity, Earthjustice, and Sierra Club

First, EPA should eliminate credit multipliers for EVs, PHEVs, and FCVs. Every EV, PHEV, and FCV automakers produce earns them large compliance benefits, since those vehicles reduce their overall fleet's GHG emissions. Multiplier credits, however, produce 'phantom emissions reductions,' by crediting automakers up to a factor of two vehicles for each vehicle produced, which necessarily decreases automakers' reductions from other vehicles in the fleet. In 2012, EPA granted multiplier credits to support the then-novel EV market, acknowledging that even while near-term emissions would increase, they would decrease in the long-term as the industry developed.33 From the beginning, EPA intended multiplier credits to be temporary, and they were set to expire in MY 2021. Yet in this proposal, EPA proposes to extend them for four additional years, through MY 2025.34

EPA should not adopt its proposed extension of multiplier credits, given the size of emissions reductions that would otherwise be captured by the rule. According to EPA, the new multipliers would reduce the stringency of its Proposal through MY 2021-MY2026 by about 6%--an amount exceeding one full year of emissions reductions.35 This represents 46 MMT of emissions over the lifetimes of MY 2021-2026 vehicles. 36 Moreover, multipliers are no longer serving their original purpose of incentivizing the production of more EVs. EV sales have surged despite the impacts of the pandemic and despite the minimal stringency increases set by the 2020 Final Rule.37 And manufacturers have already committed to producing vast numbers of additional zero- or near-zero vehicles. Nearly every automaker has announced multi-billion dollar investments; in total, their plans amount to as many as one hundred new and diverse electric vehicle types coming to market by 2025.38 Given these developments, recent analysis indicates that electric vehicles may account for as much as 19 percent of new vehicle sales as early as 2026.39

The EV future is here, and it will only continue to grow stronger. Additional nudges from EPA in the form of phantom credits are unnecessary, and will be counterproductive, since the huge numbers of multiplier credits generated allow automakers to comply with standards without producing more EVs.40 Because automakers have already committed many billions of dollars to make and sell EVs at levels exceeding any need for multipliers, multiplier credits worsen emissions without any benefit in return. Should EPA nonetheless finalize new multipliers, we urge EPA, at a minimum, to sunset them after MY 2024, not MY 2025, and also to end their carry-forward provisions at MY 2024. [EPA-HQ-OAR-2021-0208-0270-A1, pp.6-7]

Commenter: Center for Biological Diversity, et al.

As proposed in Alternative 2, EPA should eliminate credit multipliers for EVs, PHEVs, and FCVs. Every EV, HEV and FCV automakers produce earns them very large compliance benefits, as they reduce the greenhouse gas emissions of their average fleets. "Multiplier" credits, however, double up by counting each of these vehicles as more than one vehicle, and award phantom emission reductions (by up to a factor of two vehicles for each vehicle produced) for the non-existent vehicles. In 2012, EPA granted multiplier credits to incentivize manufacturers to develop and market these then-novel technologies and vehicles more rapidly. While acknowledging that multiplier credits lead to near-term emission increases, EPA anticipated greater emissions reductions in the longer run. Proposal, 86 Fed. Reg. at 43,756; 2012 Final Rule, 77 Fed. Reg. 62,812. EPA's Proposal stipulates that from the beginning, multiplier credits were designed to be "temporary" only. Proposal, 86 Fed. Reg. at 43,756. Anticipating matured technologies and rising electric vehicle sales long before the end of the 2012 rulemaking in 2025, EPA gradually phased them out, with the last, pared-back multipliers available for MY 2021 (.5 for EVs and FCVs and .3 for PHEVs and NGVs), and with none available thereafter. Id. at 43,755, 43,757. In the 2020 Final Rule, EPA did not change this result (except for natural gas vehicle credits, addressed below), and thus, all multipliers currently terminate at the end of MY 2021, just as EPA directed in 2012.

EPA now proposes to reinstate multiplier credits for EVs, PHEVs and FCVs for four more years, from MY 2022 through MY 2025, at the full 2012 rates through MY 2024 (at 2.0 for EVs and FCVs; and 1.6 for PHEVs), and at slightly lower rates for MY 2025 (at 1.75 for EVS and FCVs, and 1.45 for PHEVs). Proposal, 86 Fed. Reg. at 43,758. EPA proposes to cap them at 2.5 g/mile per manufacturer and model year for MYs 2022-2025, on average, not to exceed a cumulative total of 10.0 g/mile per manufacturer through MY 2025. EPA also proposes to permit manufacturers to allocate how much of the total 10.0 g/mile to use in any given year. Id. The new multipliers are to sunset at the end of MY 2025; once again, EPA states that multipliers are and always were intended to be "temporary." Id. at 43,757. According to EPA, even with the proposed cap, the new multipliers would reduce the stringency of its Proposal through MY 2021-MY2026 by about 6%. Id. at 43,759-60 & Fig. 7.142 Under EPA's Proposal, then, the new multipliers, whether taken at one time or over a number of model years, would create additional greenhouse gas pollution in an amount exceeding one full year of emissions reductions otherwise achieved under the proposed annual stringency levels.

Commenters urge EPA to remove the newly proposed multipliers. As EPA itself observes, multiplier credits increase pollution and were justified solely to incentivize the development of novel, advanced technology; indeed, EPA declares them to be inappropriate if they "provide a windfall" for building vehicles that would have been produced without them. Proposal, 86 Fed. Reg. at 43,747. Under this test, multipliers are inappropriate now. Electric vehicle technology has fully matured in the years since 2012. During the first half of 2021, EV sales have surged despite the impacts of the pandemic and despite the minimal stringency increases set by the 2020 Final Rule.143 And, as discussed above, manufacturers have already committed to producing vast numbers of additional zero- or near-zero vehicles. Nearly every automaker has announced multi-billion dollar investments; in total, their plans amount to as many as one hundred new and diverse electric vehicle types coming to market by 2025.144 Recent analysis indicates that electric vehicles may account for as much as 19 percent of new vehicle sales as early as 2026.145 Notably, automakers made their investment decisions and announcements before the publication of this NPRM and while the 2020 Final Rule—which provides no multipliers beyond MY 2021—has been in force. Thus, the prior justification for awarding phantom credits—the need to speed automaker investments and the maturation of EV technology—no longer exists.

Yet, the extra pollution internal combustion vehicle multipliers enable would continue to aggravate the climate crisis for the lifetime of those vehicles.

Indeed, as EV penetration increases, providing multiplier credits usable by the remaining internal combustion engine vehicles may impede the uptake of electric vehicles as well as slow the pace of emission reductions from ICE vehicles. Research indicates that multiplier credits, once EVs are "even remotely close to competitive" with conventional vehicles, are "more likely to actually reduce the incentive for automakers to sell electric vehicles" because their large multipliers enable automakers to comply with emission standards while selling fewer EVs.146 Bloomberg projects large EVs to achieve price parity with their fossil-fuel counterparts as early as next year, and in other segments by the end of the decade.147 With price parity fast approaching, multipliers may well have the opposite effect than what EPA intends.

We also note that, even though EPA's proposed multiplier credits would sunset at the end of MY 2025, EPA has not proposed to terminate or shorten their carry-forward lifetimes. Though the cap would prevent the total impact of the additional pollution from exceeding the total allowed, any multiplier credits not yet utilized for compliance through MY 2025 would continue to be available to erode real-world emissions reductions through MY 2030, despite an extremely robust electric vehicle forecast by then.148 A continuing carry-forward provision would run counter to EPA's own statement that multiplier credits should not act as industry windfalls. We urge EPA, at a minimum, to end the lifetimes of any multipliers it promulgates in the final year for which they are granted.

As part of its justification for new multiplier credits, EPA observed that in MY 2019, almost all companies used credits to comply with emission standards. Proposal, 86 Fed. Reg. at 43,757. But that is a non sequitur. The use of available credits is to be expected; it is a well-recognized and continually used business strategy and compliance pathway; indeed, EPA implemented them in 2012 with the express intent that automakers be incentivized to earn and use them. Id. at 43,756. Moreover, many if not most of the credits automakers have used would have expired otherwise, a result contrary to automakers' interests. In this situation, rational automakers can be expected to defer some investments in new emission reductions until after drawing down their banks of otherwise expiring credits. Thus, use of credits by "almost all" companies in MY 2019 does not show that they cannot meet the Proposal.

EPA estimates that the proposed multipliers, even when capped at 10 g/mile, will create an additional 46 MMT of emissions over the lifetimes of MY 2021-2026 vehicles. Proposal, 86 Fed. Reg. at 43,760. As discussed, these extra tons of emissions do not serve the purpose of leading to larger long-term emissions reductions as automakers have already committed many billions of dollars to make and sell zero- and low-emission vehicles at levels exceeding any need for multipliers.

As noted, Alternative 2 excludes all multiplier credits, and implementation of that alternative is feasible without additional lead time. Even if EPA were to finalize some other form of additional credits, it should not renew multiplier credits. But if EPA does so, commenters urge EPA, at a minimum, to sunset them after MY 2024, not MY 2025, and also to end their carry-forward provisions at MY 2024. After that model year, lead time cannot possibly function as a constraint on feasibility. [EPA-HQ-OAR-2021-0208-0651-A1, p. 61-63]

142 EPA notes that this emissions reduction is less than that built into the voluntary California Framework, which EPA estimates as producing a loss of 27% of the total emissions reductions under that agreement for MY 2021-MY 2026. Proposal, 86 Fed. Reg. at 43,759-60 & Fig. 7.

143 See Skidmore, Z., Electric Vehicle Sales Surge in 2021, Power Technology (updated Sept. 23, 2021), https://www.power-technology.com/news/electric-vehicle-sales-surge-in-2021/ (EV sales in the first half of 2021 have surged in all three top auto markets—China, the US, and Europe—representing 26% of new sales globally and 3% in the U.S), attached as Exhibit 93; Smith, C., March Sets All-Time US Monthly EV Sales Record, Atlas EV Hub Weekly Digest (May 24, 2021), https://www.atlasevhub.com/weekly_digest/march-sets-all-time-monthly-u-s-evsales-record/ ("If the first three months of the year are any indication, 2021 is shaping up to be a banner year for the U.S. passenger EV market. EV sales shot up by 95 percent in the first quarter compared to 2020 with March sales 2.5 times higher than the same month last year. The 41,627 all-electric and 13,626 plug-in hybrid vehicles sold in March make it the all-time highest month for U.S. passenger EV sales..."), attached as Exhibit 94; Adler, K., Global electric vehicle sales grew 41% in 2020, more growth coming through decade: IEA, IHS Markit (May 3, 2021), https://ihsmarkit.com/research-analysis/global-electric-vehicle-sales-grew-41-in-2020-more-growthcomi.html, attached as Exhibit 95.

Commenter: Center for Climate and Energy Solutions (C2ES)

The multipliers, credit carry-forward extensions, and incentives included in the proposal allow for significant flexibility in the means of meeting the standards. C2ES believes the advanced technology multipliers should be reinstated as proposed and supports the elimination of the multiplier for natural gas vehicles. However, given that (as EPA acknowledges in the proposed rule) the multipliers have the effect of allowing for slightly higher emissions in the near term, it is vital that they be implemented in a way that maximizes the acceleration of new zero-emission technology while minimizing the potential short-term increase in emissions. Multipliers should also be based on demonstrated data that they serve as incentives to spur the production of zeroemission vehicles without relaxing the overall emissions reductions produced by the standards. [EPA-HQ-OAR-2021-0208-0287-A1, p.2]

Advanced Technology Multipliers. C2ES supports the proposed reintroduction of advanced technology multipliers and the proposed multiplier cap and recommends extending the multiplier through MY 2026 to continue incentivizing automakers to scale up their share of zero emission vehicles. Prior to EPA’s proposal of the new standards, electric vehicles were projected to reach 10 percent of new sales by 2025 due to broader product offerings.19 Given major automakers’ electrification commitments and goals, and in conjunction with the proposed standards, this share is likely to be much higher. At this higher level of market penetration, the multiplier could then be phased out after MY 2026.

The proposed reinstatement of the advanced technology multiplier for battery electric, fuel-cell electric, and plug-in hybrid electric vehicles represents a market signal and strong incentive to support the continued development and scaling up of zero emission vehicle technologies. It encourages automakers to meet the fleet average performance standards through expanded offerings of zero emission vehicles, rather than through incremental adjustments to gasoline engine technology performance. While electric vehicle technologies have existed for decades, modern electric vehicles are a still-emerging industry. [EPA-HQ-OAR-2021-0208-0287-A1, p.6]

While plug-in hybrid electric vehicles are still responsible for tailpipe emissions when using the gasoline propulsion system, a recent study from the International Council on Clean Transportation found that, on average, plug-in hybrids are driven on battery alone for approximately 54 percent of their total miles traveled.20 This corresponds to the proposed initial multiplier of 1.6 for plug-in hybrid technologies, in comparison to the proposed multiplier of 2.0 for battery and fuel-cell electric vehicles. [EPA-HQ-OAR-2021-0208-0287-A1, p.6]

Additionally, ensuring that automakers are incentivized to bring more zero emission vehicles to market is essential to meeting mid-century goals. [EPA-HQ-OAR-2021-0208-0287-A1, p.6]

Commenter: Chemours Company (Chemours)

EPA should better “weight” projected GHG emission reductions from its proposed credit programs and reconsider how the proposed rule addresses credits that can be earned for the production of plug-in hybrid electric vehicles (“PHEVs”) and electric vehicles (“EVs”). Current information indicates that EPA may have underestimated the production and sale of such vehicles, resulting in excessive crediting of such actions. As a result, incentives for manufacturers to transition away from the use of HFC-134a are diminished and could conceivably result in a “switch back” to this high-global warming potential (“GWP”) refrigerant. [EPA-HQ-OAR-2021-0208-0232-A1, p. 3]

EPA Should Consider Other Actions Addressing GHGs as Part of Proposed Rule. EPA Should Limit and Better Weight Emission Credits to Reflect Actual GHG Reductions. EPA has proposed to retain multiplier incentives for advanced technology vehicles, including fuel cell vehicles (“FCVs”), plug-in hybrids (“PHEVs”) and electric vehicles (“EVs” or “BEVs”), subject to declining percentages a cumulative cap.47 Specifically, EPA is proposing to extend the 2.0 credit multiplier for EVs and FCVs from 2017-2019 MYs under the 2012 rule to MY 2022-2024 vehicles.48 EPA would also extend a reduced credit of 1.75 (available in MY 2020 in the 2012 Rule) to MY 2025, while reducing the multiplier to 1.0 in MY 2026.49 Concurrently, EPA is proposing to sunset the multipliers in MY 2026 so as to signal that it does not intend to include multipliers within any follow-on rules for MY 2027 or later MYs.

The rationale given for the extension of these multipliers is that “limited additional multiplier incentives are appropriate for the purposes of encouraging manufacturers to accelerate the introduction of zero and near-zero emission vehicles and maintaining momentum for that market transition.”50 But at the same time, EPA indicates that these multipliers are essentially the product of negotiation between automakers and the State of California and that they reduce the effective stringency of fleet average target levels for CO_2 emissions, albeit at a lesser rate than the California Agreement.51 EPA estimates that the total loss in stringency is equivalent to 46 million metric tons of CO_2.

EPA's projected rates of adoption of EVs and PHEVs within the LDV fleet vary according to manufacturer and vehicle type, but for passenger cars, EPA analysis indicates an overall 8.4% penetration rate for PHEVs and EVs combined in MY 2026. For some manufacturers in MY 2026, EPA is projecting zero or minimal penetration rates, while for other manufacturers (outside of Tesla at 100% EV production) adoption of PHEVs and EVs could constitute up to 19.5% their total fleet production for that MY.

There is considerable information, however, that indicates the transition to electric vehicle technology may occur at a much faster rate than EPA is projecting. IHS Markit's June 2021 forecast indicated that BEVs will make up 18.9% of total vehicle sales and PHEVs 4.3% of total vehicle sales by 2026, in part in order for manufacturers to be able to reach the higher electric vehicle that the Administration has articulated for 2030.52 This estimate is almost triple the amount of PHEV/EV sales that EPA is projecting as part of the proposed rule.

Otherwise, there is much private commentary that points in the direction of increased PHEV and EV production and sales. Consumer Reports indicates that "[a] record number of almost 100 pure electric vehicles (BEVs) are set to debut by the end of 2024 if all goes according to plan . . . 'These more affordable models have the potential to sway a significant percentage of the car-buying public toward buying an EV with their efficiency, performance, and lower ownership costs."'53 Taking a longer view, from 2011 to 2019, annual PHEV and EV sales "grew from fewer than 18,000 to more than 325,000, equivalent to an average year-over-year growth rate of 44%."54 Thus, given the number of incentives and state programs aimed at electrifying transportation, as well as the current market conditions noted above, it is possible to question why EPA's projected growth rate for PHEVs and EVs is not higher.

The other important aspect of EPA's proposed treatment of PHEVs and EVs is that the proposed rule would maintain a 0 g/mi imputed EV and PHEV tailpipe-only value.55 This valuation does not account for any upstream GHGs produced when electricity used to fuel EVs and PHEVs is produced (even while such upstream emissions contribute to the overall level of GHGs associated with the use of PHEVs and EVs). And while EPA is proposing to phase-down EV and PHEV credits, the proposed rule is silent with respect to the utilization of this imputed value in 2026 or thereafter. There is no consideration or proposal to phase down this imputed 0 g/mi value despite the value being obviously inaccurate in terms of assessing the CO_2 emissions associated with operation of any PHEV or EV. Thus, in this respect, EPA's proposed treatment of EVs and PHEVs would effectively maintain a "double-benefit" through at least MY 2025 and maintain an additional advantage in MY 2026 and perhaps thereafter which is untethered from a realistic assessment of the actual environmental impact of PHEVs and EVs.

Chemours recognizes that EPA is proposing to cap multipliers at a fleet equivalent of 2.5 g/mile per MY, or an overall cap of 10.0 g/mile on a cumulative basis over MYs 2022-2025.56 And this would directionally curb the benefit of the multiplier at least with respect to OEMs that produce higher numbers of PHEVs and EVs as a percentage of their overall fleet. But at the same time, the imputed 0 g/mi value allows for the accretion of a considerable amount of credits which do not accurately equate into direct environmental benefit due to actual emissions associated with the fueling of such vehicles. Within the proposed rule, EPA should therefore address the overall impact of the multiplier and the imputed 0 g/mi value to bring the available credits into line with actual environmental results. As EPA notes with respect to the California Agreement, unrestrained crediting can have a significant impact on the overall stringency of the program, with losses in the Framework Agreement estimated at 27 percent of the total stringency.57 Chemours concerns in this area do not center on any aversion to the electrification of our nation's transportation system. But as noted above, A/C credits are calculated and directly considered in setting the stringency levels of future year GHG standards. The same treatment is not afforded to PHEV and EV credits and, as a result, imbalances in the incentives sought to be promoted by LDV GHG requirements are created. As one possible consequence of this imbalance, multiplier incentives and unrestrained 0 g/mi values could work against or even create a temporary halt on the introduction of further emission reduction technologies between 2024 and 2026. It is also conceivable that this imbalance in incentives could stall or even cause a temporary change-back to the use of HFC-134a in MVAC systems if leakage and equipment credits are not needed for compliance or valued less by the marketplace.

While Chemours appreciates that EPA is intending to provide incentives for the market purchase and adoption of EV and PHEV technology, EPA should reconsider the credits available for such vehicles relative to other credits allowed under the proposed rule to account for overall environmental benefit. This would help to ensure incentives remain in place to introduce further emission reduction technologies apart from PHEV and EV technology between 2024 and 2026 and weigh against unintended results such as a change-back to the use of HFC-134a. [EPA-HQ-OAR-2021-0208-0232-A1, p. 11-13]

Commenter: City of Albuquerque, NM

Recommending EPA set the advanced technology vehicle multiplier and the credit caps [3] at levels appropriate to protect the rigor of the standard and increase the number of zero emission vehicles available for purchase. [EPA-HQ-OAR-2021-0208-0535-A1, pp. 1-2]

Commenter: Consumer Federation of America

Second, it is important to close the loopholes, especially those that might allow the automakers to 'use' the electric vehicle part of the fleet to 'relax' the efficiency of the gasoline-powered part. That trade-off must not be allowed. [EPA-HQ-OAR-2021-0208-0297-A1, p. 24]

Commenter: Consumer Reports (CR)

While CR applauds EPA's efforts to greatly limit the harm done by electric vehicle multipliers, these multipliers, by EPA's own analysis, do not significantly increase electrification and should be eliminated. [EPA-HQ-OAR-2021-0208-0602-A1, p.5]

EV Multipliers. Consumer Reports does not support the inclusion of electric vehicle multipliers. EPA's own analysis in table 4-25 of the RIA finds that they only increase EV penetrations under the preferred alternative from 7.4% to 7.8%. EPA concludes that "The results presented in this table suggest that the advanced technology multipliers are not expected to have a large impact on BEV and PHEV technology penetration."26 EPA also cites and discusses Gillingham's recent work that shows that electric vehicle multipliers can have a negative impact on EV penetration rates and emissions reductions.27 Consumer Reports strongly agrees with this research, and concludes that the inclusion of electric vehicle multipliers is unwarranted, even with caps as included in the proposal. [EPA-HQ-OAR-2021-0208-0602-A1, pp.11-12]

Even capped, EPA estimates that these multipliers decrease the emissions reductions by about 8% compared to standards without multipliers between MY21-26.28 EPA also states that: "As zero-emissions technologies become more mainstream, EPA believes it is appropriate to transition away from multiplier incentives."29 While Consumer Reports agrees with this statement, we also assert that EVs are already becoming more mainstream (see section 3d), and do not find the continued inclusion of these multipliers justifiable, especially given the reduction in emissions savings, and limited influence on the market demonstrated by EPA's modeling. [EPA-HQ-OAR-2021-0208-0602-A1,p.12]

Commenter: DENSO International America, Inc. (DENSO)

Support for Advanced Technology Multiplier Credits. DENSO supports the advanced technology credit multiplier program which incentivize battery electric vehicles (BEVs), fuel cell vehicles (FCVs) and plug-in hybrid vehicles (PHEVs) by counting each vehicle more than one vehicle as proposed by EPA this time through 2025MY. We also recommend EPA consider the necessity to include this incentive after MY2025 to continue to promote advanced vehicle adoption. As EPA works towards development of 27MY and beyond GHG regulations, it should fully evaluate jurisdiction's current and planning electricity sources, capacity, and infrastructure distribution capabilities before implementing vehicle emission programs. [EPA-HQ-OAR-2021-0208-0282-A1, p. 7-8]

Commenter: Edison Electric Institute (EEI)

Regulatory Flexibilities Are Appropriate as Long as They Further Program Goals. EPA is well supported in moving forward with new rules addressing vehicles out to MY 2026, leveraging the progress of the electric sector to reduce emissions in the transportation sector is important. As the Agency regulates the transportation sector, those rules should include compliance flexibilities to help incentivize automakers to deploy more electric vehicles—an approach that is both necessary and well supported. And—as highlighted by the Agency—those incentives and flexibilities should be "limited" and "focused" on "support[ing] automakers' acceleration of their introduction and sales of advanced technologies, including zero and near-zero-emission technologies," and the Agency should continue to monitor those flexibilities to ensure they facilitate the transition to increasingly stringent standards required for the zero-emissions future—not impede that transition. 86 Fed. Reg. at 43,731. [EPA-HQ-OAR-2021-0208-0284-A1, p. 8-9]

EPA Should Look to Tailor Flexibilities Here and in the Future. The Agency also tailors certain flexibilities and eliminates others, appropriately. EPA proposes to allow for ZEV multiplier incentives from MY 2022 though MY 2025 with a cap on multiplier credits in order to provide a limited ZEV incentive to automakers with the intent of inducing increased ZEV deployment in the near term. Further, EPA also proposes—understandably and correctly—to eliminate incentive multipliers for natural gas vehicles because they are not a ZEV or near-ZEV technology. Id. at 43,734.

Limiting ZEV multipliers and eliminating natural gas vehicle multipliers is entirely reasonable and well supported by the Agency. As EPA looks to future rulemakings—as discussed supra—tailoring or eliminating flexibilities may be appropriate for the Agency to consider given the facts and circumstances of EV deployment going forward. As more automakers offer greater ZEV opportunities, multipliers might not be as impactful in future years, and EPA should look to modify them as needed—possibly on a geographically specific basis in an effort to push adoption across the country in states that may lag in terms of overall electrification. [EPA-HQ-OAR-2021-0208-0284-A1, p. 12-13]

Commenter: Electric Drive Transportation Association (EDTA)

EDTA Supports the Advanced Technology Multiplier Credits – As EPA and NHTSA have previously determined, electric drive offers 'game changing' benefits in clean transportation. To achieve those benefits, we need to rapidly scale adoption of electric drive vehicles. To expedite the investment that will help secure those game changing benefits, EDTA supports incentive multipliers for BEVs, PHEVs and FCEVs. Electric drive is still an emerging market and industry is pushing to deliver enhanced performance at reduced cost, while building to full scale. The multipliers promote investment in innovation, which builds out the supply chain, puts downward pressure on costs and accelerates achievement of full market scale.

Electric drive technologies and the industries commercializing them are making great strides. Innovations in electric drive transportation that enhance performance and reduce costs are providing expanded choice to consumers, businesses and municipalities, while nationally reducing emissions and diversifying the transportation sector’s dependence on oil.

Nevertheless, there is significant uncertainty in multi-year market predictions, particularly regarding emerging technology and markets. The rationale for the multiplier, as provided in the current rule, is that it is needed as an incentive to accelerate the commercialization and widespread adoption of BEVs, PHEVs, and FCVs.

EDTA concurs that this incentive is needed, and we recommend that it be maintained at its current level. Further, expanding electric drive vehicle capacity will require substantial investments and long-term planning by manufacturers and other industry participants. The incentive to encourage those investments should be similarly long-term and not subject to an arbitrary time limit. [EPA-HQ-OAR-2021-0208-0569-A1, pp. 2-3]

The voluntary emissions reductions are generally comparable to those that would be required of all manufacturers under EPA’s Proposed Standards for MYs 2023-2026. A few notable differences are that EPA proposes new credits for pickups equipped with strong hybrid technology; EPA proposes to cap advanced technology vehicle multiplier credits at an average of 2.5 g/mi per model year (as opposed to 1% of GHG emissions reductions). [EPA-HQ-OAR-2021-0208-0688-A1, p. 14]

Commenter: Environmental Protection Network (EPN)

Flexibilities. EPA proposes to extend the use of multipliers for electric powered vehicles beyond that currently allowed, along with a cap on the amount of benefit that can be derived from this extension. EPA also recognizes that this extension reduces the overall GHG reductions that otherwise would be achieved by these standards, possibly reducing the percentage of electric vehicles that otherwise would be produced.

EPN recognizes that, conceptually, multipliers for electric power vehicles are important incentives for early progress in transitioning to electric power. EPN also recognizes that for automakers who are already committed to significant EV production, multipliers will reduce the number of EVs that they must sell, while for automakers who are not committed to significant EV sales, multipliers could increase EV sales. The net effect is not clear from EPA’s discussion.

But it is also clear that EV multipliers are not a long-term solution. They need to terminate as the technology becomes more mainstream. EPA’s proposal does not present a compelling justification for this extension.

Given the short time frame between now and MYs 2030 and 2035, the progress to date on electrification, and the stated public plans of many manufacturers to significantly expand their offerings and ramp up production of electric powered vehicles, EPA should seriously reconsider its proposed extension of EV multipliers. EPA has not shown that this extension is the optimum approach to lay a strong foundation and make strong progress to the longer-term electrification goals for MYs 2030 and 2035. EPA should reconsider this proposal given its impact on the long-term goals for the light-duty sector and the lack of a compelling justification for its inclusion. EPA should consider revising this proposal to make more progress to electrification and should not consider extending the multipliers even further than proposed.

EPN recommends that EPA base its decision on EV multipliers on whether it believes that the multipliers will increase EV sales in the MY 2023 to 2035 timeframe, and if the agency does believe this, that it provide an analysis to support that projection. [EPA-HQ-OAR-2021-0208-0213-A1, p. 10]

Commenter: Ford Motor Company

Multiplier Incentives for Advanced Technology Vehicles (ATV). Ford supports EPA’s proposal to extend the ATV multipliers first promulgated in the 2017-2025MY 'One National Program' GHG standards. The SAFE rule did not extend this provision, which phased out after 2021MY.

The California Framework Agreement includes these multipliers, recognizing the importance of continuing to provide regulatory support for electric vehicles in order to ensure continued progress toward electrifying the fleet.

EPA has proposed to 'cap' the ATV multiplier benefit to a cumulative 10 g/mi at the fleet level for 22- 25MY. The California Framework Agreement also includes a multiplier cap but utilizes a percentage-based mechanism that scales with an OEM’s fleet obligation, appropriately providing the same proportional benefit to all OEMs. Ford prefers the percentage-based approach but recognizes that it does add complexity to compliance and reporting. In light of the need to balance simplicity with a level competitive playing field, Ford recommends that EPA add additional cap space to the light-duty truck portion of the fleet, thus allowing an overall fleet level cap somewhat higher than the proposed 10 g/mi, depending on truck mix. This would help alleviate the proportionally lower benefit provided to OEM’s with higher truck mixes (trucks tend to have higher a GHG obligations). This approach also recognizes the additional utility provided by trucks and the pressing need to support accelerated electrification in this segment. [EPA-HQ-OAR-2021-0208-0294-A1, p.3]

Commenter: Gentherm, Inc.

EPA Proposed Advanced Technology Multiplier Credits. Gentherm supports the EPA’s proposal to extend advanced technology multiplier incentives for battery electric vehicles (BEV), Plug-in Hybrid Vehicles (PHEV) and Fuel Cell Electric Vehicles (FCEV) that sunset in 2025 or 2026 and include a cap. Working with automakers, Gentherm has made considerable investments in these technologies. Gentherm believes that harmonizing the advanced vehicle technology multiplier credit cap with California’s Framework Agreements is the appropriate path to allow flexibility in meeting the top line emissions stringency given the short time automakers have to respond to a sharp stringency change by 2023. [EPA-HQ-OAR-2021-0208-0216-A1, pp.6-7]

Commenter: Hyundai America Technical Center, Inc. (Hyundai)

EV multipliers and multiplier cap. EPA has proposed reinstating the advanced technology vehicle multipliers through 2025 MY. These multipliers encourage automakers to accelerate EV production while EVs continue to move toward cost parity with gasoline vehicles. EPA has also proposed adding a multiplier cap of 2.5 gpm/year.

Hyundai supports EPA’s proposal to reinstate the advanced technology vehicle multipliers, however to further encourage early electric vehicle sales Hyundai recommends raising the cap from 2.5 gpm/year to 5.0 gpm/year thus increasing the cumulative total from 10 to 20 gpm over four years (2023 – 2026 MY). If EPA raises the multiplier cap, the agency could consider lowering the advanced technology multipliers for BEVs and PHEVs in order to moderate the number of credits earned as shown in Table 1 below. This would also generate greater EV production volumes than proposed in the GHG NPRM. Hyundai recommends that the FCEV multiplier remain at 2.0 to spur sales and infrastructure investment in fuel cell vehicles. Hyundai also requests that the agencies maintain the EV multipliers through the 2026 MY. It is appropriate to continue to encourage EV production and sales using EV multipliers while EVs are moving towards cost parity with gasoline vehicles. [EPA-HQ-OAR-2021-0208-0603-A1, p.8] [Table 1 can be found at docket number EPA-HQ-OAR-2021-0208-0603-A1, pp. 7-8].

Commenter: Illinois et al. Corn Growers Associations

When coupled with EPA's extremely aggressive proposed timeline, this defect makes it virtually certain that automakers will not be able to comply with the proposed rule without what the proposal euphemistically calls regulatory "flexibility."4 That flexibility is promised in part in the form of extensions of "EV multipliers," which allow traditional automakers to buy their way out of compliance with EPA's standards by double counting electric-vehicle credits when calculating fleet-average greenhouse gas emissions. This is counterproductive because, as EPA admits, multipliers do not meaningfully encourage the adoption of electric vehicles, but instead serve only to enrich electric vehicle manufacturers at the expense of consumers, industry, and the environment. [EPA-HQ-OAR-2021-0208-0563-A2,p.3]

The costs of this approach are significant. According to the proposal, the multipliers will license an increase of nearly 46 million metric tons (MMT) of carbon pollution over the lifetime of the relevant cars and trucks.5 According to EPA's Greenhouse Gas Equivalencies Calculator, the 46 MMT EPA says will be added by the production multiplier for EVs is the equivalent of adding more than ten million cars to the road for one year, or burning over five billion gallons of additional gasoline, or operating 12 additional coal-fired power plants for one year.6 [EPA-HQ-OAR-2021-0208-0563-A2,pp.3-4]

These environmental and social costs would be one thing if EPA thought they would be offset by future improvements from electrification. But as EPA all but admits, multipliers will not meaningfully increase electric vehicle sales; rather, EPA anticipates that the increased penetration as a result of these subsidies will be "less than 0.5 percent" in any year.7 In other words, EPA plans on getting nothing for something. [EPA-HQ-OAR-2021-0208-0563-A2, p.4]

The sole reason for this approach appears to be the optics: EPA will be able to claim to have radically slashed emissions, while in reality creating less-stringent standards that automakers can actually comply with.8 In response to criticism, moreover, EPA will be able to point to the benefit to the electric vehicle industry, allowing it to "greenwash" the social, environmental, and economic costs of this wasteful approach. This is arbitrary and capricious and lacks any sound basis in evidence to support EPA's claim that its standards will benefit "public health and welfare." [EPA-HQ-OAR-2021-0208-0563-A2, p.4]

The approach is also out of step with the Clean Air Act. Section 202(a) requires EPA to "prescribe . . . standards applicable to the emission of any air pollutant from any class or classes of new motor vehicles or new motor vehicle engines, which in [its] judgment cause, or contribute to, air pollution which may reasonably be anticipated to endanger public health or welfare."9 This does not allow the agency to set standards and then provide ways that regulated entities can avoid those standards by giving money to electric vehicle manufacturers. By definition, this is inconsistent with the EPA's duty to protect "public health and welfare" since it is deliberately designed to relax the standards that EPA concluded are reasonably anticipated to protect those interests. [EPA-HQ-OAR-2021-0208-0563-A2, pp.4-5]

Commenter: Institute for Policy Integrity

Similarly, EPA should also more critically evaluate the trade-offs resulting from its proposed extension of multiplier credits and the credit carry-forward period and consider the forgone benefits to public health and consumer fuel savings associated with these compliance flexibilities. To the extent that these extended compliance flexibilities are intended to provide additional lead time for manufacturers to comply with the MY 2023 standards, EPA should evaluate whether such flexibility is needed beyond the first model year of its proposed standards. As detailed below, we do not believe EPA is required to provide significant lead time for standards (such as the proposed standards) that do not require significant technology investment and development. EPA should consider whether scaling back even some of the multiplier credits or carry-forward period, or limiting their application to MY 2023, would increase net social benefits while still preserving more than enough compliance flexibility to satisfy the requirement for lead time. [EPA-HQ-OAR-2021-0208-0299-A1, p. 5.]

Commenter: ITB Group, Ltd. (ITB)

EPA Proposed Advanced Technology Multiplier Credits. ITB conditionally supports the EPA's proposal to extend advanced technology multiplier incentives for battery electric vehicles (BEV), Plug-in Hybrid Vehicles (PHEV), and Fuel Cell Electric Vehicles (FCEV) that sunset in 2025 or 2026 and include a cap. While there have been considerable supplier and OEM investments in these technologies, many of these technologies are still immature and incentives for a certain period of time can provide a catalyst to get more zero-emissions vehicles to the market sooner while reducing investment risk for the automotive industry.

ITB believes that harmonizing the advanced vehicle technology multiplier credit cap with California's Framework Agreements is the appropriate path to allow flexibility in meeting the top line emissions stringency given the short time automakers have to respond to a sharp stringency change by 2023. [EPA-HQ-OAR-2021-0208-0222-A1, p. 7]

Commenter: Jaguar Land Rover North America, LLC (JLRNA)

Incentive Multipliers. Jaguar Land Rover welcomes the proposed extension of ATV multipliers. In 19MY Jaguar Land Rover was the second highest claimant of ATV multiplier credits, behind only Tesla. Jaguar Land Rover considers the ATV multipliers a powerful driver in improving EV adoption.

However, the cap of 2.5 g/mi per year, combined with the proposed 2x BEV multiplier, means that (for a hypothetical company with a status without multipliers of ~200 g/mi) effectively only the first 1.25% of the manufacturers sales mix which are BEV could earn multiplier credits. Any BEVs beyond this would not be eligible for credits.

Jaguar Land Rover proposes that the cap is increased from 2.5 g/mi up to 5 g/mi while multipliers are maintained at the lower, 2021MY level (1.5x for BEV, 1.3x for PHEV). This would increase the BEV share at which OEMs would be additionally incentivized by ATV multiplier credits, which will help accelerate EV adoption. This would lead to incentivizing a BEV mix up to 4 times higher than the current proposal. We would propose that the cumulative cap is also raised respectively from 10 g/mi to 20 g/mi. [EPA-HQ-OAR-2021-0208-0269-A1, p.7] [The tables can be found on p.7 of Docket number [EPA-HQ-OAR-2021-0208-0269-A1]

We believe this proposal will help improve the administration's goal of incentivizing EVs to a percentage mix that aligns more closely with the expectation for the time period. [EPA-HQ-OAR-2021-0208-0269-A1, p.7]

In addition to this we propose an alternative to the new ATV incentive multipliers by increasing the cap and lowering the multiplier to further motivate the introduction of new electric vehicle models to the market. [EPA-HQ-OAR-2021-0208-0269-A1, p.8]

Commenter: Kreucher, Walter

The Agencies further propose in the rulemaking to modify these generous credits to add a vehicle multiplier for EVs and FCVs. Under the proposal, each vehicle counts as 2.0 for MYs 2022-2024, and 1.75 for MY 2025, subject to a cap on all vehicle multipliers. A clear indication that even they do not think the standards are achievable. [EPA-HQ-OAR-2021-0208-0199-A1, pp. 6-7]

Commenter: Lucid USA, Inc. (Lucid)

Lucid also supports the continued use of EV incentives as proposed in the NPRM, including the extension of multipliers for EVs into MY2025 and the continued assumption that EVs produce 0 g/mi of CO_2. Lucid encourages the Agency to consider adopting additional incentives for manufacturers that develop and manufacture electric vehicles and related technology and components in the United States. Incentivizing domestic innovation, development and manufacturing of EVs, across the entire supply chain, is consistent with the Biden Administration's Buy American efforts, which aim to encourage U.S. manufacturing and the purchase of U.S.-made goods. [EPA-HQ-OAR-2021-0208-0528-A1, pp. 3-4]

However, ZEV-only manufacturers like Lucid are accelerating the transition to a zero-emission future and should not be subject to an advanced technology multiplier cap. This cap was intended to target manufacturers that produce vehicles with internal combustion engines and prevents them from counterbalancing high-emitting vehicles with ZEV sales. ZEV-only manufacturers should not be subject to this cap because they are not offsetting sales of ICE vehicles in their own fleets. [EPA-HQ-OAR-2021-0208-0528-A1, p.5]

Commenter: Manufacturers of Emission Controls Association (MECA)

Advanced Technology Multiplier Credits. MECA has supported the early introductory use of incentives to promote innovative technologies that can be disadvantaged by lack of customer exposure and experience. However, in order for a technology to be a sustainable and successful solution, it must be competitive in cost and performance with other technologies to gain consumer acceptance. Indeed, this was recognized by the original EPA 2012 LD GHG rule, the Midterm Review and subsequent SAFE 2 LD GHG rules which all phased out advanced technology multiplier credits for PHEVs, BEVs and FCEVs in MY2022.

The phase-out of multiplier credits is justified as electrified vehicles have now been around for about 30 years and have matured to the point where almost every manufacturer is offering multiple hybridized and fully electric models, allowing consumers to make informed choices with respect report1 to advanced powertrain vehicles. A recent ICCT points out that similar to the latest EPA proposal, the California ZEV program forecasts only 8% EV penetration in 2025 due to credit multipliers. In their report, ICCT cautions that long term reliance on credit multipliers for ZEV technology may result in the unintended consequence of increasing real world emissions from the remaining non-ZEV portion of the fleet that is allowed to continue to emit at higher levels.

The revisions to the LD GHG standards for MY 2020 to MY 2026 created uncertainty for the supplier industry as well as our OEM customers. Furthermore, the proposed standards are scheduled to be implemented in a short time frame. Based on the agencies impact analysis and inclusion of the annual 2.5 g/mile cap on the use of the EV multiplier credits, we agree with the inclusion of the advanced technology multipliers for the limited number of years proposed because it offers some near-term compliance flexibility during this critical transition period for suppliers. However, for the reasons listed earlier in this section, we urge EPA to follow through with sunsetting these credit multipliers by MY 2025 and not grant further extensions in future LDV rulemakings. [EPA-HQ-OAR-2021-0208-0261-A1, pp.2-3]

Commenter: Mercedes-Benz USA, LLC

Mercedes-Benz supports the extension of the advanced technology vehicle multiplier incentive through MY2025, and encourages the agency to extend through MY2026 to conclude the regulatory period.

In addition to extending the sunset for the advanced technology vehicle multiplier, Mercedes-Benz requests that EPA increase the cap to 6.4 g/mi per year. [EPA-HQ-OAR-2021-0208-0523-A1, p.2]

Advanced Technology Vehicle Multiplier. The existing GHG program includes temporary incentives through MY2021 that encourage the use of advanced technologies such as electric, hybrid, and fuel cell vehicles. In EPA’s proposal, the agency proposed extending these incentives from MY2022-2025 with a cap on multiplier credits. Mercedes-Benz supports the extension of the advanced technology vehicle multiplier, in particular, because adoption rates for EVs and PHEVs remains lower than anticipated for the time frame under discussion.

First, EPA requests feedback on the extension of the cap from MY2021 (the original sunset date) through MY2025 under the revised proposal. Mercedes-Benz supports the extension of the multiplier incentives through MY2025, and requests that EPA reconsider its decision to exclude multipliers from MY2026. While we recognize that EPA's intention is to signal that multipliers will be excluded from future regulatory programs, we do see a need for multipliers as one complementary policy within the proposal timeframe to encourage the adoption of EVs during this critical time frame. We believe the extension to MY2026 nicely concludes the proposal's programmatic period and complements the opportunity to utilize one-time carry-back provisions included within EPA's proposal. In the event that EPA chooses to extend the advanced technology vehicle multiplier cap through MY2026, we recommend that the agency include the multiplier without adjustment to the proposed stringency of the MY2026 standard.

Second, in in addition to the extension of the advanced technology vehicle multiplier flexibility, EPA is asking for feedback on the application of a credit cap of 2.5 g/mi per vehicle or 10 g/mi cumulatively. Mercedes-Benz requests that EPA extend the cap to 6.4 g/mi per year in alignment with the model presented by the California Framework Agreement. These credits are a stimulus opportunity for the agency to incentivize all-electric powertrains and for manufacturers to reinvest their R&D expenditures through credit accrual. Credits are a low cost, low risk, win-win opportunity for EPA to support the all-electric transition.

In lieu of the 6.4 g/mi per year cap we previously mention, an alternative option would be including the advanced technology vehicle multiplier credits as part of the off-cycle credit menu. In this case, EPA would use the existing advanced technology vehicle multiplier credit values available through this proposal, and a manufacturer could choose whether to utilize the advanced technology vehicle multiplier as a type of off-cycle credit in their annual reporting rather than a separate incentive with its own cap. If EPA chooses to add the advanced technology as an option for the off-cycle credit menu, we recommend that EPA continue with its proposal to increase the off-cycle credit cap from 10 to 15 g/mi.

For the aforementioned reasons, Mercedes-Benz recommends extending the multiplier through MY2026, and increasing the fleet-wide cap for MYs 2023-2026 to 6.4 g/mi per year. [EPA-HQ-OAR-2021-0208-0523-A1, pp.3-4]

Commenter: Michalek, Jeremy and Whitefoot, Kate S.

Treatment of alternative-fuel vehicles: EPA is proposing to expand the favorable treatment of alternative fuel vehicles (AFVs) by treating AFVs as lower emitting than they really are and treating each AFV sale as though more than one AFV had been sold in compliance calculations. EPA recognizes that this approach to encouraging AFV technology advancement will increase fleet emissions but believes that long term benefits of advancing future technologies will outweigh near term losses. We recommend that EPA (1) test this belief with evidence, (2) consider the effect of this policy design on the ability of all other U.S. actors to encourage AFV adoption without triggering increased fleet emissions, and (3) measure and predict actual GHG emissions as closely as possible in the regulation, eschewing distorted measurement as a mechanism for encouraging AFV advancement in favor of other policies that can achieve AFV advancement without increasing fleet emissions. [EPA-HQ-OAR-2021-0208-0300-A1, p. 2]

Alternative Fuel Vehicles. In the proposed rule, EPA requests comment on proposed policies for handling of alternative fuel vehicles (AFVs) in the standard:

'EPA requests comment on all aspects of the proposed extension of multipliers, including the proposed multiplier levels, model years when multipliers are available, and the size and structure of the multiplier credit cap.' (p43757)

EPA's LDV GHG rule has incentives for alternative fuel vehicles (AFVs) that treat them in compliance calculations as though they are lower emitting than they actually are. This is done in two ways: (1) by ignoring emissions from locations other than the vehicle tailpipe, such as emissions from electric vehicle charging, and (2) by treating each AFV sold as though multiple AFVs were sold for compliance calculations. Both of these have the effect of reporting lower emissions for these vehicles than they actually produce and therefore permitting higher overall actual fleet emissions. EPA recognizes that this approach to incentivizing AFV technologies produces an effective loss of stringency for the standard and increases fleet emissions relative to what they would be if all vehicle emissions were counted equally. EPA's stated intent is to incentivize manufacturers to invest in technologies that can realize an ultra-low emission future.

'When EPA established these incentives in the 2012 rule, EPA recognized that they would reduce the effective stringency of the standards, but believed that it was worthwhile to have a limited near-term loss of emissions reduction benefits to increase the potential for far greater emissions reduction and technology diffusion benefits in the longer term. EPA believed that the temporary regulatory incentives would help bring low emission technologies to market more quickly than in the absence of incentives.'

Justifying Assumptions and Considering Effects on Other Actors. EPA states that they believe these incentives are worthwhile - that the loss of stringency in the near term is outweighed by the potential for far greater emissions reductions and technology diffusion benefits in the long term.

We recommend that EPA should (1) demonstrate this belief with evidence and (2) consider the interactions of this policy design with other federal and state policies when determining whether it is worthwhile. We discuss each in turn:

1. Evidence: EPA should state what evidence it has that (1) the LDV GHG incentives for AFVs have an effect on technology development and (2) that this effect is greater than the stringency loss. In the absence of other policies, it is plausible that EPA's favorable treatment of AFVs in compliance calculations could be a driver of innovation and technology development, though it is not clear whether or not the magnitude of this effect in accelerating penetration of AFVs and achieving future GHG reductions is larger than the stringency loss. Further, in the presence of other policies that also drive alternative fuel vehicle adoption, such as California's zero-emission vehicle mandate and other policies, it is also possible that AFV technology development would be unchanged by removal of AFV incentives in EPA's LDV standards because these other

policies may be the binding constraint for automaker decisions about AFVs. EPA should state what work it has done to test its belief that long term GHG benefits of these AFV incentives outweigh near term costs.

2. Policy Interactions: We recommend that EPA also consider that the design of AFV incentives in the LDV standards prevents all other federal, state and local efforts from encouraging AFV adoption without triggering unintended consequences of increased permitted fleet emissions. Peer reviewed studies have shown that efforts to increase alternative fuel vehicle adoption trigger an increase in permitted GHG emissions by up to 60 tons of CO2 equivalent per vehicle (depending on the vehicle and year of sale) (Jenn et al., 2016), and these federal incentives interact with state zero-emission vehicle policies to produce higher fleet GHG emissions than either policy alone (Jenn et al., 2019). EPA should consider the effect its policy choice has on constraining other entities from encouraging AFV adoption without triggering an increase in fleet emissions.

Measuring GHG Emissions Without Distortion. It is our view that in order to avoid unintended consequences, the federal LDV fleet standards should measure actual GHG emissions as closely as possible and not conflate the goal of reduced GHG emissions with the goal of technology advancement via distorted measurements. A better approach, in our view, would be to target actual GHG emission reductions with the LDV standards and use other policies to encourage AFV adoption. In this way, other policies can encourage AFV adoption without triggering an increase in permitted fleet emissions. The proposed cumulative cap and explicit sunset date on the AFV incentives is a step in this direction, but we are concerned that amplifying the distortion between now and 2025 will amplify the unintended consequences. [EPA-HQ-OAR-2021-0208-0300-A1, pp. 7-8]

Commenter: Minnesota Pollution Control Agency (MPCA) and Minnesota Department of Transportation (MnDOT)

The MPCA and MnDOT also encourage EPA to revisit its proposed multiplier and set it at a level that protects the rigor of the standards while still driving ever-increasing levels of EVs into the market to support the Biden Administration’s stated goal of 50% of new vehicle sales being electric by 2030. [EPA-HQ-OAR-2021-0208-0211-A1, p.3]

Commenter: Motor & Equipment Manufacturers Association (MEMA)

MEMA Supports the Advanced Technology Multiplier Credits - MEMA conditionally supports extending these advanced technology multiplier incentives. The proposed sunset and stringent credit cap encourage further improvements to ICE technologies. The program parameters are critical to suppliers as MEMA supports a structure that encourages a broad spectrum of innovative technologies. [EPA-HQ-OAR-2021-0208-0249-A1, p. 3]MEMA Supports the Proposed Advanced Technology Multiplier Credits

The 2012 EPA rule provided vehicle manufacturers with multiplier incentives that allow advanced technology vehicles – BEVs, FCEVs, PHEVs, and compressed natural gas vehicles

(CNGs) – to count as more than one vehicle toward compliance beginning in 2017 and expiring in 2021.36 EPA proposes extending the advanced technology multiplier incentives only for BEVs, FCEVs, and PHEVs for MYs 2022–2025 with lowered credits and a sunset in MY2025. EPA would impose a cap of 2.5 g/mi for car and light truck fleets per MY for MYs 2022–2025 or 10 g/mi on a cumulative basis. EPA requests comments on all aspects of the proposed multipliers.37

The advanced technology multiplier credit offers credits that help “incentivize technology in the near term.”39 Incentive credits are important to suppliers because these are the technologies in which suppliers have invested significant resources to develop. While there has been supplier and vehicle manufacturer investments in these technologies, many of these technologies are still new enough that incentives are needed to provide the initial catalyst to get more ZEVs to the market in the nearer term.

However, MEMA also strongly supports an EPA program that requires significant advances in a wide range of innovative technologies including improvements to ICE technologies. EPA justifies the proposed credit cap to prevent “backsliding for internal combustion engine” technologies and to “limit the potential effect of the multipliers on reducing the effective stringency of the standards.”40

These limits on the credits, the sunset and cap, are critical to suppliers as MEMA supports stringent standards that encourage a broad spectrum of innovative technologies. Suppliers have made significant investments in all these technologies, and all have a place in helping to meet the nation’s goals. Without a cap and sunset, the advanced technology multiplier credits could drive technologies down too narrow of a regulatory path, too quickly.

Consequently, MEMA conditionally supports extending these advanced technology multiplier incentives that sunset in 2025 and include a stringent cap. While MEMA can support these advanced technology multiplier incentives, these multiplier incentives should not be extended indefinitely, credits should not be set higher than the proposed levels, and the proposed cap should not be increased. If the incentives were set any higher or extended, these credits could cause a distortion in the market. MEMA agrees with EPA that these credits should be a temporary part of the program.41

In EPA’s post-2026 program, MEMA strongly supports a GHG emissions program that relies on performance-based standards and phases out incentives limited to specific technologies. MEMA, however, could support performance-based incentives for technologies that meet certain performance criteria. Such a program that focuses on performance rather than specific technology incentives would encourage more innovation and support the competitive marketplace paving the road to meeting the nation’s goals. MEMA is committed to a shift towards significantly higher levels of electrification while continuing to allow innovation to drive us toward a broad spectrum of advanced innovative technologies. [EPA-HQ-OAR-2021-0208-0249-A1, p. 11-12]

Commenter: National Association of Clean Air Agencies (NACAA)

ZEV Multipliers. EPA includes in the proposal an extension of the advanced technology vehicle multiplier incentives for MYs 2022 through 2025 with a cumulative credit cap. The level of this cap will depend on each automaker's actual fleet, specifically, what vehicles will become EVs and the footprint(s) of those vehicles compared to the fleet target, with a multiplier added.

Consistent with NACAA's recommendation above, to, at a minimum, restore the emissions benefits of the 2012 rule, EPA should reduce the multiplier to set it at a level that protects the rigor of the standards while still driving increased levels of EVs into the market beyond what manufacturers are likely to deliver without additional incentives. [EPA-HQ-OAR-2021-0208-0255-A1, p.7]

Commenter: National Automobile Dealers Association (NADA)

NADA generally supports the multiplier incentives EPA has proposed but opposes elimination of the multiplier for natural gas fueled vehicles. Moreover, NADA supports such additional compliance flexibilities as will afford OEMs a greater ability to deliver compliant vehicles in a more cost-efficient manner, and to help incentivize the acceptance of new technology and alternative fueled vehicles in the marketplace.38 [EPA-HQ-OAR-2021-0208-0290-A1, p. 10]

38 NADA supports the comments of the Alliance of Automotive Innovation in this regard.

Commenter: National Parks Conservation Association (NPCA)

Finally, NPCA requests that the final rule should not include unnecessary loopholes or credits, such as multipliers, that allow manufacturers to avoid real world reductions. [EPA-HQ-OAR-2021-0208-0291-A1, p. 2]

Commenter: New Mexico Environment Department

Third, NMED recommends the EPA set the advanced technology vehicle multiplier and the credit caps5 at levels appropriate to protect the rigor of the standard and drive increased levels of electric and other zero-emission vehicles into the market. [EPA-HQ-OAR-2021-0208-0205-A1] [p.1]

Commenter: New York State Department of Environmental Conservation

New York supports the proposed extension of multipliers for advanced technology vehicles for model, years 2022-2025 but questions the need for the proposed increases in multiplier values. The current incentives established by the 2012 SAFE Rule established an orderly decline in multiplier values from MYs 2017 to 2021. Instead of increasing the multiplier values for electric and plug-in hybrid vehicles, New York recommends maintaining the multiplier values for advanced technology vehicles at MY2021 values, or 1.5 for EVs and FCEVs and 1.3 for PHEVs for model years 2022-2025 (see Table 24). qEC supports EPA's plan to sunset the multipliers after MY 2025 and the incorporation of a cap. [EPA-HQ-OAR-2021-0208-0238-A1, p.3]

Commenter: Nissan North America, Inc.

The continuation of credit multipliers also is essential to encouraging manufacturer investment in and widespread deployment of these advanced powertrain technologies. Under the current rules, the multipliers for EVs, fuel cell vehicles ("FCVs"), and plug-in hybrids ("PHEVs") are scheduled to phase out after model year 2021. Nissan supports EPA's proposal to extend the credit multipliers available for EVs through model year 2025. EPA's proposal is a valuable step towards incentivizing investment in these technologies; however, Nissan encourages EPA to consider extending the multipliers even further, through at least model year 2026. In its reasoning for sunsetting the multiplier incentives in model year 2025, EPA focuses exclusively on the development and availability of zero-emission technology and does not consider the full context necessary for achieving such a market shift, including availability of infrastructure and consumer demand, which have lagged behind technological advancements. EPA is also proposing an average of 2.5 g/mile per year cap on such multiplier-based credits for model years 2022 through 2025, which is more restrictive than the cap adopted under the California Framework Agreements. Extending the credit multipliers beyond model year 2025 with a cap more equivalent to that under the California Framework Agreements would incentivize manufacturers to continue investing in these technologies despite these challenges. Encouraging manufacturers to continue improving and selling zero-emission technologies will facilitate infrastructure development and consumer education that will ultimately lead to a broader market shift.

The overall adoption of EVs remains relatively low today in spite of the billions invested by the automobile industry on technology and product development and other market actions. Many market barriers to mass EV adoption, such as cost parity and lack of consumer acceptance, continue to exist. These barriers must be overcome in an expedited manner in order to reach the longer term goal of a carbon neutral future. EV-related regulatory incentives, such as production multipliers and tailpipe-only calculations, are effective tools to ease such barriers and would encourage accelerated production of EVs. Without these incentives, transforming the current EV market would become more challenging and could place the Administration's long-term carbon neutral goals in jeopardy. [EPA-HQ-OAR-2021-0208-0529-A1, p. 6-7]

Commenter: Olmstead, Thomas

As seen in the following table, more credits are being used from prior years to meet the more stringent standards from 2016 onwards and the number of credits used by manufacturer varies greatly: [Figures and Table at docket number EPA-HQ-OAR-2021-0208-0190-A1, pp. 2 and 3]

The above tables shows that an active credit market exists, and numerous manufacturers have used credits to meet the standards. For this reason, the credits should be phased out. However, the multipliers should be ended because as EPA has noted in the proposed rule, the multipliers make the standard less stringent. Multiplier incentives for advanced technology vehicles including electric vehicles, fuel cell vehicles, plug-in hybrids were set to end after model year 2021. According to the American Council for an Energy-Efficient Economy (ACEEE), 'EV multipliers allow automakers to give extra weight to EVs (often 1.5 or 2x weight) when calculating their fleetwide average, which means that they can use EVs to offset the sales of larger, higher-emitting vehicles. Automakers need to meet an annual sales-weighted average efficiency level and the EV multipliers give disproportionate weight to EVs, which are generally more efficient. This means that each electric model sold actually increases overall fleetwide emissions despite EVs themselves emitting less. Also, while the multipliers may have been introduced to spur EV sales, there is evidence to suggest they are not having that effect and may actually hinder EV sales. The Obama standards included a phase-out of these multipliers by MY 2021.' With a 229,216,449 Mg credit balance for all manufacturers available in 2019, these credits provide more than enough to cover the more stringent standards for manufacturers that struggle to meet the standards in future years and additional lead time to meet increasing standards.

For these reasons, EPA should adopt more stringent standards, phaseout credits, and eliminate the multiplier incentives for advanced technology vehicles. [EPA-HQ-OAR-2021-0208-0190-A1, pp. 2-3]

Commenter: Peterson, Doug

The Credit Multiplier for Battery Electric Vehicles Should Not Be Restored. The credit multiplier under consideration was designed to accelerate electrification when zero emission vehicles were just getting started. It was a fairly sensible plan, seems to have served its purpose for BEVs, was sensibly phased out, and should remain phased out as far as BEVs are concerned. The excessive number of compliance credits generated by the multiplier has undermined the overall effectiveness of the regulatory framework. Reasonable people might disagree about whether or not it was worth it. Tesla has never had to be concerned about compliance but has benefited from the flow of pay-to-pollute dollars into its coffers and is now thriving. If there is any bright spot in the U.S. regarding auto emissions, it is the rapid ascent of Tesla, proving beyond a shadow of a doubt that BEVs are feasible and marketable. But the original justification for the multiplier is no longer valid. BEV adoption is accelerating around the globe, and most automakers are getting on board, making substantial investments in electrification. Environmentally responsible countries are implementing zero emission vehicle mandates and plan to phase out the sale of internal combustion vehicles in the 2030-2040 timeframe. The writing is on the wall; automakers will have to electrify or die.

I firmly believe that restoring the multiplier will slow BEV adoption within the United States. The automakers crave earned compliance credits more than purchased ones, and the multiplier allows them to earn the same number of credits by selling half as many BEVs. The EPA should go even further and align the credits generated by BEVs with the emission reductions they provide in the real world. The average carbon intensity of the national grid could be used to estimate upstream emissions, and BEVs would generate an appropriate number of credits that take those emissions into account. As local grids are steadily decarbonized, BEVs would steadily generate more credits that are aligned with their real world benefits. Such a system would not be perfectly accurate, but it would be better than the current rules that allow BEVs to generate unjustified windfall credits. This would restore integrity to the existing regulatory framework, which is essentially a cap-and-trade system without a sealed cap.

Under the current rules, BEVs generate windfall credits when they are averaged into fleet performance calculations, offsetting the shortcomings of overpowered gas-guzzlers that fail to meet their standards. I drive a Hyundai Ioniq because it gets extraordinarily high MPGe, but I am fully aware that this allows Hyundai to sell a much larger number of vehicles that do not meet their footprint targets, if they so choose, or they can sell my BEV's credits to an irresponsible automaker. The credit trading system and the use of averaging to determine fleet performance results in a system in which the altruism of an individual like myself ends up enabling the moral indifference of folks who drive gas-guzzlers, and this is especially troubling to me. I can feel satisfied that my vehicle does indeed reduce light duty CO2 emissions, but those gains are used to offset the shortcomings of inefficient vehicles that fail to achieve their footprint targets. It is worth mentioning at this juncture that the current framework also incentivizes the upsizing of ZEVs. If the EPA were bolder about protecting the environment, they would be establishing policies that aim to downsize our national fleet to some degree, including ZEVs.

I do support restoring the multiplier for fuel cell electric vehicles. Our regulations should guarantee a steady transition to a zero emissions fleet that includes roughly equal numbers of both ZEV powertrains. BEVs and FCEVs each have their own unique benefits, and there are important synergistic advantages to developing both. While it seems like this would require the development of two expensive fueling infrastructures, that is not completely the case. Green hydrogen fueling stations would reduce the need for so many public charging stations. It is going to be extremely difficult to bring the crucial benefit of home charging to people who live in apartment complexes, but there is nothing to prevent renters from filling up their tanks with green hydrogen. The two zero emission powertrains complement one another nicely. The development of green hydrogen as a means of storing intermittent solar and wind energy will also decrease the need for large banks of batteries that might serve the same purpose, reducing demand for lithium and scaling up the production of hydrogen fuel for a wide variety of environmentally helpful uses that ought to include FCEVs.

I favor restoring the credit multiplier for FCEVs for the same reason it was implemented to begin with, to incentivize this promising technology while it is struggling to get on its feet and creating a bigger market for green hydrogen. The fact that BEVs are currently seen as more feasible than FCEVs should not lead us to discard nascent fuel cell technology in favor of BEVs. Both are extremely valuable for defeating climate change, and our environmental policies should embrace them both. FCEVs are currently being sold in very small numbers, so I do not believe that restoring the multiplier for these vehicles will contribute greatly to the glut of compliance credits in the near term. Depending on how fast FCEVs catch on, it might be possible to phase out the restored multiplier after 2027. The flow of pay-to-pollute dollars to manufacturers that sell FCEVs would likely benefit them in the same way the flow has benefitted Tesla, accelerating FCEV adoption and the buildout of green hydrogen fueling stations.

I will not comment much on the cap that the EPA envisions which would limit the extent to which automakers might benefit from the restored multiplier. If the EPA follows my thoughtful recommendation to restore the multiplier to FCEVs but not BEVs, I advise against the cap. I would argue further that future rules should disallow the sale of ZEV credits to other automakers. Altruistic individuals who choose to drive BEVs or FCEVs should not be enabling irresponsible

10 automakers and consumers under the pay-to-pollute provisions of the outdated framework. A more robust framework would disallow the trading of credits generated by ZEVs, isolating all zero emission credits from the pay-to-pollute travesty as a mandatory electrification transition accelerates. If automakers are to advance the most promising technologies while improving their fleet performance, they should be forced to build their own ZEVs. If they refuse, they should not be allowed to achieve compliance by exploiting the current pay-to-pollute flexibility provision. If the new regulatory framework were to drive them into bankruptcy, so be it. Internal combustion vehicles are causing severe harm to the environment and need to be phased out. [EPA-HQ-OAR-2021-0208-0692-A1, p. 8-10]

Commenter: Rivian Automotive, LLC

Do Not Extend the Advanced Technology Vehicle Multiplier. EPA originally devised advanced technology multipliers to encourage the use of advanced technologies such as electric drivetrains. According to the agency, when first implemented in 2012 they were "temporary regulatory incentives" that came at the cost of program stringency but "would help bring low emission technologies to market…"10 However, at least one study of policy design issues in fuel economy and GHG emissions standards calls the efficacy of multipliers into question. By artificially enhancing the compliance value of EVs, the multiplier can enable manufacturers to sell additional conventional vehicles if those units deliver a greater financial return.11 It is also debatable whether the multiplier is even necessary at this stage to help commercialize EV technology. With a rapidly proliferating lineup of EVs in all body styles and vehicle segments, the auto industry has amply demonstrated its ability to bring compelling and competitive advanced technology vehicles to market

Additionally, Rivian is concerned about the impact of these incentives on the environment. In general, EPA's calculations indicate that even with a cap on the maximum benefit of the multiplier for any given manufacturer, including multipliers in the proposed rule erodes its GHG emissions reductions by effectively easing stringency. Over the lifetime of MY2021-2026 vehicles, EPA estimates that the multipliers in the proposed rule result in 46 million fewer metric tons of GHG reductions. And continuing to award multipliers for plug-in hybrid electric vehicles (PHEVs) specifically rewards a "pass-through" technology with significant variability in its environmental performance. Research from Europe suggests that PHEVs deliver significantly poorer environmental benefits in real-world usage than certified under test procedures, with troubling implications for the projected benefits of regulatory programs that encourage the development and sale of these vehicles.12 For all these reasons, we believe it would be imprudent for EPA to sustain the advanced technology vehicle multiplier incentive under any alternative. [EPA-HQ-OAR-2021-0208-0274-A1, p. 5]

Commenter: Securing America's Future Energy

Multiplier for Advanced Technology Vehicles. In the 2012 rule, EPA established a multiplier for alternative fuel vehicles to accelerate their market penetration. EPA used a multiplier for electric vehicles, plug-in hybrid electric vehicles (PHEVs), fuel cell vehicles (FCVs), and compressed natural gas (CNG) vehicles sold in MYs 2017 through 2021. This multiplier approach meant that each qualifying alternative fuel vehicle would count as more than one vehicle in the manufacturer's compliance calculations. This operated as an incentive for automakers to manufacture and sell alternative fuel vehicles. EVs and FCVs started with a multiplier value of 2.0, meaning that the sale of each car was treated as the sale of 2 cars for compliance purposes, phasing down to a value of 1.5 in MY 2021. PHEVs and CNG vehicles started with a multiplier value of 1.6, phasing down to a value of 1.3 in MY 2021. There we no multipliers for MY 2022 or later years.[40]

In the SAFE Rule in 2020, EPA established a multiplier of 2.0 for natural gas vehicles through MY 2026. It did not extend multipliers for any other types of vehicles.[41]

SAFE supports EPA's decision to reinstitute multipliers for electric vehicles, and believes that it should do so in selecting Alternative 2 or a more stringent alternative as well. SAFE is well aware of the criticisms of the multipliers. It is correct that the multiplier may allow for the sale of dirtier vehicles. In an averaging program, however, the sale of every cleaner car allows for the sale of some dirtier cars; that is a basic feature of averaging. SAFE recognizes that the availability of the multiplier further relaxes the overall standard by effectively increasing the number of cleaner vehicles that an automaker is credited with selling in the calculation of fleet emissions, thus allowing the sale of more vehicles with higher emissions. We view this, however, as a worthwhile tradeoff because of the importance of accelerating sales of electric vehicles, as explained above. Overall, electric vehicles not only operate more efficiently and have lower emissions,[42] but they will continue to get cleaner over time as the emission standards for power generation become more stringent. Stated otherwise, electric cars are the only cars that get cleaner as they get older.

A recent commentary concerning the GHG emission standards and their use of multipliers for electric vehicles expressed some concern about the overall effectiveness of a multiplier, including its effect on total emissions and on EV adoption rates.[43] The analysis observed that a multiplier that does not account for upstream emissions reduces the stringency of the standard, and that the multiplier enables the sale of more inefficient vehicles with higher emissions.[44] SAFE believes, for reasons explained below, that it is appropriate to exclude upstream powerplant emissions from the emissions calculation. And as noted above, it is a basic design feature of fleet averaging programs that the sale of an efficient vehicle allows the sale of a less efficient vehicle.

The analysis also observed that EV incentives can increase EV adoption rates when sales are small and/or technology costs are high, but that once EVs are priced competitively with conventional vehicles, extra credits may decrease EV market share because fewer EVs are needed to comply with the less stringent standard.[45] SAFE believes that at the current modest adoption rates and elevated costs, a higher multiplier will not decrease EV adoption rates. First, as described above, EV sales remain a small share of the overall new vehicle sales market. Further, EVs are not yet competitively priced with conventional vehicles. The average cost of a new vehicle in March, 2021, was $40,472, while the average cost of a new EV was $53,297. [46] It also is more expensive to insure an EV than a conventional vehicle,[47] and though EVs may need fewer repairs, the repairs they need may be more costly due to the complexity of the vehicles, the expense of the equipment needed to repair them, and the need to retrain mechanics.48 Finally, one cannot assume that non-commercial purchasers of new vehicles make vehicle purchase decisions on the basis of total cost of ownership. If a consumer was looking to minimize total cost of ownership, they would nearly always choose to buy a used car. In fact, recent research concludes that very few consumers examine the total cost of ownership as part of their decision to purchase a new vehicle.[49] It seems that a total cost of ownership analysis is more likely to affect commercial purchases than personal purchases, but without individuals transitioning to electric vehicles, they will be consigned to a limited corner of the marketplace. SAFE's recommendation that EPA reinstate an EV multiplier is supported by recent research that concludes that a multiplier will not begin to erode the total GHG emissions meaningfully until EV sales approach 7 to 8 percent of the market, and they are unlikely to reduce the overall EV sales until EV sales also approach 13 to 15 percent of new vehicle sales.[50] U.S. EV penetration rates do not yet approach the level at which they will reduce EV sales, and EPA does not forecast that sales rates would approach that level during the model years covered by this proposed rule.

If EPA remains concerned that the multiplier will result in fewer EV sales because the availability of the multiplier relaxes the stringency of the standard, EPA could modify the operation of the multiplier to mitigate those concerns while still incentivizing the sale of electric vehicles. First, EPA could take into account the possibility that the multiplier might relax the stringency of the standards, and then further tighten the standards to maintain its initial level of stringency. In the alternative, EPA could modify the multiplier so that it would only apply to the incremental percentage of EVs that an automaker sold over the percentage in the previous year. By limiting the availability of the multiplier to the incremental sales of EVs year over year, EPA could reduce the extent to which it decreases the overall stringency of the standard. Yet, by maintaining the multiplier for electric vehicles that represent growth of the EV segment of an automakers' sales, the multiplier would provide an ongoing and robust incentive for automakers to continually increase their EV sales. [EPA-HQ-OAR-2021-0208-0527-A1, pp. 11-14]

Commenter: Sierra Club

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, pp. 29-30.]

The current proposal would reinstate a prior loophole by treating each zero emission vehicle as multiple zero emission vehicles when measuring compliance. Not only does this loophole erode the effectiveness of the rule, but recent research shows that it is actually counterproductive to accelerating the deployment of electric vehicles.

We should be past the point of multipliers by now. Instead, the final rule should say loud and clear one zero emission vehicle counts for one zero emission vehicle.

Commenter: South Coast Air Quality Management District

The South Coast AQMD supports the prudent extension of incentives for production and sale of vehicles with zero and near-zero emissions technology. The District supports the proposed multiplier incentives from MY2022 through MY2025 to accelerate the introduction of zero and near-zero emissions vehicles.3 The District agrees that special watchfulness is warranted on how the incentives impact overall program stringency. A multiplier credit cap or other mechanism to protect against any stalling in the momentum of improved fleet average calculations seems especially appropriate. The District further agrees that it is sensible to sunset multipliers in MY2025 to signal their discontinuation and simplify the transition to a more stringent program for MY2027. Regarding whether to allow multiplier credits to be generated in 2026 without an increase in the cap, the District generally supports a rule design that may incentivize a manufacturer, even in MY2026, to bring to market its first models of advanced technology vehicles. If the rule design could recognize narrower eligibility for generating credits in 2026, e.g., extending the incentive only to those manufacturers that have used less than some fraction of the cap, it could promote this beneficial result without further ossifying multipliers. Moreover, if MY2026 had its own year-specific, lesser cap, such that a manufacturer would not rely too heavily on any new-gained multiplier incentive, that may partly address the stated concern that any MY2026 credits could 'potentially complicate transitioning to MY2027 standards for some manufacturers.' 86 FR at 43757. [EPA-HQ-OAR-2021-0208-0215-A1, p.4]

3 Going further, EPA should look at rule designs that would accelerate zero and near-zero emissions technology in the exercise of all its Title II mobile source responsibilities.

Commenter: Southern Environmental Law Center

EPA should also not utilize multipliers for natural gas vehicles (NGVs), electric vehicles (EVs), fuel cell vehicles (FCVs), or plug-in hybrid electric vehicles (PHEVs) under any standards adopted. [EPA-HQ-OAR-2021-0208-0244-A1, p. 2]

EPA should also not use multiplier incentives for EVs, FCVs, and PHEVs, and we support EPA’s proposal to eliminate the multiplier incentive for NGVs.[40] The use of these incentives—which EPA believes vehicle manufacturers will continue to utilize ‘to their fullest extent’[41]—will ‘result in roughly 46 MMT (596 minus 550 MMT) fewer tons of CO2 reduced over the lifetimes of [model year] 2021-2026 vehicles.’[42] This amounts to an approximately 7.7 percent reduction in the stringency of the proposed standards. EPA notes that it intends to transition away from multiplier incentives ‘as zero-emissions technologies become more mainstream,’ but, as discussed above, the time for such a transition is now.[43] Two of the three advanced technologies provided favorable treatment through the application of credit multipliers—EVs and PHEVs—are common technologies in today’s vehicle marketplace. One recent study suggests that application of multiplier incentives for EV and PHEV technology under these circumstances could create a compliance loophole that allows manufacturers to continue making and selling dirtier (but currently more profitable) vehicles and could result in reductions in EV market share—which would be contrary to the intent of the multiplier.[44] As a result, EPA’s proposed use of multiplier incentives could decrease the stringency of the overall emissions standards for little gain in technological advances or EV penetration.[45]

If EPA decides to move forward with the use of multiplier incentives for EVs, FCVs, and PHEVs—which, again, we urge that it not do—several changes should be adopted. One of EPA's rationales for proposing new multipliers is 'to provide continuity for the incentives,' but the proposed multiplier incentives are in fact more generous than the multiplier incentives utilized in the 2012 Rule.[46] The proposed multiplier values effectively restart the incentive program, applying the multiplier values that the 2012 Rule used for vehicles from model years 2017 through 2019 to vehicles from model years 2022 through 2024. As discussed above, EV and PHEV technology has advanced and costs have decreased since the 2012 Rule was promulgated, and these generous incentive values are no longer needed. At a minimum, EPA should revise the proposal so the model year 2022 through 2024 multiplier incentives values start at 1.5 for EVs and FCVs, and 1.3 for PHEVs—the values provided for the last year of advanced technology credits (model year 2021) in the 2012 Rule—and then decrease to a value of 1.0 (no multiplier credits) by model year 2026.

EPA should also reconsider the incentive for PHEV technology. While the current multiplier structure provides a lower multiplier incentive value for PHEVs, the multiplier value could be better calibrated to reflect the fact that PHEV technology, which utilizes both battery and internal combustion engines, is not true zero tailpipe emissions technology. Under California's Advanced Clean Cars program, for example, 'transitional zero emission vehicles,' which are most commonly PHEVs, earn credits based on their all-electric range (AER), with a minimum amount of AER required for the vehicles to qualify for credits in the first place.[47] If it adopts a multiplier incentive structure, EPA should provide more generous multiplier values for PHEVs with greater AERs and set an AER floor below which vehicles will not qualify for the multiplier, and it should cap the amount of credits generated by PHEVs that may be used to satisfy the overall multiplier incentive credit cap—similar to the cap established by California to transitional zero emissions vehicles.[48] [EPA-HQ-OAR-2021-0208-0244-A1, pp.7-8]

Additionally, EPA should not utilize multipliers for NGVs, EVs, FCVs, or PHEVs under any standards adopted [EPA-HQ-OAR-2021-0208-0244-A1, p. 8]

[40] NGVs vehicles are not zero-tailpipe-emissions technology and should not be incentivized.

Commenter: Stellantis

Stellantis supports EPA's ambitious and challenging GHG standards and its desire to extend and expand flexibilities to further incentivize GHG reductions aligned to our common goal of an electrified future. However, certain modifications proposed by EPA are overly constraining. Specifically,

• EPA proposes to extend EV multipliers through MY2025, but with a highly constrained cap making multipliers one third as effective as the multipliers in the California Framework; and

• EPA should increase the EV multiplier cap to the same level proposed in the California Framework to incentivize EV growth from the current 2.5% rate to an 8-13% rate, which is the range modeled by EPA and NHTSA for MY2026.

• EPA should extend appropriate EV multipliers through MY2026.

Conclusion. Stellantis is committed to executing an electrified future pledging over $35 billion through 2025 to electrify all 14 Stellantis brands offering best-in-class fully electrified solutions. Stellantis supports EPA's proposed GHG standards with revised flexibilities included in the program, Increased EV multiplier caps set at levels in the California Framework through MY2026, and postpone off cycle credit redefinition until the next rulemaking cycle (MY2027+). Stellantis does not support the more stringent alternatives evaluated by EPA or the addition of 5-10g/mi in the final year for proposed GHG standard. [EPA-HQ-OAR-2021-0208-0532-A1, p. 5]

EV Multipliers and Caps Should Follow California Framework. A number of changes are needed in the proposed rule to align flexibilities with the market challenges of higher electrification rates that are needed to achieve requirements. While electric vehicle adoption has increased in recent years, it is still considerably less than what will be required to meet the proposed standards and meet the goals of industry and the Biden Administration. The inclusion of sales multipliers for EVs, PHEVs, and fuel cell vehicles ('EV Multipliers') should work alongside complementary consumer-facing policies, such as financial incentives, to take a whole-market approach to growing electrification. We believe that minor changes to the structure of the EV multipliers will help to grow EV market.

The advanced technology vehicle multipliers and caps proposed unnecessarily limit the incentive for EV technology and should be expanded to the same levels proposed in the California Framework. Regulatory incentives are needed to foster additional growth in these markets, as acknowledged by the 2012 final rule:

'EPA believes that it is both reasonable and appropriate to accept some short-term loss of emissions benefits in the short run to increase the potential for far-greater game-changing benefits in the longer run. The agency believes that these multipliers may help bring some technologies to market more quickly than in the absence of incentives.'20

As shown in the table below, EPA's proposed EV multipliers are capped at a maximum 10 g/mi cumulative impact over four model years (MY2022-2025) with no multiplier for MY2026. Stellantis estimates that this reduces the EV multiplier benefit to one third of that proposed in the California Framework which has a cap structure defined as 1% difference in stringency and extends through MY2026. [Table 1 can be found on p. 15 of Docket number EPA-HQ-OAR-2021-0208-0532-A1]

While we understand the concerns of 'lost' GHG reduction from incentives, we believe the EV multiplier structure adopted in the Framework agreement better balances this against the need to grow the EV market.

Stellantis recommends adoption the California Framework's cap and multiplier structure. While still maintaining an overall cap on the maximum benefit, the California Framework's cap provides greater regulatory certainty as major manufacturers invest heavily in electrifying their portfolios. Additionally, in response to EPA's request for comment on the appropriateness of extending multipliers to MY2026, EPA should also adopt multiplier applicability time frames as described in the California Framework through MY2026. This harmonization would place the phase-out year for the multipliers in 2026, easing any potential transition into a new rulemaking without multipliers in 2027, which was another concern EPA had expressed. [EPA-HQ-OAR-2021-0208-0532-A1, p. 14-15]

Commenter: Tesla

EPA Should Not Reintroduce the Alternative Vehicle Multiplier. In its proposal, EPA renews alternative technology multiplier credits that were previously scheduled to be phased out in 2021 and raises the value of the multiplier from 2021 levels to 2.0 in MY 2022-2024 and 1.75 in MY 2025.170 This proposal will have the opposite of its intended effect of enhancing the deployment of this technology and is not based upon a sound record basis concerning the need for this concession to manufacturers. The renewal and increased value are unnecessary and, rather than serve as an incentive, will further delay manufacturers from deploying large amounts of electric vehicles in the U.S. Under the proposed architecture, manufacturers will likely deploy EVs to maximize generation of multiplier credits up to the 10 g/mi cap limit but move no further. In the E.U, a similar 'Super Credit' multiplier exists for vehicles which emit <50g CO_2/km, which can be earned from 2020- 2022 inclusive. In the first year of the Super Credit eligibility, eight out of ten manufacturers reached the cap.171 This was achieved by aggressive sales practices (pricing and pre-registrations) to capture the maximum value of the credits up to the cap, and then halting further sales once the cap was reached. Moreover, manufacturers with discretion on when to use the credits will likely deploy at least half of these credits in MY 2023, further delaying near term delivery of EVs and eroding the stringency of MY 2023 to the point that the proposed standards are, in effect, only slightly more stringent than the SAFE rule in that model year. See Figure 1.

Additionally, the enhanced multiplier unnecessarily rewards late-acting manufacturers with excessive credits and richer credits after over a decade of notice from the EPA that such incentives were temporary and destined to decline in reward. In 2010, EPA proposed and finalized rules that provided a temporary incentive to encourage the commercialization of, inter alia, electric vehicles but did not include a multiplier out of concern of creating excess credits.172 At the heart of EPA’s justification for these incentives was the finding that for MY 2012-2016, there is a tradeoff benefit from 'temporarily rewarding advanced emissions control technologies by foregoing modest emissions reductions in the short term in order to lay the foundation for the potential for much larger emission reductions in the longer term.'173

Similarly, in 2012, the EPA continued to create incentives by including an EV multiplier 'to promote increased application of these advanced technologies in the program’s early model years, which could achieve economies of scale that will support the wider application of these technologies to help achieve the more stringent standards in MYs 2022–2025.'174 Simply put, EPA’s multiplier has pined for EV technology in the future but continually deferred requiring actual deployment of the technology in the now. Such incentives are no longer necessary, as Tesla’s experience has demonstrated, because this technology is well established, widely available as a compliance strategy, and now highly cost effective. Continued deferral of the obligation to create real compliance through these means serves to place the U.S. as a laggard rather than a leader in global emissions reductions and again cuts against the EPA overall mission to protect the public health and welfare.

As noted at length, electrification technology has become widely available and represents the best-in- class emission reduction technology. In short, the technology is available to achieve an increase in stringency in the standards for MY 2023-2026—and simply does not justify eroding that stringency. Continuing and increasing the multiplier incentive is unnecessary and after a decade of being an element in standards proposals now threatens to further institutionalize a compliance crutch for manufacturers to deliver a limited number of compliance vehicles to maximize credit accumulation with no incentive to deliver more actual deployment and the accompanying emission benefits.175

As proposed, the ATV credit even rewards manufacturers that have delayed EV deployment over the last several years by creating a perversely richer multiplier for MY 2022-2024. As the technology has been now commercialized at scale, each EV manufactured already contributes to achieving the CO2 target by making each manufacturers' fleet more efficient. All the enhanced multiplier does is weaken the stringency of the standard with no further delivery of an actual zero emission vehicle and little further technology development benefit from this new incentive.

While EPA may believe that the increase of 46 MMT176 caused by the multiplier is not significant, as the IPCC report recently highlighted, 'every tonne of CO2 emissions adds to global warming.'177 Further, the multiplier credit even makes full decarbonization harder by allowing for more polluting, inefficient vehicles to populate the fleet for approximately 17 years, when meeting the Administration's decarbonization goal requires the entire fleet be turned over to electrification by mid-century. Perverse incentives that reward delay and make the full electrification of the light duty fleet more difficult should be eliminated.

Further, programs with EV multipliers have determined that fears of excess crediting, like those expressed by the EPA in 2010, have come to fruition and widespread availability and cost-effectiveness of EV technology warrant eliminating credit multipliers.178 Indeed, that EPA is now asserting that a multiplier is still needed is in many ways an indictment of the policy that after a decade of utilization - by EPA standards - has not compelled legacy auto manufacturers to deliver ZEVs. Moreover, these flexibilities are even less justified given the moderated ambition the current proposal reflects.

Tesla, even though being the largest EV manufacturer, supports eliminating the ATV multiplier to ensure overall program integrity and supports firmly establishing a one-for-one credit ratio that is a more rational and transparent compliance mechanism and creates actual ZEV vehicle deployment, thereby enabling deeper emission reduction targets. [EPA-HQ-OAR-2021-0208-0278-A1] [pp.20-22]

Commenter: Toyota Motor North America, Inc. (Toyota)

Advanced Technology Vehicle Multipliers – Striking an Appropriate Balance. Toyota requests the PHEV multiplier be increased closer to that provided for BEVs. As explained further in

Appendix 1, PHEVs have similar lifecycle CO2 emissions under many operating conditions, can be more financially accessible to a larger consumer base, and fill utility and range gaps currently associated with BEVs. Toyota requests the proposed 1.6X multiplier be increased to 1.8X, or alternatively the 1.6X multiplier not decline over the duration of the provision.

We also request the proposed 2.5 g/mi cumulative cap be increased to 5.8 g/mi consistent with the benefit provided under the CA Framework. 15 Alternatively, Toyota could support a 4.0 g/mi cap representing the approximate mid-point between the proposed 2.5 g/mi cap and the effective 5.8 g/mi cap from the CA Framework. Either approach can increase technology deployment while limiting concerns about potential loss of environmental benefits.

Finally, we request the multipliers and cap be extended to 2026 model year, or at least both be available any four years between and including 2022 and 2026 model years. The any four-year availability option is consistent with EPA's thought of allowing multiplier credits to be generated in model year 2026 without an increase in the cap. Allowing for the incentive in the 2026 model year via a slightly broader or more flexible period of coverage can motivate later product entries as EPA recognizes and ensure an equitable benefit for all manufacturers independent when products enter the market. 16 We understand part of EPA's intention is to signal that multipliers will not be a part of 2027 model year and later standards as technologies become mainstream and core to compliance. Given the current uncertainty of reaching such a desired outcome by 2026 model year, we request EPA defer the decision to eliminate the ATV multiplier until the 2027 and later rulemaking.

Manufacturers are at different stages in the transition to electrification. Any revision to the proposed flexibility needs to maintain a level competitive playing field recognizing electrification strategies and deployment plans are substantially fixed over the period of the regulation. For this reason, we could not support any lowering of the multipliers even if associated with raising the benefit cap. [EPA-HQ-OAR-2021-0208-0531-A1, p. 9-10]

Emissions Performance. The GHG performance of a PHEV can rival that of a BEV over many real-world operating conditions. Lifecycle CO2 emissions are an important consideration to achieving climate goals as we move towards electrified powertrains. A lifecycle analysis is an important tool for comparing the CO2 reduction capability of various technology pathways. Toyota has developed an open source tool that analyzes the lifecycle CO2 of different powertrains where parameters can be adjusted to determine the impact on emissions and costs. The tool, publicly available data sources, and reference and source code are available on the website https://www.carghg.org.

As seen on the left side of Figure 1, PHEVs can have as good or better lifecycle CO2 emissions performance than BEVs when electricity is generated from the national grid on average because of the lower manufacturing emissions for smaller batteries and lower well-to-tank emissions with PHEVs still covering a significant fraction of daily trips in electric drive. And PHEV CO2 performance comes at much less cost compared to a BEV and without need for access to fast charging. [Figure 1 can be found on p. 16 of Docket number EPA-HQ-OAR-2021-0208-0531-A1]

As we shift to the cleaner CA grid (right side of Figure 1), BEVs show a higher incremental CO2 improvement. However, the less expensive PHEVs also benefit from the cleaner electric driving and manufacturing, so their CO2 performance remains in line with BEVs.

The conclusion is that PHEVs at significantly lower cost and with greater convenience have similar or better lifecycle CO2 emissions performance compared to BEVs, even as the electricity grid becomes cleaner. [EPA-HQ-OAR-2021-0208-0531-A1, p. 16]

Efficient use of batteries. As the transition to electrification gains momentum, demand for batteries will increase placing greater importance on material supplies, mining requirements, and other considerations involving increasingly sought natural resources for battery production.

PHEVs can make the most efficient use of a limited global battery supply as illustrated in Fig. 2 below using an example of allocating 170 KWhr of battery capacity to displace ICE powertrains from a 10-vehicle fleet of SUVs. [Figure 2 can be found on p. 17 of Docket number EPA-HQ-OAR-2021-0208-0531-A1]

The first option is to split that 170 KWhr capacity into two 85 KWhr BEVs that leaves eight ICE powertrains on the road. The second option is to allocate the battery capacity among nine 19 KWhr PHEVs with only one of the ten-vehicle fleet remaining an ICE powertrain which results in lower estimated total lifetime emissions. The lower relative cost of a PHEV enhances the chance for this larger volume of PHEVs to be accepted by consumers.

PHEVs are not always the superior CO2 performer or the best choice for every consumer. Toyota believes they can play a significant role in reaching our climate change objectives and making the most cost-efficient use of battery production for electric vehicles. We intend to expand our efforts to increase customer acceptability of all electrified powertrains. [EPA-HQ-OAR-2021-0208-0531-A1, p. 17]

15 5.8 g/mi is the effective annual result of the CA Framework 1% (of the 3.7% annual stringency increase) limit on Advanced Technology Multipliers.

Commenter: Union of Concerned Scientists (UCS)

EV Multipliers. The original theory behind inclusion of EV multipliers was that such multipliers provided a needed boost to a new technology. This is no longer the case, and multipliers no longer provide such a boost. In fact, the opposite is true. Recent economic analysis by Ken Gillingham shows that EV multipliers at moderate levels of penetration generally act as a disincentive for EV adoption.44 While the agency acknowledged Gillingham's study in their Draft Regulatory Impact Analysis (RIA), the accompanying analysis did not agree with its conclusions.45 Our own analysis disagrees with EPA's conclusion and remains consistent with the conclusions of our previous analysis46 and that of Ken Gillingham. The model indicates that significantly more EVs are introduced under Alternative 2, which lacks multipliers, as compared to the Preferred Alternative, which includes them.

We support EPA's cap on the EV multipliers and smaller window of time by which those multipliers are used if multipliers are to remain in the rule. The best approach, however, is to eliminate the multipliers as the evidence shows that a strong standard is the most efficient regulatory tool to drive EV adoption at the federal level—and that means a rule that is not undermined by credits awarded beyond the effectiveness of a technology.

There are two significant points that were not well considered by the agency in assessing the impact that its EV multiplier would have: 1) federal regulatory incentives already exist in the current greenhouse gas program, and 2) the impact of state ZEV requirements. Moreover, historic evidence raises doubts about the value of even the current, uncapped multiplier in driving additional ZEV sales. This calls into question the entire premise of EPA's use of the multiplier moving forward.[EPA-HQ-OAR-2021-0208-0277-A1, pp. 23-24]

To the first point, EPA already substantially incentivizes EV adoption by excluding upstream emissions from the compliance calculation, thus overstating the net greenhouse gas benefits of EVs.47 The impact of this is significant—in the 2012 regulation, EPA calculated that this cut the advantage to a manufacturer deploying a Nissan Leaf in 2025 from 136 g/mi (under 0 g/mi accounting) to just 41 g/mi, equivalent to more than a 3X multiplier.48 Obviously a multiplier on top of this results in multiplicatively worse emissions outcomes—for example, the industry leader in EV sales, Tesla, generated 8.6 million Mg of credits from the use of the multiplier in 2018, despite representing only slightly more than 1 percent of industry sales. Even without the multiplier, 0 g/mi accounting alone represented an overestimate of about 6 million Mg of emissions impacts. In EPA's modeling, EV sales increase to around 8 percent of the market, which means that upstream accounting accounts for on the order of 40 million Mg of undue credit annually, even without multipliers—that's equivalent to a reduction of about 12 g/mi in stringency.49

Given an incentive this strong, it is no surprise that EPA's modeling shows only very low levels of additional internal combustion engine technology deployment.

A complicating factor about federal regulatory incentives to spur EV adoption is that states are already leading the way. California set the first ZEV sales requirements in the country, and eleven states have since adopted those ZEV requirements.50

Unsurprisingly, the states with ZEV requirements see more EV models and greater EV adoption.51 While complementary policies and differences in local demography may play a role, the data is clear: manufacturers preferentially distribute and sell EVs in states with ZEV policies. As a result, while so-called ZEV states make up less than 30 percent of the new car buying market, consumers in those states purchase nearly two-thirds of all EVs (Figure 10) [Figure 10 can be found at docket number EPA-HQ-OAR-2021-0208-0277-A1, p. 25]

However, while ZEV sales requirements are driving sales upwards in those states, EV sales around the country are on the rise. So, a natural question arises: Are EV credit multipliers helping to drive that boost? The data raises doubts.

Apart from Tesla's sales, which skyrocketed beginning in 2017 with the releases of the Model 3 and Model Y (which together now make up more than half of all EV sales annually), EV sales have grown steadily, consistent with the pace of growth required by state ZEV policies (Figure 11). [Figure 11 can be found at docket number EPA-HQ-OAR-2021-0208-0277-A1, p. 26]

While there may be some additionality from federal regulatory incentives (after all, EVs are not sold exclusively in ZEV states), there has been no proportional jump in sales in response to EV multipliers. For automakers other than Tesla, sales have remained proportional to the number of vehicle offerings, a number which is also related to increasing state ZEV requirements (since many of those models can only be found in ZEV states). [EPA-HQ-OAR-2021-0208-0277-A1, pp.23-26]

For Tesla, it is likely that federal EV incentives have helped support growth, since the sale of overcompliance credits to EV laggards like Stellantis and Mercedes helps improve profit margins on their EV offerings. However, such credits are reducing the incentive for those companies themselves to invest in electrification, so it is not clear how much of a win even Tesla's bonus credits are, on net.

Growth in EV sales predominantly coming from Tesla and from sales in ZEV states indicates that federal emissions regulations to date (applicable to all states) have not been a primary driver of EV sales. While this does not preclude federal regulations driving adoption in the future, particularly if EPA sets standards much stronger than those proposed, it appears that EPA's current incentives are not driving additional sales. This means that overcrediting EVs acts simply as a windfall for manufacturers responding to other policies and incentives.

As a windfall credit serving primarily to weaken the federal program, EV incentives are doing so at a significant environmental cost. Since 2011, manufacturers have reduced lifetime fleet emissions by nearly 1 billion metric tons by responding to strong standards set under the Obama administration for MY2012-2020—however, our analysis indicates that an additional 66 million Mg of extra EV credits were used for compliance, resulting in relative increases in emissions and fuel use of nearly 7 percent over where we'd be without those incentives.52

Impact of stringency on EV adoption, compared to EV multipliers. Given the directive in EO 14037 to target new EV market share of 50 percent in 2030, it makes sense to focus particularly on how well EPA's proposed MY2023-2026 standards align with that goal. As depicted in Figure 7, we see a clear and obvious trend—the best way to increase the levels of EV adoption is to increase stringency of the standard. Even EPA's relatively constraining cap on the adverse impacts of EV multipliers has a notable reduction in the incentive to adopt further technologies overall, including electrification—this directly results in a weaker rule and lower level of EV penetration in the fleet. [Figure 7 can be located at docket number EPA-HQ-OAR-2021-0208-0277-A1, p. 17]

Our previous analysis showed the same trend.53 In that analysis, the incentive was significantly more expansive, leading to an even more dramatic disparity in EV adoption. This makes clear just how critical it is to limit this type of incentive.

General support for capping multiplier effects. To best support the deployment of EVs, UCS strongly supports eliminating EV multipliers, which our modeling shows are ineffective in encouraging greater sales, and instead increasing overall stringency of the greenhouse gas program. However, should EPA continue to move forward with a new phase of EV multipliers, we are strongly supportive of the agency's proposed approach with the cap. The current cap is appropriately low—with a typical fleet compliance of 200-250 g/mi in this timeframe, even using all of the cap in a single year would affect no more than a few percent of a manufacturer's fleet in that year. Because the total impact is relatively low, allowing manufacturers to distribute the total cap utilization according to their own optimal usage does not pose a drastic risk—however, generally such flexibility is maximized by manufacturers at a cost to the goals of the program, and any increase in the total g/mi value of the cap or additional years in which the multipliers are made available significantly enhances such risk.

We urge EPA to reconsider its support for the EV multipliers, but the mechanism put in place is far superior to that linked to the California framework, and any future changes other than complete elimination should be modeled on the proposed cap. [EPA-HQ-OAR-2021-0208-0277-A1, pp.27-28]

49 This is a rough estimate based on 16 million vehicles and a 50/50 passenger car/light truck split and is solely meant to be illustrative of the magnitude of the incentive, which is worth roughly one year of stringency at the levels of EV adoption forecast in this rule.

50 In addition to California, the states that have formally adopted ZEV standards are: Colorado, Connecticut, Maine, Maryland, Massachusetts, Minnesota, New Jersey, New York, Oregon, Rhode Island, and Vermont. Moreover, Nevada is 'on track' to adopt the California standard (Bright, Z. 2021. 'Nevada on track to adopt version of California's low- and zero-emission vehicle-programs.' The Nevada Independent, July 29, 2021), and Virginia has signed legislation establishing a ZEV program in Virginia under HB 1965.

51 For a comprehensive look at local policy, see https://theicct.org/publications/ev-update-us-cities-aug2020. For an example of how this affects model availability, see this announcement from Hyundai of its brand new PHEV SUV: 'Currently, 2022, Santa Fe Plug-in Hybrid is only sold in CA, CO, CT, ME, MA, MD, NJ, NY, OR, RI, and VT.' https://www.hyundaiusa.com/us/en/vehicles/2022-santa-fe-plug-in-hybrid

52 Note that we are not considering a 1:1 relationship between credited emissions reductions and real-world impacts because of the difference between lab certification procedures and real-world performance. Also, because some of this loss is the result of not accounting for upstream emissions from the electrical grid, to the extent that the grid continues to get cleaner with time the long-term impact will be reduced somewhat.

Commenter: Valero Energy Corporation (Valero)

EPA seeks comment on its proposal to extend multiplier incentives to manufacturers of electric vehicles through 2025, and specifically, on whether to adopt a less aggressive standard

("Alternative 1") or a more aggressive target ("Alternative 2"), in either case without the use of multipliers. Among this limited range of options, Alternative 1 appears preferable as compared to the proposed standards. The current proposal inflates the light-duty vehicle emissions reduction goal so that it can be met only by using multipliers. [EPA-HQ-OAR-2021-0208-0601-A2, p.4]

Finally, the only rationale EPA provides for setting the multipliers at the high values in the proposed rule is to make the values match those in the California Framework Agreements for MY 2022-2025.[10] In doing so, EPA is unconstitutionally delegating its rulemaking authority to California and the automakers party to those agreements, in conflict with the non-delegation doctrine and the doctrine of equal sovereignty. While there is value to having consistent rules across the country, incentives appropriate to the California program may not be appropriate for a nationwide standard and certainly allocates preferential treatment to California. EPA must make the determination of the proper efficiency level and the necessary multiplier values for itself rather than delegate such rulemaking to California. [EPA-HQ-OAR-2021-0208-0601-A2,p.5]

Commenter: Volkswagen Group of America, Inc. (Volkswagen)

Support for Extending Advanced Technology Vehicle Multipliers. Volkswagen supports the comments provided by AFAI regarding the extension and enhancement of the advanced technology vehicle multipliers (EV multipliers). As described throughout Chapter 2 of these comments, Volkswagen's future market plans and compliance pathways are focused on delivering high levels of electrification to the US market through 2026 and beyond. The EV multiplier provides a valuable compliance mechanism that helps to incentivize early electrification programs that would otherwise be challenged with high costs and low levels of public charging infrastructure. Volkswagen agrees that while the multiplier may reduce the overall programmatic reductions in CO_2 in the near-term, the flexibility will drive additional volumes of electrification beyond which otherwise may achieved. This additional volume will help to further commercialize EV technology and will lay the groundwork for longer-term CO_2 benefits. Volkswagen has actively used the multiplier flexibility in the current GHG regulation and projects to continue to do so, both under this proposal and under our parallel California Framework Agreement.

Volkswagen believes the multiplier remains a prudent policy choice during this early and transitional phase of electric vehicle deployment. Volkswagen acknowledges that as the costs for EVs approach parity with conventional vehicles, and as the public recharging infrastructure improves, the need for this incentive will diminish. However, Volkswagen projects that for the duration of this NPRM (i.e. 2026MY), electric vehicles with market demanded ranges and functionality will not achieve price parity with comparable conventional vehicles. Furthermore, public policy efforts to build nationwide charging stations will still be in the midst of development and deployment, meaning consumers will still be facing challenges with finding adequate recharging infrastructure. Therefore, Volkswagen supports that EPA retain the multiplier and consider options to expand the overall level of support.

As a signatory to the California Framework Agreement, Volkswagen supported the inclusion of an extended EV multiplier which included a phase down of the multiplier and an overall programmatic cap. Volkswagen believes this was a pragmatic approach which balances the market incentivizing effect with overall CO2 reduction goals. A cap helps estimate the potential impacts on CO2 emissions and to weigh this against the incentivizing effect of the flexibility. EPA's proposal models their extension on the Framework by also including a phased reduction of the multiplier with a similar, but more restrictive, credit cap.

Volkswagen supports the extension of the multiplier, but recommends a higher overall credit cap. A higher cap will help the flexibility be applicable to an even greater number of EVs which will be helpful in further expanding the EV market. Volkswagen believes that one alternative approach EPA may consider is to reduce the per year multiplier value, but increase the annual average cap. This approach would motivate even further EV deployment in order for a manufacturer to fully utilize the flexibility. [EPA-HQ-OAR-2021-0208-0237-A1, p.12]

Commenter: Volvo Car Corporation

Compliance Incentives, Flexibilities, Credits. Volvo Car supports the agency’s proposed modifications to the Compliance Incentives and Flexibilities (86 FR 43733). Specifically, extending the advanced technology vehicle multiplier and increasing the cap for off-cycle technologies supports electrification and the introduction of new energy efficient technologies. [EPA-HQ-OAR-2021-0208-0253-A1, p. 3]

With respect to ATV credits, Volvo Cars is concerned the proposed cap of 2.5 g/mile per model year for these credits is too low and not reflective of the market value. Volvo Cars believes EPA should raise the cap so that it is consistent with the value of the other technology caps. Please refer to the Auto Innovators comments on EV Multipliers for more information. [EPA-HQ-OAR-2021-0208-0253-A1, pp. 3-4]

Commenter: Zero Emission Transportation Association (ZETA) and EVHybridNoire (EVHN)

ZETA and EVHN recommend the elimination of multiplier credits for EVs. Extending the lifetime of credits, including multipliers that double the credits earned for every EV sold, weakens the standards and indirectly incentivizes traditional automakers to continue manufacturing their least efficient vehicles that generate the highest profit margins, especially as EVs reach price parity. As the current standards are written, internal combustion engine vehicles (ICEVs) are sales-weighted for their average fuel economy. The current EPA standards were also set to phase out the advanced technology multiplier that had allowed EVs up to a 200% credit multiplier. This strategy allowed conventional automakers to meet the minimum standard while under-complying on their ICEVs, essentially acting as an offset of emissions reductions from EVs.7

Research has shown that as EVs become less expensive, as they have in the last decade, and there is still demand for ICEVs, using the multiplier credits will allow traditional automakers to continue making and selling their most inefficient vehicles. Credits made sense initially to incentivize automakers to develop new electric technologies, but now that EVs are more widespread, Advanced Technology Vehicle (ATV) multipliers should be phased out as initially intended.8 EPA should not extend the advanced technology multiplier. [EPA-HQ-OAR-2021-0208-0275-A1, pp. 3-4]

EPA Response

EPA is finalizing ATV multipliers for MYs 2023-2024 only rather than the proposed MYs 2021-2025 and at lower numeric multiplier values than proposed. Also, EPA is retaining the proposed cumulative cap of 10 g/mile for multiplier credits. These provisions as well as EPA's response to comments regarding the magnitude and timing of multipliers are provided in preamble section II.B.1. Comments regarding upstream emissions are addressed in section 6.2 below.

Chemours raises concerns that the incentives for manufacturers to transition away from the use of air conditioning refrigerant HFC-134a are diminished by the proposed multipliers and could conceivably result in a "switch back" to this high-global warming potential ("GWP") refrigerant. EPA understands the concern raised by Chemours that, since EPA's air conditioning refrigerant credits are voluntary, if too many other types of credits are available to manufacturers, they could opt not to claim the optional A/C credits. EPA believes these concerns are significantly diminished both due to the narrower scope of the multiplier incentives included in the final rule compared to the proposal and the more stringent standards EPA is finalizing in MYs 2025-2026, as compared to the proposal. While the A/C credits remain an optional avenue to help with compliance, EPA believes the refrigerant credits will remain attractive to manufacturers who have made the investment to switch over to the new refrigerants and it is unlikely that they would switch back and forego the credits in the time frame of this rule, given the stringency of the standards being adopted. These A/C credits have proven to be a cost-effective GHG control strategy as evidenced by most manufacturers claiming the credits by switching refrigerants and will likely remain so in the future.

The Environmental Protection Network commented that the impact of the multipliers on sales of EVs is not clear from the proposal. Other commenters too raised concerns that the multipliers could actually lead to reduced EV production in these MYs. For the Final Rule, EPA conducted model runs with and without the final multipliers and found the model predicted little difference in market penetration of EVs due to the multipliers alone (see RIA Chapter 4.1.4). EPA does not expect the final multipliers to adversely impact EV production.

Ford recommended that EPA add additional cap space to the light-duty truck portion of the fleet. Ford commented that "this would allow an overall fleet level cap somewhat higher than the proposed 10 g/mi, depending on truck mix and that this approach would help alleviate the proportionally lower benefit provided to OEM's with higher truck mixes (trucks tend to have higher GHG obligations)." EPA does not believe such an approach is warranted and is not differentiating between light-duty trucks and passenger cars for purposes of applying the multiplier cap. All manufacturers regardless of product mix will have the same magnitude of multiplier credits. The standards EPA is adopting for light trucks are feasible without additional multiplier credits for the vehicle class. Retaining the 10 g/mile cap as proposed preserves the most emissions reductions feasible. EPA also notes that in addition to multipliers it is providing another flexibility targeted specifically to full-size pickups (see section X).

Walter Kreucher commented that the proposed multipliers were a clear indication that EPA does not think the proposed standards are achievable. In response, EPA disagrees with the commenter's characterization. EPA is in fact adopting more stringent standards than proposed with less generous multipliers than proposed. While multipliers are one of the flexibilities EPA is including for the near-term MY 2023-2024 standards, EPA does not believe the feasibility of the standards hinge on manufacturers making full use of them. These are optional incentives that EPA is including to help manufacturer manage the transition to more stringent standards in the longer term by providing some additional flexibility.

Lucid commented that the cap was intended to target manufacturers that produce vehicles with internal combustion engines and prevents them from counterbalancing high-emitting vehicles with ZEV sales and that ZEV-only manufacturers should not be subject to this cap because they are not offsetting sales of ICE vehicles in their own fleets. EPA disagrees with this comment since ZEV-only manufacturers would likely sell those credits to manufacturers that would use them to offset ICE vehicle emissions, since the ZEV-only manufacturer would have no use for the credits within their own fleet. For example, it has been Tesla's practice to date to sell their credits to other manufacturers. This has the same practical impact as a manufacturer with a mix of vehicle types using the credits generated by ZEVs in their own fleet.

The Illinois Corn Growers Association commented that "multipliers do not meaningfully encourage the adoption of electric vehicles, but instead serve only to enrich electric vehicle manufacturers at the expense of consumers, industry, and the environment." It commented that "EPA will be able to point to the benefit to the electric vehicle industry, allowing it to 'greenwash' the social, environmental, and economic costs of this wasteful approach. This is arbitrary and capricious and lacks any sound basis in evidence to support EPA's claim that its standards will benefit 'public health and welfare.'" It also commented that "the approach is also out of step with the Clean Air Act. Section 202(a) requires EPA to 'prescribe . . . standards applicable to the emission of any air pollutant from any class or classes of new motor vehicles or new motor vehicle engines, which in [its] judgment cause, or contribute to, air pollution which may reasonably be anticipated to endanger public health or welfare.' This does not allow the agency to set standards and then provide ways that regulated entities can avoid those standards by giving money to electric vehicle manufacturers." EPA disagrees with this characterization. EPA has fully incorporated the multipliers into its cost and emissions reductions estimates for final rule and has established a cap on the emissions impact of the multipliers. The final rule standards will provide significant emissions reductions even after taking the small impact of the multipliers into consideration. Furthermore, EPA continues to believe that zero-emissions EV technology is key to long-term GHG reductions and the multipliers signal EPA's continued support for this important technology while providing additional flexibility to manufacturers in the near-term.

Valero commented that the proposal inflated the light-duty vehicle emissions reduction goal so that it can be met only by using multipliers. Valero also commented that "the only rationale EPA provided for setting the multipliers at the high values in the proposed rule is to make the values match those in the California Framework Agreements for MY 2022-2025" and that "in doing so, EPA is unconstitutionally delegating its rulemaking authority to California and the automakers party to those agreements, in conflict with the non-delegation doctrine and the doctrine of equal sovereignty." EPA disagrees with both of these comments. The multipliers provide a very limited voluntary flexibility and as such are not required to be part of the compliance pathway for any manufacturer. The final standards are feasible without the use of the multipliers. In response to comments regarding EPA choosing to propose multiplier values in line with those of the California Framework, EPA disagrees that this choice represented some relinquishment of authority. EPA requested comment on the level and scope of the multipliers, making it clear that EPA could finalize different multiplier values than it proposed, and we are in fact doing so. Also, EPA proposed a cap that was much lower than that contained in the California Framework. Finally, EPA has decided, after fully considering comments, to finalize multipliers that are in line with its multipliers for MY 2021 and lower numeric multipliers than proposed. Please see section 16 for EPA's response to additional comments regarding delegation of rulemaking authority.

Regarding comments submitted by the Southern Environmental Law Center, regarding incorporating some differentiation in the multiplier for PHEVs based on their all-electric range, EPA has already limited multipliers significantly in both the level of the multiplier and the MYs when they are available. Given that they will be in place for only two model years, EPA does not believe this additional limitation is necessary.

Toyota comments that the multiplier for PHEVs should be the same as those for EVs, because PHEVs are capable of operating with zero tailpipe emissions depending on how they are used. In response, EPA is continuing to differentiate between the two technologies, with PHEVs receiving a lower multiplier compared to EVs or fuel cells, because PHEVs include an internal combustion engine and zero emissions operation depends on driver charging habits and how the vehicle is used. While PHEVs may be capable of operating with zero tailpipe emissions, zero tailpipe emissions are not assured in the same way it is for full EVs.

UCS commented that EPA's proposal did not consider that EVs are already incentivized in EPA's GHG program through the use of zero g/mile compliance emissions level (i.e., the EPA program does not require manufacturers to account for upstream emissions through MY2026) and are also incentivized in state programs. UCS is concerned that the multipliers represent a windfall for manufacturers that only act to weaken the program. Due to these and similar concerns expressed by other comments regarding the impact of multipliers, EPA has reduced the scope of multipliers, including them only for MYs 2023-2024, primarily to help address any potential lead time concerns for those model years as discussed in section II.B.1 of the preamble.

6.2. Upstream Accounting for Electrified Vehicles

Commenters Included in this Section

Alliance For Automotive Innovation
Alliance for Vehicle Efficiency (AVE)
American Council for an Energy-Efficient Economy (ACEEE)
American Fuel & Petrochemical Manufacturers (AFPM) et al
American Honda Motor Company (Honda)
BorgWarner Inc.
Center for Biological Diversity, et al.
Consumer Reports (CR)
Edison Electric Institute (EEI)
Michalek, Jeremy and Whitefoot, Kate S.
Minnesota Corn Growers Association (MCGA)
Motor & Equipment Manufacturers Association (MEMA)
National Corn Growers Association (NCGA)
Nissan North America, Inc.
Securing America's Future Energy
Valero Energy Corporation (Valero)
Volkswagen Group of America, Inc. (Volkswagen)

Commenter: Alliance For Automotive Innovation

Upstream Fuel Production and Transport Emissions. Upstream emissions associated with electricity production should not be assigned to EVs for compliance purposes; limitations to this approach should be removed.

Under current regulations, EPA assigns a value of zero grams per mile of carbon-related exhaust emissions to vehicles for the electric portion of their operation.109 This approach is generally limited to certain model years and, for some model years, to a limited quantity of EVs.

Assigning a compliance value of zero grams per mile is technically correct—an EV operating on electricity has no tailpipe emissions, GHG or otherwise.

The recognition of zero tailpipe emissions from operation on electricity is also consistent with the treatment of vehicle operation on all other fuels—emissions are measured at the tailpipe no matter what fuel the vehicle is operating on, and upstream emissions are addressed at their upstream sources. Electricity should be treated no differently than gasoline, ethanol, natural gas, and every other fuel used in motor vehicles.

Nor does a compliance value of zero grams per mile negatively affect the emissions benefits of the GHG standards. The upstream emissions impacts of fuel production and transportation for all fuels projected to be used under the proposed standards are addressed in the benefit-cost analysis. If upstream emissions are assigned to vehicles, the benefit-cost analysis does not change. The only effect is to add additional technology and market pressures to manufacturers which would need to be considered by EPA in its analysis of what level of standard is appropriate.

We recommend that EPA remove all limitations (model year, production volume, or others) to the use of zero grams per mile for the tailpipe emissions of EVs operating on electricity and to move this compliance provision to a section more appropriate than that dealing with incentives for EVs (e.g., 40 C.F.R. Part 600).

If EPA does not eliminate all model year and production limits for the use of zero grams per mile for the GHG emissions of a vehicle operating on electricity, it should issue a rule to clarify that 40 C.F.R. 86.1866-12(a) applies to model years 2012 through 2026.

In the current regulation, there is a potential conflict between 40 C.F.R. § 86.1866-12(a), which allows the use of zero grams per mile in MYs 2012-2025, and 40 C.F.R. § 86.1866-12(a)(2), which specifies that the provision is unrestricted in MYs 2017-2026. EPA clearly intended to extend the zero gram per mile provision through MY 2026 in prior rulemaking.110 Notwithstanding our comment that upstream emissions should never be included for the purpose of compliance with EPA light-duty vehicle GHG regulations, we recommend that EPA correct the regulatory text at paragraph (a) to include an endpoint of MY 2026 for consistency with the subsequent subparagraph (a)(2). [EPA-HQ-OAR-2021-0208-0571-A1, p. 35-36]

Commenter: Alliance for Vehicle Efficiency (AVE)

AVE urges EPA to account for lifecycle and upstream emissions for all vehicle technologies, and the fuels that power them in future emission standards. AVE also requests EPA work with the Department of Energy and NHTSA to create a unified accounting approach for lifecycle emissions. [EPA-HQ-OAR-2021-0208-0256-A1, p. 2]

Lifecycle (Upstream) Emissions. AVE urges EPA to work with the Department of Energy and NHTSA to create a unified approach for including lifecycle emissions into the Proposed Rule and future standards.

It is essential that EPA incorporate a lifecycle analysis (LCA), and account for all upstream emissions, for all vehicle technologies and the fuels that power them in future emission standards. LCA is a necessary element of the U.S.'s efforts to transform the transportation system into one that is significantly less carbon intensive.

This transformation is already in process with significant investments in renewable sources of energy, renewable and lower carbon fuels, more sustainable forms of generation to power the electrical grid, and expanded supply chains to provide the resources necessary to support production of a greener light-duty fleet. Adoption of LCA would better prepare industry for the impact of expiring multiplier credits and the accounting of upstream, embedded, and end-of-life carbon emissions which influence the technology investments being made today by OEMs and suppliers. Yet, 'EPA is continuing to use tailpipe-only values to determine vehicle GHG emissions, without accounting for upstream emissions (EVs and PHEVs will continue to use 0 g/mile through MY 2026).'13

EPA's focus solely on tailpipe emissions appears in contrast to President Biden's January 25, Executive Order, in which he stressed the need for standards to account for all GHG emissions.

Accounting for the Benefits of Reducing Climate Pollution. (a) It is essential that agencies capture the full costs of greenhouse gas emissions as accurately as possible, including by taking global damages into account. Doing so facilitates sound decision making, recognizes the breadth of climate impacts, and supports the international leadership of the United States on climate issues.14

All transportation-related industries have a role to play in helping the U.S. meet our carbon reduction goals. LCA provides a holistic approach to truly impact the environment and has been recognized in environmental assessments in other jurisdictions. AVE agrees with the aspirations and direction of President Biden's Executive Order to address the 'full-costs of greenhouse gas emissions as accurately as possible.'15

LCA is challenging, and different LCA models exist, but LCA is not new:

• Low carbon fuel standards, such as the Federal Renewable Fuel Standard and the California Low Carbon Fuel Standard, have led to significant reductions in GHG emissions from transportation fuels. These standards rely on LCA as a tool to estimate the GHG emissions of fuels.16

• DOE's Argonne National Laboratory also engages in substantial research on the LCA of vehicle and fuel technologies to improve energy efficiency and reduce GHG emissions in the transportation sector. EPA should work with DOE to measure the true impact of all technologies and develop performance-based standards that incorporate the LCA of emissions from all vehicle technologies to create a more accurate assessment of their overall GHG impact.

• DOE has been conducting LCA data modeling for many years and EPA should be encouraged to use DOE's GREET model as a starting point. The chart below is one example of GREET modeling comparing the footprint of various vehicle technologies [EPA-HQ-OAR-2021-0208-0256-A1, pp.6-7] [Figure ES-1 can be found at docket number EPA-HQ-OAR-2021-0208-0256-A1, p. 7.]

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

EPA proposes to continue treating electric vehicles as entirely zero emission vehicles (ZEVs). While it is true that EVs generate no emissions at the tailpipe, charging these vehicles does create emissions upstream. Treating electric, and other similar zero-tailpipe emission vehicles, as true ZEVs leads to a situation where the creation and sale of these vehicles actually increases fleetwide emissions (Jenn, Azevedo, and Michalek 2016; A. C. Mersky and Samaras 2020). This is because ZEVs are credited with emissions reductions in excess of their real reductions, which allows for a higher number of high-emitting vehicle sales. Additionally, as noted above, over-awarding emissions credits to EVs can depress EV sales (Gillingham 2021).

Another major flaw with ignoring refueling emissions is that EPA loses the opportunity to influence the efficiency of a growing component of the vehicle market. EPA is both empowered and required to regulate the emissions from on-road light duty vehicles. If 50% of all new vehicle sales are EVs by 2030, EPA cannot fulfill its obligations while ignoring the upstream emissions of these vehicles, which are directly tied to how effectively EVs convert kilowatt hours into miles traveled. While the White House also plans to significantly reduce emissions from the power sector in the long-run, emissions from electricity generation are expected to still exist into the next decade. This makes the emissions of EVs sold under the current rules significant, even in the face of other regulations in the power sector.

Additionally, ignoring upstream emissions may have the counterproductive effect of encouraging sales of larger vehicles. If all EVs are treated as having zero emissions then automakers are encouraged to focus efforts on those vehicles with the highest emission limits, in order to generate the most credits and reduce compliance costs for the rest of the fleet. This leads to an increase in total energy consumption and emissions, as well as increased wear and tear on our roads and congestion, compared to a scenario where upstream emissions are accounted for, and automakers have no incentive to increase EV footprint.

ACEEE research shows that accounting for upstream emissions for ZEVs, based on an average national grid over the life of the vehicle, would increase the annual effective stringency of the proposed standards by 1-3 g/mi and lead to an additional emissions savings of 9% for the MY 2023-2026 standards. Given the significant reduction in rule stringency that this zero-upstream emissions accounting causes ACEEE believes that it is necessary to revert to counting those emissions, as provided for in the MY 2017-2025 standards. [EPA-HQ-OAR-2021-0208-0251-A1, pp. 6-7]

Restore upstream accounting for zero tailpipe emission vehicles [EPA-HQ-OAR-2021-0208-0251-A1, p.14]

Commenter: American Fuel & Petrochemical Manufacturers (AFPM) et al

Moreover, the disparate tests EPA uses for assessing fuel economy and GHG emissions of ICEVs and EVs, and on which the Agency relies for this proposal, should not be used to award de facto ‘bonus’ credits to EVs for fuel economy or GHG reductions.31 EPA notes in the Regulatory Impact Analysis accompanying the proposal that the Agency ‘extended the ‘0 g/mi upstream’ incentive for electric vehicles through 2026 beyond its original sunset of MY 2021.’32 This is arbitrary and capricious. This ‘incentive’ arbitrarily fails to account for real-world fuel economy, and any emissions and other real-world environmental impacts.33 There is no such thing as a zero-emission vehicle.34 Policymakers must compare the environmental, economic, and performance attributes of current conventional vehicle technology with alternatives such as EVs. [EPA-HQ-OAR-2021-0208-0286-A1, pp. 5-6]

31 EPA’s test procedures for demonstrating compliance with these standards are arbitrary and the differences between procedures for EVs and ICEVs cannot be reconciled. EPA’s proposal states ‘EPA is continuing to use tailpipe-only values to determine vehicle GHG emissions, without accounting for upstream emissions (EVs and PHEVs will continue to use 0 g/mile through MY 2026).’ The omission of significant lifecycle emissions renders EPA’s analysis arbitrary and capricious. Moreover, EPA should not finalize this proposal based on this 0 g/mile EV assumption until it eliminates irreconcilable differences between its testing procedures of EVs and ICEVs for GHG emissions and fuel economy. For example, for fuel economy, ICEVs must be tested on a robust 5-cycle test method that factors in all types of real-world driving conditions (see, https://www.fueleconomy.gov/feg/fe_test_schedules.shtml). Conversely, EPA does not subject EVs to the same robust fuel economy tests as internal combustion engines. Instead, EPA has adopted a procedure that requires only the first two tests, in a laboratory setting, at ideal temperatures for batteries, ultimately divorced from real-world driving conditions (see, https://www.fueleconomy.gov/feg/pdfs/EPA%20test%20procedure%20for%20EVs-PHEVs-11-14-2017.pdf).

33 EPA has arbitrarily created an EV subsidy program that is beyond the authority granted to EPA by Congress. EPA attempts to justify its creation of this program by stating that the effect of the multipliers on electric vehicle penetration will be ‘less than 0.5 percent’ in any year. In making this statement, EPA concedes it has created an on-paper subsidy program that will increase EV sales.

Commenter: American Honda Motor Company (Honda)

Upstream Emissions Accounting. In the proposed rule, the agency states its intent to continue using 'tailpipe-only values to determine vehicle GHG emissions, without accounting for upstream emissions (EVs and PHEVs will continue to use 0 g/mile through MY 2026).'23 Honda supports this position. While full lifecycle accounting is necessary to quantify emissions inventories, it is inappropriate to hold the auto industry accountable for emissions that are beyond its control. As such, we support a clear division of regulatory responsibility between the auto and utility industries. Applying 0 g/mi upstream emissions accounting for BEVs, PHEVs and FCEVs is not only logically appropriate, but will encourage the transition toward greater levels of vehicle electrification. [EPA-HQ-OAR-2021-0208-0565-A1, p.12]

Commenter: BorgWarner Inc.

Lifecycle. We support the transition from a tailpipe-based standard (tank-to-wheel) to a more holistic assessment (well-to-wheel emissions, or more completely, full life-cycle emissions) as the proper metric for determining the environmental impact of the vehicle as a product. This approach is consistent with technology neutrality and global carbon neutrality goals. Regulations based on the end goals of a clean environment, minimizing CO2 emissions and preserving resources should not give preferential treatment to a specific technology. Public policies should let innovation and market dynamics determine the most effective solutions to achieve the end goals. [EPA-HQ-OAR-2021-0208-0260-A1, p. 2]

Commenter: Center for Biological Diversity, et al.

EPA should continue to count the upstream emissions of EVs, PHEVs and FCVs. The 2012 Final Rule treated the upstream (from electricity production) emissions of EVs, PHEVs and FCVs as zero through MY 2021, but, beginning with MY 2022, required automakers to account for them in their standard compliance calculations. 2012 Final Rule, 77 Fed. Reg. 62,651. EPA now proposes to again allow automakers to ignore upstream emissions for compliance purposes through MY 2026, Proposal, 86 Fed. Reg. at 43,746; EPA would include upstream emissions only in its analysis of the Proposal's costs and benefits, e.g., id. at 43,735.

We urge EPA to again require automakers to count these vehicles' upstream emissions in their compliance calculations for the same reasons discussed in connection with multiplier credits. In 2012, EPA stressed that the exclusion of upstream emissions was temporary only, and intended for the sole purpose of incentivizing the production and of then-novel zero- and near-zero technology that would produce far greater emissions reductions later. EPA provides no different justification in the Proposal. But as explained above, the conditions that earlier might have provided reasonable grounds for ignoring this pollution in the standard-setting process no longer pertain.

Moreover, as is the case with multipliers, ignoring upstream emissions ascribes more climate benefits to zero or near-zero vehicles than they achieve in the real world; and, also as is the case with multipliers, when those vehicles begin to reach price parity, not counting their upstream emissions is likely to impede their sale as automakers can use the extra but phantom emissions reduction to sell fewer of them while still reaching the stringency targets, or to sell more higher-polluting internal combustion vehicles. 149 A full accounting of the light duty vehicle fleet's actual greenhouse gas emissions is also necessary to correctly assess its contribution to the climate crisis and to set the stringency of emission standards accordingly.

At a minimum, EPA should not allow automakers to count them as zero g/mile after MY 2024, when any lead time concerns play no role. [EPA-HQ-OAR-2021-0208-0651-A1, p. 63-64]

Furthermore, should EPA finalize its proposal to reinstate crediting EVs with a compliance value of 0 g/mile or less while real-world EV emissions are positive due to emissions associated with electricity production, then a larger EV penetration will undercut the expected GHG reductions from the program.

EPA could address these concerns by adopting one or both of the following designs: (1) account for EV upstream emissions as it did for MY 2021 and later in the 2020 Final Rule – and as we already urge EPA to do in our credit discussion – and /or (2) set a minimum rate of improvement for ICE vehicles to ensure steady, meaningful progress in emissions reductions. [EPA-HQ-OAR-2021-0208-0651-A1, p. 77-78]

Commenter: Consumer Reports (CR)

EV Upstream Emissions. Consumer reports does not support continuing to expand the "0 g/mi" assumption for EV emissions through 2026. While EVs have much lower fuel cycle emissions than all gasoline vehicles, their emissions are not zero. The core purpose of these standards are to reduce emissions, and not counting the emissions from EVs unfairly benefits electric vehicles under a standard that is supposed to be technology-neutral. While electric vehicles are an important technology for meeting our long term climate goal, they should not be given unfair advantages under this standard. Transportation electrification is expected to rapidly increase, and as it does the lost consumer savings and emissions benefits due to the "0 g/mi" will also grow rapidly. See section 3d for further data to support the likelihood of higher EV penetration rates. [EPA-HQ-OAR-2021-0208-0602-A1, p.12]

Commenter: Edison Electric Institute (EEI)

Included in the proposed suite of compliance flexibilities is the continued recognition of EVs as 0 g/mi without any phase-out, consistent with the current regulations. See 77 Fed. Reg. 62,810-26 (Oct. 15, 2012). This determination is appropriate because these vehicles have no tailpipe emissions when operating on electric power.18 Accordingly, the Agencies should continue to credit EVs with a 0 g/mi emission factor for all future MYs as EVs do not emit pollutants from the tailpipe of the vehicle—without a combustion engine, there are no vehicle emissions, and treatment of each EV as 0 g/mi is an accurate and practical method of counting their impact on transportation sector emissions.

This recognition and EPA's decision not to specifically account for any upstream emissions impacts is consistent with CAA section 202(a)(1), which directs EPA to regulate "the emission of any air pollutant from any class or classes of new motor vehicles or new motor vehicle engines…such standards shall be applicable to such vehicles and engines for their useful life." 42 U.S.C. 7521(a)(1). The statute clearly directs EPA to regulate emissions from vehicles and engines, and as EVs do not emit any pollutants, the continued recognition of their 0 g/mi tailpipe emissions is both technically and legally appropriate.19 [EPA-HQ-OAR-2021-0208-0284-A1, p. 10-11]

The continued reductions in GHG and criteria pollutant emissions from electricity generation will allow increased EV deployment to create additional environmental benefits, as the increased deployment of electric vehicles will use more of the increasingly clean power generated by the electric sector.20 Accordingly, EPA should continue to treat EVs as 0 g/mi sources and include averaging, banking, and trading provision. The continuation of these provisions is both appropriate and necessary in any final rule. [EPA-HQ-OAR-2021-0208-0284-A1, p. 12]

18 Recognizing that EVs are 0 g/mi sources, rather than having to account for the GHG emissions associated with upstream electricity generation up to a per-manufacturer cumulative production cap for MY 2022-2025, is well reasoned analysis—any upstream analysis of emissions is extremely difficult given that any upstream emissions will be a function of where and when a car is charged. Moreover, it is more appropriate and more direct to regulate upstream emissions at the point of generation, not at the point of consumption.

19 Should, however, EPA instead choose to take estimated upstream emissions into account when developing emissions factors for EVs, the Agency must note that the increased deployment of EVs will increase fuel economy and reduce dependence on imported petroleum, as well as reduce emissions of GHGs and criteria pollutants from the transportation sector. As power sector emissions have been reduced and are on a long-term trajectory toward further reductions, increased EV deployment, therefore, will not result in increased overall GHG and criteria pollutant emissions. Should EPA choose to analyze estimated upstream emissions, that analysis should be full and fair—it should consider all vehicle and battery and engine types and not single out EVs. As noted, however, the EPA should not engage in endless estimated upstream emissions analyses, and instead focus on emissions at the vehicle level, consistent with CAA's plain text. The Agency also should use the most recent available data in any emissions analysis to ensure accuracy in estimates.

Commenter: Michalek, Jeremy and Whitefoot, Kate S.

If the EPA's goal is to set standards for actual GHG emissions, it is important that all emissions associated with owning and operating a vehicle are accounted for. The largest of these missing from current EPA policy is the emissions from electric vehicle charging and from hydrogen production for fuel cell electric vehicles. As electric and fuel cell vehicles gain market share, these 'upstream' emissions will become a larger fraction of the emissions associated with the light duty fleet. Our view is that EPA should account for these emissions, because regulating only a particular subset of GHG emissions associated with operating a fleet distorts the incentives to reduce GHG emissions.

In accounting for EV charging emissions and other non-tailpipe emissions, we recommend that EPA use a consequential life cycle assessment framework, estimating the difference in emissions between a world with policy or AFV adoption and a world without that policy or AFV adoption. Such an assessment addresses the key question: identifying how a policy or technology action will change net GHG emissions. These assessments cannot be completed without uncertainty, since the counterfactual cannot be observed in the present, and all future projections are uncertain. However, the literature includes a range of regression-based and simulation-based methods for estimating consequential emissions from EV charging. EPA has used related methods in regulatory impact assessment to assess GHG implications of EV adoption, and we recommend that EPA seriously consider using such estimates in LDV GHG rule compliance.

Further, within the consequential framework, we recommend that EPA account for the projected emissions of electric vehicle charging and hydrogen production over the lifetime of the vehicles. Expected changes in marginal grid emissions associated with the electricity grid over the lifetime of the vehicles should be accounted for when determining the expected upstream emissions of these vehicles. [EPA-HQ-OAR-2021-0208-0300-A1, pp. 8-9]

Commenter: Minnesota Corn Growers Association (MCGA)

EPA's proposal continues to treat EVs as carbon neutral, without regard to the source of electricity powering the vehicles. Depending on the sources of electricity – whether coal, natural gas, wind or nuclear and the mix of those sources - full lifecycle emissions of EVs vary widely, masking the true GHG emissions from these vehicles. Without accounting for upstream emissions from these vehicles, full lifecycle emissions are not considered. Furthermore, EPA notes in the proposal that increases in electricity demand will result in increased non-GHG emissions for some upstream pollutants. EPA does a disservice to emissions reduction goals by accounting for upstream emissions from some fuels and vehicle technologies but not others, providing an advantage to the sources for which “wells to wheels” upstream emissions are excluded and concealing emissions from coal power generation, mineral extraction, and other high-carbon sources.

In a 2020 analysis of the impacts of preferential treatment for electric vehicles, such as credit multipliers and omitting electricity generation emissions in regulations in China, the European Union and the United States, researchers at Argonne National Laboratory found that GHG emissions in those three countries would reach 1 billion tons higher through 2050 than emissions would be without those preferences.31 They recommend that as the EV markets continues to grow and electricity generation remains GHG intensive in some markets, WTW GHG emissions need to be considered for all technologies to achieve GHG reductions, stating, “The WTW consideration will also level the playing field so that all technologies will compete on their GHG reduction merits.”32 We strongly agree with the need for a level playing field so that all low carbon fuels and technologies are compared on full and accurate lifecycle emissions on a technology and feedstock neutral basis. [EPA-HQ-OAR-2021-0208-0530-A1, p. 13-14]

Commenter: Motor & Equipment Manufacturers Association (MEMA)

MEMA Supports a Holistic Approach to a Climate Plan and Transportation Emissions. MEMA supports the administration’s goal of economy-wide net-zero carbon emissions by 2050. Accordingly, MEMA encourages EPA and the administration to provide a climate plan that is holistic, equitable, and economy-wide in scope, covering all industries and continuing to encourage innovation.

For the post-2026 program, a holistic or an ecosystem approach for the transportation sector includes looking beyond vehicle tail-pipe emissions. MEMA encourages upstream emission accounting for GHG emissions and criteria pollutant emissions associated with electricity generation used to power electric vehicles. Any transition to a new accounting method should provide sufficient time for industry to adapt. Agencies should fully evaluate current and planned electricity sources, capacity and infrastructure distribution capabilities before implementing future vehicle emission programs.

In MY2027 and beyond, the agency should consider a lifecycle analysis that evaluates the manufacture, materials, disposal, and transport for components needed for each vehicle technology. A lifecycle analysis is needed to evaluate the benefits of vehicle technologies and alternative and renewable fuels (potentially including efuels) to determine their impact on GHG emissions. This type of analysis will help policymakers understand the true GHG emissions cost for every vehicle technology and will be a necessary analysis to ensure the nation meets its economy wide goal of net-zero carbon emissions. Alternative or renewable fuels could be particularly useful as the electric utility sector is transitioning to a cleaner grid and as charging and refueling infrastructure continues to be developed. [EPA-HQ-OAR-2021-0208-0249-A1, p. 15]

Commenter: National Corn Growers Association (NCGA)

EPA's proposal continues to treat EVs as carbon neutral, without regard to the source of electricity powering the vehicles. Depending on the sources of electricity – whether coal, natural gas, wind or nuclear and the mix of those sources - full lifecycle emissions of EVs vary widely, masking the true GHG emissions from these vehicles. Without accounting for upstream emissions from these vehicles, full lifecycle emissions are not considered. Furthermore, EPA notes in the proposal that increases in electricity demand will result in increased non-GHG emissions for some upstream pollutants. EPA does a disservice to emissions reduction goals by accounting for upstream emissions from some fuels and vehicle technologies but not others, providing an advantage to the sources for which 'wells to wheels' upstream emissions are excluded and concealing emissions from coal power generation, mineral extraction, and other high-carbon sources.

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Commenter: Nissan North America, Inc.

Continued Need for EV-Related Incentives. As noted above, EV market share has not grown as rapidly as many had expected over the last 10 years. In order to encourage auto manufacturers to further invest their time and resources in EV development (and to incentivize a more rapid transition to EV fleet offerings), Nissan urges EPA to maintain the EV-related incentives available under the current GHG program.

In particular, Nissan has consistently endorsed a policy of measuring GHG emissions for all vehicles, including EVs, based on tailpipe emissions, and not including upstream emissions associated with the electricity that powers these vehicles. Nissan supports EPA in continuing to allow manufacturers to use a 0 g/mi CO2 measure for all EVs without any quantity cap; however, as currently written in the regulations, this incentive would be phased out after model year 2026. Nissan encourages EPA to extend the applicability of the 0 g/mi incentive without limitation beyond model year 2026 in order to encourage manufacturer investment and widespread adoption of these alternative technologies. This is consistent with EPA's long-term goal of increasing the EV market share and with the fact that automobile manufacturers only control tailpipe emissions and have no control over the fuel source for electric power. An EV operating on electricity emits no tailpipe emissions, and automobile manufacturers should only be responsible for the emissions from the vehicles they produce. Including upstream emissions with EVs under the vehicle regulations would dis-incentivize EV production and could negatively impact automobile manufacturers' electrification efforts. [EPA-HQ-OAR-2021-0208-0529-A1, p. 6]

Commenter: Securing America's Future Energy

Treatment of Upstream GHG Emissions. In the final 2012 rule, EPA decided not to attribute upstream powerplant emissions to electric cars in calculating an automaker's average fleet emissions. EPA noted that even though '[t]he 0 gram per mile value accurately reflects the tailpipe CO2 gram per mile achieved by these vehicles,' the 'fuel use from these vehicles will impact the overall GHG reductions associated with the standards due to fuel production and distribution-related upstream GHG emissions which are projected to be greater than the upstream GHG emissions associated with gasoline from oil.'[51] EPA further acknowledged that combined tailpipe and upstream emissions for EVs are substantially lower than from gasoline vehicles using the average mix of fuel sources, and even lower where the electrical grid is cleaner than average.[52]

EPA then observed that because an EV's upstream emissions exceed those of gasoline vehicle, and 'there is currently no national program in place to reduce GHG emissions from electric power plants,' it was appropriate to consider upstream GHG emissions.[53] EPA ultimately declined, however, to consider upstream emissions in order to promote the commercialization of EVs and in recognition of the 'potential for game-changing GHG emissions and oil savings in the long-term.'[54]

SAFE believes that given the still nascent stage of EV deployment, that it remains appropriate to maintain this treatment of upstream emissions from EVs. In fact, in originally noting the rationale for regulating upstream emissions, EPA cited the fact that there was no national program to regulate powerplant GHG emissions. That, however, has changed. President Biden has stated his intentions to regulate emissions, and to do so to a more stringent standard than the Obama Administration's Clean Power Plan.[55] Moreover, Congress is actively considering doing so as well. Draft legislation recently released by the House Energy and Commerce Committee outlined the Clean Energy Performance Plan, a fee and subsidy program for load serving entities intended to subsidize the sale of renewable power and impose fees on the sale of GHG emitting power.[56]

In the preamble to the 2012 rule, EPA acknowledged that to the extent that upstream GHG emissions are already regulated effectively, attributing the emissions to the vehicle would constitute double counting. The primary justification for regulating emissions from a product or vehicle is to internalize the cost of emissions. If those costs are effectively internalized at the point of generation, to further regulate them at the point where the electricity is consumed constitutes double counting.[57] SAFE believes that the best way to regulate emissions of any emitting source is to regulate them at the point of emission, and that EPA should continue to exclude upstream emissions from electricity that powers EVs from the GHG calculation. If EPA is concerned that doing so relaxes the GHG emission standard too much, it should instead consider tightening the standard. [EPA-HQ-OAR-2021-0208-0527-A1, pp.14-15]

Commenter: Valero Energy Corporation (Valero)

Neither the structure of the rule nor EPA's assessment of benefits and impacts should arbitrarily favor a single technology or fuel source.

While the preamble to the proposed rule acknowledges that internal combustion engine ("ICE") vehicles powered by liquid fuels do and must play a critical role in reducing GHG emissions in the transportation sector, the structure of the proposed rule is expressly designed to incentivize increased production of electric vehicles. A key example is EPA's attribution of 0 g/mi upstream GHG emissions for electric vehicles: characterized as an "incentive," this measure skews the compliance demonstration by erasing the actual GHG emissions impacts for these vehicles. [EPA-HQ-OAR-2021-0208-0601-A2, p.2]

In so doing, EPA glosses over the GHG and criteria pollutant emissions associated with electrical vehicle and battery production and understates the emissions, reliability, cost, and safety considerations associated with increased demand for electrical generation. The very use of the term "zero-emission vehicle" throughout the preamble to describe electric vehicles highlights EPA's unsupported bias. As noted by the National Bureau of Economic Research, "...despite being treated by regulators as 'zero emission vehicles', electric vehicles are not necessarily emissions free."1 Battery production, transport, and disposal or recycling present emissions and waste impacts2 as well as national security concerns—including resource access, supply chain vulnerability, and cybersecurity risks for charging stations.3

Commenter: Volkswagen Group of America, Inc. (Volkswagen)

Support Maintaining Zero Upstream Emissions for Electrified Vehicles. Volkswagen supports EPA's proposal to maintain 0 g/mile upstream emissions accounting for fully electrified vehicles and electric operation for hybrid drive vehicles. Upstream emissions are not emitted by electrified motor vehicles, but are rather emitted by power generation facilities when consuming feedstock used to produce electricity. Volkswagen supports the premise that upstream emissions of electricity should not be accounted for in a motor vehicle regulation whose scope is to regulate the performance of motor vehicles. Volkswagen does not control or influence emissions from another sector and is opposed to being held accountable for those emissions in a motor vehicle regulation.

Volkswagen acknowledges that consuming feedstock to generate electricity used to propel electric vehicles results in emissions of greenhouse gases. Volkswagen recognizes that the rate of emissions is based in turn on the feedstock and efficiency of the generating facility and the transmission grid. Electricity generation is the US varies considerably by region, however data illustrates that overall the efficiency of generation and the transition to lower GHG intensive feedstocks is contributing to a decline in the greenhouse gas intensity. Shifting to sources such as natural gas has helped achieved significant reductions in GHG emissions from the power sector. In addition, the improving economics for renewable generation is further accelerating reductions in emissions as more zero emissions sources are being integrated within production grids.

One of the key policies to assure that a future electrified transportation system is enabled to deliver reductions in national emissions is to establish policies and regulations pushing the wide spread deployment of 'green' electricity, or electricity generated with net-zero emissions. Looking beyond the timeframe of this NPRM, future discussions regarding EV deployment pathways should be aligned with pathways that ensure matching levels of 'green' electricity generation are planned. This will ensure that the investment in electrified technologies are providing the fullest return on reduced GHG emissions. [EPA-HQ-OAR-2021-0208-0237-A1, pp.11-12]

EPA Response

In response to comments both supporting and not supporting accounting for upstream emissions associated with electricity use in determining the emissions levels for electrified vehicles, EPA did not propose or seek comment on making any changes to current upstream accounting regulations. In the SAFE rule, EPA extended the use of 0 g/mile value without limits through MY2026.[21] EPA did not revisit its previous decision for reconsideration in this rulemaking for MYs 2023-2026 by proposing changes or otherwise seeking comment on the issue. Comments, either for or against upstream accounting, suggesting that EPA proposed to revise or otherwise sought comment on the use of 0 g/mile are incorrect. Therefore, EPA is not including any changes to these provisions through MY2026 in this rulemaking. Starting in MY 2027, upstream accounting of emissions associated with electricity generation will be part of manufacturer compliance determinations unless EPA changes the regulations through a future notice and comment rulemaking.[22] EPA continues to believe that maintaining the current treatment of upstream emissions in this rule is appropriate given the timeline of this rule and the goal of encouraging further transition to electric vehicles. EPA notes that upstream emissions are included in EPA's analysis of emissions impacts and the use of 0 g/mile through MY 2026 is also included in its cost, technology, and feasibility analyses. The effect of manufacturers having to account for upstream emissions from electricity use starting in MY2027 is also incorporated in EPA's analyses for the rule as discussed in the Chapter 4 of the RIA.

The Alliance noted what they viewed as a discrepancy in the regulations, commenting that if EPA does not eliminate all model year and production limits for the use of zero grams per mile for the GHG emissions of a vehicle operating on electricity, it should issue a rule to clarify that 40 C.F.R. 86.1866-12(a) applies to model years 2012 through 2026. EPA acknowledges that the introductory paragraph 40 CFR 86.1866-12(a) provides for the use of the 0 g/mile value for MYs

[21] See 85 FR 25207 for further discussion including EPA's rationale for its previous decision.
[22] See 40 CFR 600.113-12 and 40 CFR 86.1866-12(a)(2).

2012-2025 whereas the more specific subparagraph 40 CFR 86.1866-12(a)(2) specifies the unrestricted use of the 0 g/mile factor for MYs 2017-2026. We recognize that the regulations could be clarified and will plan to do so in a future rulemaking. EPA notes that the current regulatory text does not prevent the use of the 0 g/mile factor in MY2026.

7. Full-size Pickup Strong Hybrid (or Equivalent Technology) Incentives

Commenters Included in this Section

Alliance For Automotive Innovation
Aluminum Association
American Council for an Energy-Efficient Economy (ACEEE)
BorgWarner Inc.
California Air Resources Board (CARB)
Center for Biological Diversity, Earthjustice, and Sierra Club
Center for Biological Diversity, et al.
Center for Climate and Energy Solutions (C2ES)
Consumer Reports (CR)
DENSO International America, Inc. (DENSO)
Electric Drive Transportation Association (EDTA)
Environmental Defense Fund (EDF)
Ford Motor Company
Gentherm, Inc.
Growth Energy
ITB Group, Ltd. (ITB)
Lucid USA, Inc. (Lucid)
Manufacturers of Emission Controls Association (MECA)
Motor & Equipment Manufacturers Association (MEMA)
New York State Department of Environmental Conservation
Rivian Automotive, LLC
Securing America's Future Energy
Stellantis
Tesla
Toyota Motor North America, Inc. (Toyota)
Union of Concerned Scientists (UCS)
Zero Emission Transportation Association (ZETA) and EVHybridNoire (EVHN)

Commenter: Alliance For Automotive Innovation

Full-Size Pickup Hybrid and Over-Performance Incentive Credits. Auto Innovators supports the proposed full-size pickup hybrid and over-performance incentive credits through MY 2026.

Auto Innovators supports inclusion of the proposed full-size pickup hybrid and overperformance credits through MY 2026. Although many full-size pickup trucks are quite efficient for their size, weight, and utility, they remain among the highest emitting non-niche vehicles in the fleet. Incentivizing strong hybridization or other technology solutions that yield GHG emission rates 20% or better than their regulatory targets can help encourage manufacturer production and marketing to foster greater long-term consumer market adoption in the transition to EVs.

If minimum production requirements are adopted, Auto Innovators recommends that EPA allow them to be met in combination. EPA is proposing to require a minimum 10% penetration rate of strong hybrid or over-performance-qualified full-size pickup trucks out of a manufacturer's total full-size pickup truck production to qualify for credits. Given the current niche nature of such technologies in full-size pickup trucks, Auto Innovators recommends that EPA allow manufacturers to combine the production of strong hybrid and 20% over-performance full-size pickup trucks to determine if a single combined minimum production of 10% is reached. Both types of incentivized technology are provided the same proposed credit (20 g/mile) and would likely achieve similar emissions reductions. Such an approach could provide manufacturers with flexibility to develop multiple technical solutions to address different market needs.

EPA should consider expanding hybrid and over-performance credits to other light trucks with similar characteristics to full-size pickup trucks. EPA notes that full-size pickup trucks face "unique challenges in the costs of applying advanced technologies due to the need to maintain vehicle utility and meet consumer expectations."108 In recognition that certain other vehicles may face similar challenges, we suggest EPA consider slightly broadening this provision to vehicles with similar customer requirements as full-size pickup trucks. To ensure environmental objectives continue to be met while still providing some additional flexibility with this provision, a utility- and/or weight-based criteria could be developed to determine vehicle eligibility. Individual member companies may choose to comment on more specific concepts to slightly broaden the proposed provision to other vehicles with challenges similar to those of full-size pickup trucks. [EPA-HQ-OAR-2021-0208-0571-A1, p. 34-35]

Commenter: Aluminum Association

The Association supports the continued incentivization of advanced vehicle technologies including the performance incentive on pickup trucks that allows for manufacturers to exceed their targets by faster adoption of new technologies and fuel efficiency solutions, including the wider use of mass reducing materials across their portfolio to extend vehicle range and/or support battery downsizing to reduce battery costs [EPA-HQ-OAR-2021-0208-0233-A1 p.4]

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

EPA proposes to extend the Advanced Technology Incentives for Full-size Pickups introduced in the 2012 standards. This is another instance of awarding credits in excess of actual emission reductions, which reduces the stringency of the standards. This specific incentive is also problematic because it could encourage production of full-sized pickup trucks at the expense of smaller vehicles. It also provides a loophole to the 2.5g/mi EV multiplier credit limit, by creating an alternative pathway for EV pickup trucks to earn unwarranted credits after the fleetwide EV multiplier limit has been reached. ACEEE estimates that this provision alone could reduce stringency by up to 2 g/mi by MY 2025 and reduce emissions savings by up to 1% for the entire period of the proposed rule. [EPA-HQ-OAR-2021-0208-0251-A1, p.7]

Eliminate the advanced technology multipliers for plug-in vehicles and full-sized pick-up trucks. [EPA-HQ-OAR-2021-0208-0251-A1, p.14]

Commenter: BorgWarner Inc.

Strong Hybrid Trucks Incentive. We support incentives for full-sized strong hybrid trucks / 20 percent better performance incentive and the carry-forward credits earned during MY 2016 to 2020. Hybrid trucks offer a significant opportunity for lower CO2 and fuel consumption due to their high sales volume and relative fuel consumption. The existing credits have not achieved their goal of significantly increasing hybridization of trucks. The conditions necessary to earn these credits are stringent. Eliminating the volume requirement and awarding credits based on a sliding scale which relates the fuel economy/CO2 of a hybrid vehicle to the same non-hybrid vehicle would provide a better incentive for hybridization in proportion to the value of the technology. [EPA-HQ-OAR-2021-0208-0260-A1, p. 2]

Commenter: California Air Resources Board (CARB)

[S]hould restore the advanced technology full size pick-up truck credits for model years 2023-2025, but not for model year 2022. [EPA-HQ-OAR-2021-0208-0643-A6, p.7]

The proposed standards would also reinstate a credit from the National Program for full-size pick-ups. The National Program standards provided two options for these credits. One option provided credits for hybrid technology, and the other provided performance-based credits if emissions were reduced by at least 20% less than the applicable footprint-based standard for a given vehicle. The SAFE Final Rules eliminated these options. EPA proposes to restore the credits with a modification to prevent any one vehicle from earning both kinds of credits.111 CARB supports restoring the full-size pickup credits in conjunction with revised standards for model years 2023 through 2026. But CARB disagrees the credits should be restored for model year 2022. As noted earlier, vehicles produced for model year 2022 will remain subject to the overly lax SAFE Final Rule standards and no action should be taken to effectively further weaken the 2021 or 2022 standards. There is no valid basis for providing additional credits. [EPA-HQ-OAR-2021-0208-0643-A6, p.37]

Commenter: Center for Biological Diversity, Earthjustice, and Sierra Club

Full-size pickup truck incentives are a second category that should be removed from the final rule. EPA must reduce emissions from light duty trucks, which have come to dominate the domestic market. Due to weaker emission standards and higher profitability, manufacturers have increasingly shifted from producing passenger cars to SUVs, pickups, and vans. Whereas passenger cars represented roughly 80% of the passenger car-light duty truck market in 1975 and 50% as recently as 2013, they now represent a mere 33%.41 The increasing share of light duty trucks subject to looser emissions standards means that while emissions are at near record lows for most vehicle types, cumulative emissions reductions have been offset by the higher portion of light trucks sold to consumers.42 The imbalance is particularly severe for the U.S. Big Three manufacturers, whose fleets also have the highest average emissions among the 14 largest auto manufacturers. Ford and GM’s fleets actually increased their emissions in 2020.43 Due to the long average lifespan of these vehicles, the imbalance of light trucks to passenger cars will persist for decades and continue to impede national emission targets. [EPA-HQ-OAR-2021-0208-0270-A1, p.7]

Against this backdrop, EPA proposes to offer more phantom credits to automakers for producing electric trucks, despite the fact that these credits were set to expire in MY 2021 and no manufacturer has applied for them since 2012.44 Yet as is true for multiplier credits, EPA does not need to incentivize production in this market segment because it is already happening. Automakers are making new electric trucks, and consumers are buying them. For example, as of early June 2021, Ford had reached 100,000 reservations for its 2022 Ford F-150 electrified full-size truck.45 Rivian's electric R1T will be released this year,46 and General Motors is planning an electric version of its popular Chevrolet Silverado for 2023.47 As these developments are happening on their own, there is no evidence that EPA's incentives would further spur production. [EPA-HQ-OAR-2021-0208-0270-A1, p.8]

Commenter: Center for Biological Diversity, et al.

EPA should not reinstate full-size pickup truck incentives. Since 2012, EPA has devised credits intended to incentivize the application of mild (10 g/mile) or strong (20 g/mile) hybrid technologies to full-sized pickup trucks if manufacturers meet minimum production thresholds or if the vehicles achieved 15 or 20 percent better performance than similar internal combustion pickup trucks. Proposal, 86 Fed. Reg. at 43,761. The incentives constitute another form of "phantom" credits because they come in addition to the emissions reductions these trucks already achieve when the technology is installed. Nonetheless, the incentives were intended to spur the advancement of hybrid technology and its application to these vehicles, which feature higher towing and hauling capabilities, in the early years of the program. But in the ensuing nine years, no manufacturer has applied for them, and the 2020 Final Rule terminated them at the end of MY 2021. Id.

EPA now proposes to reinstate them to further incentivize advanced technology penetration into this market segment. It does not, however, show that manufacturers are not likely to install the technology absent the extra incentives, particularly since they (and the public) will already reap the benefits that come from the resulting emissions reductions – for automakers, by decreasing their fleets' average emissions, and for the public, in the form of pollution harm reduction. Notably, full electrification has already penetrated the light duty truck segment, with extremely positive consumer uptake. As of early June 2021, Ford had reached 100,000 reservations for its 2022 Ford F-150 electrified full-size truck.150 Rivian's electric R1T will be released this year.151 General Motors is planning an electric version of its popular Chevrolet Silverado for 2023.152 Tesla's electric Cybertruck production is slated for 2022.153 And Bollinger's electric B2's production is also slated for 2022.154 Plainly, full pickup truck electrification is about to arrive without the proposed incentives in place.

In light of these developments, there is no evidence additional incentives are needed to spur the development of less-polluting trucks. And indeed. And indeed, EPA has not included their use in its evaluation of the standards' projected GHG emissions, costs, benefits, or other program effects. Proposal, 86 Fed. Reg. at 43761. We urge EPA not to reinstate them. [EPA-HQ-OAR-2021-0208-0651-A1, p. 65]

Commenter: Center for Climate and Energy Solutions (C2ES)

Along the same lines, C2ES supports the reinstatement of the pickup strong hybrid/20 percent better performance credit on the condition that EPA demonstrates they are likely to appreciably accelerate the development of zero-emission vehicles.[EPA-HQ-OAR-2021-0208-0287-A1, p. 2]

Full-size Pickup Performance Incentives. C2ES supports the reinstatement of the previously existing full-size pickup strong hybrid/20 percent better performance incentives on the condition that EPA demonstrates significant emissions reductions facilitated by this incentive. However, EPA should ensure that automakers are not allowed to apply both incentives, as this double counting would significantly loosen the effective stringency of the proposed standards. With pickups representing a large—and growing—segment of the national light-duty market, but emitting much higher amounts of greenhouse gases on a per-mile basis than other light-duty vehicles, it is necessary for EPA's incentives to support the rapid reduction in greenhouse gas emissions from pickups, both through improved efficiency among conventional models and increased deployment of zero-emission models.22

Currently, while some zero-emission pickup options are entering the market, many more electric SUV and sedan models are available, providing consumers interested in those models with more choice. In the near future, high-emitting pickups will likely represent a continuously increasing share of combustion engine vehicles as drivers of sedans and SUVs increasingly switch to zero-emission vehicles while fewer offerings of zero-emission pickups remain.

Preliminary data do not suggest that the pickup incentives under the 2012 Final Rule were highly successful in reducing emissions from pickups. Where we would expect to see an accelerated rate of improvement in the emissions of pickups from MY 2017–19, when the 2012 Final Rule was in effect with the incentive, realworld fleet average emissions from pickups only decreased 3 g/mile (from 470 to 467 g/mile) in this timeframe, according to EPA data.23 If strong hybrid incentives will not produce demonstrable emissions reductions among these remaining pickups, they should be eliminated in favor of advanced technology multipliers that directly incentivize the development battery electric, fuel-cell electric, and plug-in hybrid electric pickup models. [EPA-HQ-OAR-2021-0208-0287-A1, pp.6-7]

Commenter: Consumer Reports (CR)

Advanced Technology Incentives for Full-Size Pickups. This credit, although limited to a relatively small portion of the market, may have some unintended consequences. Hybridization is increasingly being used by automakers to boost performance rather than efficiency. Ford's full sized pickup hybrid is marketed as "Power Boost" and happens to be the most powerful truck in their lineup at 430 HP. However, it achieves only a 3 mpg improvement over their 2.7L EcoBoost powertrain but increases horsepower by 105. Compared to the 3.5L EcoBoost, it increases efficiency by 4mpg (in 4x4 configuration) and horsepower by 30.30 In addition to

Ford, Toyota just announced a new Tundra Pickup that will be available with a hybrid option that will add 48 HP compared to the non-hybrid version.31 EPA efficiency ratings for these powertrains are not yet available. While increasing the efficiency of full sized pickups is important, and can have an outsized impact on reducing emissions due to their low efficiency, any credits given for installing specific technologies should be designed to ensure that the technologies are actually used to increase efficiency rather than just used to boost power and performance. [EPA-HQ-OAR-2021-0208-0602-A1, p.13]

In Consumer Reports' 2019 Automotive Fuel Economy Survey, drivers of large SUVs and pickups told us they wanted to see their vehicle's fuel economy improved more than 6 times as often as they wanted to see their vehicle's horsepower increased (55% vs. 8%) as shown in Figure 3.1.32 This credit, as designed, allows automakers to comply by two pathways. The first is by installing a strong hybrid powertrain. The second is by achieving 20% lower emissions than the footprint based standard. If EPA decides to keep this credit in their final standard, Consumer Reports recommends that EPA simplify the credit by eliminating the "strong hybrid" credit, and only provide the credit to vehicles that meet the 20% improvement above the standard threshold, regardless of technology used. This would avoid potentially giving credits to strong hybrids designed to deliver increased performance, but minimal efficiency improvements. [EPA-HQ-OAR-2021-0208-0602-A1,p.13] [[See EPA-HQ-OAR-2021-0208-0602-A1, p.14 for Figure 3.1]]

Another concern with this credit is that it is also applicable to electric pickups. While EPA put a cap on the EV multiplier credits, this credit would provide a means to exceed that cap with additional credits for electric vehicles. [EPA-HQ-OAR-2021-0208-0602-A1,p.14]

Commenter: DENSO International America, Inc. (DENSO)

Support Incentives for Strong Hybridization for Light Trucks. DENSO supports the reinstatement of incentives that will further electrification of pick-up trucks to allow for increased fuel economy and reduced greenhouse gas emissions. We also ask the agencies to revise the strong hybrid pick-up truck incentives (20g/mi through 2025) by removing the production threshold requirement and expanding the eligibility to all light-duty trucks. [EPA-HQ-OAR-2021-0208-0282-A1, p. 7]

Commenter: Electric Drive Transportation Association (EDTA)

EDTA Supports the Extended Credit and Pickup Truck Credit Programs - EDTA supports the reinstatement of the incentives for full-size pickup strong hybrid/20 percent better performance incentive. We agree with EPA's rationale that advanced technologies are "particularly challenging due to the need to preserve towing and hauling capabilities" and will help to address initial market challenges. (Source: Revised 2023 and Later Model Year Light-Duty Vehicle Greenhouse Gas Emissions Standards, 86 Fed. Reg. 43726.)

EDTA recommends that minimum sales thresholds in the full-size pickup truck provision be eliminated. The prior regulation required that a minimum sales percentage of a manufacturer's full-size pick-ups be equipped with hybrid technology before credits could be generated. While the efficiency benefits of hybridizing this segment are large, the current market penetration is small. The minimum sales threshold undermines the effectiveness of the incentive, as low rates of adoption persist in this segment. Reducing or eliminating the sales threshold will grow the hybrid pickup truck segment by increasing investment, accelerating innovation, and reducing system and component costs. [EPA-HQ-OAR-2021-0208-0569-A1, p. 3]

Commenter: Environmental Defense Fund (EDF)

The voluntary emissions reductions are generally comparable to those that would be required of all manufacturers under EPA's Proposed Standards for MYs 2023-2026. A few notable differences are that EPA proposes new credits for pickups equipped with strong hybrid technology; EPA proposes to cap advanced technology vehicle multiplier credits at an average of 2.5 g/mi per model year (as opposed to 1% of GHG emissions reductions). [EPA-HQ-OAR-2021-0208-0688-A1, p. 14]

Commenter: Ford Motor Company

Reinstatement of Full-Size Pickup Incentives for Strong Hybrids or Equivalent Technologies. In the original 2017-2025MY GHG standards, EPA provided a 20 g/mi incentive for full-size pickups that achieved either a CO2 performance 20% better than the obligation or that applied 'strong' hybridization. The provision was subsequently removed in the SAFE rule but was included in the California Framework Agreement. This provision will help to build the customer base for advanced, but costly, fuel-efficient technologies in the full-size pickup segment, while also recognizing the unique challenges of improving the fuel efficiency of these vehicles while preserving important utility functions like payload carrying capacity, towing, and off-road capability.

Ford believes that this provision continues to be essential in enabling continued adoption of advanced technology in the full-size pickup segment and supports EPA's proposed reinstatement. One concern with this credit mechanism is the legacy requirement that 10% volume penetration of the relevant technologies must be reached within a given model before any credit is granted. This 'all-or-nothing' approach poses risks and uncertainty to OEM compliance planning since it is difficult to predict future volumes with precision, particularly for new or advanced technologies such as hybridization. The threshold is also unnecessary since an OEM is already motivated to maximize volumes to the greatest extent possible – within market and material constraints – in order to recoup the sizeable investments needed to implement such technologies.

For these reasons, Ford believes it is appropriate to lower or remove the volume threshold requirement. In the alternative, Ford asks that EPA clarify that an OEM may include multiple technologies toward the 10% threshold, for example, by combining BEV and HEV volumes to satisfy a given model's 10% threshold requirement for the performance-based credit pathway. [EPA-HQ-OAR-2021-0208-0294-A1, pp.3-4]

Commenter: Gentherm, Inc.

Advanced Technology Incentives for Full-Size Pick-up Trucks. Gentherm supports reinstatement of the incentives for full-sized pickup strong hybrid/20 percent better performance incentive. One improvement in the rule would be to provide a combined penetration requirement rather than independent 10 percent requirements for multiple types of technologies. This would mean that any combination of strong hybrid and other 20 percent better performance technologies would fall under one cap. This is an important technology agnostic requirement, since it is not clear the receptiveness that the market will have for a specific technology. As far as possible, the standards should be flexible and technology agnostic to incentivize fuel consumption and CO2 emissions reductions. Gentherm agrees with the EPA justification for reinstating the full-size pickup truck credits since full-size pick-up truck technologies are "particularly challenging due to the need to preserve the towing and hauling capabilities of the vehicles." [EPA-HQ-OAR-2021-0208-0216-A1, p. 6]

Commenter: Growth Energy

The proposal appropriately allows performance based GHG incentives for full-size pickups, which should be adjusted slightly to incentivize FFV pickups.

The NPRM gives "performance-based credits" for full-size pickups with 15 to 20% better CO2 performance than their footprint-based targets. (NPRM at 43,761). EPA offers this incentive because "introduction of low-emissions technologies in this market segment creates more opportunities for achieving the more stringent later year standards." (Id.). This approach is reasonable for full-sized pickups.

This technology neutral approach is appropriate whereby "These performance-based credits have no specific technology or design requirements; automakers can use any technology or set of technologies as long as the vehicle's CO2 performance is at least 15 or 20 percent below the vehicle's footprint-based target." (NPRM at 43,761). Performance-based, technology-neutral approaches for EPA vehicle incentives are generally preferred, as stated above, and this approach should allow FFVs and other alternative fuel vehicles to compete on a level playing field.

While this performance-based approach is appropriate, full-size pickups should qualify based on 10% CO2 reduction measured at the tailpipe. Thus, under 40 CFR §86.1870-12 ("CO2 credits for qualifying full-size light pickup trucks"), the figure 0.8 should be changed to 0.9 to allow incentives for full size pickup trucks that achieve carbon-related exhaust emissions less than or equal to 10% below the applicable target value. (See NPRM at 43,810 citing proposed regulatory text at 40 CFR §86.1870-12(b)(2)).

In the alternative, a 15-20% CO2 reduction below the vehicle's footprint-based target is appropriate to trigger incentives if the VCF is applied to full-size FFV pickups for purposes of calculating this CO2 reduction threshold. Under this approach, text would be added to 40 CFR §86.1870-12 so that, for purposes of qualifying for the credit under §86.1870-12(b)(2), the CREE for the ethanol portion of FFV fuel use would be multiplied by the VCF. If the CREE incorporating the VCF would be less than 15-20% of the applicable target value, FFV full-sized pickups should qualify for the incentive.

EPA notes that “full-size pickup truck credits are appropriate to further incentivize advanced technologies penetrating this particularly challenging segment of the market.” (NPRM at 43,761). FFV technology has been readily deployed for pickups, which provides yet another reason to align these pickup incentives for use with FFVs. Finally, these performance-based credits for full sized pickups, for which FFVs may qualify, should extend through the last year covered by this rulemaking (model year 2026), to allow for manufacturers to recoup the costs of upgrading these pickups as FFVs. The regulatory text states, “A pickup truck that qualifies for this credit in a model year may claim this credit for a maximum of four subsequent model years (a total of five consecutive model years).” (NPRM at 43,810). Given this timing, the credit should extend through model year 2026. [EPA-HQ-OAR-2021-0208-0279-A1, p. 12-13]

Commenter: ITB Group, Ltd. (ITB)

Advanced Technology Incentives for Full-Size Pick-up Trucks. The ITB Group supports reinstatement of the incentives for full-sized pickup strong hybrid/20% better performance incentive. One improvement in the rule would be to provide a combined penetration requirement rather than independent 10% requirements for multiple types of technologies. This would mean that any combination of strong hybrid and other 20% better performance technologies would fall under one cap. This is an important technology-agnostic requirement, since it is not clear the receptiveness that the market will have for a specific technology. As far as possible, the standards should be flexible and technology-agnostic to incentivize fuel consumption and CO2 emissions reductions. ITB agrees with the EPA’s justification for reinstating the full-size pickup truck credits since full-size pick-up truck technologies are “particularly challenging due to the need to preserve the towing and hauling capabilities of the vehicles.” [EPA-HQ-OAR-2021-0208-0222-A1, p. 6-7]

Commenter: Lucid USA, Inc. (Lucid)

Additionally, the NPRM proposes incentives for ICE vehicles that will effectively delay the transition to the net-zero emission future promised by President Biden. Reviving the full-size pickup truck incentives allows the highest-emitting vehicles to receive only modestly effective technology updates rather than a true conversion to zero emissions. The all-electric full-size pickups soon coming on the market from multiple manufacturers demonstrate that EV pickups are feasible and EPA does not need to reward partial reductions of GHG emissions to make progress in the pickup segment of the market. [EPA-HQ-OAR-2021-0208-0528-A1, p. 5]

Commenter: Manufacturers of Emission Controls Association (MECA)

Advanced Technology Credits for Pick-up Trucks. MECA supports EPA’s proposal to reinstate the original 2012 rule’s full-size pick-up truck incentive credits for strong (full) hybrids or similar performance technologies. Pick-up trucks, which are the second most popular light-duty vehicle segment in the North American market, are often identified as a greater technical and consumer acceptance challenge to higher efficiency standards. The presence of both electric, full hybrid and other advanced technology vehicle options in this segment is clearly beneficial to both consumers and the environment.

Unlike multiplier credits, the Advanced Technology Credits for pick-up trucks do require the use of additional full hybrid or other advanced technologies that deliver at least 20% better CO2 reduction performance than the footprint-based target value in a minimum 10% of total model production volume. In particular, MECA feels the additional 20 g/mile CO2 credit incentive is reasonable given that on average, pick-up trucks emit considerably more CO2 per year and are almost twice as likely to reach 200,000 miles compared to vehicles in other LDV segments. Given that large SUVs also commonly utilize the same chassis and powertrains as pick-up trucks, we believe that EPA should consider extending these advanced technology truck credits to similarly powered SUVs as well.[EPA-HQ-OAR-2021-0208-0261-A1, p.3]

Commenter: Motor & Equipment Manufacturers Association (MEMA)

MEMA Supports the Extended Credit and Pickup Truck Credit Programs - MEMA supports the reinstatement of the incentives for full-sized pickup strong hybrid/20 percent better performance incentive. Additionally, MEMA supports the carry-forward proposal that provides additional flexibility for credits earned during MYs 2016–2020. [EPA-HQ-OAR-2021-0208-0249-A1, p. 3]

MEMA Supports the Extended Credit and Pickup Truck Credit Programs. Advanced Technology Incentives for Full-Size Light Pickup Trucks. Under the 2012 rule, the full-size pickup strong hybrid/20 percent better performance incentive credit extended through MY2025 and required a 10 percent production threshold. The SAFE rule ended this incentive, but EPA is proposing to reinstate the credits for MYs 2022–2025. EPA justifies proposing to reinstate the full-size pickup truck credits as these advanced technologies in full-sized pickups are “particularly challenging due to the need to preserve the towing and hauling capabilities of the vehicles.”32 Further, reinstatement of this program incentivizes advanced technologies into the full-sized pickup segment to help address cost, utility, and consumer acceptance challenges.33 EPA requests comment on whether to reinstate the credit program and a proposed approach for doing so.34

MEMA supports the reinstatement of the incentives for full-sized pickup strong hybrid/20 percent better performance incentive. Now, even more than a few years ago, there are sufficient technologies and more consumer acceptance that can be used to help pickups meet the performance criteria and market penetration rates for strong hybrids. MEMA continues to urge EPA to consider extending these credits to all pickup trucks, not just full-size pickup trucks.35

In the post-2026 program, MEMA urges EPA to consider continuing the full-sized pickup incentive but structure the program for providing credits for full-sized pickup trucks that just achieve 20 percent or better performance. This structure will continue to encourage innovative, creative solutions without being partnered with credits awarded for targeted technology. [EPA-HQ-OAR-2021-0208-0249-A1, p. 10-11]

35 Program requires a minimum of 15 percent in MY2017 increasing to 40 percent in MY2021.

Commenter: New York State Department of Environmental Conservation

New York also supports EPA's proposal to restore full-size pick-up credits as they existed before SAFE rule (for MYs 2022- 2025). Should EPA proceed with this revision; the final rulemaking should estimate the resulting loss of stringency. New York agrees with EPA's outlined credit approach that would avoid double-counting of credits by restricting the use of credit types for the same vehicle. [EPA-HQ-OAR-2021-0208-0238-A1, p.3]

Commenter: Rivian Automotive, LLC

Do Not Revive Incentives for "Strong Hybrid" Trucks. EPA previously offered an incentive for "strong" and "mild hybrid" pick-up trucks in the form of a grams per-mile, per-vehicle credit. Rivian's own groundbreaking product offerings prove that hybridization of pick-up trucks is a technological dead end—while incrementally better than a conventional ICE, hybrids fail to excite the driving public and are insufficient to the task of decarbonizing the transportation sector. Only fully electric models will rise to the challenge of deep emissions reductions while providing customers with a superior ownership experience.

Rivian believes the agency made the right decision sunsetting this credit in the SAFE Rule and the proposed rule fails to adequately support a decision to reverse course. The EPA is quite explicit that such credits present trade-offs: effectively reduced regulation stringency in favor of catalyzing development and market entry for new technologies that promise greater environmental benefits in the long run.9 This trade-off might be worthwhile for true "end game" solutions such as BEVs but is harder to accept when the technology in question can never be more than a half-measure and is subject to real-world emissions increases driven by operation and age. The truck hybrid credit should be allowed to expire as originally intended. [EPA-HQ-OAR-2021-0208-0274-A1, p. 4]

Commenter: Securing America's Future Energy

Incentives for 'Strong Hybrid' Trucks. In the 2012 rule, EPA offered an incentive for 'strong' and 'mild hybrid' pick-up trucks, trucks with a 'start/stop capability and regenerative braking capability, where the recovered energy over the Federal Test Procedure is at least 15 percent.'[60] The incentive took the form of a grams-per-mile, per-vehicle credit available to vehicles with this 'game-changing technology,' but was sunset in recognition that the technology was intended primarily to 'help provide a bridge for industry to future more stringent light truck standards.'[61]

Today, hybridization of pick-up trucks is no longer an innovative technology. It has been replaced by full electric pickup trucks, with towing and hauling capacity similar to conventional pickups, that are entering the market shortly. Yet, in its proposal, EPA announced its intention to reestablish incentives for strong and mild hybrid trucks. In the proposal, EPA acknowledged the incremental emissions this decision would enable and failed to adequately support its decision to do so. [62] Given the current state of pickup truck technology, EPA should focus on incentivizing transformative electric pickup trucks and decline to extend incentives to hybrids. [EPA-HQ-OAR-2021-0208-0527-A1, pp. 16-17]

Commenter: Stellantis

Stellantis supports EPA's focus on crediting hybrid technology on trucks and believes crediting all hybrid technology on trucks has opportunity to maximize near term GHG reductions.

Incentivize All Hybrid Technology in Trucks. We applaud EPA for restoring the full-size pickup truck incentive for strong hybrids. Similarly, EPA should restore the credit for mild hybrid technology which offers considerable real world benefits by recovering up to 65%24 of total braking energy at a relatively low cost. This represents an important step on the path to stronger electrification. Rather than sunsetting this credit, we believe EPA should extend the mild hybrid pickup truck credits through MY2026 with corresponding shifts to the minimum percent of pickup sales thresholds. EPA recognized this benefit, and the need to incentivize further development of the technology, in its original MY2017-2025 rulemaking.

The mild hybrid credit also came with minimum volume requirements that, after rapidly increasing yearover- year, have proven to be impractical. From the detailed data supplied in the 2020 EPA trends report25, no OEM met the minimum sales volume requirement. Pickup trucks have a wider variety of powertrain options than most vehicles, and to meet minimum volume requirements of the credit, manufacturers would need to introduce mild hybrid technology across multiple models in the span of just a few years. This implementation pace did not align with product design cycles for any full size pickup truck and therefore minimum volume requirements were unachievable by any OEM. With mild hybrid market share currently sitting at 1.2% per the 2020 IHS baseline study, further incentives are needed to promote more widespread deployment of mild hybrid technology. [EPA-HQ-OAR-2021-0208-0532-A1, pp. 18-19]

24 40 CFR §86.1803-01 Mild hybrid electric vehicle means a hybrid electric vehicle that has start/stop capability and regenerative braking capability, where the recovered energy over the Federal Test Procedure is at least 15% but less than 65% of the total braking energy, as measured and calculated according to 40 CFR 600.116-12(d).

Commenter: Tesla

EPA Should Not Renew the Advanced Technology Incentives for Full-Size Pick-ups. EPA proposes to reestablish an additional credit incentive for full size pickups and underestimates the potential use of the credit. As noted above, EPA's analysis underestimates the deployment of newly manufactured full EV pick-up trucks. For example, EPA projects no delivery of the Tesla Cybertruck as is scheduled in MY 2022, ignores any deployment of pickups by Rivian, and appears to underestimate Toyota's deployment despite pronouncement of seven models by MY 2025.179 Just as EPA acknowledges recent manufacturer announcements on electrification in its preamble,180 the agency should recognize the increasing announcements around full electric pick-up trucks.181 Regardless, under a conservative estimate, Tesla's modeling anticipates that starting in MY 2023 this annual credit would further erode the proposed standard's stringency starting at .3 g/mi and grows in usage MY 24 and 25. See Figure 1.

For the reasons cited in Tesla's opposition to the ATV multiplier, Tesla also asserts this incentive is not needed to incentivize deployment of actual EV pickups and should be removed to increase the proposal's stringency. [EPA-HQ-OAR-2021-0208-0278-A1][pp.22]

Commenter: Toyota Motor North America, Inc. (Toyota)

Full-Size Pickup Truck Credits – A Challenge for Heaver, More Capable Light Trucks. Toyota supports reinstituting the advanced technology incentives for full size pick-up trucks, but requests the incentives apply through 2026 model year, or at least any four years between and including 2022 and 2026 for the same reasons provided for ATV multipliers. EPA has appropriately acknowledged the segment's "unique challenges in the costs of applying advanced technologies due to the need to maintain vehicle utility and meet consumer expectations". EPA's determination that "these full-size pickup truck credits are appropriate to further incentivize advanced technologies penetrating this particularly challenging segment of the market" remains sound policy to promote significant future GHG reductions.17

Unfortunately, the market challenge is not unique to full-size pick-up trucks. All pickup trucks and body-on-frame SUVs contend with similar difficulty in providing low CO2 performance while preserving towing and hauling capabilities. We request the strong hybrid incentive be extended to all light trucks having a gross vehicle weight rating (GVWR) greater than 6,500 lbs. As seen in Figure 5, the share of hybrids remains low in this segment of light trucks relative to the gains made in most every other segment. [EPA-HQ-OAR-2021-0208-0531-A1, p. 10] [Figure 5 can be found on p. 10 of Docket number EPA-HQ-OAR-2021-0208-0531-A1]

Incentivizing this slightly broader segment will help manufactures "address cost, utility, and consumer acceptance challenges" as noted by EPA. 18 The additional trucks with a GVWR greater than 6,500 lbs. represent about half the sales volume of full-size pickup trucks. Any environmental impact of expanding this flexibility should remain minimal given that EPA's past analyses have demonstrated a low relative impact of the full-size pickup truck provision. 19 [EPA-HQ-OAR-2021-0208-0531-A1, p. 11]

Commenter: Union of Concerned Scientists (UCS)

Strong pick-up credits. The final flexibility being considered by EPA is reinstating so-called 'advanced technology' incentives for full-size pick-ups, which awards 20 g/mi additional credit per full-size pick-up that is either a strong hybrid or has a performance at least 20 percent better than the applicable standard, provided it represents at least 10 percent of production.

EPA claims that 'the rationale for establishing them in the 2012 rule remains valid.'72 However, this seems to completely ignore the developments in the industry over the past decade. The Ford PowerBoost hybrid went on sale earlier this year and is already selling at a take-rate of 8.4 percent over the past three months, despite a chip shortage that is currently limiting production, making it quite likely that this vehicle will qualify for the credit.73 Additionally, Ford is slated to start producing the Lightning full-size EV pick-up in MY2022, 74 which shows that a strong hybrid pick-up isn't so 'advanced.' With a new production target of 80,000 units, the Lightning will also likely qualify for the credit under the performance provision. And it isn't just Ford who's rolling out these vehicles: Toyota's next Tundra full-size pick-up will only have two engine offerings, one of which is a hybrid.75

All of this is to say that even in the absence of the full-size pick-up strong hybrid/performance credit, manufacturers have moved forward with plans for full-size pick-ups that meet the criteria. The simple reason is that these vehicles are sold by only a small number of manufacturers, and as such represent a critical piece of the portfolio of those manufacturers—a company like Ford cannot afford for its best-selling vehicle to be a deficit-generator under the standards. Since these vehicles are already planned, the agency's reinstatement of the credit cannot be considered an incentive—instead, it is a windfall credit.

Because full-size pick-ups are a very concentrated part of the market, while the total credits generated under this flexibility may not be as large as some of the other proposed flexibilities, they will be available to only a small number of companies and thus have an outsized impact on those manufacturers. If 20 percent of F-150s sold qualify for this credit, this provision would generate over 700,000 Mg in credits for the company—this equates to a 2.5 g/mi credited improvement in Ford's light truck fleet thanks to this potential windfall credit.

In addition to the concentration of this credit in the hands of just a few manufacturers, there is an additional concern around the efficiency of the strong hybrid pick-ups. These vehicles are not being designed for efficiency, as acknowledged by the Tundra's Executive Program Manager.76 Given that, it makes sense to eliminate the strong hybrid credit entirely, and if EPA wishes to implement a full-size pick-up credit, it should only be for the 20 percent performance credit. This ensures that at least the credit windfall will be limited to efficient vehicles, not just a high-performance trim level.

UCS opposes the reinstatement of the full-size pick-up 'advanced technology' credit. However, if EPA includes such a provision in its final rule, it should only be under the performance mechanism. [EPA-HQ-OAR-2021-0208-0277-A1, pp.37-38]

Commenter: Zero Emission Transportation Association (ZETA) and EVHybridNoire (EVHN)

Extension of credits like those for hybrid trucks are outdated. While it made sense to provide these incentives when electric drivetrains were still being innovated, we currently have fully electric pickup trucks slated to be on the road by 2023 including from Rivian, Tesla, and Ford. There is no reason to give a generous credit to hybrid trucks when the bridge technology is well-established. The same is true for advanced gasoline vehicle technologies included for off-cycle credits, like start-stop technology. Off-cycle and hybrid credits should not be extended and should not be expanded. [EPA-HQ-OAR-2021-0208-0275-A1, p. 3]

<u>EPA Response</u>

EPA is finalizing the full-size pickup incentives only for MYs 2023-2024. EPA's response to comments regarding whether or not to include the incentives in the program are provided in section II.B.2 of the preamble, which also provides EPA's response to comments from Consumer Reports and UCS that EPA should not include an incentive for strong hybrid technology.

Several commenters recommended that EPA remove the 10 percent production threshold requirement from the program. In addition, the Alliance commented that if EPA continues to require manufacturers to meet the production threshold to qualify for the incentives that production for pickups meeting either the strong hybrid or 20 percent performance criteria should be combined to determine that they meet the threshold. The Alliance commented that both types of incentivized technology are provided the same proposed credit (20 g/mile) and would likely achieve similar emissions reductions and that such an approach could provide manufacturers with flexibility to develop multiple technical solutions to address different market needs. Ford, ITB Group, and Gentherm provided similar comments.

In response, EPA included the minimum percentage for each type of incentive to encourage significant penetration of these technologies, leading to long-term market acceptance.[23] In the 2012 rule preamble establishing the thresholds, EPA explained its decision in part stating "our goal is to create an incentive for manufacturers to commit to the large-scale application of hybrids and other advanced technologies in the challenging large truck sector and specifically that at least mild hybrid or comparable technology become a standard technology feature for large pickup trucks. Eliminating or greatly tempering the minimum penetration requirements might retain the incentive for niche applications but would lose any assurance of widespread 'game-changing' technology introduction and substantial penetration." EPA believes this remains an important aspect of the incentive. As several commenters recommending EPA not adopt the incentives noted, there are some advanced technology full-size pickups being introduced by auto manufacturers that may qualify for the incentives. EPA believes its rationale for including the thresholds remains important, that retaining the production thresholds will provide incentive for manufacturers to sell qualifying pickups in substantial numbers now that such vehicles appear to be entering the market. Therefore, EPA is not revisiting or changing the thresholds. For these reasons also, EPA did not propose or seek comment on reducing or removing the thresholds.

Some automakers commented on expanding the pickup truck incentive beyond what EPA had proposed. Stellantis commented that EPA should reinstate the mild hybrid incentives, believing that further incentives are needed to promote more widespread deployment of mild hybrid technology. Toyota requested that the strong hybrid incentive be extended to all light trucks having a gross vehicle weight rating (GVWR) greater than 6,500 lbs. Toyota commented that the share of hybrids remains low in this segment of light trucks relative to the gains made in most every other segment. Incentivizing this slightly broader segment, Toyota argues, will help manufactures address cost, utility, and consumer acceptance challenges. MEMA supported EPA's proposal to reinstate the full-sized pickup strong hybrid/20 percent better performance

[23] 77 FR 62826.

incentive, while also urging EPA to consider extending these credits to all pickup trucks, not just full-size pickup trucks.

In response, EPA does not believe expanding the full-size pickup incentive to other vehicle categories is reasonable. EPA must balance the need for flexibility with the environmental impacts of the incentives and long-term goals of the program. Expanding the incentives to smaller vehicle types would reduce the emissions reductions of the program to the extent it was used by manufacturers. Many commenters were very concerned about the impact of the incentives, commenting that they could weaken the program. EPA shares their concerns regarding the potential impact of the incentives and is only including a narrow set of flexibilities as needed to address lead time issues associated with MYs 2023-2024. Also, full-size pickups represent the highest degree of challenge due to vehicle utility needs of consumers that purchase such vehicles, which is why EPA established the full-size pickup incentives as part of the 2012 rule. In the proposal for the current rulemaking, EPA did not propose or seek comment on significantly expanding the previously existing full-size pickup incentives by extending it to other vehicle categories.

Rivian commented that it believes the agency made the right decision sunsetting this credit in the SAFE Rule and the proposed rule fails to adequately support a decision to reverse course. It commented “the EPA is quite explicit that such credits present trade-offs: effectively reduced regulation stringency in favor of catalyzing development and market entry for new technologies that promise greater environmental benefits in the long run. This trade-off might be worthwhile for true “end game” solutions such as BEVs but is harder to accept when the technology in question can never be more than a half-measure and is subject to real-world emissions increases driven by operation and age. The truck hybrid credit should be allowed to expire as originally intended.” In response, EPA believes that for full-size pickups, strong hybrids (or technologies providing similar emissions reductions under the performance-based option) have the potential to provide significant emissions reductions in the interim between the timing of this rulemaking and when full size pickups are converted to EVs on a widespread basis in the future. EPA also notes that EPA originally provided these incentives through MY 2025, so EPA “originally intended” them to be available through MY 2025. After considering comments, EPA is reinstating them only for MYs 2023-2024.

Growth Energy commented that EPA should reduce the performance incentive threshold from 20 percent to 10 percent so FFVs could potentially qualify. Growth Energy commented that alternatively a 15-20% CO_2 reduction below the vehicle’s footprint-based target is appropriate to trigger incentives if the “volumetric conversion factor” (VCF) of 0.15 is applied to full-size FFV pickups for purposes of calculating this CO2 reduction threshold.

In response, EPA is not making changes to the full-size pickup incentives to accommodate FFVs. FFVs have been available for many years, including for full-size pickups. While operating on E85, FFV CO_2 emissions are typically about 5 percent lower than when operating on gasoline. EPA already factors in this lower emissions level in determining the GHG emissions performance level of FFVs under the current regulations.[24] Often, FFVs are not refueled with E85 which negates any benefit for the vehicle technology.[25] Because FFVs have been available to consumers for many years and because there is no assurance FFVs will be refueled with E85, EPA is not including any new incentives for these vehicles. EPA is not reducing the percent reduction threshold form 20 percent to 10 percent also because such an approach would potentially allow many other less impactful technologies to qualify for the credit. EPA is also not including a "volumetric conversion factor" (VCF) of 0.15 for FFVs. Comments regarding applying a VCF are addressed in section 26.2 below.

[24] 40 CFR 600.510–12(c)(v) and (j)(vi).

[25] See "Technical Memorandum Describing Potential Methods for Determining the Weighting Factor (F-Factor) for Testing E85 Flexible Fuel Vehicles (FFV) Light-duty Vehicles," EPA Office of Transportation and Air Quality, Assessment and Standards Division to F-Factor Determination Docket EPA-HQ-OAR-2020-0104, August 2020.

8. Off-cycle Credits

Commenters Included in this Section

Advanced Engine Systems Institute (AESI)
Alliance For Automotive Innovation
Alliance for Vehicle Efficiency (AVE)
American Council for an Energy-Efficient Economy (ACEEE)
American Honda Motor Company (Honda)
BorgWarner Inc.
Center for Biological Diversity, Earthjustice, and Sierra Club
Center for Biological Diversity, et al.
Center for Climate and Energy Solutions (C2ES)
Consumer Reports (CR)
DENSO International America, Inc. (DENSO)
Ford Motor Company
General Motors LLC (GM)
Gentherm, Inc.
Hyundai America Technical Center, Inc. (Hyundai)
ITB Group, Ltd. (ITB)
Jaguar Land Rover North America, LLC (JLRNA)
Lucid USA, Inc. (Lucid)
Manufacturers of Emission Controls Association (MECA)
Motor & Equipment Manufacturers Association (MEMA)
New York State Department of Environmental Conservation
Nissan North America, Inc.
Rivian Automotive, LLC
Securing America's Future Energy
Stellantis
Tesla
Toyota Motor North America, Inc. (Toyota)
Union of Concerned Scientists (UCS)
Volvo Car Corporation

Commenter: Advanced Engine Systems Institute (AESI)

Off-Cycle Technologies. EPA has proposed to increase the off-cycle credit cap from 10 g/mile to 15 g/mile. Off-cycle technologies are EPA evaluated technologies which are found to represent real-world CO2 reductions for vehicles under real world operation. Therefore, they should be further recognized to drive down CO2 emissions by all technological means. A pathway should be expanded to allow vehicle manufacturers as well as technology suppliers to document CO2 reduction performance and obtain off-cycle technology menu listings and credit values. These additional technologies are likely to be increasingly needed between 2023 and 2035 to achieve CO2 reduction goals. AESI fully supports the retention of off-cycle technology credits and the increase in the effective cap from 10 g/mile to 15 g/mile. Unlike credit multipliers, which do not represent additional technology deployment, off-cycle credits are awarded only when a technology's real-world benefits are validated and the technology is deployed. AESI strongly urges EPA to implement a pathway for technology suppliers to apply for conditional off-cycle technology credits that are verified in the real world. This supplier program could be modeled on that included in the California framework with 5 OEMs. [EPA-HQ-OAR-2021-0208-0267-A1, p. 3]

Commenter: Alliance For Automotive Innovation

Off-Cycle Technology Credits. The off-cycle technology program provides credit for the on-road benefits of GHG technologies that are not observed in standard compliance tests. EPA has taken great care to ensure that credits granted under the program are reflective of on-road emissions reductions. In the case of the pre-defined "menu" of off-cycle technologies,64 EPA chose conservative credit values and capped the amount of credit that can be claimed regardless of the absolute number of menu technologies incorporated in a manufacturer's fleet. In the case of credits made under an alternative method,65 credits have only been granted after a lengthy review process. We concur with EPA's assessment that off-cycle credits do not result in deterioration of program benefits.66

In response to the off-cycle credit program, manufacturers and suppliers continue to develop innovative technologies that reduce on-road GHG emissions. Auto Innovators supports the continuation of the off-cycle credit program in general, revisions to reflect new technology innovations, and other modifications to allow the program to work more efficiently.

Auto Innovators supports raising the credit cap for on the off-cycle technology menu, effective MY 2020. Auto Innovators supports raising the credit cap for the off-cycle technology menu. The current 10 g/mile cap was originally promulgated in the 2012 Rule and has become constraining to technology additions, particularly with the addition of new technologies. In the Safer Affordable Fuel-Efficient ("SAFE") Vehicles Rule ("SAFE Rule"), EPA added high efficiency alternator technology but did not raise the menu credit cap.67 Adding additional technology without increasing the credit cap fails to recognize that additional benefits beyond the original conservative cap may be realized with added technologies.

The addition of high-efficiency alternators to the credit menu without increasing the cap is particularly problematic for manufacturers who have already been granted credit for them outside of the cap using the alternative method process. EPA discusses not allowing manufacturers to generate credit for on-menu technologies through the alternative process unless additional benefits through other innovations can be demonstrated.68 If EPA takes this approach, the original credit cap becomes even more constraining.

We recommend that the cap be raised to 15 g/mile, effective MY 2020, aligning with the timeline in the California Framework Agreements.69

An increased off-cycle menu cap should not be tied to modified technology definitions. EPA is proposing to tie the proposed increase in the off-cycle menu cap to modified definitions for certain technologies.70 We believe that these issues should be considered separately. The cap should be raised regardless of the decision whether to modify technology definitions or not and, if modified technology definitions are adopted, regardless of when a manufacturer applies the modified definitions. As described in our support for raising the cap in general, additional technology has been added to the menu, but the cap was not modified to reflect this addition. In the balance, it is unnecessary to tie an increase in the predefined technology credit cap to proposed modifications to certain technology definitions.

Auto Innovators supports timely additions of technology to the menu, but the cap must be increased as technologies are added. Auto Innovators fully supports adding technologies to the predefined menu of off-cycle credits, but only if commensurate changes to the credit cap are made. Some technologies have found broad adoption across the industry following approvals under alternative methods. It makes sense to include these technologies in the menu. However, the credit cap should be raised commensurate with the potential benefits of the technologies under such a cap lest manufacturers forego technologies because they would not receive credit. As EPA notes, adding technology to the predefined list reduces the burden on manufacturers and EPA to evaluate off-cycle technologies through either the five-cycle or alternative methods, but potentially exacerbates the credit cap issue for some manufacturers.71

The lead-time for the adoption of new technology definitions for passive cabin ventilation, active transmission warm-up and active engine warm-up is insufficient; changes should take effect in MY 2027 or later. EPA proposes to modify certain technology definitions effective MY 2023 (or sooner if a manufacturer wishes to receive a higher credit cap for predefined off-cycle technologies).72 Model year 2023 vehicles can be built as soon as January 2022, leaving manufacturers only three to at most nine months to design, validate, and certify vehicles with systems that meet the new definitions. This lead-time is simply insufficient to make the necessary level of changes. In MY 2019, the fleetwide average use of active engine warmup, active transmission warmup, and passive cabin ventilation technologies resulted in a credit of approximately 3.6 g/mile.73 Modifying definitions without sufficient lead-time would likely result in an immediate loss of most, if not all of this credit, further escalating the challenge of managing the large increase in standard stringency proposed for MY 2023.

The new definitions will require innovative solutions and significant changes to vehicle design to meet them. EPA should consider comments made on modified definitions, but it would be more appropriate to forego making any changes until a subsequent rule with a more typical amount of lead-time than that minimally provided under this rulemaking.

If EPA adopts new definitions for passive cabin ventilation, active engine warm-up, and/or active transmission warm-up technologies, EPA should also continue to recognize existing designs. EPA justifies its proposal to modify technology definitions on the basis that current system designs are not meeting EPA's original expectations.74 However, current system designs are providing off-cycle emissions benefits. Given the benefits of such systems, EPA should continue to provide credit for systems that meet existing definitions through the menu, in addition to newly defined systems. If EPA were to instead eliminate credit for existing systems entirely, especially with no lead-time, manufacturers may remove those existing technologies from their vehicles.

Thermal control off-cycle technologies should be combined with credits for improving the efficiency of air conditioning systems. EPA includes “thermal control technologies” as a set of predefined technologies subject to a separate per-vehicle cap.75 These thermal control technologies should ideally have been analyzed and administered in combination with the mobile air conditioning (“MAC”) efficiency technologies from the earliest stages of the light-duty greenhouse gas regulation since they both address energy usage to power the air conditioning system.

We recommend that EPA move these technologies to the section on improving the efficiency of air conditioning systems (40 C.F.R. § 86.1868-12) and to combine and increase the caps on thermal control and air conditioning efficiency technologies as described below in comments on air conditioning efficiency technology credits.

Timely review, publication, and approval of alternative method off-cycle credit applications is needed. Time is of the essence when a manufacturer submits an off-cycle credit application for review. Lengthy delays in processing applications and in reviews subsequent to the public notice and comment process introduce uncertainty into compliance planning and reporting for manufacturers. Delays also affect timely determinations of compliance and valuation of credit trades and transfers. They also discourage further investments in off-cycle technologies due to the uncertainty of when (or if) credit will ever be granted.

EPA is required to review an application for completeness and to notify the submitting manufacturer if additional information is required within 30 days.78 Subsequent to determining an application is complete, EPA is required to make the application available to the public for comment within 60 days.79 These two processes should collectively take a maximum of 90 days. Thus far in 2021, the three applications that reached publication in the Federal Register took 111,80 290,81 and 34282 days. Other applications are still pending review or publication for public comment.83 We urge EPA to follow its regulations by providing an initial response on the completeness of credit applications within 30 days and to make complete applications available for public comment within 60 days.

Once the public comment period closes, the EPA decision process is also frequently lengthy. For example, EPA published off-cycle credit applications for public comment from Toyota in April 202084 and in October 2020,85 from Nissan in February 2021,86 and from Stellantis in April 2021.87 As of September 2021, all are still pending a decision. We recommend that EPA establish a reasonable deadline (e.g., a maximum of 60 days following the close of the public comment period and any manufacturer rebuttal of public comments) to make a decision on alternative method credit applications. [EPA-HQ-OAR-2021-0208-0571-A1, p. 21-26]

Commenter: Alliance for Vehicle Efficiency (AVE)

AVE supports EPA's proposal to increase of the off-cycle credits menu cap from 10 g/mile to 15 g/mile. [EPA-HQ-OAR-2021-0208-0256-A1, p. 2]

Expanding Off-Cycle Credits Menu from 10% to 15%. AVE supports EPA's proposal to increase of the off-cycle credits menu cap from 10 g/mile to 15 g/mile4 and the eventual phase-out of these credits.

EPA's off-cycle credit program incentivizes investments into technologies that provide real-world emission reductions, but that are not otherwise captured in the agency's two-cycle test. For decades, EPA has recognized that the two-cycle test is inadequate. Without off-cycle credits, OEM compliance with GHG emission standards could be jeopardized. Expanding the credits menu cap sends a strong message to industry that investments in new advanced technologies are needed for future compliance.

Although AVE recognizes the need to incentivize consumer acceptance in the short term, credits distort the marketplace and AVE supports efforts to move away from incentives such as these. [EPA-HQ-OAR-2021-0208-0256-A1, p. 3]

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

EPA proposes to increase the credit cap for uses of off-cycle menu credits from 10 g/mi to 15 g/mi. They justify this increase with, among other reasons, proposed definition changes to two menu credit technologies to emphasize that certain implementations that have previously been awarded menu credits will no longer be considered eligible (EPA 2021b). EPA claims the current definitions are too vague and allow for underperforming technologies to earn full menu credits. We support EPA in this decision. EPA should continue to scrutinize menu credits to ensure that definitions only allow for technologies that have been researched and tested and not others that may be superficially similar.

That said, EPA has also proposed that the 5 g/mi increase in credit cap be applied retroactively to MY 2020-2022 vehicles, if all claimed credits fall under the new technology definitions. This proposal fails to account for the fact that these vehicles have already been designed, with the current rules in mind, and no new menu technologies are going to be added to such vehicles. This proposal would not lead to any reductions in actual emissions. Instead, it would effectively reduce the stringency of the proposed rule by giving automakers credits for decisions that they have already made and implemented. ACEEE opposes this retroactive increase in the credit cap. ACEEE estimates that if automakers were to take advantage of the entire 5 g/mi retroactive cap increase, emission savings from the proposed standards would be reduced by 19%.

The credit cap increase is also concerning as applied to future model years, as the off-cycle credit system already over awards credits. Any increase in the cap would exacerbate this element of the off-cycle program and further weaken the rule stringency. Research has shown that some technologies area awarded up to 100% more credits than appropriate, equaling up to 3 g/mi of credits per technology (Gonder et al. 2016; Kreutzer et al. 2017). Another concern is that technologies that qualify for menu credits have not been evaluated for redundancies or overlaps in benefits (Lutsey and Isenstadt 2018). A vehicle that has more than one of these technologies addressing the same inefficiencies may not achieve the sum of the benefits of the individual technologies. A vehicle that adopts both solar panels and ventilation improvements may see no additional improvement over solar panels alone, if the extra power from the solar panels was already sufficient to cover and used for the ventilation system. However, because the credits in the off-cycle program are simply additive, this could lead to the awarding of up to 2 g/mi1 in additional credits that do not correspond to reductions in actual emissions. EPA should not increase the cap on menu credits until after it has reviewed the literature on the effects of the current menu credits and has tested these technologies for synergistic effects and ensured that any overlaps are sufficiently accounted for. ACEEE estimates that, if only half of the additional off-cycle credits, or 2.5 g/mi per year, for model years 2023-2026 led to real emissions reductions, the proposed rule's emissions savings would be reduced by 14%. [EPA-HQ-OAR-2021-0208-0251-A1, 3-4]

The NPRM does not propose any changes in the off-cycle credit program in anticipation of emerging technologies. These emerging technologies including automated vehicle (AV) technologies, have the potential to substantially affect vehicle emissions but are not detectable under current emissions testing protocols. The current off-cycle credit program is unable to adequately account for the changes in emissions that this technology causes. The growth of the AV market has been rapid. In 2021 Level 1 automated vehicles reached a market share of 26% of all new vehicles, while Level 2 AVs grew from just 2%, in 2018, of the market to over 10%, in 2019 (Xie et al. 2020; NAS 2021; Low et al. 2019). The effect of these technologies is both highly uncertain and dependent on design decisions that are being made now. These design decisions are directly influenced by emission regulations and the current off-cycle program provides no incentive for automakers to design their AVs for fuel efficiency. Mersky 2021 has shown that near term AV technologies could increase fuel economy by up to 46% but could also decrease it by up to 14%, depending on automaker design decisions. ACEEE suggests that EPA investigate the how the off-cycle program can account for AV emission changes and to encourage efficient AV design. [EPA-HQ-OAR-2021-0208-0251-A1, p. 4]

ACEEE recommends that EPA:

• Keep the total off-cycle menu credit cap at the current 10 grams/mile and ensure that no retroactive changes in the credit cap are built into the final rule [EPA-HQ-OAR-2021-0208-0251-A1, p. 14]

• Clarify what a 'significant' reduction in emissions is in order to determine eligibility for off-cycle menu technologies for other credit pathways. ACEEE proposes a definition of at least 1g/mi greater than those currently assigned by the menu. Additionally, EPA should ensure that menu technologies that are granted credits through another pathway still count towards the menu cap.

• Begin considering how the GHG standards encourage efficient AV design by accounting of the emissions impacts of automated vehicles [EPA-HQ-OAR-2021-0208-0251-A1, p. 15]

Add new or clarify proposed provisions

ACEEE recommends the following clarification and additions that do not strictly change rule stringency. EPA should:

• Place a firm time limit on automaker applications to the non-menu off-cycle credit program, in line with the National Highway Transportation Safety Administration (NHTSA) proposal. This program has long been plagued by automaker applications for technologies implemented on old vehicle models. These retroactive requests have no bearing on OEM technology decisions and also cost a significant amount of time to process. Lastly, they make setting future standards difficult, as actual contemporary compliance is not set in stone. Requiring automakers to submit their requests for off-cycle credits in a timely manner would improve the effectiveness of the off-cycle program. [EPA-HQ-OAR-2021-0208-0251-A1, p. 15]

1 A solar system that charges batteries and provides power to active ventilation provides 0.8 g/mi credits less than battery charging alone, to attempt to account for this, but this change is non-variable. The ventilation credits are still worth up to 2.8 g/mi, which would be unearned if the solar system was sufficient to cover all ventilation and climate control needs.

Commenter: American Honda Motor Company (Honda)

Off-Cycle Technology Credits. Despite challenges to its implementation, Honda remains supportive of the off-cycle technology program for the real emissions reductions these technologies deliver. The off-cycle program provides a regulatory rationale for applying GHG reduction measures to new and/or existing technologies and systems that might not otherwise occur, given that the benefits are (by definition) not captured through standard test procedures. [EPA-HQ-OAR-2021-0208-0565-A1, p.12]

Uncertainty associated with agency approvals, as well as the magnitudes of compliance benefit, remain core impediments to the pursuit of these technologies. As such, Honda supports efforts to streamline the program, and to provide greater clarity and certainty to manufacturers regarding the menu credit value when pursuing credits for new technologies. An expanded credit menu could, for example, reduce the amount of time necessary for agency review of multiple applications that largely mirror one another, as well as provide greater certainty regarding technology credit values.

Honda supports periodic updating of the off-cycle menu, as technologies become better understood and as vehicle electrification becomes a more prominent portion of the new vehicle fleet. Changes should be data driven, include opportunity for stakeholder input, and provide sufficient lead time to ensure continuity of compliance plans. The agencies may also wish to consider creating a multiagency/ OEM/supplier consortium for off-cycle technology sensing. Such an effort could provide regulators insight into potential future technologies, helping facilitate important technical conversations among stakeholders well before any consideration of technology application. [EPA-HQ-OAR-2021-0208-0565-A1, p. 13]

Commenter: BorgWarner Inc.

Off-cycle Credits and Credit Caps. We support the continuation and expansion of credits for technologies that provide verifiable real-world improvements in fuel economy. The 10 g/mile off-cycle credit cap should be removed to allow and promote the true potential of these technologies to achieve the new standards. We do not see the value of a cap that excludes technologies that are shown to provide additional real-world fuel economy benefits. Credit programs should be continued and expanded to provide important flexibilities and broader pathways for greater innovation and lower compliance costs. [EPA-HQ-OAR-2021-0208-0260-A1, p. 3]

Commenter: Center for Biological Diversity, Earthjustice, and Sierra Club

Third, if it proceeds with its current proposal, EPA should end, reduce, or significantly reform the off-cycle credit program. Off-cycle credits reward manufacturers for adopting technologies that reduce GHG emissions that are not otherwise captured by the standard two-cycle testing system. In this rulemaking, EPA proposes to retain the program and to increase the cap for 'menu' technologies with pre-set credit values that manufacturers can adopt.48

Yet EPA itself has expressed considerable doubts about the off-cycle program, namely, whether it actually delivers the real-world emissions reductions it promises.49 These uncertainties arise both from a number of individual factors, and from their combination: the lack of data submission; the lack of testing; and the practice of 'one-size-fits-all installation' by which automakers who install the same technology not just on the specific vehicle type and model they tested, but also on many or all of the other cars and trucks in their fleets, without submitting any test data on the level of emissions reductions, if any, they generate on these different and diverse vehicles.50 Furthermore, there are enormous logistical and administrative concerns that hinder the agency's ability to manage these credits and inform the public about the state of the program. For example, manufacturers routinely miss deadlines and submit applications late, which, according to NHTSA, has caused 'significant challenges in finalizing end-of-the year compliance processes for the agencies….These late reports amount to more than just a mere accounting nuisance for the agencies; they are actively chilling the credit market.' 51 In short, the off-cycle credit program has delayed agencies' calculation of, and public formation about manufacturer compliance results since MY 2017, the last year for which NHTSA has issued compliance results. In addition to hindering the agencies, these delays make it difficult for the public to accurately inspect overall manufacturer compliance, which is critical to providing feedback for future rulemakings.

For these reasons, if EPA proceeds with its current proposal, off-cycle credits should, at a minimum, be limited and reformed so real-world results are assured and verified, as stated in the Joint Comments. If the agency adopts Alternative 2 plus, off-cycle credits should still not be expanded, and their cap maintained. [EPA-HQ-OAR-2021-0208-0270-A1, pp.8-9]

Commenter: Center for Biological Diversity, et al.

EPA should not increase the cap for off-cycle credits and should instead reduce and reform the off-cycle program. Off-cycle credits find their genesis in the proposition that some technologies can produce real-world greenhouse gas emissions reductions even though those reductions are not captured or measured for compliance by the so-called two-cycle testing system. Although any real-world reductions could be measured for the vast majority of these technologies by employing a five-cycle test (which, for example, captures results at high vehicle speeds, acceleration or cold temperatures), that test procedure is more expensive and time-intensive. Either way, testing is done by manufacturers, and EPA itself does no testing when reviewing and approving off-cycle credit applications. Proposal, 86 Fed. Reg. at 43,762.

Manufacturers currently use three ways to obtain off-cycle credits. (1) They install technology on or fitting within a category list, or "menu", of technologies and receive pre-set credit values, with minimal or no data submittal or testing requirements. EPA approves the application if the technology meets regulatory definitions. Id. (2) Manufacturers test the technology and its emission reductions using the five-cycle testing procedure and submit the results for approval. (3) If five-cycle testing is inadequate to show whether emissions are being reduced, manufacturers use a notice and comment process to obtain EPA approval based on other demonstration methods they have chosen.

EPA now proposes not only to retain the program, but to increase the cap for the first pathway for credit approval (it proposes no cap for credits approved under the latter two pathways). Id. However, the agency itself expresses considerable reservations about the program. Specifically, EPA previously capped menu credits to 10 g/mile per model year, and then declined to increase the cap, citing inherent uncertainty about whether new technologies manufacturers claim fall within the menu categories actually deliver the real-world results for which they receive credit. As EPA explains, these uncertainties arise both from a number of individual factors, and from their combination: the lack of data submission; the lack of testing; and the practice of "one-size-fits-all installation" by which carmakers install the same technology not just on the specific vehicle type and model they tested, but also on many or all of the other cars and trucks in their fleets, without submitting any test data on the level of emissions reductions, if any, they generate on these different and diverse vehicles.155 EPA does not mention yet another uncertainty: automakers sum the fixed credit amounts allocated to each new menu credit they receive together with already existing menu credits, without any verification that those technologies, installed in the same vehicles, are in fact additive, in the summed amount or any other, under real-world conditions.

NHTSA's recent proposed rulemaking describes serious and fundamental additional concerns. In its September 2021 proposed rulemaking for MY 2024-2026 fuel efficiency standards, NHTSA explains that since 2017 the off-cycle application process has caused "significant challenges in finalizing end-of-the year compliance processes for the agencies." Corporate Average Fuel Economy Standards for Model Years 2024-2026 Passenger Cars and Light Trucks, 86 Fed. Reg. 49,602, 49,836 (Sept. 3, 2021) (NHTSA 2021 NPRM). In particular, NHTSA explains that some manufacturers do not seek early reviews to determine technology eligibility, a review process NHTSA describes as of "critical importance," NHTSA 2021 NPRM, 86 Fed. Reg. at 49,835, even though automakers may begin their technical development and testing as much as six years before applying for credits. NHTSA reports that some manufacturers miss deadlines and submit applications late – or even retroactively, and explains that as a result, EPA “has had to identify and correct multiple testing and analytical errors after the fact.” Id. NHTSA describes the current situation as follows:

The backlog of retro-active and pending late off-cycle requests have delayed EPA from recalculating NHTSA’s MY 2017 finals and from completing those for MYs 2018 and 2019. Fifty-four off-cycle non-menu requests have been submitted to EPA to date. Nineteen of the requests were submitted late and another seven apply retroactively to previous model years starting as early as model year 2015. Since these requests represent potential credits or adjustments that will influence compliance figures, CAFE final results cannot be finalized until all offcycle requests have been disposed. . . . [¶] These late reports amount to more than just a mere accounting nuisance for the agencies; they are actively chilling the credit market.

NHTSA 2021 NPRM, 86 Fed. Reg. at 49,836. In short, the off-cycle credit program has prevented the agencies from being able to calculate, or inform the public about, manufacturer compliance results since MY 2017, the last year for which NHTSA has issued compliance results. The program is so bogged down that they impede vital functions.

Despite its own recitation of the interacting uncertainties concerning whether off-cycle credits properly reflect actual emissions reductions, and despite NHTSA’s account of a vast, time-consuming and expensive backlog impeding accurate compliance calculations, EPA now proposes to increase the menu credit cap to 15 g/mile, beginning (retroactively) as early as MY 2020. Proposal, 86 Fed. Reg. at 43,762. EPA previously declined to increase the 10 g/mile cap “because of the uncertainty inherent in using limited data and modeling as the basis of a single credit value for either cars or trucks,” id.; remaining headroom below the cap; and the time and cost involved to determine whether manufacturer applications meet regulatory definitions. In support of the Proposal to increase the cap another 10 g/mile, EPA states that the 2020 Final Rule added even more menu credits and that the program has been growing. It also observes that menu technology is often more cost-effective than other available technology; that the menu process reduces costs to EPA and manufacturers; that some companies were at or approaching the cap in MY 2019; and that it proposes to “tighten” regulatory definitions describing technology eligible for menu credits. Id. at 43,762-63. EPA further proposes to limit the “tightened” regulatory definitions to retroactive credit requests between 10 g/mile and 15 g/mile for MY 2020-2022, reasoning that otherwise the “transition” for those model years might affect credits already awarded. The new definitions would, however, apply to all credit requests for MY 2023 and later.

EPA should reject the proposed cap increase and should further restructure off-cycle credits as soon as possible to provide more comprehensive data and necessary guardrails to avoid the problems described above. NHTSA’s description of the current state of the application process demonstrates it is not performing as intended, despite efforts since the 2020 Final Rule to improve it. NHTSA 2021 NRPM, 86 Fed. Reg. at 49,836. Disregarding pleas from the agencies for more and early information, manufacturers are not keeping them apprised of the technologies for which they plan to request credit. They routinely fail to heed the application process’ various deadlines, submitting applications late – and even retroactively. Id. The number of unresolved credit applications, their timing, uncertainty about whether technology fits within a menu category, and the existing backlog has impeded vital functions at least at NHTSA – the accurate measurement of standard compliance levels and the timely conveyance of this information to the public. Indeed, as of August 2021, NHTSA still had not made public manufacturers' performance for MY 2017 – and for none of the model years thereafter.

At a minimum, EPA should not add to the problem by expanding the menu program cap – particularly since the process is already overwhelming the agencies, even though many manufacturers have not yet reached the existing cap. EPA should not expand a program that EPA and NHTSA both acknowledge is rife with substantive and procedural problems. The time and money spent, which is already extraordinary and deeply disruptive, would only increase, as would the uncertainty about actual results. And yet, EPA would still not be in possession of comprehensive testing data across the fleet.

Commenters urge EPA in any event not to finalize any additional MY 2020-2021 menu credits. They would be granted retroactively, as MY 2020 is complete and MY 2021 will be complete by the time the Proposal is finalized. These credits would add to the existing backlog and their analysis and approval would continue to impede a final accounting of manufacturers' emissions reductions. EPA itself cites the retroactivity of this Proposal when discussing why it does not intend to apply tighter regulatory definitions to menu items already granted. But, as discussed above, manufacturers do not base their product plans on credits they do not possess (or plan to purchase), and retroactive application therefore does not create real-world emissions reductions. Moreover, even assuming the new definitions will be effective in providing certainty that the claimed emissions reductions are real, applying them only to some but not all retroactive credits (those between 10 and 15 g/mile) would add even more complexity, confusion, time and agency expense to the process.

In addition to rejecting the proposed cap increase, we strongly urge EPA to codify provisions that prohibit, without exception, the submission of any application that has missed any of the applicable deadlines, a change clearly needed to avoid otherwise inevitable additional processing time, expense and delay in determining and reporting compliance results. As NHTSA has explained, manufacturers plan for off-cycle submissions years before the submission deadlines, and there is no reason to introduce additional delay, expense, and uncertainty about compliance and the status of approved credits. EPA should also require the submission of much more comprehensive testing results to assure accuracy, particularly for menu credit applications to vehicles in which the technology has not been tested, and in instances requesting automatic, and untested, "summing" of menu credits. To be viable, the program must be able to demonstrate that the credits it awards actually reduce greenhouse gases in the real world, and not only on paper. [EPA-HQ-OAR-2021-0208-0651-A1, p. 66-69]

155 Off-cycle technologies receive a one-size-fits-all credit amount even though their application in any particular vehicle may result in wholly different emissions reductions. For example, credits are fixed for active or passive cabin ventilation and active engine or transmission warm-ups, regardless of the characteristics of the vehicle.

Commenter: Center for Climate and Energy Solutions (C2ES)

Off-Cycle Menu Credits. C2ES supports the proposed off-cycle menu credits and the proposed 15 g/mile cap and believes the increased cap should begin in MY 2023 when the new standards would be implemented, in order to reflect the significant increase in stringency of the MY 2023 emissions standards over the MY 2022 standards. The off-cycle menu credits in the proposal support development of technologies to reduce emissions that may not be measured in the regular two-cycle emissions testing process, such as high-efficiency alternators, waste heat recovery, solar roof panels, and others. The flexibility to generate credits through these technology improvements provides an additional incentive for automakers to increase the efficiency of their vehicles. [EPA-HQ-OAR-2021-0208-0287-A1, p.7]

Commenter: Consumer Reports (CR)

CR also questions the expansion of the off-cycle credit cap without putting into place stronger requirements to ensure that these technologies actually deliver real world benefits. Without sufficient verification of emissions savings, these credits have the potential to be a massive giveaway to automakers for technologies that don't deliver real world benefits. [EPA-HQ-OAR-2021-0208-0602-A1, p.5]

Off-Cycle Credits. Consumer Reports generally disagrees with EPA's plan to expand the off-cycle credit limit by 5 g/mi. While other commenters will go into more detail on this program, CR's high level concern is with the lack of sufficient verification of real world emissions savings delivered by these technologies. We disagree with further expansion of this program without simultaneously increasing the requirements to verify real world emissions savings. [EPA-HQ-OAR-2021-0208-0602-A1, p.12]

As a separate point, Consumer Reports questions the idea of awarding off-cycle credits to battery electric vehicles. These vehicles emit zero tailpipe emissions, so no technology applied to these vehicles can further reduce real-world tailpipe emissions. As electric vehicles become a larger and larger portion of the fleet, the off-credit program may inadvertently hand out a significant number of "free" credits to electric vehicles that provide no real world emissions benefits. [EPA-HQ-OAR-2021-0208-0602-A1, p.13]

Commenter: DENSO International America, Inc. (DENSO)

Off-Cycle Technology Credits. We support the continuation and expansion of the program, and strongly encourage both EPA and NHTSA to also recognize the important contribution the off-cycle program makes to the overall goals of the regulations. DENSO, along with others in the supplier community working independently and in collaboration with OEMs, develop and engineer innovative technologies that contribute to vehicle manufacturers' strategies for real-world GHG and fuel consumption reductions often beyond those measured with standard test procedures. The off-cycle credit program helps support industry investment in innovative and forward-looking technologies that provide environmental benefits. These technologies offer measurable, demonstrable, and verifiable real-world benefits that improve efficiencies and reduce GHG emissions. They also provide an important cost-effective option for OEMs to achieve fuel economy and GHG targets. Therefore, DENSO has a vested interest in making sure innovative technologies are easily deployed and utilized by OEMS to ensure these benefits are realized.

Off-Cycle Credit Application Process. DENSO would also like to take this opportunity to recommend EPA streamline and standardize its process for evaluating applications for off-cycle credit. Timely processing of applications by EPA can encourage manufacturers to invest in new off-cycle technologies that do not offer a significant 2-cycle benefit. When processing of applications is delayed, it provides a disincentive to both the manufacturers and the suppliers to expand research, development, and eventual vehicle applications of technologies providing CO2 and fuel consumption reductions. The delay can also limit the positive benefits these technologies bring to society and the environment.

We appreciate EPA's commitment to the integrity of the off-cycle technology credit program, and we also encourage EPA to continue to examine options for improving the off-cycle application process so that it can continue to be a viable option for vehicle manufacturers. DENSO strongly supports changes to the off-cycle process that would streamline the program, which are proposed by the agencies in the NPRM. These improvements could include, but are not limited to:

- Revising the regulations to allow EPA to add technologies to the preapproved credit menu without going through a subsequent rulemaking;

- Revising the regulations to define a time period for which application will be finalized; and

- Creating a pathway for provisional off-cycle credits through a supplier application process.

DENSO also requests EPA consider new evaluation methods for off-cycle (and A/C efficiency) technologies. For example, EPA could consider approving credit evaluation methods that not only require implementing physical tests, but also methods such as calculation/simulation. We would welcome the opportunity to have a deeper discussion on this matter with EPA in the future and discuss DENSO ideas and calculation methods.

Revisions like these can lead to a reduction in redundancy of applications and subsequent approval processes for both manufacturers and the agency. There is wide support for having a more efficient offcycle technology program to allow for more certainty and faster deployment of emissions-reducing technologies that cannot be measured on-cycle.

Supplier Process for Off-Cycle Credits. A supplier process, allowing a menu of provisional credits, could also contribute to the streamlining of the process. As a member of the Motor & Equipment Manufacturers Association (MEMA), we have spoken with EPA regarding a proposed Supplier Process for Off-Cycle Credits that could provide one pathway to streamlining the process for all parties. We have appreciated the conversations with EPA on this topic and look forward to continuing dialogue. There is a considerable upside to establishing a supplier application process enabling innovative technologies to enter the market faster and with greater penetration. An independent supplier process would lower investment risks for both OEMs and suppliers and decrease the workload for EPA and OEMs.

Support Increasing Off-Cycle Credit Caps. We appreciate the proposal's request for information regarding increasing the credit caps. DENSO supports the increase to the credit cap. There are often situations where a technology provides additive and incremental improvements to the GHG performance of a vehicle outside of the two-cycle test. We have supported comments from MEMA in the past that have asked the agency to consider eliminating the cap on the accrual of off-cycle credits for MYs 22-25. Available data on OEM off-cycle technology credit utilization within the past few years demonstrates that the use of off-cycle technologies is expected to grow—particularly technologies on the credit menus.

Solar/Thermal Control Cap. As mentioned, DENSO supports the increase in the off-cycle credit cap; however, we request EPA to consider eliminating the solar/thermal credit cap (3.0 g/mi for cars, and 4.3 g/mi for trucks). Solar/thermal technologies (e.g., glass or glazing, active seat ventilation, passive cabin ventilation, etc.) are used for different purposes, which are activated in various situations, and therefore do not overlap.

For example, passive cabin ventilation and active seat ventilation are designed to prevent cabin temperature increasing when the vehicle is parked, while S-Flow reduces the cabin thermal load on the air conditioning system and improves the fuel economy when the vehicle is in operation. Therefore, we think these technologies should not be considered in the same group, and we recommend eliminating the solar/thermal control technologies' credit cap.

Credit applications for the S-Flow technology have been applied to the solar/thermal control credit cap, even if the approval path was the off-cycle credit alternative method. Furthermore, when the agencies determined the thermal control/solar cap, the credit amount for S-Flow, which is not included in the list, was not considered in the first place. Inclusion of such technologies towards solar/thermal control cap leads to an artificial expansion of the thermal control/solar menu, which when combined with the limitation of the cap, may inhibit the adoption of efficiency items by car manufactures.

We ask EPA to consider a credit cap increase to reflect newly adopted technologies –for example, allowing the proposed addition of 5g/mile credit to be used for any item without considering solar/thermal control cap. EPA mentions in the NPRM that off-cycle predefined menu cap is proposed to be increased due to the recent technology inclusion and the limited headroom. The thermal /solar credit would face the same situation if the S-Flow technology continues to be subjected to a cap. We would welcome the opportunity to further discuss this issue together if necessary. [EPA-HQ-OAR-2021-0208-0282-A1, p. 3-5]

Commenter: Ford Motor Company

Off-Cycle Menu Credit Cap. Ford commends EPA's continued support for the off-cycle credit program. This program serves a critical role by incentivizing technologies that provide real CO2 reductions and improved fuel economy for consumers. The ability to earn regulatory credit for CO2 reductions not captured during laboratory testing enables adoption of many technologies that would otherwise not be cost-effective.

Ford also supports raising the credit cap for off-cycle menu technologies to 15 g/mi, including for past model years. Additionally, the Notice and Comment process is the appropriate mechanism for making major policy or technology definition clarifications to the off-cycle program. However, such clarifications should not be retroactively applied, or be required in order to qualify for the 15 g/mi cap for previous model years. It should also be noted that Ford has relied on these credits to comply with current and past regulatory structures, such as 'One National Program' and the California Framework Agreement.[EPA-HQ-OAR-2021-0208-0294-A1, p.4]

Passive Cabin Ventilation Credits. Ford understand EPA's rationale for revising the definition for Passive Cabin Ventilation. However, Ford has concerns with the requirement to have windows or a sunroof open automatically, since the customer must retain control over window and sunroof open/closed status in order to accommodate inclement weather, security concerns or other unanticipated conditions. Additionally, Ford requests this definition only be applied in '23 model year and beyond, not retroactively. [EPA-HQ-OAR-2021-0208-0294-A1, p.4]

Off-cycle Demonstration Credits for Alternative Fuel and Electrified Vehicles. Ford has submitted off-cycle demonstration credit applications for BEV and PHEV technologies that provide real electrical load savings. These savings translate to reduced energy consumption and improved vehicle range for BEVs and PHEVs. Ford is also considering additional technologies to be applied to future programs, assuming that such technologies will be eligible for credit consideration. Ford requests that EPA give consideration to the relative benefit provided by off-cycle demonstration technologies on BEVs and PHEVs, similar to the granting of menu credits for these types' vehicles. This action would support further technological innovation and energy savings. [EPA-HQ-OAR-2021-0208-0294-A1, p.5]

Active Engine and Transmission Warm-up Definition. Ford understands EPA's rationale for clarifying the definitions for Active Engine and Transmission Warmup technology credits. Ford is confident that our systems meet the intent of the proposed definition for Active Engine and Transmission Warm-up. However, to provide further clarity within the proposed definition, we suggest the following changes (edits shown via strikeout/ bold blue text):

Ford Proposed Definitions for Active Engine and Transmission Warm-up:

§86.1869-12 CO2 credits for off-cycle CO2 reducing technologies (b)(4)(vi)(B) Starting in model year 2023, and optionally for model years 2020–2022, active engine warm-up means a system that uses waste heat from the vehicle's exhaust to warm up targeted parts of the engine so that it reduces engine friction losses and enables **faster** closed-loop fuel control ~~more quickly~~. Active engine warm-up may also include coolant systems that capture heat from a liquid-cooled exhaust manifold~~. if the system is segregated from the coolant loop in the engine block~~.

§86.1869-12 CO_2 credits for off-cycle CO_2 reducing technologies (b)(4)(v)(B) Starting in model year 2023, and optionally for model years 2020-2022, active transmission warm-up means a system that uses waste heat from the vehicle's exhaust to warm the transmission fluid to an operating temperature range using a dedicated heat exchanger. Active transmission warm-up may also include coolant systems that capture heat from a liquid-cooled exhaust manifold~~. if the system is segregated from the coolant loop in the engine block~~. [EPA-HQ-OAR-2021-0208-0294-A1, p.5]

Commenter: General Motors LLC (GM)

General Motors believes regulatory incentives for real world off-cycle emissions reductions will continue to play an important role in reducing CO_2 emissions and increasing fuel economy. As such, GM supports EPA's proposal to raise the cap on off-cycle technologies. As discussed in previous comments by GM and industry, there are technologies and innovations that are important for EPA to acknowledge in its program to ensure continued progress toward meeting the agency's standards.4 [EPA-HQ-OAR-2021-0208-0234-A1] [p.6]

Commenter: Gentherm, Inc.

Real-World Benefits of Off-Cycle and A/C Credits. Studies by the National Renewable Energy Laboratory (NREL) and others have confirmed that off-cycle and A/C efficiency credit technologies provide real-world benefits that are not currently captured by two-cycle testing. The analysis is based on energy consumption for vehicles across the United States. We believe that off - cycle and A/C efficiency technologies are more cost effective than other currently available or proposed on-cycle technologies. It is important to note that these credits do not distort the market and do not artificially create financial benefits.

Latest EPA trends report (2020) shows a 74 gCO_2/mile national fleet difference between average light vehicle two-cycle emissions (282 gCO_2/mile) and adjusted real-world estimate (356 gCO_2/mile) for MY2019. Per the ITB Group analysis, if we assume that 9.5 percent (27 gCO_2/mile) of the average two-cycle emissions is attributed to exogenous variables like load, grade, wind, rain/snow, tire pressure, etc. that leaves on average 47g of real-world CO_2 emissions due to off-cycle (A/C, thermal, electrical, powertrain and other) variables. This gap is due to off-cycle effects resulting from variation in acceleration, thermal, aerodynamic, and electrical losses. Current and future off-cycle technologies, including autonomous and predictive driving, are expected to provide benefits not contemplated in the current 10 gCO_2/mile cap. Therefore, the current 10 g/mile fleet level cap is low and should be raised. Gentherm believes that the EPA proposal of a 15 g/mile off-cycle credit cap is reasonable today, but is conservative compared to the 47g real-world vs. 2- cycle gap and may need future adjustment as new technologies are developed. [EPA-HQ-OAR-2021-0208-0216-A1, p. 2]

Conditional support for changing Technology Menu Definitions. The EPA has proposed changing selected off-cycle menu technology definitions. In principle, Gentherm agrees that menu definitions should be supported by representative data. It is important that the off-cycle menu credits represent accurate estimates of real-world fuel consumption and GHG emissions benefits which cannot be measured in 2-cycle testing. The menu definitions should correspond to the technology(s) tested and emissions reductions associated with verifiable testing and modeling.

The difficulty is that if menu definition changes take effect in 2023, automakers are given little to no time to respond. Automakers have developed their compliance plans based on previous definitions. Furthermore, there is no time to start a complete reevaluation of existing technologies which currently meet the definitions, particularly engine and transmission warm-up technologies. In a worst-case scenario, automakers may even remove fuel savings technologies which no longer receive credits.

The EPA proposes changing the definitions of certain technologies which may have real world benefits. For example, passive cabin ventilation has been shown to provide value, but less than the current menu credit (refer to NREL Presentation 17TMSS-0056). Likewise, active engine and transmission warm-up need not use exhaust waste heat to be effective as the EPA concluded in 2012. Active warm-up can involve controlling coolant flow to change component cooling and warming timing. This may include not overcooling with zero coolant flow for rapid engine and transmission warm-up. Revised definitions for effective technologies must be based on evidence of their effectiveness, not prescriptive definitions of exhaust waste heat or secondary coolant loop configurations. In conjunction with the proposed definition changes, the EPA should consider the real-world benefit of the technologies being “stranded”, or no longer applicable, and should add new menu credit(s) at a level based on the verifiable real-world benefit of the developed and commercialized technologies. Technologies which have been developed and applied based on the original definitions should have a place on the menu commensurate with the verifiable real-world benefit the technology provides.

Gentherm is aware of a number of commercialized technology developments with real-world benefits that are not yet credited by the EPA and NHTSA. New technologies under development utilize otherwise wasted thermal energy, moderate vehicle acceleration, and allow longer engine-off periods in real-world driving, among other potential benefits.

The EPA should take action on outstanding applications of technologies with verifiable real-world benefit and accelerate their approval, or rejection, and possibly adding them to the off-cycle technology menu. The EPA should also take this opportunity to add new off-cycle menu technology definitions for items with multiple substantially similar off-cycle credit approvals. [EPA-HQ-OAR-2021-0208-0216-A1, p. 2-3]

Expand the Menu List to Add Active Climate Control Seats. Gentherm supports expanding the list of the off-cycle and A/C efficiency menu options, including adding active climate control seats. Our passenger comfort technologies have been independently proven and validated by NREL to reduce fuel consumption and vehicle CO_2 emissions. Our engineers working in the United States developed these technologies with the intention of reducing fuel consumption while improving in-vehicle comfort. For example, we invested approximately $500,000 with NREL to validate the emissions benefits of our technologies. After this validation was completed by NREL, General Motors made an additional investment to prepare a submission based on our research and was awarded off-cycle credits. In addition, Hyundai and Kia have received similar approvals from the EPA, and Stellantis (FCA) has a substantially similar pending request for approval of active climate control seats. An important factor to consider in determining if a menu credit is warranted is its commercialization status. Active Climate Control Seat technology is in production for a number of auto manufacturers and other manufacturers should receive the same credit benefits to level the playing field.

Gentherm also recommends extending off-cycle and A/C efficiency technologies to medium- and heavy-duty classes 2b and 3, which utilize such technologies. Expanding the current credit program encourages commercialization of innovative and cost-efficient technologies, while also providing consumers with more choices. [EPA-HQ-OAR-2021-0208-0216-A1, p. 3-4]

Support credit approval process streamlining. Gentherm is in agreement with NHTSA as outlined in its 2024-2026 NPRM (docket: NHTSA-2021-0053) that the Off-cycle credit approval process can be improved. NHTSA proposes setting deadlines for OEM submissions, and we suggest that there should also be deadlines for the agencies (EPA/NHTSA) to respond to off - cycle credit request submissions for the off-menu approval pathways. [EPA-HQ-OAR-2021-0208-0216-A1, p. 4]

Develop a Process for Adding Technologies to the Menu List. We encourage the agencies to create a process to add technologies to the credit menus. An off-cycle or A/C efficiency credit menu approval process would allow for technologies to be added to the menu list once sufficient data is available to the agencies. Although two technologies were added to the menu in the previous "SAFE" rule, more technologies could be added to the menu more rapidly.

We must encourage the development of new technologies, and we believe that the regulations should encourage new technology developments with sufficient data is available to create a menu credit. When technologies are added to the menu lists, industry compliance costs are decreased, and national fuel consumption and exhaust emissions are reduced. A difficult to change menu deters companies from innovating by making the approval more burdensome than if a credit approval menu process was available. We recommend that the agencies develop a process which allows automakers to apply for adding technologies to the menu lists and which should include public review of such submissions.

Gentherm is currently developing several energy conservation technologies. In the future emissions reductions from off-cycle technologies and A/C efficiency technologies could be credited when used on BEVs, PHEVs and FCEVs. Such a pathway will become highly relevant when EV emissions account for upstream CO2 emissions, not only the 0 grams/mile tailpipe emissions. Certain off-cycle and A/C efficiency technologies, particularly cabin heating technologies help reduce the amount of energy used to power a vehicle. Consequently, technologies that reduce EV energy consumption should be recognized when the 0 g/mi electric drive incentive is potentially eliminated after 2026. Gentherm recommends that a program be developed by the agencies to consider developing a set of EV and autonomous technology off-cycle menu credits in preparation for future rule making. [EPA-HQ-OAR-2021-0208-0216-A1, p. 4-5]

Establish an off-cycle credit adjustment process. Gentherm believes that the agencies should consider adjusting menu credit values either up or down if new vehicle or component testing becomes available. For example, an NREL study raises questions about the efficacy level of current technology used for active and passive cabin ventilation credits. Establishing a credit adjustment process would allow benefit levels or formulas to be adjusted when new studies are performed or when technology interaction effects are identified. [EPA-HQ-OAR-2021-0208-0216-A1, p. 5]

Increase Off-Cycle Thermal Control and A/C Efficiency Technology Credit Levels. The latest estimate of average national CO2 emissions attributed to light duty vehicle air conditioning, per NREL, is 20.8 gCO2/mile for cars and 26.0 gCO2/mile for trucks1 . If the agencies deem that a A/C load reduction cap is necessary, Gentherm supports an increase and combination of the off-cycle thermal control technology and A/C efficiency caps to 14.3 gCO2/mile for cars and 18.5 gCO2/mile for trucks. This cap increase is based on new NREL A/C load estimates and preserves the original cap rationale. These calculations were made by The ITB Group using NREL data and are included in their comment submission to this docket.

The latest NREL A/C load estimates should be used to increase credit levels of certain Off-Cycle Thermal Control and A/C efficiency technologies. For example, General Motors'2 credit approval for active climate control seat was based on a study by NREL that estimated a 17 percent reduction in A/C energy consumption on average across the United States. General Motors scaled their actively cooled seat credit submission to the A/C fuel usage estimates using recognized A/C energy consumption equivalent to 13.8 and 17.2 gCO2/mile for cars and trucks from the augural standards. If one uses the latest NREL A/C national load estimates of 20.8 and 26 gCO2/mile for cars and trucks, then active seat ventilation and active climate control seat credit benefit levels would increase by approximately 51 percent as shown below. [EPA-HQ-OAR-2021-0208-0216-A1, p. 5]

For ventilated seats we propose increasing the credit levels as shown in the table below and in the NREL benefit calculations3. [Table can be found on p. 6 of Docket number EPA-HQ-OAR-2021-0208-0216-A1]

It may be appropriate for other A/C efficiency or off-cycle thermal control technologies to be scaled-up following the same methodology using the latest NREL A/C load estimates, if their credit levels are a function of vehicle A/C fuel usage.

The agencies currently place a VIN specific cap on A/C efficiency technologies and a sub-cap on off-cycle thermal control technologies which affect A/C load. Gentherm recommends that they be converted to fleet level caps for more flexibility and ease of implementation. Improved flexibility across a fleet average would reduce discounting of real-world benefits. [EPA-HQ-OAR-2021-0208-0216-A1, p. 6]

Commenter: Hyundai America Technical Center, Inc. (Hyundai)

Off-Cycle Credits. Hyundai appreciates EPA's continued inclusion of off-cycle credits which incentivize the application of technologies that have been proven to reduce greenhouse gas emissions during real-world driving but not captured by the prescribed certification test cycles. Following are our comments on the specific changes to the program proposed by EPA.

1. 15 gpm menu cap. EPA has proposed raising the off-cycle credit cap from 10 to 15 gpm for pre-defined off-cycle technologies. The credit cap was originally added by the agency 'because of the uncertainty inherent in using limited data and modeling as the basis of a single credit value for either cars or trucks'9. EPA acknowledges that new technologies have been added to the menu list (e.g. high efficiency alternator) without raising the cap, and some manufacturers are nearing or are already generating credits beyond the current credit cap. To properly adjust for additional technologies, EPA suggests raising the cap.

As new technologies are added to the menu, the cap will be further strained. Therefore, Hyundai supports the agency's proposal to raise the cap as technologies are added to the menu. Additional credit headroom will encourage continued off-cycle GHG improvements which will be realized as real-world emissions reductions. [EPA-HQ-OAR-2021-0208-0603-A1, pp. 8-9]

2. Approval timing for the alternative method. Speedy reviews are critical to automakers to ensure that investments in technologies are implemented in a timely manner. Decisions should be made prior to vehicle launch. Hyundai is one of several auto manufactures who have long-pending applications, some from 2020.

Both auto manufacturers and the agency should be held to timing requirements. Automakers should submit off-cycle applications in a timely manner. Similarly, the EPA should make applications available for public comment within 90 days of the manufacturers' submission and then establish a reasonable timeline to issue a decision on the applications (perhaps 60 days after the public comment period closes). This would result in a maximum review period of 150 days which would be more timely than the approval length for some current applications.

Finally, long application review and approval timelines for technologies using the alternative process result in multiple submissions to update GHG and Corporate Average Fuel Economy reports which is inefficient. Reducing these review times should resolve the need for multiple submissions. [EPA-HQ-OAR-2021-0208-0603-A1, p. 9]

3. Definition changes. EPA's GHG NPRM proposes modifying technology definitions for active transmission and active engine warm-up effective in the 2023 MY which is just a month after EPA is expected to publish their new rule. The definition changes would go into effect retroactively for auto manufacturers opting in to the higher credit cap for the off-cycle menu. The EPA proposed definition change states that 'systems that capture heat from the coolant circulating in the engine block [will no longer] qualify for the Active Engine and Active Transmission warm-up menu credits.'10

Both of these technologies are used in Hyundai vehicles to reduce real-world emissions. Hyundai does not agree with the agency's proposal to restrict credits for manufacturers choosing the higher credit cap. The menu credit cap should not be tied to whether a technology meets the proposed new definition or not. Use of the higher 15 g/mi cap should be permitted without prejudice in order to encourage the inclusion of more fuel saving technologies. Hyundai will separately provide the agency with data that supports this request.

Additionally, while the agency allows manufacturers to choose the alternative method of providing data to prove emissions reductions higher than the menu values, there is insufficient lead time to meet product timing. If the agency decides to proceed with this definition change, Hyundai requests that it not be implemented until 2027 MY to provide automakers lead time to make necessary design changes to meet the new definitions. [EPA-HQ-OAR-2021-0208-0603-A1, pp. 9-10]

4. Technologies on the menu must use menu pathway. The EPA GHG NPRM 'proposes to clarify that manufacturers claiming credits for a menu technology must use the menu pathway rather than claim credits through the public process or 5-cycle testing pathways'11. However, as automakers improve upon existing technologies they have been able to show that the actual benefits exceed those granted under the menu option. Therefore, Hyundai requests that EPA allow manufacturers to pursue approval of menu items using the alternative (public) method when those automakers have data which proves the benefits of their technology exceeds the amount provided by the menu.

We also request, for transparency, that EPA clarify and preferably quantify the statement 'new technology that represents an advancement compared to the technology represented by menu credits – that is, by providing significantly more emissions reductions than the menu credit technology – would be eligible for the other two pathways'. If EPA quantifies the word 'significant' this would serve as a guide for manufacturers to the appropriate approval path. [EPA-HQ-OAR-2021-0208-0603-A1, p.10]

5. Hyundai proposal to combine thermal control technologies under a single cap. EPA currently provides an individual cap for thermal control technologies. However, since these technologies impact the energy usage that powers the air conditioning system, it is logical to move these technologies under the same cap as those that control air conditioner efficiency. The subsequent combined cap should be raised in order to accommodate both sets of technologies. This combined cap would also provide more flexibility to maximize use of the menu cap by application of air conditioning, thermal, and / or both technologies under the larger cap. [EPA-HQ-OAR-2021-0208-0603-A1, p.10]

Commenter: ITB Group, Ltd. (ITB)

Off-Cycle Technologies Provide Real-World Benefit but are Limited by Credit Caps. The basis for EPA GHG and NHTSA CAFE measurements are repeatable vehicle two-cycle testing. Such testing does not include several "off-cycle" driving variables like thermal effects, electrical efficiency, aerodynamics, and acceleration rates. These variables have a significant effect on real-world fuel consumption and GHG emissions. Off-cycle and A/C efficiency technologies provide important reductions in energy consumption which are not measured through two-cycle testing. Automotive suppliers, vehicle manufacturers, and third parties perform testing to quantify real-world off-cycle benefits. For example, the US Department of Energy's National Renewable Energy Laboratory (NREL) has developed models to calculate real-world impact for different vehicle designs which take into account real-world trip time, duration, and ambient temperature across the United States.

ITB supports increasing technology credit cap(s). If the caps are set at a restrictive level, as they are today, then it may be quite costly to demonstrate that they should be raised in the course of individual technology credit approval submissions. The ITB Group has made an estimate of the credit level possible for a holistic off-cycle and A/C efficiency cap. The latest EPA trends report (2020) shows a 74 gCO2/mile national fleet difference between average light vehicle two-cycle emissions (282 gCO2/mile) and adjusted real-world estimate (356 gCO2/mile) for MY2019. If we assume that 9.5% (27 gCO2/mile) of the average two-cycle emissions is attributed to exogenous variables like load, grade, wind, rain/snow, tire pressure, etc., that leaves on average 47g of real-world CO2 emissions due to off-cycle (A/C, thermal, electrical, powertrain and other) variables. This gap is due to off-cycle effects resulting from variation in acceleration, thermal, aerodynamic, and electrical losses. Current and future off-cycle technologies, including autonomous and predictive driving, are expected to provide benefits not contemplated in the current 10 gCO2/mile cap. Therefore, the current 10 g/mile fleet level cap is low and should be raised. The EPA proposal of a 15 g/mile off-cycle credit cap is reasonable today, but is conservative compared to the 47g real-world vs. 2-cycle gap and may need future adjustment as new technologies are developed.

It is important to encourage new technology development and to do so properly, the technology credit programs should anticipate such new credits. One way to encourage new developments is to set caps in anticipation that technologies will address additional sources of energy losses, like autonomous and predictive driving technologies. Preserving credits will incentivize further development of rapid warm-up, heat retention, passenger comfort, and automated driving technologies.

One concern of the agencies and some third parties is potential technology interaction effects. Rather than set restrictive caps due to this concern, ITB recommends incorporating technology interaction effects into approved credit levels. For example, Section 6.5 of the EU Eco-innovation guidelines require the assessment of potential interaction effects and incorporating this into the technology credit level formula to avoid double counting of benefits where technologies may address the same losses. We recommend flexibility in using vehicle, component, and simulation technologies to calculate technology credit levels, including interaction effects. An alternative ITB recommends is to set a holistic cap reflecting the potential that technologies have to improve real-world fuel consumption and emissions. [EPA-HQ-OAR-2021-0208-0222-A1, p. 2]

Conditional Support for Changing Technology Menu Definitions. The EPA has proposed changing selected off-cycle menu technology definitions. In principle, ITB agrees that menu definitions should be supported by representative data. It is important that the off-cycle menu credits represent accurate estimates of real-world fuel consumption and GHG emissions benefits which cannot be measured in 2-cycle testing. The menu definitions should correspond to the technology(s) tested and emissions reductions associated with verifiable testing and modeling.

The difficulty is that if menu definition changes take effect in 2023, automakers have little to no time to respond. Automakers have developed their compliance plans based on previous definitions. Furthermore, there is no time to start a complete reevaluation of existing technologies which currently meet the definitions, particularly engine and transmission warm-up technologies. In a worst-case scenario, automakers may even remove fuel savings technologies that no longer receive credits.

The EPA proposes changing the definitions which may result in commercialized technologies which may have real-world benefits no longer receiving off-cycle credits. For example, passive cabin ventilation has been shown to provide value, but less than the current menu credit (refer to NREL Presentation 17TMSS-0056). Likewise, active engine and transmission warm-up need not use exhaust waste heat to be effective as the EPA concluded in 2012. Active warm-up can involve controlling coolant flow to change component cooling and warming timing This may include not overcooling with zero coolant flow for rapid engine and transmission warm-up. Revised definitions for effective technologies must be based on evidence of their effectiveness, not prescriptive definitions of exhaust waste heat or secondary coolant loop configurations.

In conjunction with the proposed definition changes, the EPA should consider the real-world benefit of the technologies being “stranded”, or no longer applicable, and should add new menu credit(s) at a level based on the verifiable real-world benefit of the developed and commercialized technologies. Technologies that have been developed and applied based on the original definitions should have a place on the menu commensurate with the verifiable real-world benefit the technology provides.

ITB is aware of several commercialized technology developments with real-world benefits that are not yet credited by the EPA and NHTSA. New technologies under development utilize otherwise wasted thermal energy, moderate vehicle acceleration, and allow longer engine-off periods in real-world driving, among other potential benefits. The EPA should take action on outstanding applications of technologies with verifiable real-world benefits and accelerate their approval, or rejection, and possibly adding them to the off-cycle technology menu.

The EPA should also take this opportunity to add new off-cycle menu technology definitions for items with multiple substantially similar off-cycle credit approvals. For example, active climate control seats have been approved by the EPA for two manufacturers with pending approval for a third manufacturer. Another example is high-efficiency alternators which have been received off-cycle credit approvals. [EPA-HQ-OAR-2021-0208-0222-A1, p. 3-4]

Improvements to the Off-cycle and A/C Efficiency Credit Programs. The current off-cycle and A/C efficiency program has some limitations which form the basis for making improvements. In general, there are two types of opportunities. First, reducing compliance and approval costs will reduce unnecessary burdens without affecting program effectiveness. Second, streamlining the credit approval processes will make approval faster and timing more certain, therefore increasing the rate of development and implementation of cost-effective fuel-saving and emissions-reducing technologies. [EPA-HQ-OAR-2021-0208-0222-A1, p. 4]

ITB Supports Adding Technologies to the Off-cycle Credit Menus. The A/C and off-cycle menu programs are widely used due to the ease and certainty of applying for prevalidated technology credit levels. Menu credits must be based upon quantification of a technology's benefits which can be based on formulas to adjust the benefits for different vehicle applications depending on the relevant variables. Ultimately, menu credits and benefit formulas may be just as effective as multiple individual vehicle tests by manufacturers, but at a much lower cost. Numerous examples of existing technology credit approvals in both the United States and Europe demonstrate that formulas can be developed to consider the main effects of a technology and its potential interactions with other technologies. As technologies are developed and proven, and sufficient evidence is available, they should be added to credit menus.

EPA should consider adding technologies to the off-cycle menu that NHTSA has deemed fuel saving. The NHTSA NPRM lists electric power steering (EPS), improved accessory devices (IACC), and secondary axle disconnect (SAX). NHTSA points out that there is a large opportunity to incorporate IACC for GHG reduction benefits in future model years. As shown in the NHTSA table below, the fuel savings, and emissions reduction impact for these three technologies are high. [EPA-HQ-OAR-2021-0208-0222-A1, p. 4-5] [Table can be found on p. 5 of Docket number EPA-HQ-OAR-2021-0208-0222-A1]

Additionally, Certain technologies are approved for the European Eco-innovation program and have been extensively evaluated by suppliers, automakers and regulators with confirmation of the technology benefit by the EU Joint Research Commission (JRC). The approved Eco-innovation technologies include the following items, which could be added to the agencies' off-cycle technology menu list. We note that adjustments in the benefit level formulas may be necessary to reflect different vehicle size and driving patterns in the USA. There may be other proven eco-innovation technologies not listed below.

Approved European Eco-Innovations Which Could be Added to US Off-Cycle Menu

- Coasting (Porsche / BMW)
- Encapsulation (Daimler)
- Enthalpy Storage (Mahle Behr)
- Adaptive SOC (Bosch)

Another example of an off-cycle technology that should be added to the menu list is active climate control seats which are approved by the EPA for General Motors, Hyundai, and Kia. Stellantis (FCA) also has a substantially similar pending request for approval of active climate control seats. An important factor to consider in determining if a menu credit is warranted is its commercialization status. Active climate-controlled seat technology is in production for several auto manufacturers and other manufacturers should receive the same credit benefits to level the playing field.

ITB Supports Credit Approval Process Streamlining. The ITB Group agrees with NHTSA as outlined in its 2024-2026 NPRM (docket: NHTSA-2021-0053) that the Off-cycle credit approval process can be improved. NHTSA proposes setting deadlines for OEM submissions, and ITB suggests that there should also be deadlines for the agencies (EPA/NHTSA) to respond to off-cycle credit request submissions for the off-menu approval pathways. ITB also recommends the development of a formal process for adding technologies to the menus and adjusting menu credits when necessary.

Develop a process for adding technologies to the menu lists. ITB supports the creation of a more formalized process to add technologies to the off-cycle credit menu. An off-cycle or A/C credit menu approval process would allow items to be added to the menu when sufficient data is available. Although two technologies were added to the menu in the previous “SAFE” rule, more technologies could be added to the menu more rapidly. When technologies are added to the menu lists, industry compliance costs are decreased and national fuel consumption and exhaust emissions are reduced.

In the current state, where it is not easy to add technologies to the menu, new developments are handicapped and require significantly higher costs for initial and subsequent approvals. We believe the regulations should encourage new technology developments when sufficient data is available to create a menu credit. It should not be strictly necessary to have multiple lengthy OEM off-cycle credit approval cycles to add a menu credit. Therefore, the agencies should develop a process that allows automakers to apply for adding technologies to the menu lists and which should include public review of such submissions. Creating a process for obtaining menu credit approval will reinforce and create incentives for the development of new energy-saving technologies.

We are certain new autonomous and energy conservation technologies will be developed and existing technologies refined. In the future emissions reductions from off-cycle technologies and A/C efficiency technologies could be credited when used on BEVs, PHEVs, and FCEVs. Such a pathway will become highly relevant when EV emissions account for upstream CO2 emissions, not just the 0 grams/mile tailpipe emissions. Certain off-cycle and A/C efficiency, technologies, particularly cabin heating technologies help reduce the amount of electric energy used to power a vehicle. Consequently, technologies that reduce EV energy consumption should be recognized when the 0 g/mi electric drive incentive is potentially eliminated after 2026. ITB recommends that a program be developed by the agencies to consider developing a set of EV and autonomous technology off-cycle menu credits in preparation for future rule-making.

Establish an off-cycle menu credit adjustment process. Additionally, the agencies should consider adjusting menu credit values either up or down if new vehicle or component testing becomes available. For example, an NREL study2 raises questions about the efficacy level of current technology used for active and passive cabin ventilation credits. Establishing a credit adjustment process would allow benefit levels or formulas to be adjusted when new studies are performed or when technology interaction effects are identified. [EPA-HQ-OAR-2021-0208-0222-A1, p. 5-6]

Summary of Recommendations and Conclusions. ITB expresses strong support for continuous improvement in vehicle fuel efficiency and CO2 emissions. One way of reducing real-world fuel consumption and CO2 emissions are off-cycle technologies. Technology credit flexibilities give automakers credits for applying off-cycle efficiency measures. These technologies provide real-world benefits in an economical way, therefore allowing the automakers to reduce fuel consumption and emissions at the lowest cost. The bottom line is our support for maximum United States environmental protection and fuel security at the lowest industry cost. [EPA-HQ-OAR-2021-0208-0222-A1, p. 7]

Commenter: Jaguar Land Rover North America, LLC (JLRNA)

Off-Cycle Credits. JLR appreciates the EPA's recognition of the importance of off-cycle technologies and that increasing the off-cycle cap will lead to reduced GhG emissions. To increase innovation across all off-cycle technology areas the EPA should also increase the Thermal Controls cap by the same proportion (from 3.0 g/mi for Passenger Cars and 4.3 g/mi for Light Trucks to 4.5 g/mi for Passengers Cars and 6.5 g/mi for Light Trucks).

As previously stated, JLR was one of the biggest claimants of off-cycle technology credits in EPA's 2020MY final report. The adoption of these technologies is based on their reduction of real-world emissions and was a significant investment for a niche manufacturer such as JLR. The retroactive action of discounting of MY2021 and MY2022 credits, despite the relaxed stringency of the SAFE standards in those model years will only unnecessarily burden manufacturers who have already made engineering and supply-chain investments to maximize their use. JLR have been fitting and claiming for these technologies based on the definition provided by the government agencies and so any retroactive changes would be unfair.

JLR understands the EPA's proposal to change the requirements around Passive Cabin Ventilation and Active Transmission/Engine Warm up but would like to request that the menu is expanded to include technologies which do not meet the new definition, but do meet the old definition, with appropriate credit values assigned. This will help to reduce the complexity of needing to showcase the impact via 5-cycle testing and other methods and reduce our cost burden on fitting technologies that will continue to benefit the real-world CO2 of our vehicles.

In the case of Passive Cabin Ventilation (PCV) Jaguar Land Rover proposes the following, based on the NREL study referenced by the EPA in coming up with the original and new definition:

- For vehicles which meet the new definition of passive cabin ventilation (with windows/sunroof open) can claim the 1.7 g/mi or 2.3 g/mi for Passengers Cars or Light Trucks based off the shown 5.7 °C.

- For vehicles which just have vents open, assume the benefit of this is the difference between sunroof only (2 °C) and the combination of sunroof and vents (5.7 °C) to give a benefit of 3.7 °C.

• Therefore, for vehicles that have just vents open, allow manufacturers to claim a proportion of the 1.7 g/mi or 2.3 g/mi, based off the reduction in temperature being 3.7 °C instead of 5.7 °C, resulting in a reduction of either 1.1 g/mi for Passenger Cars or 1.5 g/mi for Light Trucks. [EPA-HQ-OAR-2021-0208-0269-A1, pp 5-6] The tables can be found on p.6 of Docket number [EPA-HQ-OAR-2021-0208-0269-A1].

For other off-cycle technology definition changes, where there is not a clear alternative value to achieve partial accreditation such as our proposal above for Passive Cabin Ventilation, Jaguar Land Rover proposes that the option for manufacturers to remain at the 10 g/mile (lower) cap with the original technology definitions up to and including 25MY. This is required as, for technologies which involve significant changes to the vehicle to meet the new definition such as active transmission warm up, there must be a longer lead time for manufacturers to adapt to this change in the regulation.

We also propose that, when the new definition of these technologies does take effect, that a menu item is added which will attribute fair, partial, credit values for technologies which meet the old but not the new definition. This would result in manufacturers being able to continue claiming for these established technologies via the menu based approach (reducing the need for costly and time consuming 5-cycle testing or other methods) but at a fair value. We welcome comments and discussion on what partial credit values should be set at for these technologies and will look to make recommendations in the future on this. [EPA-HQ-OAR-2021-0208-0269-A1, p.7]

We also suggest that the off-cycle credits proposal is amended to continue to allow manufacturers to claim for technologies which meet current regulation definitions, but at a more appropriate value. This allows manufacturers to continue claiming for technologies which we have previously invested in due to their real-world benefits, without the need for expensive and complex additional testing. [EPA-HQ-OAR-2021-0208-0269-A1, p.8]

Commenter: Lucid USA, Inc. (Lucid)

The increase in the cap on off-cycle credits allows extra flexibility for ICE vehicle manufacturers in return for measures that offer only questionable reductions in GHG emissions. Extra credits and multipliers for hybrid vehicles also reward the continued use of ICE technology and slow progress towards a zero-emission future. Each of these proposed flexibilities should be revisited and reduced in the final rule. [EPA-HQ-OAR-2021-0208-0528-A1, p. 5]

Commenter: Manufacturers of Emission Controls Association (MECA)

Off-Cycle Technologies. MECA supports EPA’s continuation and improvement of the off-cycle credit program with the higher credit cap in order to provide the benefit of verifiable, GHG emission reductions through all technological means to accelerate CO2 reduction from all new vehicles. MECA recognizes the benefit to real-world CO2 reductions via the off-cycle credit program as a policy to expand the available technologies that vehicle manufacturers can deploy to reduce the GHG contribution from transportation. A key factor in MECA’s support is that off-cycle credits, unlike other flexibilities, such as technology multipliers, are only awarded for the inclusion of additional technologies that have been evaluated and found to represent additional CO_2 reductions for vehicles under real world operation.

Expanding the off-cycle credit process to include EPA, NHTSA and the California Air Resources Board may be one consideration in the post-2026 rulemaking to allow for resource sharing among the agencies for reviewing data and evaluating innovative technology pathways for CO_2 reduction. MECA looks forward to working with EPA to investigate the potential of verifying the climate benefit of advanced technologies through more rigorous technology definitions and testing in future rule development. We support the EPA's thinking, for a future rulemaking, of bringing as much technology evaluation "on-cycle" and therefore, increasing the transparency of the program and ensuring verification and compliance of real-world emission reductions. [EPA-HQ-OAR-2021-0208-0261-A1, pp.3-4]

Commenter: Motor & Equipment Manufacturers Association (MEMA)

MEMA Supports the Off-Cycle Technologies Credit Program p MEMA continues to strongly support EPA expanding the off-cycle technology credit program by increasing the credit cap on credits received through the off-cycle menu. This cap increase is critical for encouraging greater technology innovation. MEMA supports EPA's proposed technology definition revisions but provides recommendations on the resulting "stranded" off-cycle technologies. MEMA looks forward to working with EPA on improving the air-conditioning (A/C) efficiency program in the post-2026 program. [EPA-HQ-OAR-2021-0208-0249-A1, p. 3]

MEMA Supports the Off-Cycle Technologies Credit Program. EPA's current program includes credits for technologies that reduce GHG emissions that are not captured on the EPA test cycle, including improvements to A/C systems that increase efficiency and reduce refrigerant leakage. EPA is proposing that these credit programs do not sunset and will remain part of the program through MY2026. EPA requests comment on the proposal to increase the pre-defined menu credit cap from 10 to 15 grams per mile (g/mi) beginning as early as MY2020. EPA is also proposing to modify some of the regulatory definitions that are used to determine whether a technology is eligible for the off-cycle menu credits. EPA is not proposing changes to the A/C credit program.15

MEMA appreciates that EPA includes the off-cycle technologies credit program and the A/C efficiency technology credit program in the proposal, alternative 1 and alternative 2 for MYs 2023 and beyond. The off-cycle technology credit program along with the A/C efficiency credit program are important as they provide credits for technologies that achieve "real-world reductions and do not represent a loss of overall emission benefits."16 These credit programs are not loopholes and do not distort the market but recognize technologies that are not measured accurately on the existing test-cycles. MEMA agrees with EPA that these technologies are "often more cost effective than other available technologies that reduce vehicle GHG emissions"17 and that without these credits, manufacturers would "have to apply costlier technologies to meet the standards."18 It is important that the program from MYs 2023-2026 allow a variety of regulatory tools to broaden compliance pathways for vehicle manufactures to manage their product mix.

MEMA Strongly Supports an Increase of the Off-Cycle Menu Credit Cap. MEMA strongly supports EPA expanding the off-cycle technology credit program by increasing the credit cap on credits received through the off-cycle menu from 10 g/mi to 15 g/mi. More than 95 percent of off-cycle technology credits are generated via the menu pathway, and, for many vehicle manufacturers, it is the sole pathway used to generate off-cycle credits. Accordingly, multiple vehicle manufacturers are approaching the 10 g/mile menu credit cap.19 Furthermore, in recent years, off-cycle technology credits have been rapidly growing due to the cost-effectiveness of these technologies. The increase in the cap is critical as once vehicle manufacturers meet the cap, there is no compliance benefit or incentive for vehicle manufactures to continue to invest in these GHG reducing technologies.

An expansion and continuation of the off-cycle credit program is critical in encouraging technologies that allow greater innovation which can include a cost-efficient range of technology options that ultimately lower compliance costs and increase consumer choice. These technologies will continue to promote “consumer choice, spur technology development, and minimize compliance costs, while achieving significant GHG and oil reductions.”20 Importantly, expansion of the off-cycle technology credit program will help maintain market certainty for these technologies that would otherwise not be used.

MEMA was disappointed that EPA did not propose adjustments to the thermal control sub-cap for off-cycle thermal control technologies. From compliance data, the sub-cap for off-cycle thermal control technologies is being exceeded by some vehicle manufacturers.21 We look forward to working with EPA on potential adjustments to this sub-cap as appropriate in the post-2026 program.

MEMA Conditionally Supports the Revised Technology Definitions. EPA is proposing that all vehicle manufacturers that want to accrue menu credits between 10 and 15 g/mi from MYs 2020–2022 will need to meet the new revised definitions for passive cabin ventilation, active transmission warm-up, and active engine warm-up.22 For MYs 2023 and later, the proposed revisions of the technology definitions would apply exclusively if earning credits. However, EPA is not requiring the revised definitions prior to MY2023 for vehicle manufacturers not opting into the 15 g/mi credit cap. EPA proposes this as a transition to the new definitions. EPA explains that raising the menu cap is only appropriate if the technology definitions are tightened.23

MEMA supports this transition to the new credit cap and the use of the new proposed technology definitions for active transmission warm-up, active engine warm-up and passive cabin ventilation. Furthermore, MEMA conditionally supports EPA’s proposed technology definitions. MEMA continues to strongly support that off-cycle menu credit values represent accurate estimates of real-world fuel consumption and GHG emissions reduction benefits. The menu definitions and credit values should correspond to the technologies tested and emissions reductions associated with verifiable testing and modeling.

However, MEMA does have concerns with the resulting “stranded” off-cycle technologies. The EPA proposes refining the definitions of certain technologies to provide credits only for the more specified technologies. However, the original and less specific technology definitions and the associated technologies still provide real-world GHG reductions. For example, passive cabin ventilation has been shown to provide value, but is less than the current menu credit.24 Similarly, active engine and transmission warm-up does not need to use exhaust waste heat to be effective as the EPA concluded in 2012. Active warm-up can involve controlling coolant flow to change component cooling and warming timing. This may include not overcooling with zero or minimal flow for rapid engine and transmission warm-up. Consequently, in conjunction with the proposed wording changes, we urge EPA to consider the real-world benefit of the technologies being "stranded" or no longer applicable.

MEMA Supports Adding Technologies to the Menu Including the New "Stranded" Technologies. MEMA supports EPA adding the original off-cycle technologies to the menu with a new credit(s) level based on the verifiable real-world benefit. These off-cycle technologies that meet the original definitions should continue to have a place in the off-cycle technology menu just at the more accurate benefit levels. Revised definitions for effective off-cycle technologies must be based on evidence of their effectiveness, not prescriptive definitions of exhaust waste heat or secondary coolant loop configurations. Eliminating credits completely for technologies that meet the original definitions eliminates significant flexibilities. MEMA conditionally supports the proposed technology revised definitions, but urges EPA to create new menu credits based on the original and now "stranded" off-cycle technologies.

MEMA supports EPA's decision to add high efficiency alternators to the off-cycle technology menu in the 2020 rulemaking to streamline the program.25 Along these same lines, MEMA urges EPA to add additional new off-cycle technologies to the menu, particularly the technologies with several off-cycle credit approvals via the petition process. For example, EPA approved active climate control seats for two separate vehicle manufacturers with pending approval for a third vehicle manufacturer.26 Furthermore, MEMA urges EPA to consider technologies that NHTSA has deemed fuel saving. The NHTSA NPRM lists electric power steering (EPS), improved accessory devices (IACC), and secondary axle disconnect (SAX). NHTSA points out that there is a large opportunity to incorporate IACC for GHG reduction benefits in future model years.27 In 14 out of the 15 technology categories, the improvements in fuel economy are one or two percentage points. (See NHTSA tables in the Appendix) As industry progresses toward stricter emissions standards, vehicle manufactures need more proven, less expensive, reliable off-cycle technology menu options and tools.

MEMA Supports Streamlining the Off-Cycle Program. MEMA continues to support a supplier-initiated application process for supplier off-cycle technologies to be eligible for a provisional off-cycle credits, as MEMA provided in our mid-term evaluation comments, as this expansion of the program is included in the California framework.28 Having an established supplier application process would enable new supplier technologies to enter the market faster and gain penetration more efficiently. A supplier process would lower investment risks for both the vehicle manufacturer and supplier while reducing the workload for the agency and vehicle manufacturers.29 MEMA looks forward to working with EPA to find ways to make the supplier-initiated process work.

MEMA has consistently supported and advocated for EPA to evaluate ways to improve the offcycle program allowing vehicle manufacturers to more effectively use the off-cycle technologies to meet the goals of the program. Accordingly, MEMA encourages EPA to continue to improve and streamline the off-cycle and A/C efficiency program and its process by collaborating with NHTSA and CARB.

MEMA Supports Off-Cycle Credit Program Evolution in the Post-2026 Program. EPA explains that it “may make changes to the test procedures for the GHG program in the future that could change the need for an off-cycle credits program.”30 MEMA supports EPA’s goal of increasing the range of testing, such as the 5-cycle test, to pull as much of the technology into the formal testing assessment as possible. Revising the testing procedures that would capture more emissions reductions could help reduce the onerous process of industry applying for these credits and EPA reviewing the data for the credits. However, it is important that EPA continue to keep methods in place that would allow recognition of certain technologies, such as solar panels and several other technologies, the emissions reductions of which would still not be captured on a 5-cycle (or a similar alternative testing).

Similarly, MEMA encourages EPA to explore how emissions reductions from off-cycle technologies and A/C efficiency technologies could be rewarded when used on BEVs, PHEVs, FCEVs, and other ZEVs. Many of these off-cycle and A/C efficiency technologies could help in reducing battery use and therefore lower the amount of electricity used to power the vehicle. Consequently, technologies that reduce the amount of battery charging needed (and, therefore, the electricity used to power the vehicle) should be recognized in MY2027 and beyond. [EPA-HQ-OAR-2021-0208-0249-A1, p. 6-9]

Commenter: New York State Department of Environmental Conservation

Likewise, increasing off-cycle credits from 10 grams/mile to 15 grams/mile will reduce the stringency and effectiveness of the proposed regulations. New York believes the current cap of 10 grams/mile is sufficient to reward manufacturer's technological innovation while maintaining stringency. [EPA-HQ-OAR-2021-0208-0238-A1, p.3]

Commenter: Nissan North America, Inc.

Air Conditioning (A/C) Leakage and Efficiency and Off-Cycle Credits. Nissan supports EPA’s proposal to increase the cap on menu-based credits from 10 g/mile to 15 g/mile. Nissan also supports NHTSA’s proposal to maintain the A/C efficiency credit program and to increase the cap on off-cycle menu credits in a manner equivalent to the changes proposed by EPA. Additionally, Nissan supports EPA’s stated position that the off-cycle credits and A/C credits do not sunset under the current program and are intended to remain a part of the program through model year 2026 and beyond. Nissan urges EPA to maintain this position and not implement any future regulatory action to sunset or phase out these credit provisions. As acknowledged by EPA in the Proposed GHG Rule, these credits are an important source of emissions reductions, which cannot be measured properly on 2-cycle testing. These credits represent concrete improvements in fuel consumption and GHG emissions that manufacturers have worked hard to achieve.

Reducing or removing the credits available for such improvements would be disruptive to product planning and would discourage further innovation. EPA and NHTSA should continue to recognize these real-world achievements and should allow continued use of these credits to further incentivize increasing efficient and advanced technologies through model year 2026 and beyond. [EPA-HQ-OAR-2021-0208-0529-A1, p. 8]

Nissan opposes EPA and NHTSA's proposal to update the menu technology definitions, with respect to Active Engine and Transmission warm-up menu credits and passive Cabin Ventilation menu credits. The proposed change would no longer allow systems that capture heat from the coolant circulating in the engine block prior to the opening of the thermostat to qualify for the Active Engine and Active Transmission warm-up menu credits. It would also require a separate alternative application process for seeking Cabin Ventilation credits for the open dash vent system. Making such modifications to meet the new proposed definition for these credits would require sufficient time to develop and implement the relevant technology. For example, making changes to the coolant flow paths in the cylinder head and block would likely require casting changes, full design review activity, and durability testing. These are long lead-time activities and would also drain critical resources needed for electrification efforts. Additionally, eliminating the availability of credits for these currently accepted technologies would also impact the stringency level for manufacturers that have already included such credits in their fleet development and compliance planning. Manufacturers need sufficient lead time in their planning process; the design process for model year 2023 vehicles began years ago and was based on an understanding of the current credit technology definitions. The agencies should consider appropriate lead time requirements in implementing such definition changes, which should not take effect until at least the next rulemaking cycle (model year 2027+).

If EPA chooses to adopt the menu technology definition update as proposed or at a later time, EPA should continue to allow reduced credit value for the technologies meeting the current definitions. The proposed approach would likely increase the number of alternative methodology applications by OEMs seeking partial credits for Active Engine and Transmission warm-up technology credits and Cabin Ventilation credits. Allowing partial credits on the menu for the technologies meeting the current definitions would streamline the application process. [EPA-HQ-OAR-2021-0208-0529-A1, p. 8-9]

Commenter: Rivian Automotive, LLC

Maintain Current Cap on Off-Cycle Credits. Rivian questions the need to expand the off-cycle credit program in a proposed regulation that aims to quickly cut emissions from the transportation sector and accelerate the pace of electrification in the light-duty vehicle fleet. First, some of the technologies and innovations rewarded—such as "stop-start" engine technology—can only apply to ICEs by definition. As the light-duty fleet electrifies, these credits will become valueless. In this context, raising the maximum credit cap is both counter-intuitive and unnecessary. More fundamentally, however, analysts have raised concerns about the environmental integrity of the off-cycle credit program. As ICCT has noted, one of the "most disconcerting findings" of its examination of off-cycle crediting is that the credited technologies "are still largely without validated real-world benefits."7 For this reason, among others, the

Union of Concerned Scientists opposed a provision in the “California Framework” to raise the off-cycle credit cap in a manner identical to that proposed by EPA.8 Evidence suggests that not only are the real-world benefits of many off-cycle technologies less significant than claimed by automakers but, since its inception, the provision has failed to ensure “additionality,” often creating windfalls by awarding credits to automakers for technologies that were already installed. Raising the cap on off-cycle credits is not necessary and doing so would lessen the environmental benefits of the proposed rule. [EPA-HQ-OAR-2021-0208-0274-A1, p. 4]

Commenter: Securing America’s Future Energy

Using Off-Cycle Credit to Promote Safety and Efficiency. In the 2012 Rule, EPA decided to categorically bar safety technologies from receiving credit under the off-cycle program.[58] EPA’s regulation at 40 C.F.R. § 86.1869–12 (‘CO2 credits for offcycle CO2–reducing technologies’) contains a limitation that restricts the eligibility of safety technologies for off-cycle credit:

Off-cycle credits may not be approved for crash-avoidance technologies, safety critical systems or systems affecting safety-critical functions, or technologies designed for the purpose of reducing the frequency of vehicle crashes. Off-cycle credits may not be earned for technologies installed on a motor vehicle to attain compliance with any vehicle safety standard or any regulation set forth in Title 49 of the Code of Federal Regulations.

This provision should be reversed whether EPA plans to use these off-cycle credits or not. New technology can both increase fuel economy and enhance safety benefits simultaneously. The rise of autonomous vehicle technology can lead to dramatic increases in vehicle safety while simultaneously driving fuel economy improvements. While these technologies are under development and the extent of their benefits is still emerging, test results offer the promise of substantially increased efficiency and improved safety through vehicle- and system-level improvements. Yet because these technologies are so new, there is neither sufficient deployment nor adequate understanding of the degree to which these innovations can improve vehicle efficiency and decrease emissions. SAFE estimates, based on independent fuel efficiency modeling, that an 18–25 percent system-wide fuel economy savings can be realized by using existing driver assist and connected vehicle technology, and that thousands of lives can be saved annually.[59]

Fortunately, the off-cycle credit program within the EPA’s regulations to limit greenhouse gas emissions from light-duty vehicles provides a mechanism that could be used to accelerate the real-world testing, and eventual incorporation, of these technologies into the fuel economy program—not only resolving the safety-fuel economy issue once and for all but, more importantly, saving thousands of additional lives while providing further reductions in fuel demand. EPA should allow automakers to earn compliance credits (for 3–5 years) as part of a research program to deploy autonomous and connected vehicle technology, collect data about the technology’s performance, and share the data with regulators so that they can together evaluate the effectiveness of this emerging technology. To the extent that the testing demonstrates improvement in efficiency, lower emissions and increased safety, regulators can use the data to support permanently accounting for such efficiencies in future compliance periods.

The auto industry should have multiple pathways available to meet EPA's emission standards, especially pathways that both save lives on our roads and reduce emissions. Allowing safety technologies to be eligible for credit does not mean the program will suffer from tradeoffs between safety and emissions (or fuel economy) as NHTSA has already demonstrated over the history of the SAFE program the ability to balance these priorities.

SAFE appreciates that although vehicle safety is not within the scope of the Clean Air Act, EPA does regulate emissions and the ability of the auto industry to cost effectively institute advanced technology with the bonus of saving lives. In short, connectivity, autonomy, and electrification are inexorably intertwined, and EPA should evaluate each of them, instead of looking at them piecemeal. Overlooking this opportunity is a lost opportunity to reduce emissions, support the auto sector, and preserve good jobs. EPA should reverse the limitation that restricts the eligibility of safety technologies for off-cycle credit. [EPA-HQ-OAR-2021-0208-0527-A1, p. 15-16]

Commenter: Stellantis

In MY2019, several OEMs were at or approaching the off-cycle cap.2 EPA's proposal to expand the cap will give OEMs certainty to invest in the additional technologies needed.

The EPA rule will take effect early next year, after the MY2023 has begun. EPA is proposing to redefine three technologies for MY2023 that would, at least initially, zero the benefit the agency previously acknowledged. Changing technology on vehicles to accommodate new definitions requires lead time to be implemented and therefore should be proposed during the next rulemaking cycle.

Additional Off-Cycle Technology Flexibilities Needed. Stellantis appreciates both EPA and NHTSA's recognition of the important role off-cycle technologies play in reducing real world CO_2 and fuel consumption and therefore the need to incentivize innovation and implementation of that technology with more flexibility. Expanding the current credit caps is helpful for OEMs (including Stellantis) that have invested in technology on vehicles today, but cannot acknowledge its benefits because of the current cap. Expanding the cap would also incentivize OEMs to innovate and implement new fuel saving technology. There are some process fixes that could further help manufacturers implement the needed technology.

Stellantis Supports a 15 g/mi Off-Cycle Menu Cap Without Linkage to Redefinition. Stellantis supports the agencies' move to modify the off-cycle predefined technology menu cap from 10 g/mile to 15 g/mile. This is an important step to incentivize the early adoption and continued application of GHG-reducing technology in Stellantis' fleet. The increased cap will improve the business case for adding fuel-saving technology to our vehicles from the preapproved menu. See Appendix B for more details supporting the cap being increased in MY2020 to 15 g/mi with existing, approved technologies. [Appendix B can be found at docket number EPA-HQ-OAR-2021-0208-0532-A1, p. 33-45]

This cap increase should not be coupled with the proposed MY2023 technology definition changes to the existing active engine and transmission warmup and passive cabin ventilation categories. MY2023 product designs are already finalized. Recall MY2023 can start as early as January 02, 2022 - just a few months after the close of the comment period for this proposed rule. This contradicts the agencies' typical 3-year lead time allowance for hardware changes. As EPA has noted, they do not believe any of the current passive cabin ventilation21 or active engine and transmission warm up systems22 meet these proposed re-definitions. A redesign of powertrain components (engine and transmission warmup) and HVAC systems (passive cabin ventilation) to accommodate the new definitions proposed is not possible in this MY2023-2026 time frame.

The agencies have recognized many times that the vehicle design process typically takes several years, which pushes implementation of newly defined technologies beyond the period of this proposed rule. Therefore, if the agencies have concern with their existing definitions, the time to implement new technology definitions would be in the next rulemaking cycle (i.e., MY2027+) allowing automakers to plan for and implement fleet wide technology changes.

Technology Redefinition Disregards Proven GHG Saving Technologies and Increases Stringency. The current off-cycle menu definitions for the three technologies that EPA and NHTSA are proposing to modify, recognize their reduced GHG emissions and fuel usage. The advanced engine warmup, advanced transmission warmup and passive cabin ventilation systems, as applied today, all lower GHG emissions in the fleet. These approved technologies and the GHG benefits they provide are threatened by the agencies' proposal to immediately revise technology definitions.

While the new definitions for engine and transmission warmup using exhaust heat, instead of coolant heat, may provide an even larger benefit, the current technologies have provided GHG benefit that were quantified in previous rulemakings. In addition, the agencies now propose to change passive cabin ventilation systems to match unrealistic laboratory test properties with holes cut into the floor and windows opened without regard to commercial feasibility (e.g., rain and snow intrusion, occupant security and theft concerns, etc.) See Appendix B for supporting data on each of these three technologies.

Stellantis met with EPA OTAQ staff regarding the design of our Passive Cabin Ventilation system and reviewed testing results that showed both convective flow with a computational fluid dynamics model and temperature change, without open windows or sunroof. This design and results were accepted by the agencies as meeting the definitions of the credit by providing both an inlet of fresh air through the outside vent via software activation of the vent door and an exit through the body exhausters. Now the agencies' position has shifted to requiring additional parameters of automatic window or sunroof activation. These new requirements should be only considered under a new active cabin ventilation method in the next rulemaking cycle.

The agencies' proposed technology redefinition for active engine warmup, transmission warmup, and passive cabin ventilation alter the stringency of this rulemaking by immediately disqualifying existing systems from taking credit in the MY2023. MY2023 begins in less than 4 months from the time these comments are being submitted. Redevelopment of these systems to meet new or modified definitions requires additional time to accomplish on the order of 3 years or more.

We instead look forward to working with the agencies to define what higher credit values should be for these new credit categories and new names for these advanced menu technologies. In addition, we have proven the technology under the existing definitions provide GHG benefits and therefore should retain credit.

Gaining Credit for New Technology Outside the Menu Cap is Difficult. The agency is proposing to remove menu credit for technologies that impact OEMs as soon as MY2023. Recovering this lost credit outside of the menu is infeasible since the alternative methodology off-cycle application submission process can take a year or longer with uncertain outcome. There are a large number of off-cycle industry applications awaiting action by agency staff. While some of this is certainly due to COVID-19 challenges, the overall lack of movement is concerning. OEMs have yet to be asked technical questions on many applications, and, when responses have been requested and supplied, it is unclear of what happens next.

One improvement that would certainly help would be to set up a system to make the alternative methodology application process more transparent. It would be helpful if EPA could report the nonconfidential status of all off-cycle alternative methodology applications on a quarterly basis to industry.

We propose that a notice of availability be published in the Federal Register for all off-cycle alternative methodology applications after 90 days if the agency has not yet completed the review of the application for completeness, and if applicable, notify the applicant of additional information being required. This review and communication back to the applicant is required to happen within 30 days of submission. Automatically publishing the application after 90 days (three times the length of the required review period) will allow the public comment period to begin, and will help this process function as intended.

Stellantis is willing to solicit industry to partner with EPA to help identify and implement process improvements to evaluate and decision applications more quickly, if deemed helpful to the agency. [EPA-HQ-OAR-2021-0208-0532-A1, pp. 15-18]

Off Cycle & Air Conditioning Efficiency Menus Should Fully Recognize GHG Technology. The agencies need to be flexible and innovative when adding technologies to predefined menus (that could have been approved via the alternative methodology), the cap needs to be adjusted for this new technology. Both the agencies and industry want to standardize this process as much as possible. Using a pre-defined menu versus duplicative alternative methodology applications saves everyone time and resources. Adding more and more technologies to a menu, without adjusting the cap serves no one and dis-incentivizes innovation. For example, EPA recently added High Efficiency Alternators to the predefined menu but did not adjust the cap, so therefore the proposed increase to 15 g/mi is an important step to addressing this necessity.

As the agencies review new applications for credit, some of these technologies should properly be applied to the off-cycle menu as electrical load reductions. Specifically, the efficient AC compressor clutch from Denso and brushless blower motors should be added to achieve an additional 0.6 g/mile in total as originally applied for by many OEMs in April 2020. Greater detail on this subject is covered in Appendix B. [EPA-HQ-OAR-2021-0208-0532-A1, p. 17]

Stellantis Supports the Menu Cap Increase to 15 g/mile for MY2020 Without Additional Restrictions. Stellantis agrees with the agencies' move to modify the off-cycle predefined technology menu cap from 10 g/mile to 15 g/mile. This is an important step to incentivize the early adoption and continued application of GHG reducing technology in the fleet. The increased cap will improve the business case of adding additional technology to our vehicles from the pre-approved menu.

Current cap levels are constraining off-cycle technology implementation and the agencies' actions have contributed to these limitations. Alternative methodology applications have so far been approved for high efficiency alternators, advanced AC compressors, and brushless blower motors. Although credits approved through this process are not supposed to be constrained under a menu cap, the agencies have done so, without the caps expanding which is very concerning. Therefore, Stellantis supports the proposed menu cap expansion as one way to address this discrepancy.

Accordingly, there should be an incremental cap increase for each new technology added to a credit menu (or constrained by the cap even if not placed on a menu) which we suggest consideration to be half the maximum credit value of the technology. For example, the advanced compressors have been approved for a credit value of 1.1 g/mi, and this suggested value would result in an increase in the indirect AC menu credit caps of 0.5 g/mi, bringing the fleet caps to 5.5 g/mi for passenger cars and 7.7 g/mi for light trucks. Because the high efficiency alternator credit is a scalable attribute based credit, it is suggested that the off-cycle credit menu cap be raised by 1.5 g/mi, equivalent to an VDA efficiency of 76.5%, bringing the new cap to 11.5 g/mi for example.

Using this structure would stay true to the spirit of the credit menus by allowing a conservative amount of credit to be claimed at the fleet level (roughly half of the per vehicle credit value with 100% fleet penetration) for the convenience of using the menu-based credits. The alternative methodology pathway would still exist for manufacturers wishing to demonstrate a higher credit value per vehicle or to utilize a higher credit value across an entire fleet should the fleet achieve the credit cap. This also creates a very simple and straight forward system for incrementally raising a credit cap in the future once new off-cycle credit technologies become common across industry.

However, it is easy to see how such a system could create additional burden on agency staff with administering such a program. OEMs could have submissions of unique combinations of technologies and credit values which would require agency monitoring of appropriate technology cap limits for each OEM. Therefore, we support simply raising the cap from 10 g/mi to 15 g/mi as a much more streamlined approach to greatly reduce the burden on the agency for administering this program, and allowing all menu technologies approved through the alternative methodology application process to utilize the capped 15 g/mi credit limit.

Stellantis believes that the agencies should move to increase the menu cap to 15 g/mile beginning in MY2020, without any additional requirements. This would allow those OEMs to recover some of the investment of the incremental benefit of the GHG reducing technologies that are deployed in higher volumes than is being allowed by the current cap. This would also recognize the alternative application technologies that were added to the menu without cap adjustments.

Lead-time Concerns with Proposed Re-definitions. In recognition of the agencies' acknowledgement of the CO2 saving off-cycle technologies, Stellantis has invested in all three of the technologies that are now proposed to be re-defined for MY2023 (and optionally for MY2020-2022). Knowing that MY2020-2022 product has already been sold, there is no chance to change or redesign these products retroactively to allow the usage of the additional flexibility of the cap space. Additionally, EPA has acknowledged that no active warm-up systems currently in production meet the new definitions. Therefore, this proposal by the agencies is of no practical use and needs to be changed (i.e., not tied to simultaneous definition changes) to allow the added 5 g/mi cap space. Tying the two requirements together does not recognize an OEM who has been proactive in bringing more CO2 savings than is currently allowed by the 10 g/mi fleet cap.

Accordingly, MY2023 product is already designed and about to launch later this CY (i.e. MY2023 starts January 02, 2022) a few months after this proposed rule completes the comment period, and therefore redesign of powertrain components (engine and transmission warmup) and HVAC systems (passive cabin ventilation) is not possible. If the agencies have concern with their existing definitions, the time to transition to these new ideas would be after this rulemaking period which is short and immediately impacted. Instead, any changes to definitions should be proposed during the next round of GHG/CAFE rulemaking when automakers can plan to develop fleet wide technology changes and the agencies can meet required lead time requirements for new regulations.

The Existing Credit Definitions Provide a GHG Benefit and Should Retain Credit. The existing technologies for active engine warmup, active transmission warmup and passive cabin ventilation all provide a GHG emissions benefit with the current definitions. Stellantis employs these technologies on select vehicles and uses good engineering judgement to evaluate these technologies for credit.

Stellantis runs vehicle-level tests in an 'A to B' format to evaluate whether the active warmup technologies are a benefit to the vehicle prior to applying for the credit. The test vehicle is driven in the 'A' configuration without the technology to establish a baseline emissions value in grams of CO2 per mile. The test vehicle is then driven in the 'B' configuration with emissions lowering technology and the GHG emissions are recorded in grams of CO2 per mile.

Emissions from the 'B' test are subtracted from the 'A' test and with a greater than zero result, the technology is considered a benefit. This alone is not enough to determine if the vehicle qualifies for the active warmup credit. Stellantis also monitors and records fluid temperatures during the test to ensure that heat is flowing in the direction expected.

Active Engine Warmup Vehicle Testing. The active engine warmup credit that Stellantis claims is supported by data showing that the warmup technology is working and that it lowers the vehicle GHG emissions below the baseline. Engine oil temperature rises more quickly with the technology than without it. Two examples of engine oil warmup are given in Figures 9 and 10.

Figure 9 shows the warmup improvement for a midsize SUV with a 4-cylinder engine. The engine oil temperature rises faster with the active engine warmup technology than without. The improvement begins early in the test cycle with temperature separation beginning minutes after key-on and reaches 7°C of temperature improvement midway through the test cycle before convergence towards the end of the test cycle. [Figure 9 can be found on p. 35 at docket number EPA-HQ-OAR-2021-0208-0532-A1]

Figure 10 shows a similar warmup improvement for a B-Segment Crossover vehicle equipped with a 4- cylinder engine of similar displacement but from a different engine design family. The active engine warmup technology again raises the engine oil temperature faster than in the baseline test condition. The improvement begins early in the test cycle and continues throughout much of the test until the traces eventually converge towards the end of the test cycle. [Figure 10 can be found on p. 36 at docket number EPA-HQ-OAR-2021-0208-0532-A1]

The agencies can be confident that the active engine warmup menu credits granted to Stellantis is underpinned with vehicle-level testing and positive test results showing the technology works.

Active Transmission Warmup Vehicle Testing. Similarly, the active transmission warmup menu credit that Stellantis claims is supported by data showing that the warmup technology is working and that it lowers the vehicle's GHG emissions below those of the baseline vehicle. In addition to lower GHG emissions, the transmission oil temperature is required to rise much more quickly than over the baseline. Stellantis provides three examples of the technology on its vehicles in Figures 11 through 13.

Figure 11 shows the active transmission warmup improvement for a minivan class vehicle. The transmission oil temperature rises early in the test and then separates from the baseline test condition achieving a 10°C temperature delta with GHG reducing technology, rather than without it. The temperature delta remains mostly constant relative to the baseline temperature trace. The technology benefit continues throughout the test.

Figure 12 shows an active transmission warmup improvement for a C-Segment Sport Utility Vehicle contented with a 6-speed transmission. The active transmission warmup improvement begins early in the vehicle test cycle with the warmup traces diverging until half way through the test when the transmission oil temperature is 15°C higher than the baseline condition. Trace separation begins earlier than in the case of the minivan and the separation is greater. [Figures 11 and 12 can be found on p. 37 at docket number EPA-HQ-OAR-2021-0208-0532-A1]

Lastly Figure 13 shows the case of an active transmission warmup improvement for a full size SUV with an 8-speed transmission. The active transmission warmup begins immediately with the transmission oil trace and remains nearly constant at 4°C until towards the end of the test when the improvement diverges again for additional benefit. [Figure 13 can be found on p. 38 at docket number EPA-HQ-OAR-2021-0208-0532-A1]

Variation in these test results comes from shift strategy, thermal mass conditions, and other factors. The temperature response seen in these test vehicles shows that the benefit of the active transmission warmup technology is significant, if somewhat variable, and is difficult to improve upon when using a different heat source.

Stellantis, as part of the good engineering judgment it exercises, ensures that transmission test results and lower GHG emissions support each request for the proper amount of active transmission warmup menu credit.

Passive Cabin Ventilation Testing. The agencies' passive cabin ventilation credit is based on 'proof of concept' testing performed by NREL and reported in 2008 in Vehicle Ancillary Load Reduction Project Close-Out Report. The test results show that '…natural-convection-induced flow can be effective with strategically located air inlets' but that their test method had some limitations in implementation, specifically, … 'implementation challenges for this technique include preventing moisture and contamination (such as exhaust products, dirt, and animals) from entering the vehicle.'

The agencies have drawn conclusions that the passive credit ventilation method must be changed based on the flawed conclusions of one test, performed on one vehicle, in uncontrolled environmental conditions. The testing that NREL performed was insightful and valuable from a directional perspective, that setting up the conditions in the vehicle to establish a natural convection cell is possible. Their testing did not conclude that it must be executed that way. The NREL test result of 5.7°C that is referenced in the proposed credit re-definition was achieved by cutting unrealistic holes in the floor of the Jeep test property. NREL understood that their vehicle modifications are not possible on a production vehicle, of which they comment on in the report.

Stellantis' current passive cabin ventilation system sets up the convection cell in the vehicle using the HVAC air inlet door parked in fresh mode and the exhausters in the rear of the vehicle. [EPA-HQ-OAR-2021-0208-0532-A1, pp. 33-39; Passive Cabin Ventilation system figure can be found at docket number EPA-HQ-OAR-2021-0208-0532-A1, p. 39.]

Body leakage from low in the cabin coupled with airflow through the air inlet door stimulates the creation of the convection cell such that a breath temperature difference of 3.4°C is possible in a minivan as shown in Figure 14. [EPA-HQ-OAR-2021-0208-0532-A1, p. 39] [Figure 14 can be found at docket number EPA-HQ-OAR-2021-0208-0532-A1, p. 40]

Similar testing showed that the system is capable of 3.1°C in a large sedan. Test variables were controlled by evaluating the systems in a climate conditioned test cell with simulated solar load to improve upon the test condition that NREL experienced.

In addition, Stellantis met with EPA OTAQ staff in 2016 regarding the design of our PCV system and reviewed testing results that showed both convection flow and meaningful temperature change, without open windows or sunroof. This design and results were accepted by EPA staff as meeting the definitions of the credit by providing both an inlet of fresh air through the outside vent via software activation and a ventilation exit through the body exhausters. Now the agencies' conclusions seemed to have shifted to wanting additional parameters which should be only considered under a new active cabin ventilation method.

Redefining this credit to become more stringent does not recognize that this technology works as intended and provides GHG benefits as designed today. Redeveloping the technology to meet the new definition would require opening windows and the sunroof to achieve greater ventilation. The difficulty with this approach is that it is not reliably possible to secure the cabin against the elements, against intrusion and vermin. Stellantis believes that the agencies should recognize that existing technology and credit definitions meet the needs of industry, customers and its regulators and qualify for the credit amounts intended.

The agencies' proposed re-definitions should instead be considered new types of warmup credits or active cabin ventilation credits that exceed the performance level of the current definitions. We look forward to working with the agencies to define what those higher credit values should be and also the new name for these advanced menu technologies.

Reaching the 15 g/mile Off-Cycle Menu Credit Cap Will Be Difficult to Achieve. The credit values of the Engine Stop Start, Active Engine Warmup, Active Transmission Warmup and Passive Cabin Ventilation off-cycle menu technologies take up most, if not all, of the 10 g/mile cap value. Based on a theoretical 100% penetration of the fleet and a mix of 55% light-duty trucks and 45% passenger vehicles, these 4 credits total to 10.4 g/mile and are slightly over the existing menu cap.

These four core technologies are central to Stellantis' compliance plan and we see many constraints with backfilling any deterioration of those by using the remaining menu credit technologies. Of the remaining technologies that can be readily applied to existing vehicles, there is very limited additional opportunity as shown below, often at high cost. Other technologies that might provide greater benefit would require significant vehicle redesigns that would place their implementation outside the timeframe of this rulemaking.

Menu Technologies Have Limited Additional Opportunities:

Active Aerodynamics. The active aerodynamics additional contribution is limited by vehicle design, and many vehicle systems already have healthy penetrations of Active Grille Shutter ('AGS'). Ride Height and Active Air Dam technologies are packaged with the convenience features of high end accessory packages and penetration is limited based on customer preference.

High Efficiency Alternators. High efficiency alternators are tied to the volumes of the ICE fleet which is declining as electrification increases due to target stringency.

Solar Panels. The technology faces a steep challenge in the innovation phase as the business case currently is cost prohibitive on top of the costs of electrification. Stellantis does not foresee the wide application of solar panels before MY2026.

Waste Heat Recovery. Waste heat recovery systems that convert waste heat to electrical power are available in the marketplace but not applied to the US fleet as per EPA's 2020 Trends Report. Waste heat recovery systems that utilize engine coolant are available, although adoption remains low due to supplemental heat being required elsewhere in the vehicle. The lack of a credit for this technology and the high cost-benefit ratio make this technology unsuitable even for many ICE powertrains.

Solar Thermal Technologies. The opportunities in the Solar Thermal submenu are also limited as the glazing credit makes up the majority of the menu contribution with the remainder tied to customer preference such as solar paint or high end seat ventilation systems.

New Menu Technology Additions Lacking. New menu technology additions last happened with the SAFE 2 rule in 2020. An additional technology related to alternator efficiency was added to the menu without a corresponding increase in the menu cap. Stellantis asks the agencies to add technology to the cap and adjust the menu to avoid cap limitation.

The agencies have several Stellantis alternative methodology credit applications undergoing the review process for the last 18 months. As recommended in the submission, two of these technologies could be applied to the off-cycle menu as electrical load reductions based on the formula given in the 2017 Joint TSD. Specifically, the efficient AC compressor clutch from Denso and brushless blower motors could be added to the menu and achieve an additional 0.3 g/mile in for each technology. This topic will be addressed further below in regards to the AC efficiency menu.

Redefinition Impact on Compliance Plans. Redefining the three core technologies will negatively impact Stellantis compliance for several years, as we and other OEMs per the agencies' review, fail to meet the new credit definitions. The amount of credit loss depends on technology penetration and fleet mix. Assuming an OEM had 100% penetration of existing technologies (and adjusting for different percentage of fleet mix in terms of light-duty trucks and passenger cars), the loss of credit is alarming. Regardless of LDT/PC fleet mix, the average credit loss is around 50% of the newly expanded 15 g/mi cap value as shown in Table 3 below. If this is what agencies intended by the proposed definition changes, then the stringency impact on compliance must be recognized. [Table 3 can be found at docket number EPA-HQ-OAR-2021-0208-0532-A1, p. 42]

Stellantis Supports Combining the Solar Thermal and AC Efficiency Menus. As commented in previous rulemakings, the solar thermal menu credits are ideally combined with the technology on the AC efficiency menu. Solar thermal technologies that reduce AC system load are synergistic with the AC technologies that efficiently cool the cabin. Stellantis urges the agencies to revisit this menu combination alignment. [EPA-HQ-OAR-2021-0208-0532-A1, pp. 39-42]

Commenter: Tesla

EPA Should Eliminate, Not Expand, Off-Cycle Credits In the proposal, EPA increases the quantity of 'on menu' off-cycle credits available to manufacturers and potentially allows the additional credits to be use retroactively starting in MY 2020.182 When combined with other flexibilities, the credit expansion makes the proposed rule in these model years potentially weaker than the Trump Administration's SAFE rule from MY 2020-2022. See Figure 1. Expanding off-cycle crediting also creates asymmetry in the regulation favoring ICE vehicles, diverts R & D investment away from the best emissions reduction technology of electrification, and unnecessarily weakens the stringency of the standard. Tesla also notes that expanded use of 'off menu' off cycle credits will further reduce the standard's stringency.

First, the utilization and increase in off-cycle credit use creates a disparity in the type of vehicles that are rewarded for deploying efficiency technology. Originally created in 2010,183 the off-cycle menu credits consist almost entirely of technologies (i.e., Active Engine Warmup, Active Transmission Warmup, Engine Stop Start) applicable only for use on internal combustion vehicles.184 Subsequently, in its 2012 rules, EPA moved forward the timeline for generating these credits from a proposed MY 2017 to MY 2014.185 As a result, the off-cycle program has its origins in technologies over a decade old and has been rewarding manufacturers for deploying these technologies for more than seven model years. In combination, this means that ongoing off-cycle credits reduce stringency through rewards for many now commonly deployed efficiency technologies that provide, at best, negligible real-world emissions or technology advancement benefits.

Second, previous analysis has shown that manufacturers will increase reliance on off-cycle credits and divert investment and deployment away from the most efficient vehicle technologies.186 Extending and expanding these credit rewards old technology and, to the extent new technologies are deployed to generate off-cycle credits, focuses critical R & D budgets on tweaking legacy ICE platforms rather than directing these budgets to electrification and greater emissions reductions. As such, EPA's proposal, rather than confronting this built-in bias toward ICE legacy technology, enhances the pre-existing bias by increasing the off-cycle cap to 15 g/mile. Again, such perverse incentives should not be extended, much less increased. [EPA-HQ-OAR-2021-0208-0278-A1][pp.22-23]

Commenter: Toyota Motor North America, Inc. (Toyota)

Off-Cycle Credits – A Path to Real-World Benefits. Off-cycle technologies net immediate real-world emissions reductions and should be viewed no differently than emissions reductions achieved over the Federal Test Procedure. Toyota supports robust verification of off-cycle technology benefits and strongly encourages EPA to use a timely and streamlined process as suggested in past Toyota and AAI comments. We agree with AAI's current comments on the broader off-cycle technology program including but not limited to the approval process, credit values, and benefit limits.

Toyota also supports increasing the maximum credits earned under the technology menu from 10 g/mi to 15 g/mi. Please see the AAI comments for additional details. We understand the refined definitions for passive cabin ventilation, active engine warm-up, and active transmission warmup technologies are intended to better account for the real-world benefit of these technologies. The proposed changes affect program stringency because previously approved credits for these technologies that will no longer be available have already been incorporated into compliance plans. We request the revised definitions be effective starting with the 2025 model year at the earliest to provide adequate lead time for appropriate countermeasures and compliance plan adjustments.

Passive cabin ventilation, engine warm-up, and transmission warm-up technologies that meet the current definitions provide environmental benefit albeit less than under the proposed revised definitions. Once the new definitions become effective, existing passive cabin ventilation, engine warm-up, and transmission warm-up systems designed to meet the original definitions should still be granted some level of credit based on their real-world performance. [EPA-HQ-OAR-2021-0208-0531-A1, p. 11]

Commenter: Union of Concerned Scientists (UCS)

Off-cycle credits. The off-cycle credit program was introduced to capture reductions in greenhouse gas emissions that were not captured in the standard two-cycle test procedures. While this program has prompted some innovation, including active aerodynamic improvements and high efficiency alternators, real-world data on the benefits of many of these technologies continues to be scant, even as they become a larger and larger share of the purported reductions of the fleet.

Despite this lack of evidence, EPA is proposing to increase the amount of reliance on off-cycle credits for reductions from the rule by increasing the cap on technologies from the off-cycle menu. UCS strongly opposes the increase of this cap—if anything, the latest evidence indicates that EPA should be reining in the impacts of the off-cycle program, not expanding it.

Evidence of real-world improvement? In its design of the off-cycle program, and in particular the off-cycle menu, EPA cited uncertainty as a major factor in the design of the program.54 Despite some fleets approaching the limit of the off-cycle credit menu, indicating a widespread use of these off-cycle technologies, there has been no systematic study of the impacts of these technologies. What little additional data is available suggests that the program has likely been substantially overcrediting manufacturer improvements.

Researchers at the National Renewable Energy Laboratory (NREL) have published the most extensive look at a number of off-cycle technologies: active seat ventilation, both active and passive cabin ventilation, solar control glass, and solar reflective paint.55 The results of these studies are shown in Table 5, compared to EPA's off-cycle credit menu values. Because there is a discrepancy between values assumed by EPA and NREL for the greenhouse gas emissions associated with air conditioning usage, we have used NREL's observed percentage improvement for the technologies but applied them to EPA's baseline A/C greenhouse gas value, in order to provide an apples to apples comparison with the off-cycle menu credits, which were derived from EPA's assumed A/C values. [Table 5 can be located at docket number EPA-HQ-OAR-2021-0208-0277-A1, p. 29]

While the NREL data suggests that the menu credit may be conservative with respect to the benefit of active seat ventilation, the off-cycle menu has significantly overcredited both active and passive ventilation. The solar control technologies are comparable to the off-cycle credits awarded by the menu.56 While just 16 percent of the fleet received credit for adopting active seat ventilation in MY2019, 70 percent of the fleet received credit for passive cabin ventilation, and an additional 9 percent received credit for active cabin ventilation. This overestimate indicates that EPA has significantly overcredited manufacturers with respect to thermal control technologies.

EPA has also identified three technologies for which manufacturers have been receiving undue credit: passive cabin ventilation, active engine warm-up, and active transmission warm-up. In all three cases, manufacturers have been receiving credit for technologies that are less efficient than the technologies used to estimate the reduction in emissions.57

UCS strongly supports EPA revising the off-cycle menu definitions for these technologies, and we concur with EPA that any manufacturers seeking credit for technologies that do not meet this revised definition must do so through the public comment process outlined in 40 CFR § 86.1869-12(d). In fact, we recommend that the agencies make these revised definitions effective immediately to avoid further unwarranted credits for these inferior technologies. [EPA-HQ-OAR-2021-0208-0277-A1, pp.28-30]

The lack of justification for an increase in the off-cycle credit cap. Given the data to date that indicates manufacturers have received too much credit for off-cycle technologies, it is difficult to imagine why EPA would expand the program's use by increasing the off-cycle cap. In fact, if EPA were to fully adjust its program to eliminate these unwarranted credits, no manufacturer would be close to the 10 g/mi cap on menu technologies, with the vast majority of manufacturers below 7 g/mi with their MY2019 fleets (Figure 12)59 [Figure 12 can be located at docket number EPA-HQ-OAR-2021-0208-0277-A1, p. 32].

Not only would these revisions offset any potential justification for an increase in the menu cap, but it underlines the incredible amount of overcrediting in which EPA's data-light off-cycle menu has resulted. Since the off-cycle menu went into effect with MY2014, 103 million Mg of credits have been awarded—of those, 32.7 million Mg are not justifiable for the reasons stated above, or just over 30 percent. Unfortunately, this problem is getting worse over time, as manufacturers latch onto cheap-to-deploy credits like passive cabin ventilation which result in virtually no greenhouse gas benefits but are awarded significantly under the off-cycle menu (Figure 13) [Figure 13 can be located at docket number EPA-HQ-OAR-2021-0208-0277-A1, p. 33].

Eliminating the increase in credit cap should not be used to justify any reduction in the stringency of the proposal. In fact, modeling by Dan Meszler, an independent consultant, showed that benefits improve significantly when manufacturers must respond to the proposal with powertrain technologies that lead to real-world performance.60 Maintaining the 10 g/mi off-cycle cap while enforcing the preferred alternative increases the net present value of benefits through calendar year 2050 from $140 billion ($86 billion) at a 3 (7) percent discount rate to $170 billion ($110 billion).61 One of the critical reasons for this improvement is a reduction in per-vehicle price increase from $1,044 in MY2026 down to $867. [EPA-HQ-OAR-2021-0208-0277-A1, pp. 31-33]

Timely awarding of off-cycle credits. Credits for off-cycle technologies are awarded under both EPA's greenhouse gas program and NHTSA's CAFE program. In a parallel rulemaking covering much of the same timeframe as EPA's rule, NHTSA highlighted the lengthy delays in manufacturer requests for off-cycle credits.62 Not only do these delays diminish public access to information on manufacturer compliance, but they are indicative of an industry seeking to game the off-cycle credit system, including seeking retroactive off-cycle credits for vehicles sold long ago, credits which were not part of the manufacturer's initial product plans.

EPA has previously iterated that any credits awarded are required to be reported by the next credit reporting deadline and reiterated its stance that credits are generally required to be reported within four months after the end of a model year.63 It is therefore disconcerting that NHTSA has identified ongoing manufacturer reporting issues.

UCS concurs with NHTSA's concern about the effect this has on compliance and the credit market, as well as public oversight and recommends that EPA move forward with the changes to eligibility requirements for non-menu off-cycle technologies put forth by NHTSA in its proposal, adopting them beginning with MY2023. 64 Retroactively awarding credits for off-cycle technologies is a pure windfall for manufacturers and offers challenges for the agencies in their oversight of the off-cycle credit program. Manufacturers seeking approval of novel test procedures should be required to move forward with such requests well in advance of the model year in order to ensure adequate time for the assessment of such processes. Moreover, requiring timely filing for any credits granted under such programs maintains public awareness of manufacturer compliance, which strengthen the integrity of the program and the robustness of the credit trading market. [EPA-HQ-OAR-2021-0208-0277-A1, pp. 33-34]

54 "The fleetwide cap is being finalized because the default credit values are based on limited data, and also because EPA recognizes that some uncertainty is introduced when credits are provided based on a general assessment of off-cycle performance as opposed to testing on the individual vehicle models." (77 FR 62727)

56 Solar control glass is credited as a scalable technology under the off-cycle menu. However, our estimates of the average credit earned by manufacturers for this technology is similar to the single value assessed by NREL researchers

57 "This open dash vent technology [deployed by manufacturers] is not as effective as the combination of vents used by the NREL researchers to allow additional ambient temperature air to enter the cabin and also to reduce the restriction of heated air exiting the cabin" (86 FR

43764). “EPA expects that [the technologies deployed by manufacturers] may provide some benefit. But, as noted above since these system designs remove heat that is needed to warm-up the engine the Agency expects that these technologies will be less effective than those that capture and utilize exhaust waste heat” (86 FR 43765).

59 Values in Figure 8 are based on an imprecise reverse engineering process—EPA would be able to compare with the actual manufacturer-submitted data, to which UCS does not have access. The updated values reflect corrections for the NREL data, thermal control double-counting, and EPA’s revised definitions for active engine and transmission warm-up. While EPA is proposing the complete elimination of credit under the menu for these technologies, with which UCS concurs, for modeling purposes we have eliminated only half of these credits under the assumption that some share of those credits would be awarded credit under the public comment procedure. It is further worth noting that these averages include credits awarded under the alternative methodology process as well, which includes credits for high-efficiency alternators for which EPA claims require an increase in the menu cap (86 FR 43763).

60 To assess this, Mr. Meszler simply reduced the off-cycle cap in the EPA-CCEMS input files to 10 g/mi in all years. This prevents any adoption of credits above 10 g/mi and forces the additional stringency to be made up via improvements in powertrain or vehicle technologies.

61 There are two main reasons for this significant improvement: 1) off-cycle technology costs in the agencies model are significantly higher than the marginal cost of powertrain or vehicle technologies to comply at the same level, so applying with 2-cycle technology in lieu of off-cycle credits reduces the cost of compliance; 2) the agency’s model does not generate real-world benefits for off-cycle credits. Implicit in their modeling is that no off-cycle credits result in real-world fuel savings or emissions reductions—any modeled differences in off-cycle credit deployment result in significant costs with no benefits, drastically skewing the results.

Commenter: Volvo Car Corporation

Compliance Incentives, Flexibilities, Credits. Volvo Car supports the agency’s proposed modifications to the Compliance Incentives and Flexibilities (86 FR 43733). Specifically, extending the advanced technology vehicle multiplier and increasing the cap for off-cycle technologies supports electrification and the introduction of new energy efficient technologies. [EPA-HQ-OAR-2021-0208-0253-A1, p. 3]

To further support the shift towards electric vehicles, Volvo Car proposes that advanced heating, ventilation, and air-conditioning technologies for electric vehicles be added to the list of technologies that qualify for credits. This has a much greater relative impact on electric vehicles compared to vehicles with an internal combustion engine.

One example of this technology is the heat pump which has now been in use on electric vehicles for some time. There is limited time to perform research on this technology for the purpose of this proposed rule, but research can be conducted for future rulemakings. To support the immediate implementation in MY23 and later of these efficient technologies, Volvo Car proposes that EPA develop an interim temporary measure until an appropriate credit calculation is developed and included in the final regulatory text.

Volvo encourages the EPA to investigate the possibility of a temporary credit for heat pump technology as an addition to the list of predefined technologies. Alternatively, this rulemaking should make it clear that MY23 and later vehicles can be included retroactively once a final credit calculation has been included the regulation.

EPA Response

EPA is finalizing an increase in the off-cycle menu credit cap from 10 to 15 g/mile for MYs 2023-2026. EPA's response to comments regarding the increased credit cap and timing is provided in section II.B.3 of the preamble. EPA's response to comments regarding requiring manufacturers to meet the proposed revised definitions in order to access the additional menu credits is also provided in the preamble with additional discussion below.

EPA received a wide variety of comments on many aspects of the off-cycle credits program. EPA proposed and sought comment on only a narrow set of changes: increasing the menu cap and revising the menu definitions for passive cabin ventilation and active engine and transmission warmup technologies. Comments regarding other program elements are outside the scope of this rule but EPA may further consider commenter recommendations, as well as other potential program changes and approaches, as part of a future rulemaking.

Comment topics outside the scope of the current rulemaking include:

- Combining thermal control off-cycle technologies with credits for improving the efficiency of air conditioning systems and increasing their caps. (Alliance, Denso, Hyundai)
- Removing credit caps and instead incorporating technology interaction effects into credit levels (Gentherm, ITB)
- Potential off-cycle credits for autonomous vehicles (ACEEE, ITB Group, SAFE)
- Adding technologies to the off-cycle credits menu (Honda, Gentherm, ITB, MEMA, Stellantis)
- Changing the regulations to allow off-cycle credits for safety-related technologies (SAFE)
- Allowing additional off-cycle credits for EVs or disallowing off-cycle credits for these vehicles (ITB Group, Consumers Report, Volvo)
- Modifying menu credit levels for certain technologies (Gentherm, ITB, UCS)
- Regulatory changes to streamline the program (Honda, DENSO, MEMA, Nissan, Stellantis, Toyota)
- Providing a supplier pathway (AESI, DENSO, MEMA)

CBD et al. commented that EPA should not increase the menu cap, pointing to issues with the implementation of the off-cycle credits program outlined by NHTSA in their recent proposed rule and commenting that increasing the cap will add to the problems outlined by NHTSA. In response, the implementation issues NHTSA discusses in their proposal for the most part concern applications for credits under the "public process" credits pathway and not the credit menu pathway.[26] In the public process pathway, under existing regulations EPA must seek public comment before issuing a determination whether or not to approve the requested credits. This process can be lengthy if there are technical questions that must be resolved but ultimately may result in a more thorough review of a technology that would otherwise have been difficult if not impossible to predict from a generic menu description. EPA also notes that the updates to the menu definitions should generally help the implementation of the credits menu by clarifying the definitions that have previously been the source of delays because either the manufacturer felt that they didn't quite meet the menu description or EPA had to scrutinize whether the technological approaches used by manufacturers met the previous definitions.

CBD et al. recommends that EPA codify provisions that "prohibit, without exception, the submission of any application that has missed any of the applicable deadlines, a change clearly needed to avoid otherwise inevitable additional processing time, expense and delay in determining and reporting compliance results." Other commenters also raised concerns about delays in EPA's consideration and decisions regarding public process applications. EPA did not propose or seek comment on, and therefore is not finalizing any changes to deadlines for the off-cycle credits program. EPA continues to work with manufacturers to clear the backlog of credit applications. In late 2020, EPA notified manufacturers that starting May 1, 2021, EPA would no longer consider any applications for retroactive credits under the public process pathway.

Several automakers and automotive suppliers commented that off-cycle credits represent real-world CO_2 reductions and some of these commenters also commented that manufacturers should be allowed to continue to claim the menu credits without meeting the revised definitions. For example, Toyota commented "off-cycle technologies net immediate real-world emissions reductions and should be viewed no differently than emissions reductions achieved over the Federal Test Procedure." Toyota also commented "we request the revised definitions be effective starting with the 2025 model year at the earliest to provide adequate lead time for appropriate countermeasures and compliance plan adjustments." Similarly, Nissan commented "these credits represent concrete improvements in fuel consumption and GHG emissions" and also commented "Nissan opposes EPA and NHTSA's proposal to update the menu technology definitions, with respect to Active Engine and Transmission warm-up menu credits and passive Cabin Ventilation menu credits" citing lead time concerns with the changes.

Commenters argued that lead time is needed for manufacturers to change their system to meet the new definitions. For example, Stellantis commented "The agencies have recognized many times that the vehicle design process typically takes several years, which pushes implementation of newly defined technologies beyond the period of this proposed rule. Therefore, if the agencies have concern with their existing definitions, the time to implement new technology definitions

[26] 86 FR 49836, September 3, 2021.

would be in the next rulemaking cycle (i.e., MY2027+) allowing automakers to plan for and implement fleet wide technology changes."

As discussed in the preamble section II.B.3, EPA believes correcting the definitions in a timely manner is important to maintaining the integrity of the off-cycle program. EPA believes it would be a fundamental inconsistency in the program to state that the credits represent real-world reductions and also allow a level of credits that is known not to represent real world reductions. EPA does not believe such an approach is reasonable or appropriate. Off-cycle credits are a voluntary way for manufacturers to generate credits but the use of those credits offsets two cycle emissions reductions that would otherwise be required, and as such EPA believes it is critical for the off-cycle program to provide real world emissions reductions. Allowing manufacturer to continue to use the original definitions out into the future despite the known issues with the definitions is inconsistent with the intent of the off-cycle program. In response to lead time concerns, EPA believes the flexibilities provided in the final rule are sufficient to address lead time concerns without continuing to provide off-cycle credits known to not reflect emissions reductions consistent with the menu credit level provided. In addition, manufacturers don't necessarily need to redesign their systems to generate off-cycle credits for configurations not meeting the revised definitions. Manufacturers would, however, need to pursue those emission reductions through the other program pathways which require the manufacturers to demonstrate the emissions reductions of the systems.

Several manufacturers recommended that some lower level of credits should be provided to technologies meeting the original definitions. Most commenters did not provide recommendations on appropriate credit levels or data on which to base the credit levels. JLR suggested a methodology for a revised credit level for passive cabin ventilation based on an NREL study. JLR commented that EPA should use an estimate based on a sunroof open with and without the cabin vents open. EPA does not believe the suggested approach is reasonable because no data is presented on the current technological approach used by most manufacturers of opening the vents without the sunroof or windows open. Most heat is escaping through the sunroof and opening the vents helps facilitate that process by allowing an additional avenue for air to enter the cabin. This methodology provides no insight on the benefit of only opening the vents. Stellantis commented that their designs "provide a GHG benefit" and provides information on their current systems, discussed in more detail below. Stellantis did not attempt to correlate the operation of their systems to the menu credit levels for each technology and also did not quantify a different corresponding credit value for their systems. EPA again notes that manufacturers can pursue credits for their systems through the other pathways available in the off-cycle program if they are able to provide data to support their requested credit levels consistent with the regulations. If EPA receives sufficient information in the future for other technological approaches, it may consider adding new menu credits for those technologies through rulemaking.

ITB commented that passive cabin ventilation has been shown to provide value, but less than the current menu credit, referring to an NREL presentation (NREL Presentation 17TMSS-0056). The NREL presentation estimates a benefit for passive cabin ventilation of 0.2 g/mile, or roughly 10 percent of the menu credit level for passive cabin ventilation. EPA would need to investigate further how this credit estimate was derived and believes it would be appropriate to consider making any further revisions for menu credits through a notice and comment rulemaking to allow stakeholders an opportunity to provide input. However, EPA believes the NREL presentation does illustrate the differences between the menu credit for passive cabin ventilation and the approaches manufacturers have generally used to date to claim those credits and further supports EPA's basis for updating its passive cabin ventilation menu definition. In addition, the presentation cited by ITB is also cited by other commenters who note that it draws into question the menu credit level for active cabin ventilation. Again, EPA would need to consider the study further and propose any necessary changes to the menu credit for active cabin ventilation through additional rulemaking.

EPA also received comments that EPA should consider the real-world benefit of technologies "stranded" by the definition changes. ITB commented, for example, that technologies have been developed and applied based on the original definitions and they should have a place on the menu commensurate with the verifiable real-world benefit the technology provides. Similarly, Stellantis commented that technologies meeting the original definitions all lower GHG emissions in the fleet and those GHG benefits they provide are threatened by the agencies' proposal to immediately revise technology definitions. However, commenters did not provide data demonstrating the real-world emissions reductions of these technologies. Manufacturers wishing to claim credits for non-menu technological approaches may develop data and apply for credits for these technological approaches through the other off-cycle credits pathways.

Also in response to comments regarding technologies being "stranded", manufacturers have already generated credits over multiple model years for these technologies, as the menu credits were first available starting in MY 2014, and so manufacturers have generally had a significant opportunity to claim credits under the original definitions, and will continue to do so through MY 2022. Also, often manufacturers have made only minor or no adjustments to system already in place in order to claim the menu credits, representing only minimal resource investments. For example, for passive cabin ventilation, manufacturers generally only made software changes to ensure that vents were opened when the vehicle was turned off in warm weather. In fact, Stellantis, during the discussions with EPA about their passive cabin ventilation technology indicated that the approach they were seeking credit for was already generally used across their products before the GHG credit was even available but not for any heat removal benefit but instead for control of objectionable odors from the air conditioning evaporator behind the dashboard when the car is parked in hot weather. EPA confirmed with NREL that this technology was already present in the baseline vehicle study they performed before the modifications were made in support of the credit value and therefore was not believed by NREL to be an improvement from vehicles already in production at the time of the study. It was not EPA's intent that the menu credits would be available indefinitely without change. In fact, EPA continually has sought to ensure that credits represent real world reductions within the program structure. The regulations established in the 2012 rule specify that EPA may request data, engineering analyses, or other information that supports a manufacturer's use of the menu credits (see 40 CFR 86.1869-12(b). Manufacturers were encouraged and expected to review the technical materials in the TSD used to support and justify the technology approach and credit size when they were unclear or had insufficient understanding of the regulation description and goals when considering whether their technology approach satisfied the program intent.

Stellantis commented also that “the current technologies have provided GHG benefit that were quantified in previous rulemakings.” In response, when EPA estimated menu credits for these technologies as part of the 2012 rule, the estimates were based on technological approaches consistent with the revised definitions rather than the original definitions.[27] Therefore, EPA does not agree with Stellantis’ characterization. The intent of the 2012 rule definitions was clear and we expected that the technologies would be implemented as specified but in practice there has been substantial confusion and the agency realized in discussions with manufacturers that their interpretation is not meeting the program goals. Therefore, we are revising the definitions to make clear the types of systems that are deserving of the actual menu credit value. In the 2012 rule proposal, EPA clearly indicated that in the case of active engine and transmission warm-up, the technology must source the waste heat from areas not historically considered a viable source of heat in order for the technology to achieve the substantial credit value. The only source of waste heat would typically only be available in the exhaust leaving the engine and essentially released into the atmosphere as unused heat energy. In response to comments and as a flexibility in the 2012 final rule, EPA finalized the ability to use a liquid coolant based loop instead of just the exhaust based heat exchanger approach described in the proposal, however it was premised on the idea that it would harness only unused waste heat and not take the heat already part of the existing internal coolant system design used to warmup up the engine, a fundamental design aspect of every liquid cooled internal combustion engine. The existing internal engine cooling design and the natural transfer of heat to the coolant and oil is inherent and fundamental to all engine designs and the agency believes already fully captured over the 2-cycle tests in addition to not being considered a technology that results in additional off-cycle benefits. Further, using the existing internal engine cooling system without attempting to harness additional lost heat energy does not accelerate the warm-up of the engine oil or the transmission oil from what was already occurring. Accelerating the engine and the transmission warm-up results in the ability to operate the engine at a more efficient fuel air ratio and/or allows the transmission to use more gear and torque convertor options sooner, particularly in colder conditions, is fundamental to this credit size.

Stellantis further asserted that “we have proven the technology under the existing definitions provide GHG benefits and therefore should retain credit. EPA has reviewed the analysis submitted by Stellantis and found that with respect to their previous claim for their passive cabin ventilation technology, while it may provide a release of a small amount hot air when the cabin pressure exceeds the air pressure outside the vehicle, it does not move cooler outside air into the

[27] See “Joint Technical Support Document: Final Rulemaking for 2017-2025 Light-duty Vehicle Greenhouse Gas Emission Standards and Corporate Average Fuel Economy Standards for the Final Rule,” EPA-420-R-12-901, August 2012, for further information on the definitions and derivation of the credit values. See also the discussion in section II.B.3.iii of the preamble for this MY 2023-2026 final rule.

cabin and purge the hot air out of the cabin in any appreciable amount, something that is required to justify the credit size in the agency supporting documentation in the 2012 FRM. For clarity, the regulatory definition states that the technology must create and maintain convective airflow through the cabin by keeping the windows or sunroof open to prevent excessive interior temperatures when the vehicle is parked and getting direct sun loads. This helps prevent a build-up of heat in the interior air and related components (seats, dashboard, etc.) over the time period that the vehicle is soaking with sun loads in temperatures, where it can be expected that the operator will be requesting cabin cooling on subsequent operation therefore reducing the air conditioning loads on the engine or electrical system. This is a technology description capable of achieving benefits consistent with the menu value and feasible in vehicles particularly considering some manufacturers are already implementing or considering this approach. For this reason, EPA proposed and is finalizing a revised definition to more precisely match the intent of the original rule and to justify the menu credit value.

Stellantis commented that the 15 g/mile cap will be difficult to reach with the new definitions in effect. In response, off-cycle credits remain an optional compliance flexibility and no manufacturer is required to use them. Under the menu-based program, EPA does not review manufacturer's menu credit claims but instead relies on the manufacturer to review the technology definitions in §86.1869-12(b)(4) along with the agency descriptions and supporting analysis in the technical support documentation to ensure that they meet the off-cycle technology definitions. It is the responsibility of the manufacturer to ensure that their technology meets both the definition in the regulations and the performance described in the technical support documentation for the off-cycle technology which they are claiming credit.[28] Occasionally, manufacturers have requested assistance when they have questions as to whether their technology approach or implementation meets the description in the regulatory language. The finalized changes to the definitions are to address this significant concern regarding the regulatory descriptions for these three off-cycle menu technologies and provide clarity for all manufacturers going forward. EPA continues to believe the standards are appropriate with the revised definitions in place.

Nissan commented that the off-cycle credits program should remain in place into the future and should not sunset. DENSO similarly commented that it supports the continuation and expansion of the off-cycle program and they "strongly encourage both EPA and NHTSA to also recognize the important contribution the off-cycle program makes to the overall goals of the regulations." Other commenters, including CBD et al., recommended that the program be revised, further constrained, or ended. Regarding the future of the off-cycle credits program beyond MY 2026, EPA plans to evaluate all aspects of the off-cycle program for MYs 2027 and later through a future rulemaking to ensure the goals of real-world emission reductions are being achieved.

[28] 40 CFR 86.1869-12(b) provides that EPA may EPA may request data, engineering analyses, or other information that supports a manufacturer's use of menu credits.

Hyundai commented that it requests that EPA allow manufacturers to pursue approval of menu items using the alternative (public) method when those automakers have data which proves the benefits of their technology exceeds the amount provided by the menu. Hyundai also requested, "for transparency, that EPA clarify and preferably quantify the statement 'new technology that represents an advancement compared to the technology represented by menu credits – that is, by providing significantly more emissions reductions than the menu credit technology – would be eligible for the other two pathways.' If EPA quantifies the word 'significant' this would serve as a guide for manufacturers to the appropriate approval path." Similarly, ACEEE commented that EPA should clarify what a significant reduction in emissions is in order to determine eligibility for off-cycle menu technologies for other credit pathways. ACEEE proposed a definition of at least 1g/mi greater than those currently assigned by the menu. In response, EPA agrees that if a manufacturer can demonstrate that its technology represents a material improvement on a menu technology and can demonstrate an emissions benefit for those improvements beyond the menu credit level, manufacturers can apply for credits through the public pathway. EPA does not believe it should establish a quantitative cut point, but qualitatively, EPA must be able to discern a clear step change in technology improvement with a clearly demonstratable emissions reduction benefit beyond the menu credit level. At this time, EPA prefers not to establish a quantitative cut point such as the 1 g/mile suggested by ACEEE which may be reasonable for some technologies but not appropriate for others. EPA staff expects to work with manufacturers if questions arise regarding the implementation of these provisions.

Tesla commented against expanding off-cycle menu credits, commenting that it "creates asymmetry in the regulation favoring ICE vehicles, diverts R & D investment away from the best emissions reduction technology of electrification, and unnecessarily weakens the stringency of the standard." Tesla commented that its previous analysis has shown that manufacturers will increase reliance on off-cycle credits and divert investment and deployment away from the most efficient vehicle technologies. Telsa commented further that extending and expanding these credit rewards old technology and, to the extent new technologies are deployed to generate off-cycle credits, focuses critical R & D budgets on tweaking legacy ICE platforms rather than directing these budgets to electrification and greater emissions reductions. In response, ICE vehicles will continue to be a large portion of the fleet for several years during the transition from ICE vehicles to EVs and other advanced technology vehicles. EPA expects that off-cycle credits will remain an important avenue for emissions reductions, at least for the MYs covered by this rule. EPA does not believe there is significant asymmetry favoring ICE vehicles associated with EPA's proposal since EVs can generate menu-based credits in cases where EVs are equipped with menu technologies. Also, any asymmetry due to some menu technologies being ICE vehicle specific and not applicable to EVs such as active engine warmup, is at least somewhat offset by the availability of EV multiplier credits which are not available to ICE vehicles.

JLR proposed that EPA include an option for manufacturers to remain at the 10 g/mile (lower) cap with the original technology definitions up to and including MY 2025. JLR commented "this is required as, for technologies which involve significant changes to the vehicle to meet the new definition such as active transmission warm up, there must be a longer lead time for manufacturers to adapt to this change in the regulation." In response, EPA is not including such an option because EPA believes it is important to implement the revised definitions as soon as possible to help ensure emissions reductions, as discussed above.

Regarding AVE comments that off-cycle credits distort the marketplace and it supports EPA moving away from such incentives, the commenter did not elaborate on how off-cycle credits may distort the market. The off-cycle credits program is an optional program for auto manufacturers which provides additional technology choices in meeting the GHG standards; therefore EPA does not believe that the off-cycle credits program distorts the market.

Revised Definitions

With regard to the proposed revised definitions themselves, rather than their implementation, EPA received relatively few comments. Some commenters generally supported updating the definitions. Ford commented that it understands EPA's rationale for revising the definition for passive cabin ventilation. JLR similarly commented that it understands the EPA's proposal to change the requirements around passive cabin ventilation and active transmission/engine warm up. ITB and Gentherm commented that in principle, they agree that menu definitions should be supported by representative data. MEMA also noted conditional support for the revised definitions. UCS commented that it strongly supports EPA revising the off-cycle menu definitions for these technologies, and that it concurs with EPA that any manufacturers seeking credit for technologies that do not meet this revised definition must do so through the public comment process. EPA appreciates this general input regarding the proposed definitions.

Ford and Stellantis raised issues regarding the modification of the passive cabin ventilation definition being based on ventilation through opening windows and/or a sunroof. As noted above, these credits are optional, and manufacturers are not required to use them if they do not have a technological approach they believe to be workable. However, the menu credit level is based on and consistent with cabin temperature decreases associated with opening a sunroof or window to allow hot air to escape, as discussed above. We disagree with Stellantis and other comments that redefining these credits makes the GHG program more stringent. Stellantis states in their comments that they do not believe that the original technology approach by NREL is feasible in their vehicles. However, that approach was the basis for the passive ventilation credit in the original GHG program TSD. The agency believes the proposed and finalized update to the technology description with slight modifications from the original NREL approach in this new rule will provide clear and feasible design approaches that can be readily adopted with minimal or no hardware changes, and will better reflect the intent of the Agency in its original design goals for this off-cycle technology. The definition modifications were necessary to address significant confusion expressed from many manufacturers when attempting to implement some menu-based technologies while also clarifying the original off-cycle design requirements that were the foundation for the credit size. In fact, even with the proposed changes to the definitions for improved clarity, Ford recommended some additional slight changes to the revised definition of active engine and transmission warm-up to further define the technology design criteria expectations for these credits. Upon review of those recommendation, EPA is adjusting the definitions to more closely align with the recommendations from Ford but still maintaining the original design goals for these off-cycle technologies to achieve the expected GHG reduction.

The active engine warm-up description will not require the liquid cooled exhaust manifold based design to be segregated from the engine cooling loop. Similarly, the active transmission warm-up system using the liquid cooled exhaust manifold as the source of heat will not be required to be segregated from the engine coolant loop, although it must continue to be on a loop that is not shared with other heat extracting devices (ie, interior heating) and must allow immediate heat extraction following the start of the engine, consistent with an exhaust gas waste heat extraction design and the original basis for this credit size. Therefore, EPA is finalizing the revised definition as proposed with the exception of these slight changes to the active engine and transmission warm-up technologies. For technologies not meeting the revised menu definition, manufacturers may seek off-cycle credits for other approaches through the other off-cycle pathways.

9. Air Conditioning System Credits

Commenters Included in this Section

Alliance For Automotive Innovation
Chemours Company (Chemours)
DENSO International America, Inc. (DENSO)
Gentherm, Inc.
Honeywell
ITB Group, Ltd. (ITB)
Motor & Equipment Manufacturers Association (MEMA)
Nissan North America, Inc.
Stellantis
Union of Concerned Scientists (UCS)

Commenter: Alliance For Automotive Innovation

Auto Innovators recommends that EPA not cap credits for off-cycle electrical load-reducing technologies in MAC systems under the air conditioning ("A/C") efficiency technology menu.

Automakers and suppliers continue to develop technology innovations that reduce electrical energy consumption from various on-vehicle devices. Reductions in electrical energy consumption reduce GHG emissions and fuel consumption associated with alternator load (i.e., electrical generation). Such innovations also reduce stored energy consumption in EVs, improving range and reducing upstream power plant emissions. Whether the electrical load reductions occur in computer modules, electrical actuators, fans, entertainment systems, lights, A/C system clutches, or other areas, the effect is the same – a watt of reduced electrical load provides the same emission and fuel consumption savings benefits by reducing alternator mechanical power consumption.

Recently, EPA has considered alternative method off-cycle credit applications for several electrical load-reducing technologies in MAC systems. These include technologies that reduce A/C compressor clutch electrical (as opposed to mechanical) power consumption76 and brushless fan motors.77 EPA has taken the position that because the electrical load reductions are occurring in the A/C system, credits approved for these technologies should be included under the credit cap on the A/C system efficiency menu (40 C.F.R. 86.1868-12(b)). In developing the credit values for the A/C efficiency menu, EPA did consider improvements to A/C blower motor controls to limit wasted electrical energy. However, improvements to blower and fan motors themselves were not considered for the A/C efficiency credit menu, nor were they included in the research studies EPA relied upon in its determination of the maximum amount of A/C operation-related emissions that could be reduced. Similarly, improvements in A/C system compressor clutch designs to reduce electrical energy consumption were not considered.

Electrical load reductions have the same effect on emissions and fuel consumption regardless of what system they are found in, and were not fully considered by EPA in establishing an estimated maximum emissions benefit for A/C system efficiency improvements. Therefore, Auto Innovators recommends that EPA exclude new electrical load reducing technologies from the A/C efficiency menu credit cap.

Consumer education programs Additional consumer education and advertising campaigns can help promote the purchase of EVs. [EPA-HQ-OAR-2021-0208-0571-A1, p. 6]

Air Conditioning Efficiency Technology Credits. EPA provides credits for technologies that improve the efficiency of air conditioning systems.88 Auto Innovators provides the following recommendations to improve implementation of these credits. If such changes cannot be made in the present rulemaking because they were not formally proposed, EPA should indicate in the final rule what changes it may consider in the future and act expeditiously to propose those changes as soon as possible.

The cap on A/C efficiency technology credits should be increased commensurate with more recent data from the National Renewable Energy Laboratory and the inclusion of thermal control technologies.

The basis for predefined A/C efficiency technology credits was EPA’s estimate of the total fuel usage from light-duty mobile air conditioner usage in the U.S., which EPA estimated to be 14.3 grams CO2 per mile, or 3.9% of total national light-duty vehicle fuel usage. 89

The technologies identified for predefined A/C efficiency credits and the percentage efficiency improvement estimates for these technologies came primarily from the Improved Mobile Air Conditioner (“IMAC”) industry-government Cooperative Research Program conducted through SAE International. IMAC was a partnership between EPA, DOE and 28 corporate sponsors, which published its final report in 2007. The IMAC program demonstrated an improvement of 36.4% in MAC efficiency using best-of-the-best designs at the time for these technologies on a test vehicle, compared to a baseline MAC system using a defined list of typical technologies in production at that time, such as a fixed displacement compressor.90

EPA estimated from the IMAC work that a 40% reduction in emissions was possible when employing the A/C efficiency menu technologies in the study. That reduction equates to a 5.7 g/mile CO2 reduction (0.40 X 14.3 g/mi CO2), which then became the capped credit value for employing the technologies on the A/C efficiency menu in the 2010 rulemaking for MY 2012-2016 vehicles.91 The cap was modified for MY 2017 and later vehicles to separate caps for passenger cars and light trucks. The cap for predefined A/C efficiency technologies for MY 2017 and later is currently 5.0 g/mile for passenger cars and 7.2 g/mile for light trucks.92 [EPA-HQ-OAR-2021-0208-0571-A1, p. 26]

EPA based its MAC efficiency credits on estimates of each technology’s percentage impact on the total fuel usage by vehicle air conditioner systems in the U.S. However, EPA’s 14.3 grams CO2 per mile estimate of baseline air conditioner energy usage (3.9% of total light-duty fuel consumption) was well below the estimates of others, such as researchers from the National Renewable Energy Laboratory (over 6%), as well as longstanding benchmarks used by industry.

This baseline used by EPA, which was as low as half the baseline MAC energy usage estimated by the other major sources, resulted in MAC efficiency credits and an associated credit cap that are far below the actual real-world fuel savings and CO2 reductions that are resulting from these technologies.

More recent estimates of baseline U.S. energy usage for light-duty vehicle air conditioners, using updated and refined models, have continued to significantly exceed the EPA baseline. In a series of studies released in 2017 by scientists from the National Renewable Energy Laboratory, the baseline MAC energy usage was calculated as 30.0 gallons of gasoline per vehicle per year, equivalent to 23.5 grams of CO2 per mile.93 The updated estimate from NREL of 23.5 grams CO2 per mile is 64% greater than the EPA baseline of 14.3 grams CO2 per mile.

The underestimated EPA baseline for MAC energy usage also impacts the credit caps and credit amounts in the off-cycle credit provisions for thermal control technologies, such as solar reflective paint, solar reflective glass, ventilated seats, and active or passive cabin ventilation. These thermal control technologies should ideally have been analyzed and administered in combination with the MAC efficiency technologies from the earliest stages of the light-duty GHG regulation, since they both address energy usage to power the air conditioning system.

Auto Innovators therefore proposes that the MAC indirect credit caps and the thermal control technology off-cycle caps be combined, and that the two lists of technologies be administered under a single set of caps. We further propose that the combined set of caps should be revised to reflect a 64% higher baseline energy usage for air conditioner energy, as shown in Table 1. [Table 1 can be found on p. 28 of Docket number EPA-HQ-OAR-2021-0208-0571-A1]. [EPA-HQ-OAR-2021-0208-0571-A1, p. 27]

There are additional reasons to consider raising the cap on A/C efficiency credits. EPA describes in its proposal to increase the off-cycle credit menu cap that the headroom under the cap has closed significantly for some manufacturers.94 Similarly within the A/C efficiency credit program, some manufacturers have already reached the cap and are no longer able to receive credit for improving their A/C systems further. Manufacturers on average were at 84 percent of the cap in MY 2019.95 This can lead to manufacturers eliminating or avoiding A/C efficiency technologies that put them beyond the cap, as well as suppliers losing incentives to develop new A/C related technologies with real-world benefits. Manufacturers are less likely to invest resources for implementing technologies on vehicles that have already achieved maximum credits.

EPA also mentions that expanding the number of technologies on the off-cycle credit menu without modifying the cap (such as the inclusion of high-efficiency alternator technology) creates additional difficulty for OEMs to get credit due to the limitations of the credit cap.96 The A/C efficiency menu has also been expanded recently (i.e., high-efficiency compressor). In addition to the A/C efficiency menu expanding, the EPA has applied the A/C system efficiency menu credit cap for all A/C efficiency technologies approved under the alternative method off-cycle credit program. In some cases, said technologies provide an electrical efficiency benefit to the vehicle, but are counted toward the A/C efficiency cap because they are part of the A/C system. Inclusion of such technologies under the predefined A/C efficiency technology menu cap leads to additional constraints, further deterring manufacturers from making continuous improvements.

For the reasons listed above, it is reasonable to also increase the credit cap on predefined A/C efficiency technologies.

If the A/C efficiency (or combined A/C efficiency and thermal control technologies) menu credit cap is increased, EPA should not use this as a reason to further increase standard stringency.

As described above, it is unlikely that any given manufacturer will fully utilize all potential flexibilities. Increasing standard stringency under the assumption that every manufacturer will fully utilize every flexibility ultimately results in a de facto requirement to either use that flexibility or commit to even higher levels of fuel economy technologies.

The Life-Cycle Climate Performance ("LCCP") Model (SAE J2766) should be recognized in regulation or guidance as a core method for determining the benefit of new A/C efficiency technologies that are not on the predefined list.

The LCCP model was developed in 1999, building on the work done by Oak Ridge National Laboratory in developing the Total Equivalent Warming Impact ("TEWI") metric. The model was jointly developed for mobile air conditioning use by GM, SAE, EPA, and the Japanese Automobile Manufacturers Association ("JAMA") to become the Global Refrigerants Energy and Environmental-Mobile Air Conditioning-Life Cycle Climate Performance ("GREEN-MAC-LCCP"). GREEN-MAC-LCCP is a spreadsheet-based emissions estimator that accounts for climate data from around the U.S. and A/C system performance and efficiency data of comparative systems per SAE J2765. SAE developed the J2766 standard that the auto industry uses to estimate MAC emissions today.

The LCCP model considers the variables influencing A/C system operation on an aggregate level, focusing on population centers across the country. Emissions levels are determined by averaging conditions and distribution of vehicles across the country. A key benefit of the LCCP model is that it considers factors influencing MAC operation and can be run from a spreadsheet. Special expertise is not needed, and the SAE specification walks the user through the inputs. A new version of the LCCP model, the IMAC-GHG-LCCP model, has also been developed that is easier to use and has updated climate and usage data and expanded system capability.

Multiple EPA-approved alternative off-cycle credit methodologies have relied on the LCCP including applications associated with Denso SAS high-efficiency compressors (which eventually formed the basis for EPA's standardized indirect air conditioning credit for high-efficiency compressors) and Toyota "S-Flow" technology.

The IMAC-GHG-LCCP model is currently undergoing further updates to include enhancements for EVs including vehicles with heat pumps. In addition, updates and improvements suggested by EPA are planned. The original LCCP model development was a collaboration that included EPA. EPA involvement and input to reach an agency-industry consensus in the current update is requested.

A/C technologies granted credit under an alternative method for generating off-cycle credit should not be subject to the A/C efficiency technology menu credit cap if additional benefits are demonstrated.

The off-cycle credit alternative method is a means by which manufacturers can demonstrate the off-cycle emissions benefits of technologies not included in the predetermined list, or by which manufacturers can demonstrate additional benefits beyond those estimated in the predetermined list. This approach should hold whether the technologies are A/C efficiency related or not. However, EPA has instead made all A/C technologies approved under the off-cycle alternative method subject to the cap on the A/C credit menu, regardless to the benefits demonstrated, under the premise that the cap represents the maximum degree of emissions that can be reduced from A/C system operation.

As we describe above in our request for EPA to increase a combined thermal control and A/C system efficiency cap, more recent studies have demonstrated that greater emissions reductions are possible than those first estimated by EPA in its development of the A/C efficiency cap. Of even greater import, manufacturers have demonstrated additional emission benefits for some A/C efficiency technologies even on vehicles that already included enough other technologies from the predetermined list to be constrained by the cap. Table 2 provides several examples where additional emissions benefits were demonstrated beyond the cap.

We therefore recommend that A/C technologies granted credit under an alternative method for generating off-cycle credit should not be subject to the predefined A/C efficiency technologies credit cap if additional benefits are demonstrated. [EPA-HQ-OAR-2021-0208-0571-A1, p. 28-30]

Credits for Reducing Leakage and Impacts of Air Conditioning Refrigerant. Auto Innovators agrees that if EPA were to remove A/C refrigerant-related credits from the program, the standards would need to be adjusted to reflect their elimination.

EPA notes that A/C refrigerant-related credits were accounted for in setting GHG standards, making them more stringent, and if they were removed, the standards would need to be adjusted or increased to reflect their elimination.

In late 2020, the American Innovation and Manufacturing Act ("AIM Act") was signed into law, requiring a general phasedown in the use of hydrofluorocarbons ("HFCs") in the U.S. EPA recently finalized a rule for the allocation and trading of production and consumption allowances. Furthermore, a group of stakeholders has petitioned EPA to reinstate Significant

New Alternatives Policy ("SNAP") rules 20 and 21 under the authority of the AIM Act. If granted, HFC use in new light-duty vehicles would be prohibited.

Similarly, the State of California is considering a prohibition on the use of high-GWP refrigerants (which include HFC-134a) in new light-duty vehicles as part of its ACC2 rulemaking.

If HFCs or high-GWP refrigerants in general are prohibited from use in new light-duty vehicles under state or federal law, there may be calls for EPA to eliminate the credits for reducing leakage and impacts of air conditioning refrigerants. Auto Innovators agrees with EPA that if these credits were eliminated or modified, the standards would need to be adjusted to reflect such changes. Not doing so would result in a change in stringency not considered when the light-duty vehicle GHG standards were set. [EPA-HQ-OAR-2021-0208-0571-A1, p. 32]

95 Calculation by Auto Innovators based on data from 2020 Trends Report (supra note 32), Figure 5.10 (MY 2019 A/C credit data), Table 5.13 (passenger car production), Table 5.15 (light truck production) and 40 C.F.R. § 86.18686-12(b) (credit caps).

Commenter: Chemours Company (Chemours)

In 2010, 2012 and 2020, the EPA promulgated light duty vehicle ("LDV") regulations that included incentives for automakers to increase the efficiency of MVAC refrigerant systems and support the transition away from HFC-134a refrigerants. In the current rulemaking effort, EPA has proposed to keep these provisions intact and to encourage the use of alternative refrigerants like HFO-1234yf within the stringency of the GHG emission standards for Model Years ("MYs") 2021- 2026. Chemours supports these elements of the proposed rule and would note that other vendors to vehicle manufacturers also have a substantial interest in continuing the transition away from the use of HFC-134a. [EPA-HQ-OAR-2021-0208-0232-A1, p. 2]

EPA should address the use of HFC-134a in vehicle segments other than LDVs. Specifically, EPA should take further action to address HFC use in the medium- and heavy-duty market segment. Chemours is not aware of any substantial technical or economic issues that would preclude EPA from implementing a credit system approach in this market segment similar to the approach utilized for LDVs. • Separately, EPA should also pursue actions that would either "reinstate" previous CAA rules to de-list HFC-134a for use in "MVAC" systems or utilize new legal authority to accomplish the same result. Such action may be taken in parallel with EPA's proposed approach to current MVAC leakage and equipment credits. [EPA-HQ-OAR-2021-0208-0232-A1, p. 3]

EPA Should Finalize Regulations that Retain MVAC Leakage and Equipment Credits. A/C Credits are Necessary to Preserve Transition to HFC- 134a Alternatives. The Transition to Low-GWP Refrigerants is Ongoing. While LDV manufacturers have continued to move towards adoption of low GWP alternatives over the last decade, a full transition is not yet complete and therefore, EPA should retain credits for the full MY 2022-2026 period and beyond. Information in the administrative record for the rule indicates that use of low-GWP refrigerants expanded between MY 2013 and MY 2019. EPA notes that "[f]ive manufacturers have implemented HFO-1234yf across almost their entire fleets, with eight additional manufacturers exceeding at least 50% adoption of HFO-1234yf."2 Another six manufacturers have apparently adopted low-GWP refrigerants in at least some of their fleet.

This broad adoption of low-GWP refrigerants is encouraging, but it is evident that the transition to such refrigerants is not complete, nor is there a firm projection as to when a full transition will occur. One reason for this situation is that there are currently no federal requirements that prohibit a vehicle manufacturer from using HFC-134a or another high-GWP refrigerant or blend in newly-manufactured vehicles. Regulations previously promulgated by EPA to disallow use of high-GWP refrigerants in LDVs are not in effect and, thus, there is no external "forcing mechanism" that sets a firm date by which all new vehicles must utilize low-GWP refrigerants.

A major reason for this situation stems from litigation. Specifically, when EPA conducted its Mid Term Evaluation of the 2012 LDV rule in 2016, the Agency presumed that changes in HFC-134a emissions would occur through MY 2021 "at which point the use of HFC-134a in new vehicles [would be] prohibited under the Significant New Alternatives Policy (SNAP)."3 At the time, EPA expected that HFC134a would "be entirely replaced by refrigerants with lower GWPs by model year 2021."4 But this accelerated transition away from HFC-134a did not occur given the D.C. Circuit Court's 2017 decision in Mexichem Fluor v. EPA5 additional litigation on another SNAP rule,6 and subsequent rulemaking by the Agency.

Specifically, in 2018 EPA issued a rule indicating that the Agency would not apply the HFC "de-listings" promulgated in 2015 and 2016 (including de-listings that would have precluded use of HFC-134a in new MVACs) under SNAP.7 This rule thus eliminated any "forcing mechanism' that would drive the transition from the use of HFC-134a to lower-GWP refrigerants in new MVAC units. While a subsequent decision in 2020 by the D.C. Circuit Court vacated the 2018 rule,8 as of the date of these comments, the extent to which Mexichem I or the subsequent unpublished decision in Mexichem II applies or does not apply to refrigerants used by MVACs has not been further clarified by EPA.9

Therefore, EPA should recognize that the planning for a transition away from HFC-134a has been disrupted over the last several years given the uncertainty with regard to how long HFC-134a would be allowed to be used in new MVAC systems. Within this rulemaking, then, EPA should at minimum retain the status quo and extend the availability of MVAC credits for new refrigerants (generally referenced as "leakage" credits) throughout the full period of time that the new rule will remain in effect. EPA should also retain A/C equipment credits which complement the transition to high-efficiency, low-emissive MVAC systems using low-GWP refrigerants.

Manufacturers Still Require Time to Transition to Low-GWP Refrigerants. Similar to other "off-cycle" credits, credits for air conditioning ("A/C")10 allow flexibility for manufacturers to adopt new technologies when it makes the most economic sense for a specific vehicle and/or their entire fleet of vehicles, e.g., when models are undergoing periodic redesign or when entirely new vehicles are being developed and produced. And, as EPA has recognized, planning horizons for vehicle manufacturers generally extend out for five years on average.11 EPA has observed that “approximate trajectory” of these plans for new vehicles will tend to remain in place after they have been established and that vehicle designs utilize a multi-year process for both development and execution.12

In this regard, A/C credits have been available to manufacturers since the 2012 MY and were retained through rulemaking to extend into the production of vehicles through the 2025 MY. A/C credits have been successful in incentivizing many original equipment manufacturers (“OEMs’) to adopt low-GWP refrigerants across many different types of models of LDVs, even while the degree to which each OEM has adopted low-GWP refrigerants has varied.13 While Chemours is not privy to the product plans of OEMs, it is reasonable for EPA to retain A/C credits on the basis that these credits are likely to be part of current OEM product plans for the MYs addressed through this rulemaking. While specific information on product plans is not available, it would seem clear that, having been promulgated in 2010 and retained in 2010 and 2020, OEMs have relied on A/C credits in planning for the overall composition of their fleets. This reason alone would caution against EPA taking any effort to disrupt what may be viewed as settled expectations.

Other Regulatory Programs Are Not in Place. In late 2020, Congress approved the American Innovation and Manufacturing Act (“AIM Act”)14 and EPA is currently in the process of promulgating regulations to address the requirements of this law in 2022-2023.15 These rules, when adopted in final form, will implement provisions of the AIM Act providing for an overall cap on HFC emissions, implemented through an allowance program that constrains production and consumption of HFCs. As proposed, however, EPA’s rules for 2022-2023 would not specifically affect the use of HFC-134a in MVAC systems. Rather, producers and importers of HFCs will be required to “hold” a corresponding number of annual allowances authorizing the production or import of HFCs.16

The AIM Act, however, does allow for regulations that restrict the use of HFCs in a sector or subsector, and any person may petition the EPA to take such action.17 The EPA is currently in receipt of several petitions related to specific end uses of HFCs, including a request that EPA restrict the use of HFC-134a in MVAC systems.18 The AIM Act, however, provides that no rule promulgated to restrict the use of HFCs may take effect prior to one year after the date on which the Agency promulgates a rule.19 Thus, it is currently uncertain when EPA will propose, take final action and provide for the implementation of a rule that would restrict the use of HFC-134a in MVAC systems or when any such rule would take effect.

Until such time as an actual prohibition on the use of HFC-134a in MVAC systems is in place, – if indeed, that is the outcome of the petitions that EPA will consider following promulgation of a final rule to implement the AIM Act – the use of this refrigerant may still occur. As noted below, prior to such restrictions, it would be possible for an OEM to revert to the use of HFC-134a in some or all of the vehicles it produces. Therefore, retaining current A/C credits can serve as a strong counter-weight to such actions. Particularly when paired with more stringent carbon dioxide gram/mile (“g/mi”) standards for LDVs, retaining A/C credits helps to guard against any “backsliding” in the transition to low-GWP MVAC refrigerants by effectively making standards more stringent for OEMs that chose not to use low-GWP alternatives.

A/C Credits Are Integral to EPA's Proposed LDV Standards. A/C Credits Have Grown in Importance Since MY 2012. EPA has provided for A/C credits since the Agency promulgated its first rules to establish GHG standards for MY 2012 through MY 2016 LDVs.20 These credits have been an important part of EPA's LDV standards and their importance has grown as GHG emission standards have become more stringent. As EPA explained in 2010, "it is important to address A/C direct and indirect emissions because the technologies that manufacturers will employ to reduce vehicle exhaust CO2 will have little or no impact on A/C related emissions. Without addressing A/C related emissions, as vehicles become more efficient, the A/C related contribution will become a much larger portion of the overall vehicle GHG emissions."21

For example, EPA projected in 2010 that fleet-wide compliance levels for passenger cars would be 225 g/mi in 2016 and 298 g/mi light duty trucks in the same year.22 In the same rule, EPA estimated that OEMs, on average, would generate 11 g/mi in A/C credits that could be used toward meeting this compliance level.23 In other words, the percentage of fleetwide compliance that could be attributable to improvements in A/C systems and the use of alternative refrigerants constituted approximately 4.9% and 3.7% of the overall standard for passenger cars and light duty trucks in 2016, respectively.

In EPA's 2012 rule, the Agency projected that fleet-wide compliance in 2025 for passenger cars would be 143 g/mi and 203 g/mi light duty trucks.24 In this same rule, EPA calculated that the maximum A/C credits that would be available would be 18.8 g/mi for cars and 24.24 g/mi for light duty trucks.25 Therefore, the percentage of fleetwide compliance attributable to A/C credits that EPA projected for 2025 was estimated at 13.1% for passenger cars and 12% for light duty trucks. Relative to EPA's 2010 LDV GHG rules, then, the share of compliance represented by A/C credits increased between 267% and 324% over 9 years. In the proposed rule, EPA projects a fleetwide compliance level of 142 g/mi for passenger cars and 199 g/mi for light duty trucks in 2026, meaning that roughly the same percentages calculated above for the 2025 MY would remain26 and that the relative "value" of the credits for compliance will therefore continue to be very significant for OEM fleet compliance.

A/C Credits Do Not "Weaken" Standards. In addition to the relative share of compliance attributable to A/C credits, EPA is also proposing to retain its historic treatment of such credits. Specifically, in the proposed rule, the overall stringency of the standards will "take into account the credit-based emissions averaging, banking and trading flexibilities of the current program as well as additional flexibility provisions [EPA is] proposing to ease the transition to more stringent standards."27 This means that if the Agency were to not continue A/C credits, "the proposed standards would need to be adjusted or increased by the amount of the credit to reflect its elimination from the program."28

Prior to the 2020 Safer Affordable Fuel-Efficient ("SAFE") Rule, this stringency adjustment was reflected by the fact that the National Highway Traffic Safety Administration ("NHTSA") developed its fuel efficiency standards by accounting for improvement in A/C efficiency but not with respect to the use of alternative low-GWP refrigerants.29 Thus, while EPA projected in 2012 that its GHG standards would result in a g/mi standard in 2025 that would be equivalent to 54.5 miles per gallon ("mpg"), NHTSA corresponding standards for 2025 were projected to result in an average range of 48.7 to 49.7 mpg.30 In the SAFE Rule, EPA standards were not presented in the form of equivalent mpg standards but rather the stringency of the EPA g/mile standards did account for projections associated with HFC reductions as well as regulations affecting the emission of other non-CO2 GHGs.31 But under NHTSA's regulatory provisions in the SAFE Rule, manufacturers could not claim CAFE-related benefits (in terms of mpg) for reducing A/C leakage or switching to a refrigerant with a lower GWP.32

Bottomline, the SAFE Rule used different nomenclature; while EPA described A/C credits as an "offset" with respect to anticipated reductions.33 Although the description of the resulting EPA standards was adjusted somewhat, the basis of regarding A/C credits from an EPA regulatory perspective remains essentially intact and the existence of A/C credits did not "weaken" the level of the SAFE Rule as reflected in EPA g/mi standards.

In this regard, it is notable that the historic methodology for determining the relative "value" of A/C credits is robust and verifiable. A/C refrigerant credits utilize the relative GWP of different refrigerants, as determined by values established in climate programs, e.g., IPCC Fourth Assessment Report ("AR4") calculations of HFC-134a versus HFO-1234yf.34 Since the amount of refrigerant used in different MVAC systems is known, this allows for an accurate calculation of CO2 equivalent values which are then used with respect to EPA's g/mile standards.

As discussed in more detail below, however, this level of accuracy in projecting GWP and the resulting climate benefits may not be replicated with respect to other "off-cycle" credits which are based on "research, analysis and simulations, rather than from full vehicle testing."35 In some cases, such credits may be generated based on broadly averaged impact.36 By comparison, the level of accuracy involved in A/C credits measured through relative GWP and the resulting increase in g/mi stringency imposed based on these calculations ensure that the credits cannot be considered to dilute or weaken the proposed standard. Rather, to the extent that vehicle manufactures do not use alternative refrigerants, the relative stringency of g/mi standards that apply to their fleet is increased.

Retaining A/C Credits Avoids Sudden Disruption to LDV GHG Program. As EPA observed during the 2012 rulemaking, "[A/C] credits should continue to the present rule since without them, a manufacturer utilizing credits in MY 2016 could suddenly find in MY 2017 that the stringency of the standards are artificially increased due to discontinued A/C credits."37 This same effect could occur in MY 2023 if EPA fails to continue the A/C credits as it has proposed to do. In fact, vehicle manufacturers would have even less time to make adjustments to their product line than they would have had in the 2012 rulemaking. The 2012 rule was published in the Federal Register on October 15, 2012, leaving approximately four full MYs before the new standards became applicable with MY 2017 vehicles. In contrast, the current rulemaking proposes to adjust g/mile standards from their current levels starting with MY 2023, meaning that if a rule is finalized by the end of 2021 or early 2022, there is effectively less than 1 year available before the standards take effect.

As noted above, OEM vehicle planning horizons extend over many years, with five years being considered to be a "rule of thumb" for fleet projections. The development and manufacture of an entirely new vehicle can take longer. Thus, given the relative short timeframe between the finalization of the proposed rule and when the new standards will take effect, it would also be unreasonable for EPA to eliminate or substantially alter the current A/C credit program.

In addition, while an agency may adopt different approaches to regulation over time, where different approaches from past regulation are pursued, “a more detailed justification” for the changes is necessary given that implementation of the previous policy has “engendered serious reliance interests that must be taken into account.”38 With respect to A/C credits, these interests involve not only OEMs but also companies like Chemours and their suppliers who have developed products to address regulatory requirements and policies that promote the transition away from the use of HFCs in MVAC systems.

Retaining A/C Credits is Consistent With the Regulation of GHGs Under the CAA. In 2009, EPA determined that the “relevant” GHG air pollutant from new motor vehicles and new motor vehicle engines was “the combined mix of six key directly-emitted, long-lived and well-mixed greenhouse gases.”39 In this determination, HFCs were cited as one of the six GHGs that EPA identified as contributing to air pollution that endangered public health and welfare and one of four GHGs that EPA identified as being emitted by motor vehicles.

In every rule promulgated by EPA to regulate GHGs under authority of the CAA since 2009, the Agency has not deviated from considering the “air pollutant” that endangers public health and welfare and the air pollutant to be regulated to be the same six GHGs (including HFCs) despite the fact that a source category subject to regulation may actually emit far fewer individual GHGs.40 In 2010, in the first rule to regulate GHGs from LDVs, EPA noted that it has discretion to adopt separate standards for each of the six GHGs identified in the 2009 endangerment determination and that it was “finalizing separate standards for nitrous oxide and methane and a CO2 standard that provides for credits based on reductions in HFCs, as the appropriate way to issue standards applicable to the emission of the single air pollutant, the aggregate group of six greenhouse gases.”41 Two years later, in the 2012 rule, EPA did not deviate from this analysis nor its legal interpretation of the CAA but indicated that the Agency was “adopting a CO2 tailpipe emissions standard that provides for credits based on reductions in HFCs, as the appropriate way to issue standards applicable to emissions of the single air pollutant.”42

Retaining A/C credits based on HFCs, as translated into CO2e values, is therefore consistent with EPA’s approach to regulating GHGs under the CAA, and specifically, with EPA’s prior regulation for HFCs emitted from LDVs. There is no reason for the EPA to deviate from this past practice in the current proposed rulemaking given that the same methodology has been implemented by the Agency with regard to LDVs for nearly 10 MYs. More importantly, there are substantial legal and policy reasons for EPA to maintain this approach in the current rulemaking.

In Massachusetts v. EPA, the Supreme Court held that “[b]ecause greenhouse gases fit well within the Clean Air Act’s capacious definition of ‘air pollutant’ we hold that EPA has statutory authority to regulate the emission of such gases from new motor vehicles.”43 The court further indicated that once EPA made an endangerment finding for motor vehicles, the CAA requires the

Agency to regulate “emissions of the deleterious pollutant from new motor vehicles.”44 While the Supreme Court later “refined” its interpretation of when EPA must regulate GHGs under the Clean Air Act to encompass those that may be “sensibly regulated,”45 HFCs clearly fall within the zone of GHGs that must be addressed under CAA section 202(a).

HFC-134a has a global warming potential (“GWP”) that is 1,430 times the GWP of CO2 and nearly all vehicles that are produced for the consumer market (and most of the commercial market) contain air conditioning systems.46 As demonstrated over the last decade, technology is readily available to allow MVAC systems to move away from high GWP refrigerants to low GWP refrigerants such as HFO-1234yf. Thus, while EPA may promulgate flexible standards to control GHGs from new motor vehicles, it cannot ignore the substantial emissions attributable to high-GWP refrigerants. EPA should therefore “stay the course” and finalize its proposed treatment of HFCs and A/C credits. Having previously addressed HFCs from MVAC systems in prior rulemakings, EPA lacks rationale for eliminating such regulatory treatment absent a showing that such controls (and resulting stringency of the LDV standards) are no longer needed. [EPA-HQ-OAR-2021-0208-0232-A1, p. 3-11]

EPA Should Take Additional Steps to Address HFCs. Chemours recognizes that EPA has proposed changes to GHG emission standards for LDVs within certain MYs and that a final rule is constrained by what the Agency has proposed and logical outgrowths of a proposed rule.65 At the same time, it is important for EPA to address the full scope of issues concerning the use of high-GWP refrigerants in MVAC systems and thus we would respectfully request attention to the following two issues.

EPA Should Address HFC Use in Medium- and Heavy-Duty Vehicles. EPA last revised GHG standards applicable to medium- and heavy-duty vehicles in 2016.66 These standards are applicable through MY 2027 and provide for compliance based on both direct emission testing of engines and modeling of vehicle emissions using the Agency’s Greenhouse Gas Emissions Model (“GEM”). Within GEM, certain default values are provided for the incorporation of equipment on vehicles (e.g., low-rolling resistance tires, aerodynamics, vehicle and transmission types, certain idle functions, accessories).

With regard to A/C systems, in the first rule EPA promulgated to address GHGs from medium- and heavy-duty vehicles (the 2011 Phase 1 GHG Rule),67 EPA adopted a separate standard for tractor-trailers to reduce leakage of HFC refrigerants from cabin A/C systems. Unlike LDV GHG standards, however, this HFC standard was not “linked” to CO2 tractor standards nor otherwise “creditable” to those standards. Instead, manufacturers were able to select from a list of leak-reducing technologies that EPA considered sufficient to meet the standard. In the 2016 Phase 2 GHG Rule, EPA continued this approach for tractor trailers, while extending the HFC direct emission leakage standards to vocational vehicles.68 EPA also took comment on a provision to allow a manufacturer to “deem” compliance with the leakage standard through use of an alternative refrigerant, but this proposal was not finalized.

A large part of EPA’s rationale for not taking further action with regard to A/C refrigerants in medium- and heavy-duty vehicles has centered on uncertainty with regard to manufacturer adoption of new A/C systems. In 2016, EPA indicated that it was "not aware of any significant development of A/C systems designed to use alternative refrigerants in heavy-duty vehicles."69 If this was a significant consideration in 2016, however, Chemours is not aware of such circumstances existing at the present time. Any technology and economic barriers that exist to the adoption of HFO-1234yf MVAC systems in medium- and heavy-duty vehicles are currently comparable to those previously experienced by LDVs. In other words, Chemours is not aware of technical reasons or cost considerations preventing HFO1234yf systems from being widely used in new medium- and heavy-duty vehicles.70

In the 2016 Phase 2 rulemaking, EPA also noted that it had listed two refrigerants as "acceptable" for use in heavy-duty A/C systems (R-744, HFC-152a) and had proposed to list HFO-1234yf as acceptable in heavy-duty A/C systems subject to use conditions.71 But outside of these actions, EPA did not propose or incorporate any additional provisions related to alternative refrigerants, noting only that transitioning to such refrigerants could be advantageous to vehicle manufacturers for "a variety of reasons, including platform standardization and company environmental stewardship policies."72 In the same rulemaking, however, EPA noted that "[a] transition to A/C systems designed for HFO-1234yf which is more thermodynamically similar to HFC-134a than is CO2 requires less significant hardware changes that typically include installation of a thermal expansion valve and can potentially require resized condensers and evaporators as well as changes in other components."73 In other words, EPA recognized that the technical changes allowing for adoption of alternative refrigerants to HFC-134a varied and could pose significantly less challenges for some refrigerants versus other refrigerants.

While the proposed rule addresses only LDVs, EPA should consider utilizing a credit program for alternative refrigerants/leakage in standards that apply to medium- and heavy-duty vehicles in a manner similar to that utilized in the LDV program. In both the Phase 1 and Phase 2 Rules, EPA incorporated emission models to predict the GHG impact of certain technologies, allowing credits to be generated against an overall standard on this basis. These emission models addressed a variety of different vehicle types given that the medium- and heavy-duty sector is almost entirely commercial and that vehicles are primarily designed to reflect the work that will be required of them. While Chemours recognizes that the situation facing medium- and heavy-duty vehicles is different from LDVs, A/C credits could similarly be integrated into the GEM or otherwise be allowed to generate credits. In doing so, EPA could replicate the success of this approach in the LDV sector and help to incentivize the adopting of alternative refrigerants in medium- and heavy-duty vehicles with much lower GWP values than HFC-134a which remains widely in use today.

EPA Should Proceed Under AIM Act to "Reinstate" Significant New Alternative Program ("SNAP") Rules 20 and 21. Chemours recognizes that this proposed rule is being proposed under the authority of CAA section 202 and that EPA has not proposed to take any action under other authorities available to the Agency to address either ozone-depleting substances or air pollutants that have been considered to endanger public health and welfare due to their effect on climate change.

In conjunction with this rulemaking, however, EPA should actively consider petitions that have been filed with the Agency pursuant to CAA section 112 and/or with respect to new legal authority contained in the AIM Act. Such petitions request that EPA “de-list” HFC-134a in certain end uses, making it unavailable for use in new equipment.

As noted previously, SNAP Rule 20 provided for the de-listing of HFC-134a in newly manufactured motor vehicles, beginning with MY 2021. This rule was partially vacated by the D.C. Circuit Court’s decision in Mexichem I, but the Agency has not proceeded to further consider other rulemaking in this area, even while EPA’s previous rule (to not proceed with any action under SNAP Rules 20 and 21) was also vacated.74 Whether or not EPA has sufficient authority under CAA section 112 to proceed, additional petitions have been filed pursuant to EPA’s authority under the AIM Act to effectuate the same result. Thus, should the Agency believe that it is precluded from acting under CAA section 112, EPA would have additional recourse under the new, independent authority granted by the AIM Act.

EPA should additionally promptly consider pending SNAP petitions with the Office of Stratospheric Ozone Protection that would allow for the use of alternative refrigerants in medium duty, heavy-duty and off-road sectors. As noted above, EPA has not addressed HFC-134a in these sectors even while proceeding to address HFCs in the LDV sector. As a result, medium- and heavy-duty vehicles are still using HFC134a as the primary refrigerant for cabin comfort cooling. Taking further action in this area -- under whatever authority is available to EPA -- will not only help speed the transition away from high-GWP refrigerants but provide needed certainty for equipment manufacturers to plan for, design and test new equipment. [EPA-HQ-OAR-2021-0208-0232-A1, p. 14-17]

Conclusion. As indicated in the comments above, Chemours supports EPA’s proposed retention of A/C credits for LDVs and urges EPA to include these provisions, as proposed, in the final rule. Taking such action is consistent with the Agency’s authority under the CAA, the Agency’s long-standing implementation of the LDV program and accounts for the large beneficial impact of alternative refrigerants in addressing climate change. When EPA originally assessed the impact of A/C program credits in 2008, the Agency projected that an air conditioning refrigerant leakage standard could yield 50 million metric ton CO2-equivalent reductions in 2030, increasing to 70 million metric tons CO2-equivalent in 2040.78 These benefits should be fully realized.

At the same time, Chemours believes that EPA can make improvements to the operation of the A/C credit program. In specific, as noted above, there is considerable information which would indicate that the transition to electric vehicle technology may occur at a much faster rate than EPA is projecting. As a consequence, concurrent incentives for the use of alternative refrigerants such as HFO-1234yf may be diminished, delaying the transition away from HFC-134a or potentially creating some incentive to “switch back” to HFC-134a. EPA should reanalyze how it assesses the relative value of improvements in vehicle GHG performance, including PHEV and EV multipliers and imputed tailpipe emissions, so as to not misalign allowed credits with the goal of achieving broadly sustainable reductions in GHG emissions from the LDV fleet.

EPA should further consider other actions where the transition to alternative refrigerants can be accomplished, most notably through implementation of the CAA section 612 SNAP program and the newly-enacted AIM Act. EPA should promptly consider alternatives to "de-list" HFC-134a in MVAC systems in all on-road and non-road vehicles. And the Agency should consider additional rulemaking to address HFC-134a emissions from medium- and heavy-duty vehicles. The latter action could be accomplished either in the context of a follow-on rulemaking to the Phase 2 Rule or a separate regulatory vehicle amending the Phase 2 Rule. [EPA-HQ-OAR-2021-0208-0232-A1, p. 17-18]

10 These comments will generally refer to "leakage credits" pursuant to 40 C.F.R. §86.1867-12 and efficiency credits pursuant to §86.188-12 collectively as "A/C" credits.

25 77 Fed. Reg. at 62,649. In the 2012 rule, EPA kept the standards for MY 2017 through MY 2025 "generally consistent" with those promulgated in the 2010 rule, but explained that "EPA's GHG standard is more stringent in part due to its assumptions about manufacturers' use of air conditioning leakage/refrigerant replacement credits, which will result in reduced emissions of HFCs." Id. at 62,654.

26 As noted above, EPA retained the A/C leakage credits in the 2012 rule for MY 2017 through MY 2025 LDV GHG standards. 77 Fed. Reg. at 62,628 (Oct. 15, 2012). The SAFE Rule, after initially proposing to eliminate the credits, made no change in the amount of EPA A/C credits available. 84 Fed. Reg. at 24,178 (Apr. 30, 2020). Given the lesser stringency for the SAFE Rule standards in MY 2021-2025 versus the standards promulgated in the 2012, however, the relative percentages of A/C credits also decreased for the years in which the revised standards were in effect. EPA, however, is proposing to effectively restore the stringency of the 2012 LDV standards by 2025 as well as retaining the total allowable adjustment for A/C credits (i.e., 18.8 g/mile for cars and 24.4 g/mile for trucks). 86 Fed. Reg. at 43,748, n. 50.

30 Id. at 62,630. It should be noted that these standards were considered to be "augural" since NHTSA lacks authority to promulgate standards for more than 5 MYs, or for the MY 2022-2025 period covered by EPA rules.

33 Id. at 24,188. EPA and NHTSA also retained the same annual percentage increase in the stringency of the standards (1.5%) albeit EPA's calculated g/mile standard was more stringent to account for the "offset" represented by the effects of using alternative refrigerants and reducing leakage.

34 As noted in EPA's initial 2010 rule, the "A/C Leakage Credits that will be available will be a function of the GWP of the alternative refrigerant, with the largest credits being available for refrigerants with GWPs at or approaching a value of 1." 75 Fed. Reg. at 25,427. EPA has used the GWPs consistent with the 100-year time frame values as expressed in the IPPC AR4 Report. See 77 Fed. Reg. at 62,667, n. 107.

35 77 Fed. Reg. at 62,726. EPA has indicated, however, that it has attempted to derive "conservative" estimates of the resulting emission reductions from such off-cycle calculations. Id.

36 For example, some credits are averaged among many different vehicle types. EPA has included a cap on such credits due to "the uncertainty inherent in using limited data and modeling as the basis of a single credit value for either cars or trucks." 88 Fed. Reg. at 43,762.

40 For example, while EPA promulgated standards to address methane emissions from oil and natural gas production facilities, the Agency defined the "air pollutant" being regulated as the same mix of six GHGs. EPA explained that "this is the same pollutant that is regulated by this rule. However, the standards of performance adopted in the present rulemaking address only one constituent gas of this air pollution: Methane." 81 Fed. Reg. at 35,843 (June 3, 2016). Similarly, when EPA promulgated the first GHG standards to apply to airplanes and aircraft engines, EPA first made an endangerment finding concerning the same six well-mixed GHGs and indicating that it was regulating "the air pollutant that is the aggregate of six well-mixed GHGs" while noting that "[o]nly two of the six well-mixed GHGs – CO2 and N2O have no-zero emissions for total civil subsonic airplanes and U.S. covered airplanes." 86 Fed. Reg. 2,136 2,139 (Jan. 11, 2021).

46 Over a decade ago, EPA observed that "[CAA] section 202 HFC emissions are the largest source of HFC emissions in the United States, that these emissions increased by 274% from 1995 to 2006, and that section 202 sources are also the largest source of emissions of high [global warming potential] gases (i.e., HFCs, PFCs or SF6) in the U.S." 73 Fed. Reg. 44,354, 44,431 (July 30, 2008). Overall, EPA noted that emissions of HFCs from motor vehicles represented the second-highest amount of GHGs emitted from vehicles. Such emissions were 40 times larger than methane emissions from vehicles and over 2 times larger than N2O emissions." Id. at 44,505.

70 Chemours is aware that the structure of the medium- and heavy-duty vehicle industry is different from that of LDV manufacturing. As opposed to LDVs, many different companies may be involved in the manufacture of a medium- or heavy-duty vehicle, including independent vendors and "body builders." But this should not preclude address A/C credits given that EPA has already addressed such issues during the development of the GEM model and the system for certifying medium- and heavy-duty vehicles, which assesses and provides "drop down" menu values for various equipment configurations.

Commenter: DENSO International America, Inc. (DENSO)

A/C Efficiency Credit Program. DENSO supports the A/C efficiency credit program and appreciates EPA continuing the program. We would like to request EPA to propose adjustments to the A/C efficiency credit program similar EPA's proposal for the off-cycle credit program, including increasing the cap on the A/C efficiency program credits.

We ask the agencies to reconsider the application of A/C efficiency credit cap to A/C efficiency technologies approved through the off-cycle petition process. New innovative A/C efficiency technologies continue to be developed. There can be situations where the technology provides additive benefits and incremental improvements to the GHG performance of a vehicle. Therefore, we recommend the agency discontinue counting air conditioning (A/C) efficiency credits toward the cap on A/C efficiency credits if earned through the off-cycle petition process.

Technologies that are additive to the technologies in the A/C efficiency and off-cycle menu (i.e., there is no double-counting of benefits) can be empirically verified to confirm the real-world GHG emissions benefit by testing an A/C system or vehicle which includes A/C efficiency and listed off-cycle technologies at the cap limit and then testing again by adding a non-listed, off-cycle technology to demonstrate the additional, real-world GHG emissions reduction. One benefit of the credits program, and the off-cycle non-listed provision, is to encourage the implementation of technology that can provide incremental improvements in actual GHG emissions.

Counting A/C efficiency technology credits obtained through the off-cycle petition process toward the A/C efficiency credit cap significantly stifles the development of such important innovative technologies. Suppliers will have little justification to continue investing in and developing new A/C efficiency technologies and leave manufacturers with little or no incentive to continue to deploy A/C efficiency technologies. We ask EPA to carefully reconsider the proposed implementation of the A/C efficiency credit cap in conjunction with the off-cycle credit opportunities available for new and innovative A/C efficiency technologies.

Support for Increasing A/C Efficiency Cap. Within previous NPRM’s, as well as comments for credit applications, auto industry members have stated concerns with the A/C efficiency menu and the A/C efficiency credit cap. Similarly, there have been concerns raised regarding the off-cycle credit menu/cap.

Within the current proposal, the EPA has mentioned that they are proposing adjustments to the off-cycle credit program (i.e., increased credit cap), however the EPA also states that they plan to leave the A/C efficiency credit program as it is.1 EPA describes several reasons for considering an increase in the off-cycle technology credit cap. Similar reasons exist for increasing the A/C efficiency credit cap.

Technology Synergies: As the EPA mentions in the NPRM regarding the off-cycle credit menu, there has historically been some uncertainty in off-cycle menu technology credit values. The EPA has stated this same concern in the past for A/C efficiency menu items, as well as uncertainty to how these technologies may behave when combined. This lack of understanding has led to hesitancy in increasing the credit cap or allowing OEMs to get credit beyond the A/C efficiency credit cap.

Limited Headroom: The EPA mentions another reason for proposing to increase off-cycle credit cap being that the headroom under the cap has closed significantly for some OEMs. Within the A/C efficiency credit program, most OEMs have already reached the cap and are no longer able to receive credit for improving their A/C systems further, which halts any further potential improvements to the A/C system.

Menu Additions: The EPA also mentions expanding the off-cycle credit menu to include highefficiency alternator creates additional difficulty for OEMs to get credit due to limitations of the credit cap. The A/C efficiency menu has also been expanded (i.e., high efficiency compressor).

Non-A/C Technologies Counting Towards A/C Efficiency Cap: In addition to the A/C efficiency menu expanding, the EPA has seemed to take the position that any technology that touches the A/C system, will be counted against the A/C efficiency cap, whether its efficiency improvement can be recognized on the A/C system or not. An example of this is in recent applications for DENSO LE40 clutch technology. Even though this technology is an efficiency improvement that results in electrical savings to the vehicles, the EPA has stated that if approved, it will count against the A/C efficiency credit cap. Inclusion of such technologies leads to unintended expansion of the A/C efficiency menu.

For the reasons listed above, we request that in addition to changes to the off-cycle credit program, the EPA also considers similar changes to the A/C efficiency program by increasing the credit cap.

Furthermore, in NREL study 17TMSS-0056, the latest A/C energy consumption estimates 23.5 g/mile based on a series of simulations were performed to three vehicle platforms using various US driving patterns. Compared to 11.9 g/mile for passenger car and 17.2 g/mile for light truck, which were baseline A/C emissions impacts previously used by the agencies to determine A/C efficiency credit cap, new baseline A/C emission impact is calculated to 20.3 g/mile for passenger car and 29.3 g/mile for light truck by using the latest A/C energy consumption (23.5 g/mile). Based on the new baseline emission impact and A/C improvement possibility, 42% of which were previously used by the agencies, the increased A/C credit cap would be 8.5 g/mile for passenger car and 12.3 g/mile for light truck. Therefore, DENSO would request EPA to consider increasing A/C efficiency credit cap as supported by this study. These recommendations are explained in more detail here: [Table # can be found on p. 7 of Docket number EPA-HQ-OAR-2021-0208-0282-A1].

Off-Cycle and A/C Efficiency Credits for ZEVs. DENSO encourages EPA to explore how emissions reductions from off-cycle technologies and A/C efficiency technologies could be rewarded when used on BEVs, PHEVs and FCEVs. Many of these off-cycle and A/C efficiency technologies could help in reducing battery use and therefore lower the amount of electricity used to power the vehicle. All technologies and all powertrains should continue to improve. Consequently, technologies that reduce use of the vehicle battery (and reduce amount of battery charging needed) and therefore the electricity used to power the vehicle should be recognized in model years 2027 and beyond. [EPA-HQ-OAR-2021-0208-0282-A1, p. 5-7]

Support Low-GWP Refrigerants Credits and Other Refrigerant Leakage Credits. As a supplier committed to the environment, we support maintaining the Low Global Warming Potential (low

GWP) Refrigerant Credits and other A/C leakage credits. This credit program advances technological leadership, preserves significant technological investments, and allows vehicle manufacturers continued compliance flexibility while offering greater consumer choice. Importantly, the refrigerant leakage credits provide important compliance flexibility, as using these refrigerants is a simple and cost-effective solution to meeting the targets. The credits also provide a great incentive to voluntarily transition to next-generation refrigerant. Therefore, we support continuation of the low GWP refrigerant credits. [EPA-HQ-OAR-2021-0208-0282-A1, p. 8]

Commenter: Gentherm, Inc.

Real-World Benefits of Off-Cycle and A/C Credits. Studies by the National Renewable Energy Laboratory (NREL) and others have confirmed that off-cycle and A/C efficiency credit technologies provide real-world benefits that are not currently captured by two-cycle testing. The analysis is based on energy consumption for vehicles across the United States. We believe that off - cycle and A/C efficiency technologies are more cost effective than other currently available or proposed on-cycle technologies. It is important to note that these credits do not distort the market and do not artificially create financial benefits.

Latest EPA trends report (2020) shows a 74 gCO2/mile national fleet difference between average light vehicle two-cycle emissions (282 gCO2/mile) and adjusted real-world estimate (356 gCO2/mile) for MY2019. Per the ITB Group analysis, if we assume that 9.5 percent (27 gCO2/mile) of the average two-cycle emissions is attributed to exogenous variables like load, grade, wind, rain/snow, tire pressure, etc. that leaves on average 47g of real-world CO2 emissions due to off-cycle (A/C, thermal, electrical, powertrain and other) variables. This gap is due to off-cycle effects resulting from variation in acceleration, thermal, aerodynamic, and electrical losses. Current and future off-cycle technologies, including autonomous and predictive driving, are expected to provide benefits not contemplated in the current 10 gCO2/mile cap. Therefore, the current 10 g/mile fleet level cap is low and should be raised. Gentherm believes that the EPA proposal of a 15 g/mile off-cycle credit cap is reasonable today, but is conservative compared to the 47g real-world vs. 2- cycle gap and may need future adjustment as new technologies are developed. [EPA-HQ-OAR-2021-0208-0216-A1, p. 2]

Expand the Menu List to Add Active Climate Control Seats. Gentherm supports expanding the list of the off-cycle and A/C efficiency menu options, including adding active climate control seats. Our passenger comfort technologies have been independently proven and validated by NREL to reduce fuel consumption and vehicle CO2 emissions. Our engineers working in the United States developed these technologies with the intention of reducing fuel consumption while improving in-vehicle comfort. For example, we invested approximately $500,000 with NREL to validate the emissions benefits of our technologies. After this validation was completed by NREL, General Motors made an additional investment to prepare a submission based on our research and was awarded off-cycle credits. In addition, Hyundai and Kia have received similar approvals from the EPA, and Stellantis (FCA) has a substantially similar pending request for approval of active climate control seats. An important factor to consider in determining if a menu credit is warranted is its commercialization status. Active Climate Control Seat technology is in production for a number of auto manufacturers and other manufacturers should receive the same credit benefits to level the playing field.

Gentherm also recommends extending off-cycle and A/C efficiency technologies to medium- and heavy-duty classes 2b and 3, which utilize such technologies. Expanding the current credit program encourages commercialization of innovative and cost-efficient technologies, while also providing consumers with more choices. [EPA-HQ-OAR-2021-0208-0216-A1, p. 3-4]

Develop a Process for Adding Technologies to the Menu List. We encourage the agencies to create a process to add technologies to the credit menus. An off-cycle or A/C efficiency credit menu approval process would allow for technologies to be added to the menu list once sufficient data is available to the agencies. Although two technologies were added to the menu in the previous “SAFE” rule, more technologies could be added to the menu more rapidly.

We must encourage the development of new technologies, and we believe that the regulations should encourage new technology developments with sufficient data is available to create a menu credit. When technologies are added to the menu lists, industry compliance costs are decreased, and national fuel consumption and exhaust emissions are reduced. A difficult to change menu deters companies from innovating by making the approval more burdensome than if a credit approval menu process was available. We recommend that the agencies develop a process which allows automakers to apply for adding technologies to the menu lists and which should include public review of such submissions.

Gentherm is currently developing several energy conservation technologies. In the future emissions reductions from off-cycle technologies and A/C efficiency technologies could be credited when used on BEVs, PHEVs and FCEVs. Such a pathway will become highly relevant when EV emissions account for upstream CO2 emissions, not only the 0 grams/mile tailpipe emissions. Certain off-cycle and A/C efficiency technologies, particularly cabin heating technologies help reduce the amount of energy used to power a vehicle. Consequently, technologies that reduce EV energy consumption should be recognized when the 0 g/mi electric drive incentive is potentially eliminated after 2026. Gentherm recommends that a program be developed by the agencies to consider developing a set of EV and autonomous technology off-cycle menu credits in preparation for future rule making. [EPA-HQ-OAR-2021-0208-0216-A1, p. 4-5]

Increase Off-Cycle Thermal Control and A/C Efficiency Technology Credit Levels T

he latest estimate of average national CO2 emissions attributed to light duty vehicle air conditioning, per NREL, is 20.8 gCO2/mile for cars and 26.0 gCO2/mile for trucks1 . If the agencies deem that a A/C load reduction cap is necessary, Gentherm supports an increase and combination of the off-cycle thermal control technology and A/C efficiency caps to 14.3 gCO2/mile for cars and 18.5 gCO2/mile for trucks. This cap increase is based on new NREL A/C load estimates and preserves the original cap rationale. These calculations were made by The ITB Group using NREL data and are included in their comment submission to this docket.

The latest NREL A/C load estimates should be used to increase credit levels of certain Off-Cycle Thermal Control and A/C efficiency technologies. For example, General Motors'2 credit approval for active climate control seat was based on a study by NREL that estimated a 17 percent reduction in A/C energy consumption on average across the United States. General Motors scaled their actively cooled seat credit submission to the A/C fuel usage estimates using recognized A/C energy consumption equivalent to 13.8 and 17.2 gCO2/mile for cars and trucks from the augural standards. If one uses the latest NREL A/C national load estimates of 20.8 and 26 gCO2/mile for cars and trucks, then active seat ventilation and active climate control seat credit benefit levels would increase by approximately 51 percent as shown below. [EPA-HQ-OAR-2021-0208-0216-A1, p. 5]

For ventilated seats we propose increasing the credit levels as shown in the table below and in the NREL benefit calculations3. [Table can be found on p. 6 of Docket number EPA-HQ-OAR-2021-0208-0216-A1]

It may be appropriate for other A/C efficiency or off-cycle thermal control technologies to be scaled-up following the same methodology using the latest NREL A/C load estimates, if their credit levels are a function of vehicle A/C fuel usage.

The agencies currently place a VIN specific cap on A/C efficiency technologies and a sub-cap on off-cycle thermal control technologies which affect A/C load. Gentherm recommends that they be converted to fleet level caps for more flexibility and ease of implementation. Improved flexibility across a fleet average would reduce discounting of real-world benefits. [EPA-HQ-OAR-2021-0208-0216-A1, p. 6]

Commenter: Honeywell

We support EPA's recognition of the effectiveness of low-global warming potential (GWP) refrigerants on reducing greenhouse gas emissions and applaud the retention of the mobile air-conditioning (MAC) credits in the propose rule.

Since 2012, owing in large part to strong incentives like the MAC credit, there have been approximately 125 million vehicles built globally with HFO-1234yf (displacing high-GWP HFC-134a). This change has been responsible for a CO2-equivalent reduction in GHG emissions of over 100 million metric tons into the atmosphere – or the equivalent of globally removing 20 million high polluting (20 mpg or 11.76 L/100 Km) vehicles from service for a year.

Again, we thank EPA for retaining this sensible, cost-effective incentive for reducing HFC emissions in the proposed rule. The credit is a critically important tool to keep the transition to low-GWP substitutes on track. [EPA-HQ-OAR-2021-0208-0212-A1, p.1]

Commenter: ITB Group, Ltd. (ITB)

Real-world fuel consumption and emissions levels show that off-cycle and A/C emissions caps are too low. The agencies should recognize and incorporate the latest NREL estimate of national

A/C fuel usage and CO_2 emissions of 20.8 g CO_2 / mile for cars and 26.0 g CO_2 / mile for trucks. For the A/C efficiency technologies cap, we propose a further 1.1 g CO_2 / mile increase for high-efficiency compressor technology. To preserve the original A/C and off-cycle thermal control cap rationale using the new scaling factors referred to above, the following revised credit cap calculations have been made [Calculations can be found on p. 3 of Docket number EPA-HQ-OAR-2021-0208-0222-A1].

The agencies currently place a VIN-specific cap on A/C efficiency technologies and a sub-cap on offcycle thermal control technologies which affect A/C load. ITB recommends that they be converted to fleet-level caps for more flexibility and ease of implementation. Improved flexibility across a fleet average would reduce discounting of real-world benefits.

EPA has approved technologies that exceed the current A/C efficiency and off-cycle thermal control caps. When the caps are reached, vehicle manufacturer adoption of such technologies may artificially slow down. General Motors, for example, estimated that it would not be able to use 55% of the realworld benefit associated with its approved climate control seat technology due to the thermal control subcap1 and the use of other technologies. When the caps are met, alternative technologies may be more costly. Therefore, caps limit manufacturer and supplier investment in otherwise cost-effective off-cycle technologies with high benefits. The ITB Group analyses show that some off-cycle technologies have high benefit/cost ratios. Until the A/C efficiency and thermal control caps are revised, there is a significant risk of artificially higher fuel consumption and CO_2 emissions, if technologies with real-world benefits are not installed in vehicles. [EPA-HQ-OAR-2021-0208-0222-A1, p. 2-3]

Improvements to the Off-cycle and A/C Efficiency Credit Programs. The current off-cycle and A/C efficiency program has some limitations which form the basis for making improvements. In general, there are two types of opportunities. First, reducing compliance and approval costs will reduce unnecessary burdens without affecting program effectiveness. Second, streamlining the credit approval processes will make approval faster and timing more certain, therefore increasing the rate of development and implementation of cost-effective fuel-saving and emissions-reducing technologies. [EPA-HQ-OAR-2021-0208-0222-A1, p. 4]

Commenter: Motor & Equipment Manufacturers Association (MEMA)

MEMA Supports the A/C Efficiency Credit Program. MEMA continues to support the A/C efficiency credit program and appreciates EPA continuing the program. However, MEMA was disappointed that EPA did not propose adjustments to the A/C efficiency credit program, including increasing the cap on the A/C efficiency program credits.

EPA provides the justification that the off-cycle technologies credits cap is being increased because vehicle manufacturers are close to exceeding the cap and there have been technologies added to the off-cycle menu. Similarly, the A/C efficiency program technologies have seen significant technology advancements, many vehicle manufacturers are close to exceeding the A/C efficiency cap, and A/C efficiency technologies have been added to the menu. The A/C efficiency credits are capped at 5.0 g/mi and 7.2 g/mi for cars and trucks, respectively, in

MY2023 and later. Although this cap is based on a general estimate of synergies and interactions of these technologies, the cap justification still lacks an in-depth analysis that suggests CO2 reductions from vehicle air conditioner efficiency technologies greater than the set cap are not possible.

Consequently, there is much work to be done to improve the A/C efficiency credit program. Similar to the off-cycle technologies program, the A/C efficiency program represents real-world GHG reductions and, therefore, should not be viewed as cutting into the effective stringency of the program. MEMA looks forward to working with EPA on improving and expanding the A/C efficiency credit program in the post-2026 program.

MEMA Continues to Support the A/C Refrigerant Leakage Credit Program. MEMA supports the credits currently offered for the use of A/C refrigerant leakage credits as they stand now. This credit program advances technological leadership, preserves significant technological investments, while offering greater consumer choice. Importantly, the refrigerant leakage credits provide important compliance flexibility, because using these refrigerants is a simple and cost-effective solution to meeting the targets. The credits also provide a great incentive to voluntarily transition to next-generation refrigerants.[EPA-HQ-OAR-2021-0208-0249-A1, p. 10]

Commenter: Nissan North America, Inc.

Air Conditioning (A/C) Leakage and Efficiency and Off-Cycle Credits. Nissan supports EPA's proposal to increase the cap on menu-based credits from 10 g/mile to 15 g/mile. Nissan also supports NHTSA's proposal to maintain the A/C efficiency credit program and to increase the cap on off-cycle menu credits in a manner equivalent to the changes proposed by EPA. Additionally, Nissan supports EPA's stated position that the off-cycle credits and A/C credits do not sunset under the current program and are intended to remain a part of the program through model year 2026 and beyond. Nissan urges EPA to maintain this position and not implement any future regulatory action to sunset or phase out these credit provisions. As acknowledged by EPA in the Proposed GHG Rule, these credits are an important source of emissions reductions, which cannot be measured properly on 2-cycle testing. These credits represent concrete improvements in fuel consumption and GHG emissions that manufacturers have worked hard to achieve. Reducing or removing the credits available for such improvements would be disruptive to product planning and would discourage further innovation. EPA and NHTSA should continue to recognize these real-world achievements and should allow continued use of these credits to further incentivize increasing efficient and advanced technologies through model year 2026 and beyond. [EPA-HQ-OAR-2021-0208-0529-A1, p. 8]

Commenter: Stellantis

Additionally, when the agencies add technology to the AC efficiency menu, the cap should be increased by at least the value of the newly placed menu technology. In the case of advanced compressors, the menu credit cap should be increased for cars and trucks by 1.1 g/mi.

In particular agencies should revisit the assumptions that the AC efficiency credit cap is based upon and adjust the fuel consumption value of AC operation. The original NESCCAF, NREL and 2017 NREL studies all noted more fuel was consumed by AC system operation. These studies generally agreed with each other and suggested a higher number for fuel consumption than EPA's Phoenix Study. That Phoenix Study in fact, showed that fuel consumption due to AC system operation was half of the other two contemporary studies. The most recent NREL work concluded that the average value of AC fuel consumption is 23.5 g/mile. In addition, NREL showed that the solar thermal credits benefit from the same increase. Therefore, the agencies need to adjust the AC related menu caps to reflect this updated consumption value. See Appendix B for more details on these recommended cap increases.

Addressing these updated studies will allow increased innovation, deployment of additional GHG reducing technology in the fleet and remove the excess tons of CO2 due to AC system operation that today are being unrepresented with the artificially low menu cap. [EPA-HQ-OAR-2021-0208-0532-A1, p. 18]

AC Efficiency Program Comments. Stellantis appreciates the air-conditioning efficiency program of 40 CFR 1868-12 and feels that significant reductions in GHG emissions are both possible and still needed due to AC operation. Stellantis suggests the following discussion as an ongoing evolution to the credit program related to efficiency improvements.

The AC Efficiency Menu Cap Needs to be Increased. EPA originally populated the AC efficiency menu with technologies evaluated as part of the Improved Mobile Air Conditioning ('IMAC') studies, sponsored by SAE in a cooperative research program ('CRP'). IMAC was made up of representatives from the mobile air conditioning industry, EPA and DOE. IMAC's mission was to evaluate possible reductions in energy consumption and improve the delivery of conditioned air to the occupants.

Vehicle level testing was performed using a baseline system and an improved system. The improved system consisted of technologies that we see on the AC efficiency menu today. The CRP showed in their final report that a mix of technologies demonstrated a better than 36% improvement in fuel consumption. Based upon those results, the agencies developed the AC efficiency menu with the technologies evaluated by the CRP. Individual technologies were scaled to a credit level based on the relative improvement that the technology showed. The agencies established that a 40% reduction in fuel consumption due to these technologies was possible, which is similar to the IMAC study conclusion.

The agencies then estimated that the fuel required to operate a baseline AC system was '14.3 g/mi per vehicle CO2-equivalent impact due to AC use (where 30% of the vehicle fleet is equipped with automatic AC controls, and 70% of the fleet is equipped with manual controls) as contained in the Final Rulemaking to Establish Light-Duty Vehicle Greenhouse Gas Emission Standards and Corporate Average Fuel Economy Standards51 what is known as the Phoenix Study.' While the Phoenix Study is somewhat useful for the information it provided, the conclusion that the amount of fuel used due to AC operation is flawed.

Phoenix Study Issues. EPA's Phoenix Study looked at the relationship between compressor engagement as a function of heat index in the RIA document EPA-420-R-10-009. Heat index is an extrapolation of temperature and humidity into one metric that was then compared with compressor engagement. EPA then extrapolated the fuel consumption data for Phoenix, a high temperature and sunny desert climate to the rest of the United States. Each extrapolation involves an error for the variable being considered. The first error is related to the extreme low humidity and high temperature bias in calculating the heat index term to other parts of the country. In Portland, Oregon and Seattle, Washington we have high humidity and medium ambient temperatures whereas in Miami, Florida we have high humidity and high temperatures much of the year.

The second error is looking at the amount of time that the compressor is engaged instead of the compressor power needed to supply air conditioning to the cabin. Compressor power and the torque on the accessory drive determine the amount of fuel expended in operating the AC system. Compressor engagement and compressor torque are both needed to determine fuel consumption due to AC operation.

The 14.3 g/mile AC impact value from the Phoenix Study can be compared to two contemporary studies of emissions due to AC system operation. The Northeast States Center for a Clean Air Future ('NESCCAF') study52 and the National Renewable Energy Laboratory-Office of Atmospheric Programs ('NREL-OAP')53 study performed for the California Air Resources Board both show that AC fuel consumption is higher than the Phoenix Study value. EPA acknowledges that the emission from their study is half that of the other two studies as reported in the RIA.54

Stellantis believes that the agencies should consider the work performed by NREL in 2017 on this subject. The NREL study methodology looks at the factors affecting AC system fuel consumption at the county level which is an improvement over earlier studies. This method accounts for climate and population variation across the country using vehicle registration data, custom vehicle miles traveled based on MOVES data and technology types in the vehicle fleet giving a more granular picture of AC fuel consumption across the country.

NREL reports that the amount of fuel consumed to operate the AC system results in emissions on average of 23.5 g/mile. This is a staggering difference and explains why the Denso SAS compressor, on the AC 17 test cycle, emitted 1.1 g/mi less than what EPA states is possible based on their study.

Stellantis asks that the agencies consider the NREL value of 23.5 g/mile reported at SAE's TMSS Conference in 2017. Using this value and applying the original reduction of 40% fuel saved by improved mobile AC systems would produce new and appropriate higher AC efficiency menu caps.

The new menu cap would become 8.2 g/mile for passenger cars and 11.8 g/mile for light-duty trucks. Stellantis and other OEMs agree that these values are correct and have provided evidence to such in discussions with the agencies. These values are also aligned with the earlier

NESCCAF and NREL studies cited in the original rulemaking that established the AC credit menu.

The Effect of an Artificially Low Menu Cap. Higher GHG emissions due to AC system operation are the result of the artificially low AC efficiency menu cap. Industry has proven the benefit of the Denso SAS compressor such that the agencies have added the technology to the menu but then constrained its benefit under the menu cap of 5.0 g/mile for passenger cars and 7.2 g/mile for light-duty trucks.

The bench testing that was employed to determine the compressor's benefit was confirmed with vehicle level testing that confirmed the benefit. Stellantis performed their vehicle level testing on a Dodge Charger that was equipped with all of the AC efficiency technologies allowed by the menu at 5.0 g/mi. The vehicle level test confirmed the SAS compressor improvement over and above what EPA believes is possible for this vehicle. Other OEMs tested similarly with vehicles similarly contented and obtained the same result.

This level of the cap, which is constraining the benefit of the technology, is likely the reason why the implementation of this advance AC compressor is not widespread. Many OEMs have already contented their vehicle such that they are close to the menu cap. Adding this technology would offer little to no benefit from the agencies. Other technologies submitted on alternative methodology applications and granted credit under the AC efficiency menu are similarly affected.

Electrical Load Reduction Credits Belong on the Off-Cycle Credit Menu. Mobile AC systems are made up of many different components, some of which are electrical in nature. The power to operate these components can be significant such as in the cases of the HVAC blower, the condenser fan and the AC compressor clutch. PWM operation of the HVAC blower is an AC menu credit today because of real world emissions savings over blower operation in the baseline system. The original resistor based elements of blower speed control of the baseline system had to cooled by the AC system to continue operation. The additional cooling power that the PWM system does not need to keep the resistive elements cool is the benefit that put the PWM control on the efficiency menu. The AC menu credit for PWM control is based upon the additional wasted energy it took to cool the resistance based technology.

Similarly, there are other improvements that can be accomplished in the HVAC unit. Brushless blower motors eliminate the contact resistance found in older systems. The energy saved in this case is purely electrical in nature and the benefit is seen in towards the battery and the alternator, not in the AC system. Substituting a brushed motor with a brushless blower into the AC system will not impact AC related emissions. It will however have a great impact on power in the electrical system.

The Denso LE40 High Efficiency Clutch is another electrical device that is used in the AC system. The Denso clutch lowers the amount of power needed to keep the clutch fully engaged when compared to the baseline technology. The power saved with this device is measured at the battery and alternator, not in emissions due to AC operation.

The agencies seem to be concluding that these technologies, because they are AC related, should be added to and capped under the AC menu. Stellantis strongly objects since these benefits accrue to the charging system, similar to the benefits of the high efficiency alternator on the off-cycle menu. The offcycle menu is the correct area for these two technologies. [EPA-HQ-OAR-2021-0208-0532-A1, pp. 42-45]

Commenter: Union of Concerned Scientists (UCS)

EPA's assessment of the benefits of thermal control technologies does not recognize the simultaneous improvements in the efficiency of air-conditioning systems. Therefore, it inherently overstates the benefits of thermal control technologies, whose benefit is related to the reduced usage of the air-conditioning system—if the air-conditioning system has been improved, the emissions associated with the use of that system are reduced. EPA should revise the process for awarding thermal control credits to reflect a manufacturer's improvement in A/C efficiency.

In MY2019, manufacturers were credited with improvements to A/C efficiency of 4.0 g/mi for cars and 6.1 g/mi for trucks; this is compared to baseline emissions of 11.9 g/mi for cars and 17.2 g/mi for trucks, a reduction in emissions of more than one-third. The credit for thermal controls technology should scale accordingly. [EPA-HQ-OAR-2021-0208-0277-A1, p.30]

EPA Response

As discussed in Section II.B.4 of the preamble, EPA is not changing existing program opportunities to earn compliance credits toward the fleet-wide average CO_2 standards for improvements to air conditioning systems. The current A/C credits program provides credits for improvements to address both hydrofluorocarbon (HFC) refrigerant direct losses (i.e., system "leakage") and indirect CO_2 emissions related to the increased load on the engine (also referred to as "A/C efficiency" related emissions). We did not propose to change any of these aspects of the existing program because they continue to function as intended and we do not presently believe changes are needed in the context of standards for MY 2023-2026.

EPA received several comments suggesting potential changes to the A/C credits program. Also, Chemours encourages EPA to take additional actions to address impacts of A/C refrigerants through other statutory authorities, including the SNAP program and under the AIM act. EPA did not propose and did not request comment on these suggestions, and for this reason, these comments regarding other program elements are outside the scope of this rule. However, EPA may further consider commenter recommendations, as well as other potential program changes and approaches, as part of a future rulemaking.

10. Proposed on-Board Diagnostics (OBD) Provisions

Commenters Included in this Section

Alliance For Automotive Innovation
Manufacturers of Emission Controls Association (MECA)
Volkswagen Group of America, Inc. (Volkswagen)

Commenter: Alliance For Automotive Innovation

Auto Innovators supports the proposed change to allow EPA approval of on-board diagnostic ("OBD") systems that meet CARB OBD requirements newer than the 2013 version referenced in current EPA regulations.

EPA proposes to allow certification of OBD systems that meet CARB OBD requirements newer than 2013.112 Auto Innovators supports this update to maintain alignment between CARB and EPA regulations in this highly technical area. [EPA-HQ-OAR-2021-0208-0571-A1, p. 36]

Commenter: Manufacturers of Emission Controls Association (MECA)

MECA supports EPA's proposal to allow manufacturers to alternatively meet EPA OBD requirements if they can show that the vehicle meets newer CARB OBD regulations. This streamlining will provide additional flexibility to manufacturers while reducing costs by producing vehicles with one OBD system (software, calibration, and hardware) for all 50 states. [EPA-HQ-OAR-2021-0208-0261-A1, p.4]

Commenter: Volkswagen Group of America, Inc. (Volkswagen)

Volkswagen supports the change proposed by EPA to 86.1806-17(a) in order to account for future updates to California's OBD regulation and to promote 50 state calibration strategy. In order to help clarify what information could be helpful to in demonstrating that a newer OBD system approved by CARB still meets the intent of the 2013 version, Volkswagen suggests EPA consider issuing future guidance following updates to CARBs OBD regulation. Alternatively, EPA could include comments regarding intent in EPA's subsequent waiver review/approval of modifications to CARB OBD regulatory updates. Either approach could be applicable only to the extent that certain provisions within a future CARB OBD update appear to move beyond the 2013 version. [EPA-HQ-OAR-2021-0208-0237-A1, p.14]

EPA Response

EPA appreciates the commenters' support for the OBD revisions. Regarding the comments suggesting that EPA provide guidance for future CARB updates to the OBD provisions, EPA appreciates commenters' suggestions for how such guidance could be provided and will consider this issue further in the event of future OBD program updates. EPA notes that manufacturers may submit a letter in their application for certification stating the version of CARB OBD the manufacturer intends to use and requesting EPA approval to use that version. 40 CFR. 86.1806-17(c).

11. Natural Gas Vehicle Incentives

Commenters Included in this Section

American Council for an Energy-Efficient Economy (ACEEE)
California Air Resources Board (CARB)
Center for Biological Diversity, et al.
Center for Climate and Energy Solutions (C2ES)
Ingevity Corporation
National Automobile Dealers Association (NADA)
NATSO, Representing America's Travel Centers and Truck Stops et al.
NGVAmerica
South Coast Air Quality Management District

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

EPA proposes removing the 0.15 multiplier for natural gas vehicles. ACEEE agrees supports this move. This multiplier does not accurately reflect the emissions of such vehicles. EPA should continue to focus on encouraging the adoption of light-duty zero emission technology, while reducing emissions from petroleum- fueled vehicles. [EPA-HQ-OAR-2021-0208-0251-A1, p.9]

Remove natural gas vehicle multipliers [EPA-HQ-OAR-2021-0208-0251-A1, p. 15]

Commenter: California Air Resources Board (CARB)

[S]hould not provide any multiplier for natural-gas vehicles (NGVs) for any years; [EPA-HQ-OAR-2021-0208-0643-A6, p.7]

CARB agrees that the multiplier for NGVs should be eliminated. These vehicles have not been produced in this sector for some time and the multiplier has not been used. More importantly, these vehicles directly emit pollutants. A production multiplier is unwarranted. [EPA-HQ-OAR-2021-0208-0643-A6, p. 37]

Commenter: Center for Biological Diversity, et al.

EPA should not renew the natural gas vehicle credit program. EPA's determination to end the natural gas vehicle multiplier (at two vehicles for every one built) first applied with the 2012 rulemaking, Proposal, 86 Fed. Reg. at 43,760, is appropriate and well justified. As discussed above, phantom credits in general are no longer needed to incentivize the production of zero-or near-zero vehicles. Natural gas vehicles are not such vehicles, and, as EPA observes, phantom incentives for them does not constitute a pathway for significant greenhouse gas reductions. Id. Commenters also agree that EPA's Proposal to end these multipliers will have no impact on manufacturers, as none are contained in their production plans. Id. Commenters further agree that EPA's Proposal to correct a scrivener's error, aligning EPA's preamble discussion rejecting a requested additional 0.15 multiplier factor in the 2020 Final Rule with the regulatory text, is reasonable, appropriate and well justified. Id. at 43,766. [EPA-HQ-OAR-2021-0208-0651-A1, p. 69]

Commenter: Center for Climate and Energy Solutions (C2ES)

Natural Gas Vehicle Multipliers. C2ES supports EPA's proposed approach to eliminate the multiplier for natural gas vehicles altogether for MYs 2023–26. While they produce fewer emissions than conventional gas and diesel vehicles, natural gas vehicles are not zero-emission vehicles. Incentives under the greenhouse gas emissions reduction program should support decarbonization, rather than fuel switching to another fossil fuel. Additionally, the 2020 EPA Automotive Trends report found no light-duty compressed natural gas vehicles available for sale from vehicle manufacturers. 21 In light-duty applications, this technology is not applied at a significant enough volume to benefit from an additional incentive, including a multiplier. [EPA-HQ-OAR-2021-0208-0287-A1, p.6]

Commenter: Ingevity Corporation

Ingevity believes that it is appropriate to maintain the 0.15 emissions factor for dedicated and dual fuel NGVs for purposes of GHG Compliance and CAFE Compliance in 40 CFR §600.510-12 subsections (c)(2)(vi), (c)(2)(vii), (j)(2)(v), and (j)(2)(vii)(A) for Model Years 2021 and later. If vehicle multipliers remain included for EVs and PHEVs, equivalent multipliers for dedicated and dual fuel NGVs should be retained. Our detailed comments supporting these positions are in Sections I-III below. Our previous detailed comments and meeting materials in dockets NHTSA-2018-0067 and EPA-HQ-OAR-2018-0283 should be considered substantive comments and part of the Administrative Record1. These comments are attached in the Appendix.

Ingevity requests a full and thorough response from EPA to the following key points related to NGVs which were not sufficiently addressed in the NPRM or 2020 SAFE Rule. The final rulemaking should address our comments outlined in (1) – (3) below, with additional details provided in Sections I – III.

(1) EPA's proposed Natural Gas Vehicles Technical Amendment to remove the 0.15 emissions factor is a substantive change to the regulatory text which should be addressed through notice and comment rulemaking. Under the Administrative Procedure Act, 5 U.S.C. § 553(c), EPA has a clear mandate to give interested parties such as Ingevity the opportunity to participate in this rulemaking and to consider the comments received concerning this clear change in a substantive rule. A more detailed comment is provided in Section I below.

(2) EPA has not provided a detailed rationale for removal of the 0.15 factor for GHG compliance in the 2020 SAFE Rule and this NPRM. EPA's conclusions on removing incentives for NGVs are arbitrary, inconsistent with prior views, and fail to consider all the current facts and those raised by commenters in the SAFE Rule. These facts include:

a. Federally certified dual fuel ANG vehicles are available for purchase today, and a growing number of U.S. natural gas utilities and commercial stakeholders are investing in ANG equipped vehicles, including SoCalGas, Atlanta Gas Light, Ozinga Energy and the City of Orlando. Ingevity was recently awarded an Alternative Fuel Incentive Grant (‘AFIG’) by the Commonwealth of PA Department of Environmental Protection. This grant was a 28 vehicle award for which fleet participants included National Fuels, PGW, Peoples Gas, NiSource/Columbia Gas, UGI, Range Resources, Gateway Engineers and others.

b. As discussed in Section II.B, the Alternative Motor Fuels Act of 1988 shows that Congress intended to provide incentives for NGVs to reduce GHG emissions and EPA has not acknowledged or commented on this fact.

c. As discussed in Section II.C, EPA maintains a narrow ‘tailpipe only’ view of GHG emissions, which does not appropriately account for the full lifecycle GHG emissions, where data exist showing that NGVs fueled with RNG provides significant GHG reduction benefits. From a tailpipe perspective, dual-fueled NGVs on the market today can meet and exceed the emission reduction targets proposed in this NPRM. EPA continues to avoid consideration of full life-cycle analyses which show NGVs fueled by RNG have significantly lower GHG emissions than a BEV, that the RFS is successfully causing large volumes of RNG to be used as fuel for NGVs, and the GHG emissions reductions for a NGV can be achieved at a lower cost than for a BEV.

d. As discussed in Section II.D, EPA is inconsistent in their view of RNG vs. renewable electricity when determining which vehicle technologies and alternative fuels should be incentivized. EPA has not considered recent data showing RNG use has significantly increased and has now become the dominant natural gas fuel for transportation in the U.S. For example, in 2020, 92% of natural gas used in transportation fuel in California was RNG, with a carbon negative fuel footprint.

(3) EPA’s removal of the 0.15 emission factor will have significant impacts on the future NGV industry for light-duty vehicles. Because of the stringency of the proposed GHG emission standards, in addition to technology changes, the OEMs will need to consider regulatory compliance incentives. The removal of the 0.15 emission factor for dual fuel NGVs will disincentivize the OEMs from investing in and marketing dual fuel NGVs (especially considering the incentives for electric vehicles) and thus have the impact of precluding NGVs from entering the light-duty market. This is counter to the basic intent of the regulation since NGVs are an affordable technology which can meet and exceed the GHG emission reduction targets proposed by EPA in the NPRM. This restricts consumer choice and creates large barriers for innovative GHG emissions reductions technologies from entering the market.

For NGVs to fill their role in addressing energy security and environmental concerns, certain changes are needed to the current regulatory program. These regulatory changes will help to promote commercialization of NGV technology by providing OEMs attractive and economically reasonable compliance incentives. These same regulatory incentives are already in place for BEVs and PHEVs, and the changes will help undo technological biases in the current rules.

ANG technology allows vehicles to be refueled using an affordable and reliable low-pressure natural gas refueling appliance. ANG allows for a distributed refueling network at users’ homes and businesses, just like electrical recharging equipment has been installed for PHEVs over the last several years. To extend vehicle range, in a manner similar to PHEVs, a dual fuel gasoline/ANG vehicle is the current configuration. The ANG vehicle platform enables light-duty truck fleets to cost effectively utilize RNG as a long-term fuel solution. RNG is the only immediate opportunity for light-duty vehicles to cost effectively achieve a near zero or negative carbon intensity footprint across the full vehicle lifecycle. Even though ANG is a young technology not yet adopted by OEMs, it is a commercially and economically viable solution available now. More than enough information is available to ascertain how changes in this round of rulemaking would affect vehicle design decisions through the 2026 model year. Manufacturers could produce an ANG NGV at a lower cost than an EV and could use up-fitters to meet customer demand at the current monthly sales rates for EVs. But they will do this only if the NGVs can produce attractive and economically reasonable compliance incentives in both the GHG and CAFE programs.

We believe it is appropriate to maintain the 0.15 emissions multiplier for dedicated and dual-fuel NGVs for CAFE and GHG compliance calculations so that NGVs can generate credits in both the CAFE and GHG programs. This not only makes the regulations more fuel and technology neutral as has been EPA policy for decades for other pollutants, but also provides manufacturers an additional compliance pathway for meeting the fuel economy and GHG reduction goals of the NPRM. It also gives consumers more choice. In today's competitive global vehicle market, automakers choose to incorporate alternative fuel technology into their product lines based in large part on regulatory provisions which enable those technologies to generate compliance credits in both the CAFE and GHG programs.

Detailed Comment on EPA's Natural Gas Vehicles Technical Amendment. We believe EPA's Proposed Natural Gas Vehicles Technical Amendment is not a 'clerical error'2. This correction does have significant impacts and should be addressed through notice and comment rulemaking.

In the NPRM, EPA states it 'is proposing narrow technical amendments to its regulations' to correct an 'inadvertent clerical error'2. EPA also stated they are not 'revisiting or reopening its decision regarding the 0.15 factor'2. EPA's proposed technical amendment is to remove the option for NGVs to use the 0.15 emission multiplier factor for MY 2022 – 2026 for purposes of GHG Compliance in 40 CFR § 600.510-12 subsection (j)(2)(v) and (j)(2)(vii)(A). EPA states that 'there are no significant impact associated with the correction of this clerical error'2.

Ingevity disagrees with the characterization of this proposed technical amendment as an action to correct an 'inadvertent clerical error', the statement that EPA is not 'revisiting or reopening its decision regarding the 0.15 factor', and EPA's characterization that 'there are no significant impact associated with the correction of this clerical error'.

First, Ingevity does not agree with EPA's characterization of the inclusion of the 0.15 emissions multiplier for NGVs within the SAFE Rule regulatory text as an 'inadvertent clerical error'. There is an inconsistency between the preamble and regulatory text. The differences are significant and substantive and cannot be explained by any reasonable definition as being caused by a 'clerical error'.

Second, this change would not qualify as a technical correction or a technical amendment. Any technical correction is published before the rule becomes effective, otherwise a change is termed a technical amendment. A technical amendment is published on the presumption that it is minor and non-controversial in nature. Even knowing the previous comments and perspectives on this issue, EPA made no effort to contact Ingevity or other commenters about this change and instead is characterizing this action as a technical amendment with no significant impact. Contrary to EPA's view, this change to the regulatory text is substantive, and if it is to be pursued, it should be in a notice and comment rulemaking. The regulatory text controls where there is a conflict with the preamble. Ingevity had the right to reasonably rely on the regulatory text and was not obligated to mine the preamble to find an inconsistency. The 0.15 emissions factor was the logical outgrowth of the past proposed rulemaking and directly responsive to comments received by the agencies. On a plain reading of the text in the NPRM preamble, it is an abuse of the regulatory process to propose a substantive change to the regulatory text and then state that EPA is not 'revisiting or reopening its decision regarding the 0.15 factor'. This clearly implies that comments will not be considered. Yet, under the Administrative Procedure Act, 5 U.S.C. § 553(c), EPA has a clear mandate to give interested parties such as Ingevity the opportunity to participate in this rulemaking and to consider the comments received concerning this clear change in a substantive rule. EPA/NHTSA issued a technical correction to the SAFE Rule3 in July 2020, which provided the opportunity to make this change if it truly was an error as were the other items covered in that action. However, EPA did not discuss or address the 0.15 emissions multiplier for NGVs in this July 2020 technical correction action. It is inappropriate for EPA to classify this error as a 'clerical error' now after this discrepancy between the preamble text and the regulatory text has remained for more than one year.

Third, Ingevity also disagrees that this amendment will have no significant impacts. As discussed above, the removal of the 0.15 emissions factor will have the impact of impeding the entry of dual-fuel NGVs into the light-duty market. This restricts consumer choice by preventing an alternative, affordable technology which can meet and exceed the GHG reduction targets proposed by EPA in the NPRM4. Ingevity has invested over many years significant resources in the development and commercialization of ANG technology for NGVs through both internal research and outside collaborations. Ingevity's ability to market its ANG technology as well as the integration of the use of RNG into the platform will be significantly curtailed by the EPA's proposed actions. Without NGV incentives in the framework of the GHG and CAFE programs, many of these innovative products and approaches might never be adopted.

It is Ingevity's view that the regulatory text governs over any inconsistencies with the preamble. Legal rights and obligations flow from the published regulations, not the preamble. A change to amend regulatory text, especially one that has substantive impacts, requires notice and comment rulemaking and a fair opportunity for affected parties to participate. While an agency has some flexibility to change its mind regarding a policy choice, the decision has to be rational, based on the agency's underlying authority, and made after consideration of the administrative record before the agency. This is particularly true where the prior policy engendered reliance. EPA cannot accomplish its new goals by denying affected parties the right to comment.

Detailed comments on EPA's rationale for removal of the 0.15 factor for GHG compliance. EPA has not provided a detailed rationale for removal of the 0.15 factor for GHG compliance in the 2020 SAFE Rule and this NPRM. EPA's conclusions on removing incentives for NGVs are arbitrary, inconsistent with prior views, and fail to consider all the facts raised by commenters in the SAFE Rule.

The 0.15 emissions multiplier for dedicated and dual fuel NGVs for purposes of GHG Compliance in 40 CFR § 600.510-12 subsection (j)(2)(v) and (j)(2)(vii)(A) for Model Years 2021 and later should remain in the regulatory text based on the following points which are discussed further below:

EPA's view in the NPRM that NGVs are not a pathway for significant GHG reductions is arbitrary, inconsistent with prior views, and fails to consider all the facts raised by commenters in the SAFE Rule.

The Alternative Motor Fuels Act of 1988 shows that Congress intended to provide incentives for NGVs to reduce GHG emissions and EPA has not acknowledged or commented on this fact.

EPA maintains a narrow 'tailpipe only' view of GHG emissions, which does not appropriately account for the full lifecycle GHG emissions, where data exists showing that NGVs fueled with alternative fuels provide significant GHG reduction benefits.

EPA is inconsistent in their view of renewable natural gas (RNG) vs. renewable electricity when determining which vehicle technologies and alternative fuels should be incentivized.

EPA's sudden reversal in this NPRM to conclude that NGVs are not a pathway for significant GHG reductions is arbitrary, inconsistent with prior views, and does not consider all data and facts raised by commenters in the SAFE Rule.

In the SAFE Rule, EPA stated 'EPA continues to believe that NGVs could be an important part of the overall light-duty vehicle fleet mix, and such offerings would enhance the diversity of potentially cleaner alternative fuels vehicles available to consumers5.' EPA cited data for a 2015 MY CNG Honda Civic which had approximately 20% lower CO2 compared to the gasoline Civic6. Citing this same data for a CNG Honda Civic, in this NPRM, EPA suddenly reverses their position on NGVs stating 'EPA does not view NGVs as a pathway for significant GHG reductions in the future7.' In the NPRM, EPA also concludes without supporting data that 'for more recent advanced internal combustion engines, the difference [GHG reduction for CNG relative to the gasoline engine] may be less than 20% due to lower emissions of the gasoline-fueled vehicles8.' With this statement, EPA arbitrarily assumes that advancements in vehicle technology to reduce GHG emissions from internal combustion engines would not be applicable to NGVs. As one example, the light-weighting of components that have reduced GHG emissions from gasoline vehicles can readily be adopted by NGVs.

Ingevity has obtained GHG emissions test data from a 2019 Ford F-150 that was converted to an ANG dual-fuel gasoline-natural gas vehicle9. This data is in the table below and shows that CO2 and GHGeq reductions of approximately 18-19% are still achievable for a NGV fueled by fossil natural gas. Further, these reductions are for the large light-duty truck segment, for which effective and economically viable alternatives to reduce GHG emissions are extremely challenging10. There are portions of the LDV market for which electric options are not being explored, due to challenges to electrify larger and heavier trucks, such as the Ford F-250. An ANG F-250 is a pathway that is commercial ready. Therefore, NGVs can provide an alternative vehicle technology and fuel solution which exceeds the GHG reduction targets proposed by EPA in this NPRM11, while also preventing significant cost increases to the consumer and providing more consumer choice. Additionally, as discussed in section II.C below, when NGVs are fueled with RNG and the full lifecycle GHG reductions are considered, NGVs offer a solution for significant GHG reductions (>90% relative to the gasoline version) while also increasing utilization of RNG.[The tables can be found on p.7 of Docket number [EPA-HQ-OAR-2021-0208-0227-A1]].

EPA states that ‘it provided a detailed rationale for its decision not to implement a 0.15 factor recommended by comments in the SAFE Rule13.’ In its comments on the 2020 SAFE Rule, Ingevity provided three major factors that warranted the reinstatement of the 0.15 emissions multiplier for NGVs, and EPA provided a limited response to only two of these factors: (1) EPA disagreed on attributing the benefits of renewable natural gas (RNG) to reducing GHG emissions for NGVs on the basis that the Renewable Fuel Standard (RFS) already incentivizes RNG. (2) EPA decided to continue to ignore upstream and full lifecycle GHG emissions for alternative technologies and fuels, thus continuing an inconsistent and favorable treatment of electric vehicles versus other GHG-reducing alternatives. Additionally, EPA has continuously avoided responding to one substantive comment: The fact that EPA has not considered the findings of Congress and the GHG reduction context of the Alternative Motor Fuels Act (AMFA) of 1988 in the 2012 rulemaking, the mid-term evaluation, the SAFE Rule, and this NPRM.

The Alternative Motor Fuels Act of 1988 shows that Congress intended to provide incentives for NGVs to reduce GHG emissions and EPA has not acknowledged or commented on this fact.

First, although EPA cites EPCA as the source of the 0.15 divisor, the source was actually AMFA (1988) that amended Title V of the Motor Vehicle Information and Cost Savings Act. A reading of Congress’ findings in AMFA14 (see Appendix) shows that Congress intended to provide incentives for natural gas vehicles not only to displace gasoline for energy security purposes, but also to reduce greenhouse gas emissions. For example, Congress found: (a) ‘the Nation’s security, economic, and environmental interests require that the Federal Government should assist clean-burning, nonpetroleum transportation fuels to reach a threshold level of commercial application and consumer acceptability at which they can successfully compete with petroleum based fuels; (b) ‘the production and use of compressed natural gas have been estimated in some studies to release less carbon dioxide than comparable quantities of petroleum-based fuels;’ (c) ‘there exists evidence that manmade pollution—the release of carbon dioxide…—may be producing a long term and substantial increase in the average temperature on Earth, a phenomenon known as global warming through the greenhouse effect;’ and (d) ‘ongoing pollution and deforestation may be contributing now to an irreversible process producing unacceptable global climate changes; necessary actions must be identified and implemented in time to protect the climate.'

The purpose of AMFA was specifically to 'encourage the production of … natural gas powered motor vehicles.' EPA acknowledged the GHG reduction potential for fossil and biomass derived natural gas in its follow-up 1991 report to Congress .15 It is our belief that had a GHG standard existed in 1988, AMFA would have provided the same 0.15 factor to Carbon Related Exhaust Emissions (or CREE) emissions as it provided for CAFE compliance purposes to encourage the production of natural gas vehicles and to reduce GHG emissions. To encourage the use of alternative fuels, including natural gas, AMFA established that for fuel economy calculations, the measured fuel economy on these alternative fuels shall be divided by 0.1516. This 0.15 factor for CAFE Compliance remains statutory for dedicated NGVs with no expiration. For dual-fueled NGVs, the statutory 0.15 factor for fuel economy expired after MY 2019, and for MY 2020 and later, NHTSA determined in the 2020 SAFE Rule that for the portion of operation that occurs on an alternative fuel, it is consistent to use the same 0.15 factor that is specified for dedicated fuel vehicles17 In NHTSA's recent NPRM, no change to this 0.15 factor for fuel economy for dual-fueled vehicles was proposed18.

EPA provided the 0.15 emissions factor for GHG compliance purposes from 2010 through 2015 model years, but removed the incentive thereafter. The removal of the 0.15 factor for GHG compliance purposes effectively nullified any benefit of the incentive for CAFE compliance purposes and eliminated the incentive's ability to result in Congress' goal to encourage the production of natural gas vehicles. This 0.15 factor should be maintained by EPA in the regulatory text for both CAFE and GHG compliance. This action is not only justified by AMFA and for the reasons stated earlier, but also because it would provide consistency between GHG compliance and CAFE compliance. In comments to the SAFE Rule and within this NPRM, EPA has provided no response to this key point on the intent of Congress with AMFA to encourage production of NGVs when discussing their decision to remove the 0.15 factor.

The table below summarizes the current application of the 0.15 factors for EVs and NGVs. We note EVs are provided the discretionary use of a 0.15 factor in the Petroleum Equivalency Factor (PEF) for fuel economy compliance and have received this since 200019. Congress mandates that DOE establish a petroleum equivalency factor (PEF), based on four elements, and that EVs utilize this PEF to equate vehicle electricity use and petroleum consumption for EPA fuel economy regulations. When DOE established the current PEF in 2000, they added a discretionary fifth element through rulemaking, which was to divide the PEF by 0.15. DOE did this so that EVs could generate the same amount of CAFE credits as NGVs and alcohol-fueled vehicles. EPA should now use this same discretion and apply the same factor to NGVs for the CAFE and GHG compliance calculation to remain consistent. [The tables can be found on p.9 of docket number [EPA-HQ-OAR-2021-0208-0227-A1]] [EPA-HQ-OAR-2021-0208-0227-A1, pp 2-9]

EPA is inconsistent in their view of Renewable Natural Gas vs. Renewable electricity when determining which vehicle technologies and fuels should be incentivized.

In the 2020 SAFE Rule, EPA argues against adding the 0.15 emissions multiplier for NGVs on the basis that RNG use cannot be assured for the full life of the vehicle. Yet, EPA is proposing to apply a 0 g/mile upstream credit to EVs through MY 2026 when 60% of U.S. electricity in 2020 was produced using fossil fuel, including fossil natural gas23, whereas the penetration of RNG into the NGV fleet is very significant today24,25. The emergence and significant growth of domestic biomethane (RNG) as a low carbon transportation fuel presents a major opportunity for reducing GHG emissions by eliminating methane emissions from the source and using this methane as a transportation fuel in lieu of petroleum-based fuel. EPA should acknowledge that RNG supply has far exceeded their expectations in 2012 and that RNG volumes continue to grow at >30% per year.

NGVAmerica and the Coalition for Renewable Natural Gas reported in 2020 that 53% of all on-road fuel used in natural gas vehicles in 2020 was RNG24. For California, 92% of all on-road fuels used in natural gas vehicles was RNG25. According to data from the California Air Resources Board (CARB) the annual average carbon intensity score of bio-CNG in that mix was -5.845 gCO2e/MJ26. Further, RNG use as a transportation fuel grew 25% over 2019 volumes, increasing 267% over the last 5 years. Therefore, we believe EPA is incorrect to assume that this trend would not continue. EPA claimed there is no assurance NGVs produced in the future would be fueled with RNG, but the data is clear that the RFS and LCFS are driving significantly large volumes of RNG to be used in the natural gas fleets. There remains incentive for NGVs to be fueled by RNG, but EPA is proposing to remove any incentive for an OEM to manufacture an NGV.

EPA has responded to comments on alternative fuels by asserting that providing credit incentives for RNG and other renewable fuels are unnecessary, because these fuels are already covered under the RFS program and emissions benefits have already been quantified 27 Basically, EPA is saying that it should not incentivize vehicles that utilize a fuel pathway covered under RFS, because of concerns about redundant incentives. However, there are two problems with EPA’s logic. First, the RFS program does not stimulate the production of alternative fuel vehicles. This is because neither the automaker nor the vehicle consumer benefits from RFS. In order for automakers to produce vehicles that use alternative fuels in the RFS program, they need to be incentivized in the GHG/CAFE program. This is demonstrated by actions needed to be taken to get dedicated and dual fuel electric vehicles into the fleet, through generous regulatory incentives by EPA supplemented by generous Federal and state tax credit policy. EPA specifically stated the purpose of providing the incentives to electric vehicles was to promote their commercialization. It should be again noted, that Congress’ intention in AMFA for providing the 0.15- divisor incentive was to encourage the production of natural gas powered motor vehicles. Second, EPA contradicts its own logic because it justified 0 g/mile credit incentives and vehicle multiplier incentives for fuel cell vehicles (FCVs), even though hydrogen, derived from biogas, has been included as a renewable fuel in the RFS program since 2014.28 EPA cannot use the RFS program as an excuse to deny emissions credits for one fuel (e.g, RNG) while ignoring the issue for another fuel (e.g., hydrogen). EPA is also currently preparing for a review of the RFS and there are discussions that EPA could grant RFS electricity credits (eRINS), which if granted, would be in direct contradiction to the views EPA has made regarding RNG and the RFS.

Rather than removing incentives for NGVs and discrediting the benefits of RNG, EPA should be encouraging the adoption of NGVs by retaining the 0.15 factor for both CAFE and GHG compliance.

Response to Comment on 2x Vehicle Multiplier Credit Removal. EPA states it is "proposing to end multipliers for NGVs in this manner because NGVs are not a near-zero emissions technology and EPA no longer believes it is appropriate to incentivize these vehicles to encourage manufacturers to introduce them in the light-duty vehicle market."

Ingevity disagrees. First, the NPRM is not a zero-emission standard, and thus it is inappropriate of EPA to judge technology incentives on the basis of this criteria. Second, all comments referenced above support maintaining incentives for NGVs. Based on these facts, it is arbitrary for EPA to remove NGV incentives, as NGVs are a demonstrated cost-effective technology to reduce GHG. NGVs deserve incentives to stimulate market adoption and EPA should be technology neutral in application of incentives.

Ingevity believes if vehicle multipliers remain included for EVs and PHEVs, equivalent multipliers for dedicated and dual-fuel NGVs should be retained. [EPA-HQ-OAR-2021-0208-0227-A1,pp 11-13]

Commenter: National Automobile Dealers Association (NADA)

NADA generally supports the multiplier incentives EPA has proposed but opposes elimination of the multiplier for natural gas fueled vehicles. Moreover, NADA supports such additional compliance flexibilities as will afford OEMs a greater ability to deliver compliant vehicles in a more cost-efficient manner, and to help incentivize the acceptance of new technology and alternative fueled vehicles in the marketplace.38 [EPA-HQ-OAR-2021-0208-0290-A1, p. 10]

38 NADA supports the comments of the Alliance of Automotive Innovation in this regard.

Commenter: NATSO, Representing America's Travel Centers and Truck Stops et al.

Renewable Natural Gas. For example, the Proposal would repeal policies that have removed barriers to natural gas certification and incentivized expanded natural gas vehicle ('NGV') production. RNG should be a meaningful component of the mix of technologies and fuels that the Proposal incentivizes. The latest data available from the California Low Carbon Fuel Standard Program indicates that the average carbon intensity of bio-CNG sold in 2020 was -5.85gC)2e/MJ.2 In the coming years, the carbon intensity of RNG is expected to be even lower as greater amounts of low-carbon dairy gas is produced and used in NGVs. [EPA-HQ-OAR-2021-0208-0570-A1, p.2]

This rulemaking represents an important opportunity to incentivize the production of vehicles that operate on RNG. The Proposal, unfortunately, misses that opportunity. Specifically, the Agency has proposed removing the multiplier incentives for NGVs that it maintains for EVs and hybrid vehicles.3 EPA indicates that 'NGVs are not a near-zero emissions technology' so they should not receive the benefits of a multiplier incentive. 4 These policies should base GHG emissions standards on science and fully account for all of the environmental benefits of NGVs. Doing so would require the Agency to provide a sufficient incentive for auto manufacturers to produce NGVs. The Proposed Rule does not do this. The Associations urge the Agency to maintain an enhanced sales multiplier for NGVs. We further encourage the Agency to expand this sales multiplier rather than to eliminate it. This will allow vehicle manufacturers to receive emissions credits based on the life-cycle emission benefits of NGVs, consistent with the amount of RNG being utilized by them.

Expanding the enhanced sales multiplier for NGVs, or at the very least maintaining it, would augment the Agency's emissions objectives. For example, commercial pickup trucks and work vans operating in rural parts of the country where extended range is essential are a viable RNG opportunity today. Even if that fleet may one day be electrified, it is likely many years in the future, and it is unnecessary to forfeit emissions improvement opportunities in the intervening years. We should be able to do both. [EPA-HQ-OAR-2021-0208-0570-A1, pp.2-3]

Commenter: NGVAmerica

In this rulemaking, the EPA has proposed rolling back regulatory improvements advanced by the previous administration that removed barriers to natural gas certification and incentivized expanded natural gas vehicle production. The regulatory incentives include to be removed include a sales multiplier for natural gas vehicles, and the continued use of the 0.15 emission s factor used for credit calculations. NGVAmerica with these comments indicates that it supports the comments submitted by Ingevity Corporation in regard to EPA's removal of the 0.15 factor. We request that EPA not eliminate these incentives but instead retain them, or alternatively establish a credit an emission credit based on the life-cycle emission benefits of natural gas vehicles, consistent with the amount of renewable natural gas being used by natural gas vehicles.

In previous comments to EPA, NGVAmerica requested that EPA use the 0.15 factor for greenhouse gas emissions to reward manufacturers for RNG use and to create an efficient method of calculating the benefit of renewable natural gas until EPA moves to adopt a well-to-wheels regulatory approach for all fuels, or until EPA is prepared to come up with a detailed assessment and emission factor specific to erx RNG use. A benefit of the 0.15 factor is that it is consistent with the fuel efficiency credits and has been used in the past in EPA's regulations. As we previously pointed out, EPA can incorporate the 0.15 factor by restoring the credit that previously existed but was never used by manufacturers in 2012 – 2015.[8] In fact, that is exactly what EPA did in its previous rulemaking on this matter but is now proposing to undo. Importantly such factors must be in place for sufficient number of years to allow automakers to incorporate them into their production plans, which typically require 2 – 3 years lead-time.

The concept of adjusting the regulatory framework to encourage low-carbon fuels is explained in much greater detail in a recent NGVA Europe study, which we urge EPA to review.[9] The purpose of this rulemaking should be to accelerate the production of vehicles that reduce carbon emissions – it should not be to favor or support one technology over others. EPA famously indicated that electric vehicles are a game changer and therefore warrant treatment that other technologies do not. But low-carbon fuels that achieve carbon neutrality or carbon negative emissions right now are also a game changer, and they too should be supported and encouraged.

Even if electric vehicles become the dominate technology in coming years, there will continue to be applications and uses that are not a good fit for electric vehicles. For example, commercial pickup trucks operated in rural and remote parts of the country requiring extended range could continue to be an excellent niche market for natural gas. There is no reason not to provide an incentive for this type of application, when the alternative is likely that fleets in these areas will continue to rely on petroleum fueled vehicles if not provided a cleaner alternative.

Expanded deployment of affordable and available low-carbon RNG trucks and work vans will meet the administration’s goal of getting more clean replacement vehicles on the road right away, impacting frontline communities sooner. And an established, mature, and varied RNG refueling infrastructure already exists coast to coast. [EPA-HQ-OAR-2021-0208-0214-A1, p.3]

[8] The previous credit was not utilized by manufactures of NGVs because the window of opportunity was too short, and most manufacturers already were oversubscribed for credits as a result of their production of E85 FFVs. [EPA-HQ-OAR-2021-0208-0214-A1, p.4]

Commenter: South Coast Air Quality Management District

While taking no position on the proposed elimination of the multiplier for natural gas vehicles, the provision is emblematic of the 2020 SAFE rule’s arbitrariness.

EPA proposes to end the natural gas vehicle multiplier after MY2022 because natural gas vehicles (NGVs) are not a near-zero emissions technology and EPA does not believe it is appropriate to encourage any introduction of natural gas vehicles in the light-duty vehicle market. 86 FR at 43761. As EPA notes, the last compressed natural gas (CNG) vehicle to be offered was discontinued after MY2015, and EPA further states it is presently unaware---already 16 months forward from the SAFE rule—of any plans to introduce new NGV models. Id. The South Coast AQMD takes no position on the proposal to end the multiplier for NGVs, chiefly because its continuation or discontinuation would not appear to have any meaningful regulatory effect. The plug-in vehicles on U.S. roadways are already an order of magnitude greater than light-duty NGV numbers, and that disparity will only grow. It bears remarking, however, that if the NGV multiplier should remain in place, it will stand as an artifact of the SAFE rule’s arbitrariness. As the proposal notes, EPA had asserted in 2020 that 'NGVs could be an important part of the overall light-duty vehicle fleet mix, and such offerings would enhance the diversity of potentially cleaner alternative fueled vehicles available to consumers.' Id. EPA now merely says it further considered the issue. But EPA would not be wrong to find its 2020 assertion was technically unsupported and unreasoned. In any event, if EPA should not retain the multiplier, EPA could still point out that natural gas vehicle advocates would have technical eligibility for crediting under plug-in hybrid electric vehicles under the existing definitions of § 86.1803-01. Although the District is not aware of any plans to market or develop vehicles that would combine CNG technology with plug-in battery technology, any such innovation should warrant the same incentivization afforded to gasoline-fueled, plug-in hybrid electric vehicles. [EPA-HQ-OAR-2021-0208-0215-A1, p.5]

EPA Response

EPA received comments supporting its proposals regarding natural gas vehicles and also comments opposing them. Environmental and health NGOs commenting on this topic provided generally supportive comments. Natural gas stakeholders provided critical comments, along with NADA. EPA did not receive any comments from auto manufacturers concerning its proposals.

EPA agree with comments supporting the removal of the multiplier incentives for NGVs. CARB comments that these vehicles have not been produced in this sector for some time and the multiplier has not been used. CARB comments "more importantly, these vehicles directly emit pollutants." CBD comments that NGVs are not zero-or near-zero vehicles and that incentives for them does not constitute a pathway for significant greenhouse gas reductions. C2ES commented incentives under the greenhouse gas emissions reduction program should support decarbonization, rather than fuel switching to another fossil fuel. EPA agrees with all of these points.

NADA commented that it supports retaining the multipliers, commenting that additional compliance flexibilities will afford OEMs a greater ability to deliver compliant vehicles in a more cost-efficient manner, and to help incentivize the acceptance of new technology and alternative fueled vehicles in the marketplace. In response, NADA seems generally supportive of more flexibility for manufacturers. However, manufacturers have shown little interest in producing NGVs for the light-duty vehicle market up to this point, even with incentives in place, so EPA does not believe removing the multipliers will have a significant impact on manufacturers. EPA believes that the lack of comments from auto manufacturers is a further indication that removing the NGV multipliers will not adversely impact manufacturers.

Ingevity, a supplier of a natural gas vehicle technology, provided particularly detailed comments. NGVAmerica commented that it supports the Ingevity comments and also provided similar comments supporting NGV incentives. These comments touch on a range of issues. Ingevity argued that EPA should include the 0.15 factor for NGVs. Regarding Ingevity's comment that the removal of the 0.15 factor from the regulations represents a substantive regulatory change that must be done through rulemaking. EPA agrees with this comment and consistent with the comment, proposed the regulatory change through this notice and comment rulemaking allowing interested stakeholders to provide comments prior to finalizing the change.

Ingevity commented that it disagrees with EPA's characterization that EPA proposed regulatory change to correct an error in the regulations. EPA continues to consider the regulatory change as one that is needed to address an error made by EPA in the regulations established in the SAFE rule. In the 2012 final rule, EPA removed the 0.15 factor from the emissions calculations for NGVs for MYs 2015 and later. In the SAFE rule, EPA sought comment generally on incentives for NGVs. EPA received comments from Ingevity and others advocating for EPA to bring back the 0.15 factor for NGVs. In response to comments provided by Ingevity and other commenters for the SAFE rule advocating for its inclusion, EPA made clear in the SAFE rule preamble that it was not revisiting its previous decision and was not including the 0.15 factor in the program for NGVs. EPA provided its rationale for its decision as part of the SAFE final rule.[29] However, in revisions made to the regulations in the SAFE rule to address an unrelated issue, EPA inadvertently revised the regulations such that the 0.15 factor would apply in MY2021 and later. As discussed in the proposal, this was clearly an error, which EPA is correcting in this final rule. In the proposed rule for this action, EPA discussed the error and proposed to correct it. EPA did not propose or seek comment on additional NGV incentives including revisiting its previous decision to not include the 0.15 factor in NGV emissions calculations. In the proposed rule, EPA described the need for a regulatory change to correct the previous error and proposed to correct it, providing an opportunity as part of a notice and comment rulemaking for interested stakeholders to provide comment.[30]

Ingevity commented that the proposed change should not be characterized as a technical amendment or correction. In response, EPA continues to believe it is a correction as described above, since EPA was not seeking to revisit its previous policy decision, but only to correct the regulations to allow the program to be implemented as intended. EPA does not disagree that the correction could have an impact on any manufacturer seeking credits under the previous regulations, but no manufacturers have done so, and EPA did not receive comments from any manufacturers noting any adverse impact of the proposed correction. Ingevity notes a July 2020 correction notice issued by NHTSA and EPA for the SAFE rule, in which EPA did not include the correction for the NGV regulations. In response, the July 2020 notice was a correction notice, not a rulemaking, for the SAFE rule, which only provided clarifications and where no substantive regulatory changes were included. EPA did not include the NGV issue because substantively revising the regulations would require a notice and comment rulemaking, even when those regulatory changes are technical corrections.

Ingevity comments that the regulatory change removing the 0.15 factor will impede the entry of dual-fuel NGVs into the market, preventing consumers from having access to this type of vehicle. EPA disagrees with this comment. Nothing in the regulations prevents manufacturers from bringing NGVs to the market to satisfy consumer demand. For example, manufacturers could offer a mix of different fueled vehicles to consumers as long as the manufacturer meets its fleet average standard obligations. Automakers may offer NGVs, but EPA is not providing an incentive for them to do so, which EPA views as fundamentally different than impeding their entry into the market. Also, in its comments, Ingevity notes that there are NGVs offered for sale by aftermarket converters. If these vehicles grow in popularity, automakers could choose to bring NGVs into the market again.

Regarding, Ingevity's comment that the regulatory text governs any inconsistency with the preamble, EPA generally agrees. Hypothetically, if a manufacturer pursued credits under the

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[29] 84 FR 25210.
[30] 86 FR 43766.

erroneous regulations even after reading EPA's clear intent in the preamble, EPA would need to correct the regulations to ensure no manufacturers could benefit from EPA's error. However, this is only hypothetical since no manufacturers have pursued such credits and EPA is now fixing the regulatory error through this notice and comment rulemaking.

Ingevity claims that EPA did not provide a detailed rationale for the removal of the 0.15 factor for GHG compliance in the SAFE rule or the current rulemaking. In response, EPA removed the 0.15 factor from the GHG program starting in MY 2015 in the 2012 rule, and in that final rule, EPA provided its rationale for its policy decision.[31] In the SAFE rule, EPA chose not to reinstate the 0.15 factor after reviewing comments on the topic submitted in response to EPA generally seeking comment on the topic of incentives for NGVs. Again, EPA provided its rationale in response to comments in that rulemaking. In the current rule, EPA did not propose or seek comment on the 0.15 factor since it was not revisiting its prior decision, only correcting the regulations to make them consistent with its previous decision.

Ingevity provides data collected on a 2019 F150 converted to run on natural gas to demonstrate that it achieves CO2 reductions similar to that of the 2015 Honda Civic provided by EPA in the proposal as an example of the potential emissions reductions provided by NGVs. EPA appreciates the data submitted. However, the emissions reductions potential of aftermarket conversions is not central to the technical amendment proposed and finalized in this rule.

Ingevity commented that EPA has not addressed comments that EPA should consider the Alternative Motor Fuels Act (AMFA) of 1988. In response, EPA does not accept Ingevity's argument that EPA must follow AMFA due to Congressional intent in 1988. EPA's authority for the GHG program is provided by the CAA which also provides EPA with flexibility to determine the appropriate treatment of alternative fueled vehicles in the GHG program. AMFA only applies to the CAFE program. Congress amended the CAA in 1990, two years after passing AMFA. Yet, Congress did not include any provisions requiring EPA to follow or even consider AMFA's treatment of alternative fueled vehicles under CAFE. EPA does not accept that it is legally compelled to offer the 0.15 factor as an incentive under the GHG program. In fact, the GHG program does not include the treatment of alternative-fueled vehicles specified by AMFA for CAFE for other fuels as well, in addition to natural gas, including electrified vehicles and vehicles capable of running on E85. EPA has adopted these differing provisions through previous rulemakings because it has determined other approaches are more appropriate for controlling GHG emissions from vehicles than those included in AMFA for fuel economy standards. Ingevity speculates that Congress would have applied AMFA to EPA's GHG standards had they existed in 1988. However, EPA's authority for GHG standards predates AMFA and also EPA has had in place GHG standards since first adopting standards in 2010 with no Congressional action on this topic.

Ingevity comments that RFS does not incentivize the production of vehicles that use alternative fuels and that in order for automakers to produce vehicles that use alternative fuels in the RFS

[31] See 77 FR 62816 for EPA's supporting rationale.

program, they need to be incentivized in the GHG program. EPA disagrees with these comments. RFS can and does stimulate demand for alternative-fueled vehicles indirectly, as it has for natural gas heavy-duty pickups and vans, where there are no additional GHG program incentives. Manufacturers do not "need" direct incentives in the GHG program in order to produce vehicles. EPA continues to believe that RNG is appropriately incentivized through the RFS program for reasons discussed fully in the SAFE final rule.[32]

Ingevity also comments that NGVs fueled by RNG have significantly lower GHG emissions than a BEV and that the RFS is successfully causing large volumes of RNG to be used as fuel for NGVs. Along with Ingevity and NGVAmerica, NATSO also comments that EPA should adopt a full life-cycle emissions approach for these vehicles. EPA did not propose or seek comment on such as approach and is not adopting one in this rule (see sections 16 and 26 of this RTC for further comments and responses on the topic of life-cycle emissions). Further, as discussed in the SAFE rule, EPA remains concerned that there is no assurance that NGVs, once sold by the manufacturer would be fueled by RNG. Ingevity's comparison of NGVs fueled with RNG and EVs is somewhat of an apples and oranges comparison. If fossil fuel-based natural gas is used in the vehicles, the environmental benefits asserted by the commenters would not exist and the substantial vehicle incentives recommended by the commenters would result in a loss of environmental benefits. EPA does not believe it is appropriate to attribute most or all of the potential benefits of the production and use of RNG to the vehicle manufacturer. EPA's RFS already appropriately credits RNG use as compared to fossil fuel-based natural gas. Ingevity acknowledges that the RFS program has been effective in increasing RNG use in vehicles. The RFS program provides a substantial incentive for RNG production, and those incentives may lead to even lower fuel pricing and greater demand for RNG as vehicle fuel, and for NGVs in the future. EPA believes that RNG use is increasing because RFS and similar programs successfully link the vehicle operator with the fuel provider. Providing a large direct incentive to manufacturers to produce NGVs misses this important linkage. As an illustration of this point, for many years manufacturers produced FFVs capable of running on both gasoline and E85 in order to claim significant credits under CAFE but these vehicles rarely were fueled with E85 by consumers. EPA is concerned that a similar situation could potentially arise for NGVs since the consumer would have no reason to seek out RNG.

Further, we believe that it is appropriate to provide incentives for electric vehicles and fuel cell vehicles under this program but not for NGVs because of the relative efficiency of these vehicles and their GHG emission impacts if they are fueled from non-renewable sources. Both electric vehicles and fuel cell vehicles have higher efficiency engines than the internal combustion engines they replace, and thus provide GHG benefits even if they are fueled on grid-average electricity and hydrogen produced from reforming natural gas respectively. NGVs, conversely,

[32] 85 FR 25211.

provide little if any GHG benefits compared to conventional ICE vehicles if they are fueled using fossil natural gas.[33]

Ingevity comments that EPA contradicts its own logic because it justified incentives for fuel cell vehicles (FCVs), even though hydrogen, derived from biogas, has been included as a renewable fuel in the RFS program since 2014. In response, the commenter is incorrect, as the RFS program does not currently have a pathway for hydrogen used in fuel cell vehicles. Currently, the RFS program only provides credits for natural gas derived from several qualifying renewable sources. With regard to electricity, while the RFS contains a pathway for renewable electricity to generate credits, EPA has not registered any parties to generate credits for electricity used as transportation fuel until several outstanding technical and regulatory issues are addressed.

NGVAmerica comments that commercial pickup trucks operated in rural and remote parts of the country requiring extended range could continue to be an excellent niche market for natural gas vehicles fueled with RNG and that there is no reason not to provide an incentive for this type of application, when the alternative is likely that fleets in these areas will continue to rely on petroleum fueled vehicles if not provided a cleaner alternative. NATSO commented similarly on this concept. EPA is not weighing in on the potential benefits of such as approach, but again, EPA believes the RFS program is the best avenue to provide such an incentives as discussed above, because there is not a mechanism within the GHG program to ensure the vehicles, after being sold by a manufacturer, would be refueled with RNG.

Finally, EPA notes EVs and FCVs represent still developing advanced technologies with the potential for very large fleet emissions reductions in the future, whereas for natural gas vehicles, the underlying technology is essentially off the shelf technology that has been available for many years as demonstrated by NGV aftermarket conversions. This is another fundamental reason for their different treatment under the GHG program.

EPA appreciates the thoughtful comments provided by the South Coast Air Quality Management District (SCAQMD). While the commenter does not take a position regarding EPA's proposal to eliminate the multipliers for NGVs, they do note that EPA could find that it's previous decision to include them in the SAFE rule was "technically unsupported and unreasoned." Although EPA might not choose to use that phrasing, it is important to note the EPA believes there is a stronger rationale for removing the multipliers than for retaining them, as discussed above. EPA also appreciates SCAQMD comments that nothing in the regulations that prevents manufacturers from producing natural gas fueled PHEVs and claiming multiplier credits for those vehicles.

[33] Greenhouse Gas Emissions and Fuel Efficiency Standards for Medium- and Heavy-Duty Engines and Vehicles Phase 2; Regulatory Impact Analysis Chapter 13, USEPA and NHTSA; August 2016.

EPA agrees that hypothetically, manufacturers with an interest in producing NGVs could use this approach and access the multipliers provided for PHEVs.

12. Technologies Considered, Including Their Effectiveness and Costs

<u>Commenters Included in this Section</u>

Agortsas, George
American Council for an Energy-Efficient Economy (ACEEE)
California Attorney General Office, et al.
International Council on Clean Transportation
Motor & Equipment Manufacturers Association (MEMA)
NATSO, Representing America's Travel Centers and Truck Stops et al.
St. Julien, Rene

Commenter: Agortsas, George

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, pp. 189-190.]

Lastly, we have been leaders in the industrialized world in developing technologies and thriving economically from the leadership we've shown over the last 100 years.

I feel that same leadership can be leveraged and can be used to implement technologies. I believe the technologies are available. I don't believe that we have an issue of not having technologies available.

It's about adoption of those technologies as fast as possible to benefit the planet and to benefit ourselves in the end not only from air pollution but also economically.

As we made the transformation when we were industrializing, we can make the same transformation away from a carbon-based economy and we have the ability to do so. All it takes is willpower.

I look to you and our leaders to provide that willpower and provide that leadership so we can accelerate our transition out of a carbon-based economy.

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

A stronger standard is achievable but also necessary to meet the administration's 2030 goals. EPA estimates that EV sales will reach 8% by MY 2026, for the proposed rule, and even less, for Alternative 2. The White House has set a goal of 50% EV market share for new vehicles by calendar year 2030 (White House 2021). Current EV sales are about 4% of new vehicles, as of MY 2020 (EPA 2020a). EPA therefore expects EV sales share to grow by about 12% per year during the proposed rule. Should EV sales follow EPA's projection, fulfilling the Whitehouse goal would require a growth in EV sales share to grow 44% per year between the end of the proposed rule and 2030. This jump in growth is unrealistic. Either EPA is underestimating the rate of EV sales growth during the rule, and therefore pushing standards that may well be achieved with no improvements in ICV emissions, or EPA is planning for a scenario where the administrations goals will be unachievable. The better approach is clearly to plan for a more gradual growth in EV market share. An even annual growth in EV market share, between MY 2020 and 2030, would suggest an annual growth rate of roughly 26% per year, with EVs having a market share of 16% in MY 2026, double EPA's projections. As discussed above over-awarding credits to EVs is not the best way to accomplish this. Setting a higher standard is. [EPA-HQ-OAR-2021-0208-0251-A1, p.13]

Commenter: California Attorney General Office, et al.

The technologies necessary to reduce GHGs from new motor vehicles already exist and, in fact, are in wide use in the market today. [EPA-HQ-OAR-2021-0208-0245-A1, p.1]

Commenter: International Council on Clean Transportation

Indeed, it appears that no technology improvements from EPA's independent evaluations – or from any comments submitted to EPA or new studies over the last 5 years – were included in the proposed rule. EPA notes that the 2016 TSD data is 'a sound and thorough examination of the available technologies.' This basis for EPA's analysis is an overly conservative assessment of the costs of the standards. We encourage the agency to note this and acknowledge the improvements that have been made, both to effectiveness and costs of compliance technologies, in the intervening years. [EPA-HQ-OAR-2021-0208-0522-A1, p. 3]

Commenter: Motor & Equipment Manufacturers Association (MEMA)

MEMA continues to support a transition to cleaner transportation and the goal of economy-wide net-zero emissions by 2050. Consequently, MEMA supports the goals set out in the proposal and supports the proposed standards outlined through MY2026. It is critical that the EPA continues to emphasize and support multiple technological pathways to meet the targets. As EPA acknowledges in the proposal, there are multiple advanced ICE technologies as well as other advanced propulsion technologies that can significantly contribute to meeting these targets and the post-2026 emissions goals. [EPA-HQ-OAR-2021-0208-0249-A1, p. 4]

MEMA supports EPA's approach of performance-based standards that allow a broad spectrum of advanced propulsion technologies. The framework for MYs 2023–2026 encourages a wide range of electrification technologies while also requiring further technology advances and innovation to ICE technologies. This approach, along with continued credit programs, will sustain long-term supplier technological investments.

Looking beyond MY2026, MEMA stands ready to work with EPA to establish a holistic framework for long-term GHG standards that are ambitious but pragmatic and continue to provide multiple technology pathways for compliance. American innovation can drive the industry to meet the nation's goals if provided the freedom of multiple pathways to achieve them.

The following will allow the supplier industry to have increased stability, continued job growth, and sustain important long-term strategic investments:

• EPA's proposed standards that are stringent but achievable through 2026;

• Coordinated programs between EPA, NHTSA, and CARB;

• Continued credit programs, as proposed and structured; and,

• Utilization of a broad spectrum of advanced technologies that continue into the post-2026 program. [EPA-HQ-OAR-2021-0208-0249-A1, p. 16]

Commenter: NATSO, Representing America's Travel Centers and Truck Stops et al.

All fuels and technologies should be treated equally within the context of establishing performance specifications. Once those specifications are set, however, policy should harness the market's ingenuity to identify the optimal means of satisfying them. If the goal is to reduce GHG emissions and improve fuel economy, EPA should not establish unbalanced regulatory incentives that skew the market towards a particular technology. Instead, EPA should provide a level playing field upon which all technologies can compete fairly for market share. [EPA-HQ-OAR-2021-0208-0570-A1, p. 1]

GHG Emissions Standards Should be Fuel-Neutral. GHG emissions standards should not favor one technology over another. Providing one technology a 'leg up' over others will preclude markets from identifying and gravitating to the most attractive, economical option. While it may be tempting to prematurely pick winners and losers from an energy technology standpoint, sound policy must be grounded in science and recognize that the state of technology can change rapidly. What policymakers think is the best solution today may be surpassed by subsequent innovation. Sound policy should not stifle innovation by mandating specific fuel solutions. Instead, EPA should set emissions standards and let the market – guided by consumers – innovate to find the best way to meet those goals.

The Agency's preference for electric vehicles ('EVs') over other technologies is counterproductively undermining meaningful opportunities to improve the transportation sector's emissions footprint. [EPA-HQ-OAR-2021-0208-0570-A1, p.2]

Commenter: St. Julien, Rene

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, pp. 212-213.]

The world has seen incredible technological innovations over the past 40 years, many things changing at a speed which was almost hard to keep up with. Who would have thought even a couple of years ago that we could have a virtual meeting like this on Zoom?

Meanwhile, the automotive industry still produces cars and trucks using the same fossil fuel-burning internal combustion engines that were being made in the early 1900s.

About all the auto industry has done is taken the same technology and refined it a little every decade, generally in the areas of comfort, style, and reliability. For the most part, changes in the areas of safety or the environment are rarely made voluntarily and only when the Federal Government mandates it.

It appears that the open market competition has failed us. After 120 years, the extremely complex internal combustion engine should be retired. Tesla's the only car manufacturer that has dared to take on the status quo.

Our culture needs to set its expectations much higher as to what is possible when the best minds get to work. We need to stop wallowing in the past and start getting innovation and competition to accelerate us into a true clean energy future at a much faster rate than past standards have set.

EPA Response

EPA acknowledges all of the comments above.

In response to comments expressing the need to transition out of a carbon-based economy, EPA recognizes the fact that the economy is largely dependent on carbon-emitting energy sources and the need to reduce GHG emissions from such sources. A comprehensive shift from carbon-based energy sources would take longer than the time frame of the current rulemaking, which is intended to revise the SAFE rule standards through MY 2026. As noted in the Preamble and elsewhere, we acknowledge the value of providing an appropriate transition to stronger standards that we plan to develop in a future rulemaking, and we believe that this rulemaking meets that goal.

In response to comments that the standards should provide for a more appropriate transition to electric vehicles, and that setting a more stringent standard is a more appropriate way to do this than providing credits for EVs, in Preamble Section III.B.3 and RIA Chapter 4.1.4, we discuss that the final standards are projected to lead to a greater penetration of EVs than in the NPRM – the final standards are projected to result in 17 percent EV penetration in MY 2026, which is just above ACEEE’s recommendation for EV penetration that year.

EPA disagrees with comments that assert that no technology improvements were included in the proposed rule. Changes to the technology inputs are described in Preamble III.A. The current rulemaking is intended to revise the SAFE rule standards. As explained in Preamble III.A, EPA chose to continue use of the CCEMS model for this rule in order to facilitate comparisons between the analysis presented in this rulemaking and the analysis presented in support of the SAFE FRM, and to more clearly illustrate the influence of some of the key updates to the inputs used in the SAFE FRM. Also as explained in Preamble III.A, EPA made a number of updates to the inputs for the final rule analysis to better represent and characterize the available technologies. We also made additional updates for the final rule analysis, and we conducted several sensitivities covering alternative technology assumptions, including for battery costs, HCR2, and application of mild and strong hybrid technology (see RIA 4.1.5 for a discussion of these and other sensitivities), and we considered the results of these sensitivities in our assessment of the final standards. EPA notes that the final standards are of similar or lower cost compared to the 2012 rule standards and the NPRM. EPA's assessment in the context of this rulemaking is that additional updates to technologies considered or their costs would not have a meaningful impact on the conclusions of the analysis.

As discussed in Preamble III.C, EPA's assessment is that the final standards are appropriate. Coordination between agencies is discussed in Preamble I.A.1, II.A.3 and II.A.8. Our treatment of credit programs in the final rule is discussed in Preamble II.A.4, and responses to comments on that topic are presented in Section 5 of this Response to Comments document.

Regarding response to comments that EPA should consider a broad spectrum of technologies, in this final rulemaking, as with previous rulemakings, EPA is setting performance-based standards that do not mandate or favor a specific technology over another, and that can be met with a broad variety of available technologies. See also discussion on similar comments in Section 12.1.

Similarly, EPA disagrees with the comment that the agency has a preference for electric vehicles (EVs) over other technologies. Electric vehicles are significantly different from conventional vehicles in terms of their effectiveness, cost, and potential for long-term emissions reduction. Under our performance-based standards, EPA's projected penetrations of specific technologies are primarily an outcome of their relative costs and effectiveness. Our projections of technology penetrations are meant to show potential pathways to meet the standards. Ultimately each manufacturer will decide its specific technology pathway to meet the standards, and the pathways chosen by manufacturers may differ from our projections. While we project that a cost minimizing compliance pathway to meet the performance based standards of the final rule will include increasing numbers of EVs and PHEVs, we also project that more than 80 percent of vehicles in a fleet complying with the standards in MY 2026 will use gasoline technologies, including conventional hybrids which run on gasoline.

12.1. Battery/Electrification Technologies

Commenters Included in this Section

Allen, Martin
Allergy & Asthma Network, et al.
Alliance For Automotive Innovation
Alliance for Vehicle Efficiency (AVE)
American Council for an Energy-Efficient Economy (ACEEE)
American Enterprise Institute (AEI)

California Air Resources Board (CARB)
California Attorney General Office, et al.
Center for Climate and Energy Solutions (C2ES)
Chun, Mark
Connecticut Department of Energy and Environmental Protection
Consumer Federation of America
Consumer Reports (CR)
Elders Climate Action (ECA)
Energy Innovation Policy and Technology LLC
Energy Strategy Coalition
Environmental Protection Network (EPN)
Ford Motor Company
Gillet, Victoria
Holiday, Thomas
Holmgreen, Jack
Hyundai America Technical Center, Inc. (Hyundai)
International Council on Clean Transportation
International Union, United Automobile, Aerospace & Agricultural Implement Workers of America (UAW)
Lombardy, Anthony
Maine Department of Environmental Protection
Maryland Department of Environment
Merlotti, J.
Metropolitan Mayors Caucus
Minnesota Pollution Control Agency (MPCA) and Minnesota Department of Transportation (MnDOT)
Moore, Kenneth
Motor & Equipment Manufacturers Association (MEMA)
National Association of Clean Air Agencies (NACAA)
National Coalition for Advanced Transportation (NCAT)
NATSO, Representing America's Travel Centers and Truck Stops et al.
New Mexico Environment Department
New York State Department of Environmental Conservation
NGVAmerica
Northeast States for Coordinated Air Use Management (NESCAUM)
Noyes, James
Ohio Attorney General Office, et al.
Peavler, Jean
Piper, Edward
Plug In America, the National Association of Electric Vehicle Drivers
Price, Heather
Roush Engineering
Schrier, Paul
Shevelew, Jonathan
Southern Environmental Law Center

Stabnau, Angela
Stellantis
Tesla
Toyota Motor North America, Inc. (Toyota)
U.S. Chamber of Commerce ('the Chamber')
Valero Energy Corporation (Valero)
Volvo Car Corporation
Weck, Will
World Resources Institute (WRI)
Wyman, Stephen

Commenter: Allen, Martin

[The following comments were submitted as testimony at the virtual public hearing on August 26, 2021. See Hearing Testimony – 26Aug2021, p. 26.] Lack of infrastructure. Do we need fast charging stations for we consumers' range anxiety? Absolutely, and I believe the Administration's plans will greatly help.

Are single family homeowners at an advantage now over multifamily and multistory residential dwellers? Absolutely. But with increased investments in infrastructure, incentives for petroleum retailers to install charging stations, local land use incentives and the like, infrastructure can and will be built to meet the needs of consumers.

Commenter: Allergy & Asthma Network, et al.

US EPA must secure a rapid transition to zero-emission technologies. US EPA's documentation provides a thorough discussion of the technological advances and investments, automaker announcements and state policy developments in pursuit of greater deployments of zero-emission vehicles (ZEVS) as called for by President Biden's August 5, 2021 Executive Order.6 This current proposal must be followed by much stronger limits on greenhouse gas emissions from light-duty vehicles through 2030 as well as stringent multi-pollutant standards for heavy-duty vehicles without delay. US EPA must move aggressively to set additional standards to accelerate ZEV deployment in the on- and off-road medium- and heavy-duty sectors. [EPA-HQ-OAR-2021-0208-0296-A1, p. 3]

Commenter: Alliance For Automotive Innovation

Achieving a Net-Zero Carbon Transportation Future. We are confident that electrification can be successful, and that electrification will deliver uninterrupted mobility services that American families and businesses will benefit from. Together with public and private stakeholders, we can be successful in this transformation.

Transforming our light duty fleet to electrification, and creating an ecosystem in which electrification can thrive, is a task that must be accomplished at scale and in a manner that ensures uninterrupted mobility for American families and businesses. This task is not just building great cars and trucks. It starts with securing access to critical raw minerals and establishing a secure network of logistics and processing that will deliver the flow of materials to new factories that will manufacture advanced batteries and electric drive components. Furthermore, we must train our workforce to build, service, and repair electric vehicles. We must also ensure that the vehicles are handled responsibly at end of life and that critical minerals circulate back into the economy. Our service stations will also need to evolve in order to fuel these new vehicles with electrons and hydrogen. Energy producers must also move in tandem to ensure that the new fuels are sourced from renewables and can be delivered affordably and at scale to our consumers and businesses. Automakers are committed to doing our share. Collectively, automakers have committed to investing more than $330 billion to transforming cars and trucks to an exciting, electrified future.[9] We believe electric vehicles powered by clean electricity, renewable hydrogen and other low- and net-zero carbon fuels will help deliver our contribution to our nation's ambitious climate goals.

We will be successful in this endeavor when we are aligned and moving forward together to achieve our shared goal of cleaner, safer, and smarter vehicles. [EPA-HQ-OAR-2021-0208-0571-A1, p. 2-3]

Achieving Electrification Success through Cooperation and Shared Responsibility. Our national success in achieving a zero-emission future is a shared and collective responsibility that will demand immediate and sustained action from many partners. As the President has established an "all of government" approach to addressing climate change, so too must an "all in" approach to transforming America's manufacturing base, workforce, fueling infrastructure and vehicle fleet be established. Necessary actions to support the transition to electric vehicles ("EVs", including battery electric, plug-in hybrid electric, and fuel cell electric vehicles) and to make the proposed GHG standards a success include, but are not limited to:

Supporting American drivers with reliable and convenient EV refueling infrastructure. A 2021 National Academies report on improving light-duty vehicle fuel economy (the "NASEM Report")[10] cites location and availability of charging stations as the number one reason for a consumer to avoid an electric vehicle.[11] EV recharging and hydrogen fueling infrastructure availability and visibility will be critical to promoting EV market growth and supporting manufacturer sales targets to both meet the proposed standards and long-term electrification goals. Home charging will cover some needs, but not all. State and federal governments, together with private sector charging companies, have the opportunity to establish a fueling infrastructure plan that will provide confidence to American drivers that they will never be afraid of running out of fuel. Auto Innovators supports the National EV Charging Initiative.[12] In the long run, over 250 million light-duty vehicles will need to be supported with convenient, affordable, and reliable EV and hydrogen fueling. [EPA-HQ-OAR-2021-0208-0571-A1, p. 4]

Fleet purchase requirements. Over 8 million cars and trucks are owned by fleet operators in the U.S.[14] Fleets represent a significant opportunity for electrification given regular routes and often centralized fueling. Federal, state, local, and private fleets have an opportunity to demonstrate leadership in accelerating adoption of EVs. Recently, Auto Innovators wrote to the California Air Resources Board ("CARB") in support of such requirements as part of CARB's ACC2 rulemaking.15 Fleet purchase requirements are especially logical in jurisdictions that have specific EV sales requirements. Reaching high EV sales goals will require substantial fleet, in addition to retail, market penetration. [EPA-HQ-OAR-2021-0208-0571-A1, p. 5]

Development of a battery and EV recycling system in the United States. As EV manufacturing in the U.S. grows, the demand for critical minerals will also. In addition, as today's EVs are retired, a robust recycling system is required to ensure valuable components of EVs, such as batteries and the metals within them, are reused and recycled. Auto Innovators is actively working with government and recycling industry stakeholders to develop such a system.

Increased research and development investments. EVs remain relatively more expensive than equivalent ICE vehicles. Significant additional research is required to achieve the cost reductions projected and hoped for. [EPA-HQ-OAR-2021-0208-0571-A1, p. 6]

Auto Innovators supports the goal of 40 to 50 percent new vehicle market share for EVs (including battery electric, plug-in hybrid electric, and fuel cell electric vehicles) by 2030, but action is needed today to implement ten specific policies to grow EV sales significantly through model year 2026 and beyond. [EPA-HQ-OAR-2021-0208-0571-A1, p. 7]

Concerning energy savings associated with electric vehicles, there is a tremendous amount of uncertainty and geographic variability related to the future of the electricity grid, and electricity rates. Auto Innovators urges policymakers to consider the possibility that electricity rates may become considerably more expensive as renewable generation is added.

Technology Costs of Electric Vehicles

The Agencies assume significant cost decreases in battery electric and other electric vehicles through 2032. However, several cost factors need to be considered more thoroughly including raw material costs, the effect of potentially higher electricity costs on electric vehicle production, and how variations in battery cell chemistry, form factor, and pack design could affect cost learning assumptions. There are also likely near-term costs to develop the necessary supply chains. We suggest that, at minimum, the Agencies adopt a two-part learning curve for batteries that separates raw material costs from time/volume learning such as that described by MIT Energy Initiative (2019).32

Both RIAs simulate a significant increase in BEV penetration under the revised standards. It is important that the Agencies use plausible estimates of the future costs of electric vehicles.

A crucial assumption of the agency analyses of BEVs is that the manufacturing cost of a BEV declines in the decade ahead due to a continued decline in the cost of producing battery packs and other components of BEVs. A recent study covering 1992 to 2016 found that the real price of lithium-ion battery packs did decline an average of 13% per year when measured according to energy capacity supplied. When energy-density improvements are considered, the annual improvement rate was about 17%.196 Bloomberg New Energy Finance ("Bloomberg NEF") bases its battery-price forecasts on a historical annual learning rate of 18% and aggressive demand forecasts for EVs and lithium-ion batteries (which leads to high production volumes and associated efficiencies). Bloomberg NEF also assumes that battery producers can achieve maximum economies of scale by producing packs for both the stationary energy storage market as well as for EVs. Recently, the Bloomberg NEF annual battery-pack price survey found that prices continued to fall 13% from 2019 to 2020, a period when raw material prices for battery cells were falling due to the EV sales slowdown in China.197 The National Academies ("NAS") acknowledges that, in recent years, the sharp decline in material costs for cathodes was due primarily to a corresponding decline in the constituent metal prices, a trend that "may not be sustainable."198

The traditional method of accounting for possible future changes in battery-pack costs is to apply a learning curve in future years based on production volume, and then make a somewhat arbitrary assumption about when the rate of decline decelerates or stops (technological maturity). NAS did not forecast changes in material prices but nonetheless assumed that pack costs will decline by a rate of 7% per year until 2030.199 EPA did not change battery-cost estimates compared to the final SAFE rule but opined they may be too high without explanation.200 NHTSA, in its RIA, assumes production-volume economies will reduce NMC 822 production costs by up to 8% in the near-term but by less than 1.2% after seven years.201

The underlying literature focuses on learning related to volume of production, but the Agencies and NAS compress numerous unanalyzed issues into a "learning factor". NHTSA, for example, in the SAFE Rule analysis of battery costs202 – which is the basis for NHTSA's current battery-cost analysis – acknowledges that the learning factor is intended as a "proxy" for changes in battery chemistry, changes in energy density, further gains in plant efficiency, and additional economies of scale in production due to higher production volumes.

All unanalyzed factors are seen as contributing to future reductions in battery-pack costs; neither NAS nor the Agencies confront the real possibility that counteracting, unanalyzed factors could work to restrain the future decline in battery-pack costs.

A recent MIT report took an important step toward realistic forecasting by simulating future battery-pack costs using a two-stage model: one stage for the costs of materials, including processing and synthesis, and a second stage for the costs of manufacturing battery packs.203

MIT's second stage (manufacturing) has annual cost declines of 16.5% (+/- 4.5%) per year – like the results of one-stage models – but the first stage on material inputs (including materials synthesis) declines at only 3.5% per year. Obviously, the raw material costs provide a floor on the future costs of battery packs. Even assuming NMC 811 is the dominant battery chemistry in 2030 (which ensures lower material costs due to substitution of nickel for costly cobalt), the simulated pack-level costs in 2030 are not sufficiently low in the MIT two-stage simulation to hit DOE's target of $100 per kWh. In fact, the DOE goal of $100 per kWh by 2030 cannot be met unless material prices remain depressed at 2016 levels.204

NHTSA erroneously refers to the battery-cost estimate from the MIT simulation as an "upper bound";205 in fact, the MIT report supplies both a best estimate and upper and lower cost estimates based on different scenarios with the two-stage model (best estimate of $124/kWh, low estimate of $93/kWh; high estimate of $140/kWh). The two-stage model used by the MIT Energy Initiative is based on peer-reviewed scientific modeling but without recent information (2021) on the resurgence of material prices.206 The Agencies have not yet performed an in-depth analysis of material costs for lithium-ion batteries; indeed, NHTSA acknowledges that it has performed no analysis of future prices of raw materials.207 Current sensitivity cases on the learning rate alone are insufficient. The Agencies should work with National Laboratories, DOE, and others to produce sensitivity cases for raw and processed material costs, material efficiency in battery construction, and other considerations.

To provide proper analysis of the penetration of different battery chemistries, Auto Innovators recommends that the Agencies remove changes in battery chemistry from the near- term learning factor (2021-2032) and analyze it separately and explicitly in the RIAs. The proposed NHTSA RIA assumes that one battery chemistry (NMC 622) is representative of the industry for BEVs, as it was the most common cathode chemistry in 2019.208 Instead of choosing one battery chemistry as representative of the entire industry, as the Agencies do with the Argonne battery model, the Agencies should forecast the penetration of different battery chemistries in the fleet from 2021 to 2032 and estimate applicable costs for each of them. Since alternatives to lithium-ion batteries are unlikely to have significant penetration prior to 2032, the relevant battery designs for 2021-2032 are the five discussed below (NCA, NMC 111, NMC 622, NMC 811, LFP). Those batteries are well enough understood to perform separate cost analyses for each, rather than assume an arbitrary learning curve. The learning curve should focus on production volume and cell yield rather than battery chemistry.

Auto Innovators is also supplying some detailed information and analytic guidance on several other unanalyzed factors that might restrain the future rate of decline in BEV costs. We encourage the agencies to account for these factors as they make forecasts of future production costs of BEVs.

Battery Raw Material Price Impacts and Considerations

Raw material prices can greatly impact the costs of producing electric vehicles. The Agencies should adopt or develop a two-stage learning model for battery costs that accounts for both raw material costs and other volume/time-based learning in place of the single stage learning curve used in the Agencies proposals.

The key raw materials for battery packs are lithium, cobalt, nickel, manganese and natural graphite. The rare earth neodymium is critical for electric motors.209

Could EV producers face rising raw material prices between today and 2032? It is certainly possible. In the first seven months of 2021 alone, the surge in demand for EVs in China, Europe and the U.S. has induced a rapid recovery in depressed material prices. From January 1, 2021, to July 1, 2021, the spot prices for lithium, cobalt, nickel, manganese, natural graphite, and neodymium have changed +91.4%, +63.1%, +15.0%, +10.4%, +32%, and +24.9%, respectively.210 Some of this surge reflects global recovery from the COVID-induced recession.

Electric vehicle users can also incur costs beyond that of the technology itself. While some of these costs are considered, we urge the Agencies to also consider costs such as those for home charging infrastructure, and cost/benefit differences for long-range and short-range electric vehicles. Electrification technologies, especially BEVs and PHEVs, entail a significant change in how motorists engage with transportation and electric-utility systems.

Less than a handful of the dozens of published battery-forecasting models include any formal analysis of global trends in raw material prices.211 None of the published battery- forecasting models have accounted for the surge in material price experienced in 2021.212

The Agencies are currently relying on the Battery Performance and Cost Model ("BatPaC") developed by Argonne National Laboratory. This transparent spreadsheet model provides a peer-reviewed, bottom-up approach to account for cost-input factors. However, BatPaC does not include a formal global model of the market for each raw material used in battery packs. Instead, "the price of raw materials is based on our best estimate at the time of version release".213 No analytic detail is provided to support the best estimate. The versions used by the Agencies does not account for the 2021 surge in raw material prices.

Gauging the impact of raw material prices on the costs of BEVs requires the following information:

- Material intensities of the raw materials in the cathode chemistry (defined as kg/kWh). These intensities were obtained from reprinted Table 3 (Figure VII-1, below) for several of the cathode chemistries (NCA, NMC 111, NMC 622, NMC 811, LFP).

- Raw material prices.

Derivation of the weights of the materials used as a fraction of the raw materials provided (e.g., lithium as a percentage of lithium carbonate, neodymium as a percentage of neodymium oxide).

Figure VII-2: Material intensities of Raw Materials in Cathode Chemistry. Source: Faraday Insights, https://faraday.ac.uk/wp-content/uploads/2020/12/Faraday_Insights_6_Updated_Dec2020.pdf (accessed Sep. 24, 2021).

The summary tables below show the material costs for lithium, cobalt and nickel for three types of batteries: NMC 111, NMC 622 and NMC 811. For LFP battery chemistry, the usage of cobalt and nickel is zero. The summary tables also show the percent increase in battery cost if the raw material costs were doubled. The Agencies are encouraged to perform similar analyses for manganese and natural graphite.

The amount of rare earth neodymium used in permanent magnet motors was assumed to be 3.5 kgs. The summary table below shows the percent increase in electric motor cost if the raw material cost of neodymium oxide were doubled.

In summary, a pre-2032 doubling of raw material prices could substantially erode the “learning-curve” cost-reductions assumed in the RIAs. The RIAs do include a helpful sensitivity analysis that varies the learning curve by +-20% and the battery-back costs by +/- 20%. But this range is not large enough to account for large increases in raw material prices, especially since the prices of several raw materials could rise simultaneously. There is no basis for believing that raw material prices will decline for a sustained period prior to 2032.

Much more careful analysis of raw material prices is necessary in the final RIAs, because 70% of battery-cell costs are material costs (mostly for the cathode followed by the anode, and then the separator). About 50% of the cathode costs are the constituent costs of raw materials, which makes cathode production costs especially sensitive to raw material prices.214 NAS notes that the declines in metal prices from 2011 to 2017 that helped drive down material costs “may not be sustainable.”215 The preliminary material price data for 2021 supports NAS’s cautionary statement. Over time, as EV manufacturing economics take hold, raw materials – and their prices – will account for an increasing share of the overall cost of battery packs.216

The path of raw material prices from 2021 to 2032 (and beyond) will depend critically on how quickly the global supply of raw materials responds to the growth in EV sales and the price signals in the global market.217 The prospects for each raw material are somewhat different but there are reasons to believe the the global supply responses will be sluggish, especially from 2021 to 2032.218 Major advances in battery design, which could overwhelm the impact of raw material prices, are more likely to exert their impact from 2030 to 2050 than from 2021 to 2030.219 Each of the key raw materials is considered below.

Lithium

The earth has plenty of lithium resources, and the recoverable reserves are more than adequate to support a massive expansion of the global electric vehicle sector. The practical limits on lithium development are more binding than the physical limits on resources.

Lithium mining requires substantial volumes of water but over 50% of lithium mining occurs in water-stressed areas.220 The energy requirements are also substantial, but promising reserves are often located in areas with little or no energy infrastructure. And lithium miners need good access to ports with sea-faring capability in order to ship lithium compounds to refineries for processing, prior to their use in cathode production.

Opposition to lithium mining and processing – among both organized environmental groups and local communities – is intensifying in many parts of the world (including the US). Such opposition lengthens the historically long time frames for lithium development projects (about five years in Australia and seven years in South America, based on 35 projects that came on line between 2009 and 2019).221 In countries with little or no experience with lithium mining, project time lines are much longer, an average of 16 years to move from discovery to first production.222 The opposition is understandable because both lithium mining and processing have significant ecological footprints (some temporary, others longer lasting). In some cases, lithium development may also create conflicts with other business sectors such as tourism, ranching, and agriculture. In addition, investors are hesitant to make new commitments to lithium mines because of the historical price volatility and the low prices contained in some long-term projects negotatied when global prices were depressed from 2018- 2020.223

Analysts from Roskell project that, due to rising sales of electric vehicles, the global demand for lithium will rise by a factor of 4.5 between 2020 and 2030. Since supplies are expanding slowly, global supply deficits of lithium are projected toward the end of 2021 and 2022. Without successful new lithium mines, supply deficits will extend until 2030 or later. Even with new lithium mines, prices will rise insofar as the marginal cost of lithium from new mines is larger than the marginal cost of lithium from existing mines. Thus, all signs point to increasing lithium prices, at least until (or if) post-2030 lithium-free battery technologies emerge as viable substitutes for lithium ion batteries.224

Here is a brief status report on lithium development around the world, with an indication of whether significant local opposition has emerged and/or delays have occurred. The importance of lithium processing capability (as well as mining) is emphasized.

1. Sonora Lithium Project, Mexico. Bacaonora Lithium (UK), owned 50% by Ganfeng Lithium (China), is developing a large mine site in an area that has been considered promising for decades. Development activity slowed when the leftist regime in Mexico announced possible government ownership of the Project, but the government is now allowing private ownership to proceed.225 Novel technology will be used to extract lithium from clay soils with the assistance of technical specialists from China. The company has delayed production several times, most recently from 2020 to 2023.

Complicating factors include an uncertain regulatory environment and royalty regime, fears that drug cartels could disrupt the Project, and concerns from community, indigenous, and environmental groups about water shortages and water quality.226

2. Jadar Lithium-Borates Project, Serbia. In July 2017 the Serbian government and the multinational company Rio Tinto announced plans to launch a major underground lithium mine in western Serbia.227 A feasibility study is expected by the end of 2021. The first production is scheduled for 2026. Environmental and grassroots opposition to the project is growing, including street protests in Belgrade involving thousands of protesters.228 A petition calling for a ban of the project garnered 110,400 signatures as of June 10, 2021. The Serbian government has agreed to have a referendum on the project once a comprehensive study of the project is completed.229

3. Piedmont Lithium Project, North Carolina, USA. Piedmont Lithium (Australia) has proposed an open-pit lithium mine and processing plant in western North Carolina’s Gaston County. The company once had a deal to supply Tesla but that deal has been postponed indefinitely, as the company has experienced delays in securing financing, a state permit, and

Gaston County approval. The nearby community is divided about the Project and the Gaston County Commissioners passed a new zoning ordinance in 2021 to ensure adequate County oversight of the mine. The company believes the zoning ordinance will not prevent the Project from moving forward.230

4. Silver Peak Mine, south-central Nevada, USA. Albemarle (North Carolina, USA) owns the only active lithium mine in the U.S. in Clayton Valley, Nevada. In 2021 the company announced plans to double production at the site by 2025.231 Albemarle has experienced conflicts over water rights with other developers in the water-stressed area.232

5. Thacker Pass Project, northern Nevada, USA. Canada's Lithium Americas, with partial backing from Ganfeng (China), plans to launch a new lithium mine from 2022 to 2026 near the border of Nevada and Oregon. In January, 2021, the Bureau of Land Management completed its environmental impact statement on the Project and granted Lithium Americas a permit. A coalition of local and national environmental groups oppose the project but, in the summer of 2021, failed in court to obtain a preliminary injunction against early excavation work at the site.233 In separate litigation, opponents (which also include a nearby rancher) are challenging BLM's permit decision on multiple grounds such as inadequate consultation with local Tribes and failure to protect that the sage grouse, a bird found in the West that is threatened due to habitat loss.234

6. Rhyolite Ridge Lithium-Boron Project, Nevada, USA. Ioneer Ltd (Australia) is developing a major new lithium and boron mine about 220 miles north of Las Vegas. In September 2021, Silbanye Stillwater (South Africa) bought a 50% interest in the project in one of the largest lithium investments in U.S. history. The project is expected to start in 2024, but complications have emerged in the U.S. regulatory system. The U.S. Fish and Wildlife Service, under court order, issued in June 2021 a proposed decision to list a rare desert flower (Tiehm's buckwheat) as an endangered species under the Endangered Species Act. The flower grows on roughly 10 acres within the mine site area. Ioneer believes the mine and the flower can co-exist but a national environmental group, the Center for Biological Diversity, believes the flower cannot be transplanted safely to other nearby soils.235 The Center is litigating a decision of the Bureau of Land Management to provide an exploratory permit but, meanwhile, the State of Nevada has awarded both water and air permits for the proposed project.236

7. Lithium Extraction in the Atacama Desert, Chile. A decade ago, Chile was the leading producer of lithium in the world but mining progress has slowed. In March, 2018, the two major lithium miners in Chile, state-owned SQM and Albemarle (USA), announced major expansion plans in collaboration with the Chilean government and in conjunction with an elaborate plan by Samsung to build three battery plants in Chile to serve the global electric vehicle market. The deal unraveled when a report of the Chilean government alleged that the existing mining operations of the two companies have exacerbated water shortages in the Atacamera Desert.237 Indigenous groups and environmental activists also challenged lithium mining in Chile on the grounds of adverse ecological impacts.238 In 2019, Chile's First Environmental Court ruled in their favor. Meanwhile, China's Tianqi Lithium purchased a 25% interest in SQM, and Albemarle announced a revised plan to enhance yields at its existing lithium mines in Chile,

without an expansion of its ecological footprint. Chilean opponents of lithium mining see the writing of the country's new Constitution as a forum to redefine ownership of water rights in a manner that would allow indigenous groups in the Atacama Desert to exert more control over how their land is used.

8. Lithium Extraction in the Atacama Desert, Argentina. Until 2015, FMC Corporation (USA) was the only company doing large scale lithium mining in Argentina. As Chile's mining sector faltered, two consecutive presidents of Argentina attracted Japanese, Australian, French, Chinese and American companies to make new investments in Argentina.239 The huge new Cauchari-Loaroz Project, by Lithium Americas is scheduled to begin production in 2022.240 There is some opposition from indigenous groups (e.g., the Kolla communities in the Puna region) and some hydrologists are raising concerns about the potential loss of freshwater resources and adverse ecological impacts. Meanwhile, an NGO called Plurinational Observatory of Andrean Salt Flats (Opsal) links environmental and indigenous activists across The Lithium Triange in Chile, Argentina and Bolivia.241 Nonetheless, Argentina's mining sector was making progress until the COVID-19 recession and the temporary slump in lithium prices. Whether Argentina can overtake Chile as a leading global lithium miner remains to be seen.242

9. The Greenbrushes Mine, Western Australia. The world's largest hard rock lithium mine is a joint venture of Tianqi Lithium Industries (China), Albemarle (USA), and IGO (Australia). It is scheduled for expansion, as the Mine is a major supplier of Tesla.243 But the mine is only one of a recent proliferation of lithium projects in Western Australia, where a pro-mining culture is pervasive, where major investments in ports and transport infrastructure support mining, and where access to foreign capital (especially from China) has helped finance new projects. In 2017, Australia surpassed Chile as the world's number one lithium miner.

10. Northern Montalegre region, Portugal. Portugal is the only European country with active lithium mining and the national government believes that the northern Montalegre region, which possesses significant lithium reserves, would benefit economically from a new lithium mining sector. With encouragement from the European Union and the national government of Portugal, several developers (e.g., Savannah Resources of the UK) have made preliminary investments in Portugal. However, the local populations in the region and their politicians have mounted sustained opposition to new lithium mines. Fearing the political backlash, the national government adopted a new mining law that provides more royalties and local safeguards for affected local communities. Opponents have already stopped one lithium project and are opposing another that has entered the public consultation phase.244 The central government has the theoretical power to override local opposition, but it seems unlikely that such a heavy-handed approach will be taken.245

11. Direct Lithium Extraction Technology. Several developers around the world are touting a relatively new technology, direct lithium extraction (DLE) from brines, as an environmentally more benign approach compared to the traditional brine methods used in Chile and the hard rock mining in Australia.246 DOE is also optimistic about DLE.247 More R&D investments are necessary to ensure the DLE is economical and can be accompanied with proper management of large volumes of waste that accumulate rapidly.248 General Motors recently made a significant

investment in a DLE venture at the Salton Sea in California.249 It is too early to judge whether DLE will experience less community and environmental opposition than traditional methods of lithium mining. It may be 2030 or later before this technology has significant market penetration on a global basis.

12. China's Dominance of Lithium Processing. China was once a major player in lithium mining but in recent years has become a large importer of lithium, as China's lithium mines led to significant water pollution and protests among villagers.250 In order to secure a strong global position in the lithium sector, China's industrial planners – in "China 2025" – urged a move up the value chain to processing and manufacturing.251 Banks and lithium/cathode companies based in China have collaborated on acquisitions of majority (or substantial minority) interests in lithium mines in South America, Australia, the U.S. and other countries. More importantly, China has assumed a dominant position in the processing of mined lithium into lithium chemicals that are suitable for cathode manufacturing. Virtually all of the lithium mined in Australia is shipped to China for processing. China is now making large new investments in lithium processing to ensure continued dominance.252 Thus, U.S. and European politicians seeking to avoid dependence on China will need to orchestrate major investments in lithium processing capability in addition to those in lithium mining.

Cobalt

Cobalt accounts for one-fifth of the material in the cathode of a typical lithium ion battery. It has a stabilizing effect, keeping the layered structure stable as lithium ions travel in the lithium ion cell, and prevents cathode corrosion that can lead to battery degradation and battery fires.

Cobalt is also one of the most expensive materials in an electric vehicle. In 2020, the average spot price of cobalt in the U.S. was $16 per pound, down from a peak of $37.4 per pound in 2018, before the temporary slowdown of EV sales in China (2019-2020). Due to the projected growth in EV sales, Roskill forecasts that global demand for cobalt will rise from 141,000 tons in 2020 to 270,000 tons in 2030.253

The rate of growth in cobalt demand from the EV sector is expected to be slower than the rate of growth of lithium demand, as a transition toward lower-cobalt or zero-cobalt batteries is underway.254 However, the transition to lower-cobalt batteries is occurring more slowly than expected.255 The consulting firm, Rho Motion, forecasts that cobalt-free batteries will grow in the next decade but not exceed 20% of the global battery market by 2030.

Cobalt supplies do not readily respond to growth in global demand for several reasons. Cobalt is typically mined as a byproduct of copper, and thus it is the demand for copper rather than cobalt that drives the amount of cobalt that is extracted from mines. In other words, the supply of cobalt is not elastic with respect to price.

Moreover, about 60% of the cobalt mined in the world comes from one country, the Democratic Republic of Congo (DRC). The current political leadership of DRC seeks to renegotiate the mining agreements with companies doing business in DRC.256 Moreover, Chinese companies have purchased a controlling interest in 70% of Congo's copper-cobalt mines.257 Western businesses are reluctant to make investments in DRC because of political instability, violence and uncertainties about regulation and taxes. There is also evidence that child labor is used in DRC's mines, which further discourages investment by Western businesses.258

Given constraints on supply growth, deficits in cobalt supply are projected by 2024, which in turn will cause prices to rise further.259 Experts at RBC predict that cobalt prices will surpass $40 per pound by 2024.260

Global cobalt shortages and rising prices are a distinct possibility between 2021 and 2030. In the post-2030 period, low-cobalt and cobalt free battery chemistries may dominate the battery sector. Efforts to diversify cobalt mining and refining are underway in the US and Europe, but they face formidable barriers to success unless they receive strong support from host governments. Since China operates 75% of the world's cobalt refining capacity, there is also strong interest in cobalt refining outside of China. Some of those activities, and the challenges they face, are reviewed below. The non-DRC mines have difficulty competing on price with the DRC mines; the refineries outside of China have difficulty competing on price with China's refineries.

1. Mutanga Mine, Democratic Republic of Congo. The largest copper-cobalt mine in the world is the Mutanda mine in south-east DRC. The mine was closed for several years as the owner (the multinational Glencore), and the DRC had disputes about tax rates, regulations and other issues. Glencore's current plan is to resume production at the mine in 2022.261

2. Tenke Mine, Democratic Republic of Congo. The second largest DRC mine, Tenke Fungurume, is owned by China Molybdenum. To capitalize on rising cobalt prices, Molybdenum started in July 2021 a trial production to support a planned $2.8 billion plan to double cobalt and copper output in the mine.262 However, progress has been marred by strikes at the mine and a DRC government investigation of the mine and its contracts with the government.263

3. Cobalt Mining in Finland. The rising prices of cobalt, and the EU's prioritization of cobalt mining, has stimulated interest in Finland's cobalt mines: three already operating, one in development, three more in the exploration phase. Several can co-produce nickel, zinc and copper. Given the high labor costs, community resistence to mining, and high environmental standards in Europe, it remains to be seen whether the mines in Finland (and elsewhere in Europe) can be globally competitive.264

4. Expanded Cobalt Refineries in Brazil and Finland. Jervois Global (Australia) is in the process of acquiring the two largest non-China cobalt refineries, one operated by Freeport Cobalt in central Finland and the other the Sao Miguel Paulista nickel and cobalt refinery in Brazil.265

5. New Mine in Northern Ontario, Canada. Fuse Cobalt Inc. (Vancouver) is planning a new mine in the sliver-cobalt producing region of Ontario, based on promising exploratory drilling that began in 1980.266 Progress has been delayed by cobalt's price volatility and financial issues. The nearby location of a new cobalt refinery (see below) could enhance the mine's prospects for competitiveness.

6. Retooled Canadian Cobalt Refinery. First Cobalt Corporation (Ontario, Canada), with financial assistance from the government of Canada and the Ontario government, has plans to launch in late 2022 the first large-scale cobalt refinery in North America. The new refinery already has cobalt-supply arrangements with DRC mines owned by Glencore and China Molybdenum.

New Mine in Utah. Jervois Global (Australia) is planning a new cobalt mine in the state of Utah where both gold and copper are also present.267 This mine has been under construction since 2012, as the project was first authorized in 2009 by the U.S. Forest Service and delays occurred when a change of mine ownership occurred. The current plan is to ship the mine's cobalt concentrate first to a refinery in Brazil and then to a second refinery central Finland, thereby allowing the product to be used by cathode producers.

Nickel

As nickel gradually replaces cobalt in battery designs, the price of nickel will become more important in cathode and battery production. The demand for nickel in the battery market supplements robust demand from the global stainless steel and non-ferrous alloy markets. But battery producers need a special kind of nickel, nickel sulphate, that requires tailored refining techniques.268

China remains a top-ten miner of nickel but in recent years has emphasized investments in Indonesia.269 Other countries engaged in nickel mining are the Philippines, Russia, Canada, and New Caledonia. Australia and Brazil could become major players due to their substantial nickel reserves.

The global supply of mined nickel is somewhat unpredictable because the largest nickel-producing country, Indonesia (>50% of global supply), has experienced chronic governance problems. The country's political culture is sometimes hostile to foreign investment. Even the remote Indonesian island of Wawonii has become a "battleground between villagers and a nickel-mining company backed by Chinese investors."270 The country's political leadership recently lifted a multi-year ban on nickel exports, which had disrupted the global market for nickel.

The processing of nickel for use in cathodes requires a specialized and more costly leaching process compared to the traditional pyrometallurgical process used to supply the stainless steel sector. China's largest stainless steel producer, Tsingshan Holding Group, is investing up to $15 billion in Indonesia to help supply Class I nickel for the battery market.271 China's Ningbo Legend has also started a high-pressure acid leach process for nickel on the Indonesian island of Obi.

The U.S. imports the vast majority of its nickel, as only one domestic mine (the Eagle mine in Michigan) is currently operating. This mine ships nickel concentrates abroad for refining.272 Tesla, to avoid dependence on China and Indonesia, has signed a major nickel supply contract with the company, BHP, which owns a nickel mining operation in Western Australia.273

The price of nickel also has a volatile history. The commodity hit an all-time high of $51,600 per ton in 2007 but the price collapsed shortly thereafter. The price remained depressed as China's stainless steel industry shifted to a cheaper form of nickel (nickel pig iron). Near-term price forecasts for nickel, prepared before 2021, were around $16,500 per ton for 2021 and 2022, with further price increases expected as demand for nickel from the battery market expands.274 In 2021, however, the price of nickel surged past $20,000 per ton, reaching a seven-year high. Growing demand for use in both stainless steel and EV batteries spurred the price surge.275 Thus, the shift from cobalt to nickel introduces new supply-chain complications.

Rare Earths

The permanent magnets in the electric motors of EVs rely on two specific rare earths: neodymium and dysprosium. Neodymium is valuable because of its strength, its high magnetic force, and its ease of use in the manufacturing of motors. When dysprosium is added, it allows the magnet to tolerate higher temperatures.276 Toyota has an R&D program to reduce neodumium use in magnets by 50% but implementation is not expected until after 2030.277

The land-based process of extracting rare earths entails open pit mining, which leaves an ecological footprint. The dust at the mine can be radioactive because a radioactive element, thorium, is often found with rare earths. Consequently, the wastewater from the mine needs to be handled carefully in order to prevent contamination of nearby surface water and ground water.

Until 1984, the U.S. accounted for a majority of the world's supply of rare earths. The Mountain Pass mine in the Mojave Desert (California) was the single largest source of production. The mine closed in 1982 and China ultimately captured a peak of 95% of global production due to accessible reserves, labor cost advantages, permissive environmental regulation, and state support of rare-earth producers. China's Baotou Steel Rare-Earth High- Tech Co operates a large mine near Baotou in Inner Mongolia. The company extracts rare earths as a byproduct of iron ore mining.

In 2011, China and Japan experienced a territorial rights dispute over a fishing incident that occurred in the South China Sea. During the dispute, China introducted several new policies on rare-earth mining and exports: export quotas were reduced; export taxes were increased; and taxes on rare-earth mining companies were increased from $0.50 per kilogram to $8 per kilogram. Provincial and municipal governments also cracked down on unlicensed mining while the central government began stockpiling rare earths at storage facilities under the direction of the Ministry of Land and Resources. At the time, Japan was consuming 20% of the global supply of rare earths, and China was Japan's largest supplier.

The cumulative effect of China's new policies was an explosive spiral in the market prices of rare earths. From May 2010 to June 2011, neodymium spot prices rose from $19 per kilogram to $500 per kilogram.278 The European Union, Japan and the U.S. protested China's actions and won a lawsuit against China in the World Trade Organization.279 However, China relaxed its export restrictions before the final WTO ruling and the global price of neodymium collapsed.280

After several years of a stable global market for rare earths, China again used rare earths in a geopolitical dispute. During the trade dispute, China invoked retaliatory rare-earth tariffs against the U.S.

Since dependence on China for such a crucial raw material is risky, alternative sources of supply are being pursued eagerly, but with only limited success. For example:

1. Reopening of the Mountain Pass Mine in San Bernardino County, California. With encouragement from the U.S. Department of Energy, Molycorp Inc (Colorado) invested $531 million in a modernization of the Mountain Pass Mine, including a plan to construct a separation and processing facility. The mine reopened for three years but, soon after the collapse of rare earth prices, Molycorp filed for bankruptcy. The new separation and processing facility was not finished. And local government officials worried that the mine site could become an abandoned hazardous waste facility. A consortium of investors acquired the mine at auction in 2017 and the new owner, Mountain Pass (MP) Materials (Las Vegas, Nevada), gradually expanded output from 2017 to 2021, reaching about 15% of global output.281 However, the mine still has no separation and processing facility and thus ships the mine's output to China for processing. One of the company's investors, Shenge of China, acts as a distributor. The company has re-established a multi-year plan to do its own separation and processing (2022) and to make its own magnets for automakers (2025). The target dates may be more feasible now that the company has succeeded in going public (2020) and can better access capital.282

2. Expand Production at the Mount Weld Deposit in Western Australia. Lynas Corporation (New South Wales and Malaysia) is developing a large rare earth mine on Mount Weld near Laverton, Australia and a processing facility in Kuantan, Malaysia.283 The plan for the Malaysian plant experienced setbacks due to community fears of possible exposure to radioactive elements that will be separated from rare earths at the facility. The company is currently adding a cracking and leaching plant at Kalgoorlie, Australia that will process the mine output from Mount Weld, before it is shipped to Malaysia for further processing. Separately, through a 2020 contract with the US Department of Defense, Lynas and its US partner Blue Line Corporation are exploring a new US-based rare earth separation facility.284

3. The Dubbo Rare Earths Project, New South Wales, Australia. An agreement between Australian Strategic Materials (ASM) and South Korean investors is developing the Dubbo Rare Earths Project and a new Korean Metals Plant (KMP) that will supply neodymium-iron-boron alloys.285 The agreement includes a Memorandum of Understanding with two regional governments in South Korea to build the rare-earth processing plant. 286

4. Access Rare Earths in Greenland. More than 25% of the world's rare earths are located in Greenland, where the rare earth oxides lack the usual contaminants (thorium and fluorine) that require special processing. Both China and the U.S. have expressed strong interest in Greenland. Progress is slow, because an environmental regulatory system is only under development, exploratory efforts are underway, and the country lacks technical expertise in this area.

In summary, China is the only country with a complete supply chain for rare earths from mining to refining and processing. China currently controls almost 60% of global production capacity and 85% of refining output.291 With the explosive growth in BEVs globally, the demand for rare earths is outstripping supplies, and the prices of neodymium are rising again.292

ESG Constraints on Use of Low-Cost EV Component Suppliers

Automakers and their battery-making partners are under increasing pressure to refrain from using some low-cost suppliers due to environmental, social and governance (ESG) considerations. The battery-price estimates used in the RIAs are industry averages that do not exclude supply chains that fail ESG tests. Here are some examples of ESG considerations that may preclude use of some low-cost suppliers:

- Suppliers in some countries rely heavily on high-carbon sources of electricity (e.g., Australia, China and Indonesia) such as coal;

- Some suppliers of parts (e.g., cathodes) do not know whether their supply chains utilize mines that violate human rights;

- Some suppliers have low costs because they access raw materials from mines that harm nearby communities with water pollution and mismanagement of wastes; and

- Some suppliers operate in developing countries where corruption of corporate and public officials is commonplace.

For the major global automakers that operate in the US auto market, the RIAs should not assume that low-cost suppliers with poor ESG profiles can be utilized in EV supply chains. As an example, global auto makers are now paying a premium price for nickel sourced outside of Indonesia. 293 In addition to ESG considerations, those premium prices may reflect the need to have a reliable source of supply from a country with stable governance that is not heavily influenced by China.294 To assist governments, automakers and battery suppliers examine supply chains for ESG issues, both OECD and the IGF have issued advisory management frameworks that emphasize environmental and social considerations.295 To reflect these cost-increasing considerations in EV production, the RIAs should focus on the cost of supply chains that pass basic ESG tests.

Recycling of Batteries and EV Components

EV battery recycling offers an opportunity to reduce U.S. reliance on foreign nations, and generally on mining, for the critical minerals used in EV batteries while providing national energy security. EV battery recycling is currently in its infancy as there are not a large number of EVs coming out of service. As the EV market becomes more mature, EV battery recycling will similarly grow. The RIAs do not acknowledge that the shift from recycling of engines and transmissions to the recycling of batteries in EVs will impose a net cost on the economy. We encourage the agencies to consider this cost in the final RIAs.

Recycling of automotive parts, including engines and transmissions, is a mature, commercially successful industry.296 In the U.S., almost 100% of automobiles are recycled, which in turn creates $32 billion in annual sales and approximately 140,000 jobs.297 Much recycling of automotive parts will continue with BEVs, because the BEV affects only or primarily the propulsion system in the vehicle. The loss of revenue from recycling of engines and transmissions will nonetheless be significant, as many of the components of engines and transmissions have significant commercial value. The highest value of some engines and transmissions may be in re-use but even recycled materials have significant value, including aluminum blocks, steel parts, heads, intake manifolds and so forth.

The lost revenue from recycling engines and transmissions needs to be compared to the expected revenue from recycling EV batteries. A UK study found that the expected revenues from recycling automotive-grade lithium ion batteries are significantly less than the current costs of recycling.298 This does not mean that the batteries should not be recycled. The overarching imperative for recycling is to reduce the demands on landfills and other non- sustainable waste-management methods.299 Moreover, as the prices of raw materials rise, the revenue generation from recycling valuable raw materials from batteries will improve. And, with future innovations, battery recycling may become an economically more compelling enterprise.300 In the long run (post-2035), recycling of lithium might reduce the global demand for lithium mining significantly, possibly by 25%-40%.301

Electricity Price Impacts on Costs of Battery Production

Electricity is the source of energy for an EV, and thus the price of electricity is crucial in any benefit-cost analysis that includes EVs. Electric utilities may need to raise electricity rates in order to expand and modernize the grid to accommodate EVs. Rising electricity prices certainly raise the cost of using an EV, but they also have an indirect effect on the cost of producing EVs, because the supply chain of an EV is much more energy-intensive than the supply chain for an ICE vehicle.302 At battery manufacturing facilities, for example, large furnaces are required to evaporate the solvents from the coated electrodes; since battery cells are sensitive to moisture, cell assembly must occur in a dry room, which incurs high electricity costs.303

Meanwhile, both state and national policies are shifting electricity generation from fossil fuels and nuclear power to renewables, especially wind and solar. At low levels of renewables, the effect on electricity prices may be minimal. Moreover, the cost disadvantages of renewables are declining over time, but the renewables transition may increase electricity prices at higher levels of renewables penetration and will likely raise them further when investments are made (e.g., in grid-scale energy storage solutions) to address the intermittent nature of wind and solar.304

It is difficult to estimate how much electricity prices will rise in a precise time frame (e.g., 2024-2026) because they are often determined in utility rate-setting processes in each of the 50 states. And the EIA forecasts of future electricity prices do not account for all the policy changes that are underway or will soon be adopted to promote or compel renewables.

One way for the agencies to bound the potential magnitude of rising electricity prices is to undertake a scenario analysis where all of the U.S. – residences and businesses – face the higher electricity prices now experienced by Germany or the State of California, both jurisdictions that have made determined efforts to boost renewables and phase out coal and nuclear power. Germany has the highest household electricity prices in Europe, about $0.30 per kWh.305 In May 2021, the average price of residential electricity in California was $0.21 per kWh, about 7% higher than the price in May 2020.306 In the U.S. as a whole, the average residential electricty price is about $0.13-0.14 per kWh.

The electricity prices paid by businesses need to analyzed separately, as they tend to be higher than the residential rates (in part due to demand charges). The business rate for electricity is appropriate to use when computing the energy costs in the supply chain of battery production. However, since the supply chain for battery producers is global, and electricity prices vary significantly around the world, a detailed analysis of global supply chains is required. In the case of lithium, for example, agencies need to consider the price of electricity where the lithium is mined, where the lithium is processed, where the lithium is used in cathode production, where the battery cells are made, and where battery packs are assembled. As more of the lithium supply chain develops in the U.S., the analysis will be more straightforward.

In this regard, it is reassuring that the Biden administration is seeking $75 million from Congress for a DOE program to advance lithium recycling.307 Without such a program, China may be the country best positioned globally to capture the lithium recycling business, as it already has one battery recycling plant in operation and plans to build several more overseas.308

In summary, for the next decade or so, the shift from recycling of engines and transmissions to the recycling of lithium ion batteries is expected to impose a net cost on the U.S. economy. That cost should be included in the RIAs in conjunction with estimates of how the cost of battery recycling might decline with appropriate supporting policies (e.g., R&D support).

Modeling of Battery Costs in BatPac

To the extent that some manufacturers begin to vertically integrate and technically differentiate on battery systems, Auto Innovators encourages the Agencies to consider costs and specifications that are reasonable for the industry as a whole to inform policy analysis, and not to assume that intellectual property and proprietary production processes that have been the result of billions of dollars of research and development paid by one manufacturer will be readily available to all manufacturers. In the BatPac model, production volume can affect direct manufacturing cost estimates, and Auto Innovators points out that many battery cells vary (size, shape, chemistry) to suit the application. Even battery packs that share cells may require different housings and assembly processes, requiring separate production lines, resulting in economies of scale lower than would be projected if all these parts were the same. Total industry volumes of BEVs are not an appropriate volume assumption for BatPac. Auto Innovators recommends that EPA update their approach to that used in the NHTSA analysis to estimate battery costs for strong hybrids, PHEVs, and BEVs, considering vehicle type and synergies with other fuel saving technologies. That analysis could be improved by using the BatPac results for BEV400s and BEV500s, instead of scaling up BEV300 costs.

User Costs of Electric Vehicles

Compared to many "invisible" technologies used by vehicle manufacturers to comply with CAFE and GHG standards (e.g., fuel efficient technologies that are integrated into the vehicle with little to no consumer visibilty or change to the driving experience), BEVs and PHEVs are a new technology type for many drivers and, as a result, may incur some costs and inconveniences that should be addressed in the RIAs.

First, the RIAs do not incorporate the costs of charging stations for BEVs and PHEVs, and the summary cost tables do not appear to include the expenditures on electricity consumed by BEVs and PHEVs.

Level 1 charging will likely be too slow for many motorists unless their vehicles are only driven short distances on a regular basis, and thus access to a Level 2 charging station at home or at work will usually be a minimum infrastructure for a BEV or PHEV, especially as battery capacity increases to support longer vehicle driving range. The equipment and labor costs for installation of Level 2 charging typically run somewhere between $500 to $2,000, depending on location, i.e., single family home versus multi-family; a small additional charge for maintenance/repair of the charging stations should be added. Level 3 fast chargers can run into the tens of thousands of dollars and are typically confined to business and commercial applications.309,310

At relatively low levels of EV penetration by prosperous early adopters, where home charging is the predominant method of charging, the agencies could offer a simplified analysis based on a simulated national distribution of charging events: 13% Level 1 charging, 68% Level 2 home charging, 14% Level 2 workplace or public charging, and 5% DC fast charging.311 Based on those assumptions and national-average electricity prices, the levelized cost of charging (which accounts for equipment, installation, and use) is about $0.15/kWh (NAS, 2021, 5-126). The estimates of induced electricity consumption in the RIAs, which were used to compute lifecycle emissions, could be multiplied by the levelized cost of charging to provide a rough estimate of electricity and infrastructure costs induced by the assumed low penetration rates of BEVs and PHEVs. Such costs are reasonably attributable to the proposed standards since the standards are designed explicitly to encourage BEV and PHEV offerings, the agencies estimate that the standards will cause more BEV and PHEV penetration, and the proposed standards are a part of a national policy initiative of 50% PEV penetration by 2030. As the country moves beyond early adopters toward higher levels of BEV penetration near the national goal, many targeted urban dwellers and less-prosperous households may lack a home charging arrangement. A more sophisticated analysis will be required at this point.

Second, the Agencies need to estimate the costs to the user of a vehicle that has a shorter driving range than the typical ICE vehicle and that requires a long time to charge compared to five minutes at a gasoline refueling station. A series of stated preference studies have found that are willing to pay a higher purchase price for vehicles with longer driving range and shorter refueling/recharging times. The authors of a meta-analysis of 33 consumer preference studies found that "short-range cars entail important losses for the average consumer."312 This preference was found in Nordic countries, where electric vehicle penetration is relatively high, and in the U.S., where EV penetration is relatively low.313 The magnitude of the preferences are substantial, with one early study showing willingness to pay at purchase of $35-$75 for each mile of added driving range, and $425-$3250 for each hour of reduced charging time.314 The first-generation, short-range BEVs (e.g., the early version of the Nissan Leaf) were not used nearly much as ICE vehicles; their annual mileage was more than 40% less than average ICE vehicles.315 As automakers have extended the range of BEVs from less than 100 miles to 200-300 miles, their perceived disadvantage compared to ICE vehicles has lessened.

Third, the time spent charging an EV needs to be considered. NHTSA – but not EPA – includes an estimate of the time costs of charging a BEV or PHEV during long trips that occur within one day. To be complete, the time cost should include any additional travel time to the charging station, any expected delay in accessing a charging point, and time spent during the charging event. As more EVs are sold in states with cold winters, the burden of extended, outdoor public charging in cold weather should be considered (as California's temperate coastal climate is not representative of the U.S.).

The bottom-up costing method used by NHTSA is defensible, and should be considered by EPA, but both agencies may wish to explore alternative approaches to measuring the hedonic cost to an owner of a BEV that has a shorter range and longer charging time than a comparably- sized ICE vehicle. EPA does provide different technology costs for a BEV200 and BEV300 but does not offer any estimate of the user benefit of the long-range BEV. NAS (2021) makes some logical arguments that consumers should be willing to make some compromises on driving range and charging time, but more behavioral research is needed to determine whether NAS's view is shared by consumers.

In summary, the Agencies need to depart from their historical practice of assuming that CAFE compliance technologies have zero costs to the user (beyond the purchase price). The electrification technologies, especially BEVs and PHEVs, entail a significant change in how motorists engage with the transportation and electric-utility systems.

Potential Impacts of Raw Material Sourcing , Cell Production, and Pack Assembly on U.S. Content

The NHTSA analysis correctly shows that direct manufacturing costs related to batteries are a significant portion of electrification technology costs. Historically, the permitting process for establishing mining operations on U.S. soil and for building new production and assembly capacity is lengthy. As electrified fuel saving technologies are more widely adopted, significant uncertainty remains about how well extrapolating future percent U.S. content from current percent U.S. content will characterize the supply chain, and employment. Particularly for light trucks, production locations, and supply chains may interact with other policies, such as trade and tariff policies, which may materially affect future costs, availability of parts, and the ability of manufacturers to rapidly bring fuel saving technologies to market. The projected future scale of transportation-related production of some technologies (such as batteries), as forecast in the NPRM compliance pathways, often implies an order of magnitude or larger production and throughput than the currently observed global supply, across all industries. Auto Innovators recommends frequent review and update of rule-making input assumptions related to percent U.S. content, based on observed market conditions. [EPA-HQ-OAR-2021-0208-0116]

Commenter: Alliance for Vehicle Efficiency (AVE)

Impact on Manufacturing Supply Chains. AVE urges EPA to consider the costs and risks to OEMs and technology suppliers associated with converting and expanding automotive supply chains to meet future standards as more ZEV vehicles are introduced into the marketplace. To remain competitive, and to meet future standards, OEMs and technology suppliers could experience significant challenges associated with revamping supply chains, training workers, and obtaining the necessary resources.

Global supply chain pressures have already had a dramatic impact on the automotive sector and its ability to manufacture more efficient vehicles. The ongoing semiconductor shortage, which is expected to last well into 2022, has increased the cost of manufacturing, stifled the production of new vehicles, and forced temporary shutdowns of American automotive facilities.21

Critical Minerals: Similarly, EPA should consider the impact of rising commodity prices and the global availability of critical minerals and materials. Demand for steel and aluminum and the critical minerals needed for EVs is growing and will likely impact the price and availability of all types of vehicles. The World Bank recently predicted the global need for critical minerals will quadruple by 2035, far exceeding current supply.[EPA-HQ-OAR-2021-0208-0256-A1, p.9] [Figure at docket number EPA-HQ-OAR-2021-0208-0256-A1, p. 9.]

The industry may face challenges in the critical materials supply chains needed to achieve compliance. This cost and risk analysis would be similar in scope to the analysis EPA already conducts on fuel prices, as incorporated in previous rulemakings.23 These measurements are key indicators that will impact production numbers, the price of vehicles, job growth, and consumer choice, and are a necessary consideration in determining future achievable standards. [EPA-HQ-OAR-2021-0208-0256-A1,pp.9-10]

AVE recommends EPA's regulatory analysis account for the impact multipliers have on technology improvements to internal combustion engines (ICE) and hybrid vehicles. [EPA-HQ-OAR-2021-0208-0256-A1, p. 2]

Charging Infrastructure: EPA acknowledges that developing charging infrastructure for EVs, PHEVs, and FCEVs will increase upfront costs and may possibly be a barrier for consumers purchasing these vehicles.24 EPA should therefore include an additional cost analysis for the infrastructure needs of EV, PHEV, and FCV vehicles for mass market adoption, as well as how the lack of charging infrastructure in certain regions may impact sales. This analysis would likely assist regulators with understanding the need for further consumer incentives. [EPA-HQ-OAR-2021-0208-0256-A1, p. 10]

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

Since the 2012 rule was finalized, electric vehicle technology has progressed rapidly and battery prices have fallen. More people are buying EVs, and automakers are rapidly expanding their EV lineups. However, hybrids and electric vehicles still only represent a fraction of new vehicle sales and are ripe for rapid growth. They can play a considerable role in meeting stricter standards due to their superior emissions performance. Full battery electric vehicles and plug-in hybrids, as well as conventional hybrids, all have significantly lower fuel use and emissions than their conventional internal combustion engine counterparts. The proposed rule assumes plug-in vehicles reach about 8% by MY 2026 but we believe that automakers could reach even higher levels of penetration, leading to greater efficiency of the fleet.

Greater levels of electrification would allow automakers to meet standards based on EPA's Alternative 2, which proposes an additional increase in stringency of 10 g/mi in MY 2026, and the rule can and should advance that outcome. Increasing the share of non-plug-in vehicles that are strong hybrids from 6-7% in 2023 to 18% by MY 2026 and increasing the share of vehicles that are plug-ins to 14% by MY 2026, while maintaining the same growth in efficiency of gasoline-only vehicles as in the proposed standard, for example, would allow automakers to reach this higher standard. This level of ambition is also essential to put automakers on a path to reach long-term electrification goals and set the market up for further electrification post-MY 2026. [EPA-HQ-OAR-2021-0208-0251-A1, p. 12]

The cost to manufacture electric vehicles has also fallen significantly in recent years, making electric vehicles an attractive option for automakers. Many vehicle manufacturers have made announcements about expanding their EV offerings in 2021. Advances in battery technologies, in particular, have played a major role in reducing the cost to electrify, as the cost of lithium-ion batteries has fallen by over 80% since 2012 (IHS Markit 2020). As a result, the market has seen a steady rise in the number of offerings that are hybrids or battery electric vehicles. Plug-in vehicle sales increased from less than .5% in 2012 to 4% in 2020 while hybrid sales increased from about 3% to over 6% in the same period (EPA 2020). These advances mean that automakers have the technology available to them today to allow them to meet more ambitious standards. These advances are not adequately reflected in the proposed rule. Battery cost assumptions in the NRPM are too high and do not consider the manufacturing and technological advancements of the past few years. EPA uses the same cost figures used in the SAFE rule, which are based on 2017 data, effectively inflating the costs of vehicle electrification (EPA 2021b, p. 145). This limits the role stronger standards can play to drive electrification. The incremental cost of hybrids is also higher than it should be, limiting the role of hybridization can play as a compliance pathway. The incremental hybridization costs used in SAFE and in this rule range from $3,000 to $6,000, almost double what is reasonable (NHTSA and EPA 2020; NAS 2021). [EPA-HQ-OAR-2021-0208-0251-A1, pp. 12-13]

Historically vehicle standards have pushed the adoption of numerous fuel efficiency technologies in internal combustion engine vehicles and helped mainstream hybrid technology. Since the MY 2017-2025 rule was adopted in 2012, vehicle technology has continued to advance in no small part due to the efficiency targets set by that rule. [EPA-HQ-OAR-2021-0208-0251-A1, p. 13]

Commenter: American Enterprise Institute (AEI)

The value of reduced vehicle fleet refueling time. EPA at a conceptual level justifies the promulgation of a tightened fuel economy rule in part by asserting that 'vehicle electrification technologies are also advancing rapidly, as battery costs have continued to decline, and automakers have announced an increasing diversity and volume of zero-emission vehicle models.'49 If a reduction in time consumed by necessary refueling of a petroleum-powered vehicle fleet is a benefit of the Proposed Rule, then the time needed to recharge electric vehicles — when the option of doing so at night in, say, a suburban garage is unavailable — is a cost of the Proposed Rule, and EPA should have included this parameter in its analysis. It has failed to do so. [EPA-HQ-OAR-2021-0208-0254-A1, pp. 12-13]

Commenter: California Air Resources Board (CARB)

The agency cites the National Academies of Sciences recently released light-duty vehicle technology assessment. That technology assessment expects battery pack costs of $90- 115/kWh in 2025 and $65-80 in 2030.106 In May 2021, CARB presented its initial assessment of ZEV technology and battery costs to supports its upcoming rulemaking to adopt future standards for ZEVs. This included its draft Modeling Cost Workbook that included an assessment of battery costs and estimated a cost of $100/kWh in 2026 - similar to the estimates of the National Academies.107 Those battery costs fall well below those used in the draft TAR and Proposed Determination Technical Support Document. Costs for non-battery components are also declining due to improvements in design and integration, demonstrated by several vehicle and component teardowns like those available from Munro & Associates, Inc. 108 Costs are declining more quickly than previously expected, making it more likely that those OEM announcements will materialize.

As costs decline, zero-emission technology becomes cost-competitive and even superior to conventional technology. In comparison to conventional vehicles, zero-emission vehicles, especially battery-electric technology, can cost less to drive and maintain, on average. In every state, the cost of electricity is less than gasoline, and is 60% less on average across the nation. Similarly, the average maintenance cost per mile of a battery-electric vehicle is about 60% of a conventional vehicle. [EPA-HQ-OAR-2021-0208-0643-A6, pp. 34-36]

Commenter: California Attorney General Office, et al.

Third, automakers have expanded the hybrid, plug-in hybrid ('PHEV') and battery electric vehicles ('BEV') they are offering in the United States and have plans to further expand those offerings between now and MY2023.128 [EPA-HQ-OAR-2021-0208-0245-A1, p.27]

Commenter: Center for Climate and Energy Solutions (C2ES)

Additionally, federal funding for charging infrastructure is necessary to ensure all drivers will have access to charging equipment, helping to grow consumer confidence in electric vehicles.10 [EPA-HQ-OAR-2021-0208-0287-A1, p.4]

In the near-decade since the release of the 2012 Final Rule, electrification technologies have improved significantly. Between 2010 and 2020, average lithium-ion battery pack prices fell 89 percent.14 At the same time, average battery electric vehicle ranges increased significantly, with the median range of all-electric vehicles reaching 250 miles for MY 2020, according to the U.S. Department of Energy.15 Longer ranges help to eliminate range anxiety among drivers, improving consumer appetite for zero-emission vehicles.

At the state level, there is growing momentum to accelerate the transition to zero-emission vehicles, both through regulatory or legislative actions and incentive structures. Many states have enacted policies providing additional purchase incentives for electric vehicles and funding the expansion of charging infrastructure. Recently, Connecticut, New York, Oregon, and Vermont instituted consumer incentives, including rebates for the purchase of hydrogen and/or plug-in electric vehicles, which augment existing federal incentives.16 [EPA-HQ-OAR-2021-0208-0287-A1, p.5]

In 2021 alone, states including Louisiana, Maryland, Indiana, and North Carolina announced millions of dollars in grants to local utilities and municipalities to install charging stations, many emphasizing expanding access for rural or low income communities.17 [EPA-HQ-OAR-2021-0208-0287-A1, p. 5]

Utilities have also made significant commitments to expanding charging. For example, the Electric Highway Coalition, a collaboration between fourteen utilities across 29 states and the District of Columbia, aims to ensure efficient and effective fast charging deployment plans and to create a charging corridor with a network of DC fast chargers no more than 100 miles apart to facilitate long-distance electric travel.18 Safe, reliable technologies exist to electrify a significant portion of the global passenger fleet by 2035, and there is significant momentum behind the nationwide deployment of charging infrastructure. EPA's performance standards should build upon the stated ambitions of the private sector, holding automakers accountable through the regulatory process to their electrification goals and efficiency improvement commitments—particularly when many of them align with long-term decarbonization. [EPA-HQ-OAR-2021-0208-0287-A1, p.5]

Commenter: Chun, Mark

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, p. 251.]

Let's talk about range anxiety. The majority of households work within a 15-to-30-minutes radius from home. Providing economic incentives for not only new but used CPO EVs would expedite adoption.

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, pp. 251-252.]

In conclusion, there's 14 Asian and European countries that have ice bans ranging from the Year 2025 to 2050 with an average of 2034 as the target date.

Let's do all we can to incentivize average Joe households by making EVs economical and easy to get started.

Commenter: Connecticut Department of Energy and Environmental Protection

Further, EPA and the federal government must continue to invest in policies that promote technologies and infrastructure to further reduce mobile source emissions. GHG targets in Connecticut, the U.S. and worldwide will not be met unless there are viable alternatives to internal combustion engine vehicles. The federal government must do more to fund national infrastructure for electric vehicles, and electrification of larger applications, like transit buses. [EPA-HQ-OAR-2021-0208-0264-A1, p.2]

Commenter: Consumer Federation of America

Establishing the goal of an all-electric fleet and speeding the transition will require changes in infrastructure beyond the setting of efficiency standards, which the administration has recognized and is working hard to launch in the near term. [EPA-HQ-OAR-2021-0208-0297-A1, p. 24]

Commenter: Consumer Reports (CR)

Support for Higher EV Penetrations

The feasibility of greatly improving greenhouse gas standards beyond the preferred alternative is helped by rapid improvements in the economics of electrification in recent years, and corresponding growing market shares driven by automaker investments. The following subsections describe data that help justify the feasibility of stronger standards. EPA's analysis shows that Alternative 2 can be achieved with EVs accounting for only 6.9% of the fleet in MY2026. Much higher EV penetrations by this date are both likely, and needed, in order to achieve the administration's climate goals. [EPA-HQ-OAR-2021-0208-0602-A1,p.14]

EPA's modeling of both their preferred alternative, and Alternative 2 shows that both can be achieved with strong net benefits at very low EV penetration rates of 7.8% and 6.9% respectively in 2026. This is well below nearly all up-to-date, credible, industry projections. IHS Markit's latest projections expect US EVs (BEVs + PHEVs) to reach 24.3% of the market by 2026.33 Bloomberg New Energy Finance estimates EV penetrations in the US upwards of 15% by

2026.34 UBS estimates that EVs will account for 20% of the global light duty vehicle market by 2025.35 Although the UBS numbers are global, they indicate that if automakers can achieve that level globally, they can almost certainly achieve some high fraction of that level of penetration in the US. These projections by well respected industry experts combined indicate that EV market penetration rates of 15-25% by 2026 are well within the range of what is feasible. Furthermore, hitting EV penetration rates at least at the bottom of this range will be necessary to be on track to achieve President Biden’s goal of achieving 50% electrification by 2030.36 [EPA-HQ-OAR-2021-0208-0602-A1,pp.14-15]

In addition to being feasible, higher EV penetration rates will be highly beneficial to consumers. Consumer Reports has found that all of the best selling electric vehicles on the market as of 2020 will already save consumers thousands of dollars over the vehicle's lifetime, with typical savings between $6,000 and $10,000.37 This analysis also found that many of these vehicles will also save consumers money from the first year of ownership, as savings on fuel and maintenance outweigh the increased monthly payment on a financed vehicle. [EPA-HQ-OAR-2021-0208-0602-A1, p.15]

While consumers are already saving money on EVs today, they will only save more money in the future as the purchase prices drop. The cost of batteries has dropped by almost 90% over the past decade, and prices are expected to continue to fall in the future.38 This continued decline in battery costs is expected to bring the cost of electric vehicles down to the point of cost parity with conventional gasoline vehicles at some point this decade. [EPA-HQ-OAR-2021-0208-0602-A1, pp.15-16]

Estimates of exactly when cost parity for electric vehicles will be achieved vary, but most estimates fall between 2023 and 2028 (see Table 3.1). However, in vehicle classes such as luxury and sports cars, where consumers are willing to pay extra for power and performance, electric vehicles are expected to be cheaper than gas powered vehicles even sooner. This is due to the fact that it’s much cheaper to add additional horsepower to an electric vehicle than to a gasoline vehicle. That extra power also comes with less of a penalty in terms of fuel cost due to the inherent greater efficiency of electric vehicles, and the lack of a need for premium fuel. This is backed up by claims from GM that EVs are already cheaper in the luxury segment.47 It is also reflected in the actions of the rest of the auto industry, with many luxury automakers promising to rapidly increase electrification, and some promising to go all electric by the end of the decade.48 [EPA-HQ-OAR-2021-0208-0602-A1, pp.16-17] [[See EPA-HQ-OAR-2021-0208-0602-A1, p.16 for Table 3.1]]

Commenter: Elders Climate Action (ECA)

ZEV sales targets are needed now –

• to establish benchmarks for all automakers to meet to create a level playing field that promotes competitive market conditions for zero emission vehicles based on performance, reliability and cost;

• to ensure a market for ZEVs that will justify early investment by third parties in the development of supply chains needed for production of batteries and fuel cells;

• to ensure the capacity of the industry to ramp up to 100% of sales to ensure that ZEVs will be available in time to replace 280 million on-road vehicles by 2050;

• for MY 2026 to give the industry enough lead time to develop supply chains, plan the conversion of production facilities and develop marketing campaigns designed to assure public acceptance of their products. [EPA-HQ-OAR-2021-0208-0521-A1, p.3]

For most transportation sources such as on-road vehicles, zero emissions can be cost-effectively achieved by electrification with batteries or fuel cells. [EPA-HQ-OAR-2021-0208-0521-A1, p. 10.]

Commenter: Energy Innovation Policy and Technology LLC

The companion Policy Report finds that achieving the DRIVE Clean Scenario requires a combination of policy and regulatory changes at the federal, state, local, and utility level, including:

• Strengthened EPA tailpipe emission standards that support ZEV sales and reduce overall tailpipe emissions for all ground vehicle classes to 0 g/mile by 2035;

• Continued adoption of state ZEV standards and rules;

• Incentives for EVs and charging infrastructure to help more consumers access affordable new and used EVs and convenient charging;

• Workforce programs that help streamline the transition to EVs and create new jobs;

• Incentives for domestic manufacturing to encourage the production and sale of electric cars and trucks;

• EV-friendly rules, codes, permitting, interconnection, and rates. [EPA-HQ-OAR-2021-0208-0605-A1, pp. 9-10]

Commenter: Energy Strategy Coalition

Our companies and the states in which we operate have made commitments to additional investments to support EVs and this growing market. National Grid, for example, in addition to significant company- and service-area wide initiatives to support EVs, is investing $9 million in Rhode Island, $25 million in Massachusetts with plans to significantly scale up this investment in the coming years, and over $150 million in New York in charging infrastructure, incentives, and other programs to support existing and new EV drivers and to help meet state goals. Austin Energy provides rebates up to $1,200 to support customers to installing EV charging stations in their homes and up to $4,000 for chargers at workplaces. PG&E is investing more than $400 million in infrastructure and programs to support light-, medium- and heavy-duty EVs with incentives and targets for deployment in disadvantaged communities. Seattle City Light has already invested more than $12 million in installing public charging stations and is collaborating with the region's transit system, state ferry system and the Port of Seattle as they electrify their operations in the service territory. Los Angeles Department of Water and Power will invest nearly $150 million in the coming years on a variety of programs, including charging installation and rebates, electrification of ports, buses, and other heavy-duty vehicles, and education and awareness building for customers. Exelon's utilities are implementing EV programs in Maryland, New Jersey, Delaware, and the District of Columbia with approximately $70 million of approved capital to support EV programs and approximately $10 million deployed to date. PSE&G will invest $166 million to support installation of approximately 45,000 chargers in New Jersey. The Sacramento Municipal Utility District is planning to spend approximately $30 million over the next three years in supporting EVs, including charging infrastructure for both residential and commercial customers and in under-resourced communities.

These commitments and activities support a wide variety of programs, including charging infrastructure investments and educational programs that support the expansion of the EV market. These investments reflect the commitment of our companies and the conclusion that, due to both technological and competitive factors, EVs will continue to grow and play a critical part in the U.S. transportations sector. The Proposed Standards help create a business and market environment that supports these investments and spurs others. [EPA-HQ-OAR-2021-0208-0533-A1, p.3]

Commenter: Environmental Protection Network (EPN)

This proposal covers a limited number of near-term MYs, but it must be evaluated in the context of the overwhelming need for a transition to zero-emissions technologies for these vehicles. EPA's goal should be the sale of near-100% zero-emissions cars and light trucks by MY 2035. [EPA-HQ-OAR-2021-0208-0213-A1, p. 1]

Electrification Revolution Offers a Practical Pathway to Zero-Emissions Vehicles. The two leading zero-emissions technologies for car and light-truck applications are battery electric vehicles and hydrogen fuel cell vehicles. Since these technologies emit no tailpipe pollution, life-cycle GHG and criteria emissions are dominated by the emissions associated with the production and distribution of electricity and hydrogen (of course, there are emissions associated with vehicle manufacturing and disposal as well, as with gasoline and diesel vehicles).

Until recently, many believed that there were too many obstacles to battery electric and hydrogen fuel cell vehicles being viewed as a widespread zero-emissions solution.

EPN believes that this is no longer the case, that we are now on the cusp of an 'electrification revolution,' and that battery electric vehicles (hereafter EVs) now offer a practical and economic pathway to zero-emissions for new cars and light trucks over the next 15 years and for the in-use car and light-truck fleet over the next 30 years. This shift is due to three key trends that have completely upended past skepticism about EVs.

One key trend is that widespread decarbonization of the U.S. electricity sector in the next 20 years now appears to be a near certainty. Historically, fossil fuels have been the primary feedstocks for electricity generation in most parts of the U.S. (with some regional exceptions). As long as the electric system is powered primarily by fossil fuels, EVs are not true zero-emissions vehicles, due to fuel production/distribution GHG and criteria emissions. For example, in most regions of the U.S. today, EVs typically yield about a 50-75% reduction in tailpipe plus fuel production/distribution GHG emissions, relative to a similar gasoline vehicle, depending on the electricity sector fossil fuel market share. Accordingly, today EVs are still responsible for 25-50% of comparable gasoline plus fuel production/distribution GHG emissions, plus fine PM, NOx, and other criteria pollutants as well. But the GHG and criteria emissions footprints of EVs are going to rapidly change as the U.S. electricity sector is decarbonized.

Costs of solar and wind power have plummeted over the last decade—utility-scale solar photovoltaic (PV) costs have plummeted by 85% since 2010, and onshore wind costs have declined by 56%.[14] The International Energy Agency has famously stated that, in many places, ‘solar PV is now the cheapest source of electricity in history.’[15] The U.S. Energy Information Administration reports that fully 81% of new U.S. electricity generating capacity in 2021 will be solar, wind, and batteries (which are almost exclusively paired with wind and solar to accommodate their intermittency).[16] Industry experts expect solar and wind (and batteries) to continue to benefit from innovation and scale-related cost reduction in the future.

In addition to the Biden administration’s pledge to achieve a carbon-free electric sector by 2035, many U.S. states have adopted aggressive requirements or targets to decarbonize electric utilities, and many utilities have made voluntary commitments, often going farther and faster than state requirements. The widespread trend toward electric sector decarbonization means that, by 2035, an EV will be essentially a zero-emissions vehicle in terms of tailpipe plus fuel production/distribution GHG and criteria emissions.

A second key trend is the plummeting cost of batteries. A decade ago, the conventional wisdom was that the true cost to produce an EV was tens of thousands of dollars more than a comparable gasoline car, primarily due to the cost of large battery packs and poor economies of scale. This was the single biggest obstacle to mainstream acceptance of EVs.

Battery innovation and economies of scale have led to a near-90% reduction in lithium-ion battery costs in the last decade.[17] EVs that once had cost premiums, relative to their gasoline counterparts, of tens of thousands of dollars are now typically $5,000 or $10,000 more expensive. [EPA-HQ-OAR-2021-0208-0213-A1, pp. 4-5]

A third key trend is the recognition by many automakers that EVs represent the industry’s future. This is a fundamental change from a decade ago when EVs were viewed as niche vehicles with little chance of widespread utility or appeal. In its Notice of Proposed Rulemaking (NPRM), the agency pointed out that there are already about 60 EV/plug-in hybrid electric vehicle (PHEV) models for sale in the U.S., and that this is expected to grow to about 80 models by 2023.[18] Automakers have publicly pledged to spend over $200 billion in the next few years on electrification research, vehicle design, and assembly and battery plants. General Motors has an aspirational goal to achieve 100% zero-emissions vehicle sales in the U.S. by 2035,[19] and Ford is bringing the F-150 Lightning EV pick-up truck to market in 2022 at a $40,000 base price point that will make it competitive with gasoline versions of the best-selling vehicle in the U.S. market.[20] [EPA-HQ-OAR-2021-0208-0213-A1, p.6]

We Will Only Achieve Near-100% New Zero-Emissions Vehicles by 2035 if EPA Requires It. EPN stipulates that, for several reasons, a fast transition to EVs will not be simple or easy. Examples of fast consumer product transitions typically involve innovations with no or minimal tradeoffs, for example, the change from landlines and “flip” cell phones to smartphones, where the latter was a clearly superior product in every way.

EVs offer many important advantages over gasoline vehicles: zero GHG and criteria pollution, lower and more predictable fuel and maintenance costs, the convenience of home refueling for many homeowners, and in the near future the likelihood of lower vehicle prices.

Finally, EPN agrees with statements by some individual automakers and the Alliance for Automotive Innovation that there is a critical need for complementary federal policies to support a fast transition to EVs in at least three areas: the extension of federal tax credits/rebates for consumers who are willing to buy EVs in the next few years, the buildout of a nationwide public refueling infrastructure, and a modernized and more sophisticated electric grid to support widespread EV use. The Biden administration infrastructure bills include all these critical components, which are currently being debated in Congress. None of these programs would fall under the purview of EPA, of course.[EPA-HQ-OAR-2021-0208-0213-A1, p. 6-7]

Analysis of electrification:

1. Battery— cost, range, etc. This analysis appears appropriate. As part of laying a foundation for the future MYs, it is important to discuss expected future progress as well.

2. Charging and Other Infrastructure. This rulemaking needs to lay a solid groundwork for a following, longer-term rulemaking covering the increasingly broad-based and widespread transition to electric power in MYs after 2026. Therefore, issues such as battery technology, range, and cost; charging technology and infrastructure; and other issues such as electricity grid developments all need to be addressed in this rulemaking. Charging technology and infrastructure is also a critical issue for environmental justice communities.

3. EPA has addressed some areas in detail, such as issues related to battery technology, range, and cost. However, the proposal only gives limited attention to the key issues concerning charging technology and infrastructure, as well as electricity grid developments.

4. Recognizing that these issues are of much greater importance in the rulemaking for MY 2027 and later, to the extent practicable, EPA should provide a more in-depth discussion of these

issues in this rulemaking as part of laying the groundwork for the later successful transition to widespread electrification of cars and light trucks. [EPA-HQ-OAR-2021-0208-0213-A1, p, 11]

Commenter: Ford Motor Company

The Transition to Electric Vehicles. Ford is committed to sustainability leadership, and to being fully carbon neutral worldwide no later than 2050. We're pleased to see the Biden Administration making climate change an early and high priority, along with focusing on American manufacturing. We are doing our part and making our most iconic vehicles electric; the Mustang Mach-E, America's best-selling truck for 44 years – the F150 Lightning, and the E-Transit Commercial Van. Critical to a successful transition are federal and state complimentary measures supporting electrification, such as:

- Purchase incentives to accelerate the transition to EVs, and to achieve the President's goal of making half of all vehicle sold in 2030 electric vehicles. This could include a nationwide low carbon fuel standard (LCFS) program, funding consumer EV incentives as in California's Clean Fuels Reward program.

- EV charging infrastructure policy (residential, workplace, and public facilities)

- Policies to support development of EV and battery manufacturing and domestic supply chains, including critical minerals, and development of a battery and EV recycling system in the United States.

- Consumer education programs

- Continued actions and commitments by automakers to improve the availability, variety, and affordability of EVs in the United States. [EPA-HQ-OAR-2021-0208-0294-A1, pp.5-6]

Commenter: Gillet, Victoria

[The following comments were submitted as testimony at the virtual public hearing on August 26, 2021. See Hearing Testimony – 26Aug2021, p. 289.] Thankfully, you know, I know that these are harmful, but we also know the paths to the solution: electrify everything as quickly as possible, particularly transportation infrastructure, and make the electricity that we need for those electrified systems with local green energy. That transition will save 2,000 or more lives per year just in my home State of Wisconsin, and the benefit will disproportionately be good for those who have had really negative health outcomes in the past.

Commenter: Holiday, Thomas

[The following comments were submitted as testimony at the virtual public hearing on August 26, 2021. See Hearing Testimony – 26Aug2021, pp. 81-82.]

All I would ask is that the automakers have a significant increase in the production of hybrids. In other words, the technical standards of the fleet should mix their hybrids. Instead of a two percent mile hybrid and a five percent strong hybrid, the automakers should voluntarily raise those hybrids 10 percent per mile hybrids, 10 percent of the fleet for strong hybrids. If they do that, they will sell them.

[The following comments were submitted as testimony at the virtual public hearing on August 26, 2021. See Hearing Testimony – 26Aug2021, pp. 82-83.]

Because hybrids give us independence from the vulnerability in a developing grid, gives us independence from natural disasters, cyber hacks, disruptions due to evolving demand on the grid, and they get us there right away. So mixing the hybrids in at a lower percentage will advance the high efficiency of every fleet. We need more hybrids and one more thing. Pollution is local, and it's also global. Weather is global, and the global air climate is a world circulation system with winds that transport water, heat, CO2, water vapor, all of the greenhouse gas emissions.

[The following comments were submitted as testimony at the virtual public hearing on August 26, 2021. See Hearing Testimony – 26Aug2021, pp. 83-84.]

So it's not a free ride to go straight to electricity and say all of these vehicles that we really have to have, we couldn't handle it. I'm not sure we can handle it by 2026, but if we go to hybrids first and we build up the hybrid arsenal on the roads, I think that it would go a long way.

I just say electrifying American mobility, it starts here. Let's do it right, put the immediate emphasis on hybrid.

Commenter: Holmgreen, Jack

[The following comments were submitted as testimony at the virtual public hearing on August 26, 2021. See Hearing Testimony – 26Aug2021, pp. 41-42.]

The effect is that the plug-in vehicles are actually just replacing gasoline with some other fossil fuels for the most part.

My comment is this. The plug-in vehicle is not adding efficiency unless it is coupled with a requirement that it provides solar, wind, or hydrogen power to charge it. With hybrid models, however, there is an immediate reduction in gasoline consumption and pollution with no burden on the already delicate grid as witnessed here in Texas last winter.

Most plug-ins will charge at home in the evenings when returning from work and this is at peak load period. Some countries are already assessing huge import duties for all-electric vehicles because it is far more efficient to just burn gas in the car than it is to rely on the grid which in many cases is fed pirmarily by coal.

Commenter: Hyundai America Technical Center, Inc. (Hyundai)

How to ensure the success of an electrified market driven by GHG standards. It is Hyundai's view that the 2023 through 2026 Model Year ('MY') GHG standards will require significant electrification not only to meet the proposed standards but also to set the foundation for achieving the future electrification goals.

The Administration's ambitious goals require an all-hands-on-deck approach to ensure the success of an electrified market including coordination between government agencies, utilities, automakers, fuel suppliers, manufacturers and the supply chain, among others.

As stated, the NPRM and planned future electrification are challenging and will require dramatic transformations in many areas:

- Continued growth of consumer acceptance of EVs
- Proportional additions of EV charging and hydrogen fueling infrastructure
- Availability of consistent EV purchase incentives
- Robustness of the supply chain
- Resiliency of the electric grid
- Growth of green electricity and hydrogen and
- Certainty that all 50-states support expansion of the electric vehicle market.

The success of the program depends on the successful coordination of each of the above variables to deliver the unprecedented penetration of EVs. Therefore, it is crucial that each area is proactively monitored on an ongoing basis, with defined targets and metric-based checkpoints to measure progress. Such continuous, proactive monitoring will inform and enable actions to resolve obstacles before they adversely impact the U.S.'s electric vehicle future. [EPA-HQ-OAR-2021-0208-0603-A1, pp.2-3]

Accessible and reliable infrastructure is required to support plug-in EV charging and hydrogen fueling needs and inspire confidence in potential EV customers. It is critical to monitor infrastructure growth to assure it is available to support the ever increasing number of electric vehicles on the road.

Using the Department of Energy estimate5 for number of EVs per charger, nearly two million plug-in chargers are needed to support the number of EVs projected to be on the road in 2030 (assuming 50% new EV sales by 2030). Figure 1 below shows a linear increase in new EV sales from 3% in 2021 to 50% in 2030 in green, with the estimated percentage of overall EVs in the on-road fleet in orange, both referenced off the left axis. The corresponding DC Fast Charge ('DCFC') and Level 2 ('L2') ports required to support this number of EVs is shown in blue and referenced off the right axis. [Figure 1 can be found at docket number EPA-HQ-OAR-2021-0208-0603-A1, p. 5]

An important infrastructure checkpoint is ensuring that infrastructure policies and growth aligns with and supports the Administration's electrification goals.

Beyond having enough charging and fueling stations, installing the chargers and fuel dispensers in optimal locations that match EV density is vital to appropriately serve all EV customers. Priority siting should include corridors (freeways), destinations (malls, restaurants, and parks), and multiunit dwellings (as residents do not own the garage to install a charger). Another consideration is that infrastructure development is on track to meet the needs of all EV drivers. [EPA-HQ-OAR-2021-0208-0603-A1, pp.4-5]

Supply chain resilience and diversity. A resilient supply chain is crucial to moving forward with electric vehicles. As stated by President Biden: ‘We need a strong, diversified and resilient U.S.-based electric vehicle battery supply chain, so we can supply the growing global demand for these vehicles and components.’

We support strengthening the supply chain for critical minerals and all materials needed in the production of electric vehicles. The diversity and resiliency of the supply chain for all materials needed for electric vehicles should be monitored at checkpoints to determine if any weaknesses are identified and address these accordingly. [EPA-HQ-OAR-2021-0208-0603-A1, pp. 5-6]

Electric grid resiliency. The grid is critical to consumer confidence in electric vehicles. Resiliency is needed for a stable grid. Instability can be disruptive to people’s lives and hamper the uptake of electric vehicles. The national electric grid should be evaluated for readiness to accommodate growth in the electric vehicle market and hardiness against extended outages so that any issues can be addressed before widespread expansion of electric vehicles. This evaluation should be ongoing.

Green electricity and hydrogen. The government should promote and monitor continuing progress towards green electricity and hydrogen. Renewable energy is important for U.S. energy security, the reduction of fossil fuel use, and corresponding greenhouse gas reductions.

Full commitment of all 50 states. We recommend that the Federal government work with all stakeholders including the Governors of all 50 states to facilitate and accelerate EV adoption. Every state must be committed to electric vehicle expansion by developing a concrete blueprint to usher in an electric future.

Current levels of state engagement and support for EVs vary widely with some having no EVrelated support and others offering more comprehensive programs, such as California and New York. Examples of state programs to support EVs include financial incentives for EV purchases and infrastructure, highway corridor fast-charging networks, high-occupancy vehicle lane exemptions, vehicle inspections or emissions test exemptions, parking incentives, and support for utility rate reductions.

The Federal government should work with states to develop metrics to assess readiness for high levels of electrification and enhance programs accordingly.

Fleet purchase requirements. Hyundai supports the Federal Government requirement to add electric vehicles into the Federal fleet and acknowledge the Department of Energy’s6 and other agencies' efforts to promote private fleet electrification. The Federal government could further drive the demand for these new advanced technology vehicles by requiring public and private fleets to purchase EVs at a rate proportional to their overall vehicle market share, where permitted by law. Public, private, and government fleets purchase millions of vehicles each year and are critical to achieving electrification goals.

The California Clean Miles Standard7 is an example of a program designed to transition Transportation Network Companies (like Uber and Lyft) by increasing the electric miles driven each year. The government should at a minimum monitor, and should ideally mandate, fleet purchases of electric vehicles to support the transition to EVs.

In summary, the Federal government should spearhead a multipronged task force of leading experts to prepare defined metrics for each of the above checkpoints, continually assess progress, and recommend preemptive measures. Proactive monitoring as proposed above will be critical to identify and address constraints to EV adoption before they can have an adverse impact. [EPA-HQ-OAR-2021-0208-0603-A1, pp.6-7]

Commenter: International Council on Clean Transportation

Full hybrid cost: The agencies have substantially overestimated the costs of full hybrid vehicles. Because of difficulties in deciphering the agencies' multiple and inconsistent hybrid cost components, ICCT analyzed the complete vehicle costs from the agencies' final output files in the Augural standard analysis for the SAFE proposed rule. This revealed the modeled incremental price increase for hybrids was approximately $6,600 per hybrid vehicle in 2017, decreasing to $4,800 in 2025. As analyzed in ICCT's 2015 report on hybrids (ICCT 2015 hybrids),20 this is not a plausible result.

For additional information see:

ICCT 2018 comments pages I76-I77

ICCT 2015 hybrids

Battery cost: EPA used an updated ANL BatPaC model (BatPaC Version 3.1, 9 October 2017) as the basis for BEV, PHEV, HEV and mild HEV battery costs in its 2018 MTE, but these updated costs were not used in the proposed rule.

For additional information see: EPA DRIA page 1-8

Non-battery BEV and PHEV cost: For EPA's 2018 MTE, non-battery BEV and PHEV costs were updated based on more recent teardown data from California Air Resources Board, UBS, and other references,21 22 23 but these updated costs were not used in the proposed rule.

For additional information see : EPA DRIA page 1-8 [EPA-HQ-OAR-2021-0208-0522-A1, pp. 8-9]

Battery cost: Unlike for the other technologies in the agencies' analysis, the vast majority of costs related to the RPE markup are already included in the base costs that the agencies used from ANL lookup tables. In other words, those lookup tables do not provide 'direct manufacturing costs,' they provide total costs, including indirect costs. Thus, EPA erroneously inflated battery costs by applying the retail price equivalent (RPE) markup to base costs that already include indirect costs.

For additional information see: Joint NGO 2020 Reconsideration Petition, pages 88-90 [EPA-HQ-OAR-2021-0208-0522-A1, pp. 10]

Mild Hybrid: 'Suppliers are developing 48-volt systems with higher power outputs (20 - 30kW). EPA should focus on the integration of such higher power 48-volt mild hybrid systems to evaluate potential advancements in launch assist, low-speed electric driving, aggressive fuel cutoff, startstop, and torque assist during driver tip-in. In addition, these higher power ISG systems should be applied to demonstrate further advancements in synergistic technologies such as advanced electric boosting solutions, high energy ignition systems, advanced cylinder deactivation (dampen torsional vibrations), electric accessories (HVAC compressor), and an electrically heated catalyst. The use of heated catalysts will enable fuel economy to be optimized without concern of low catalyst temperatures which may result from aggressive start-stop strategies. Applications of the 48V motor-generator capability should be evaluated in P2, P3, or P4 configurations, opposed to the current P0 geometries.' (Roush 2021 LDV page 11).

'Roush believes that in the 2021-2030 time frame, higher power 48-volt systems (in P2, P3, and P4 configurations) along with complementary fuel-saving technologies enabled by the high power output of the 48-volt architecture will play an important role in increasing the fuel economy of lightduty vehicles. Such technologies or synergies have not been considered by the EPA or ICCT or the SAFE analysis.' (Roush 2021 48V page 9).

Additional information can be found at:

- Roush 2021 LDV Section 6.0 pages 38-40
- Roush 2021 48V Section 1.0 pages 11-23
- AVL 2020 slide 62: WLTP % CO2 reduction and slide 63: cost per % FC reduction [EPA-HQ-OAR-2021-0208-0522-A1, pp. 11]

Commenter: International Union, United Automobile, Aerospace & Agricultural Implement Workers of America (UAW)

The move towards electric vehicles will reduce CO2 emissions but currently, only roughly 2% of passenger vehicles are electric. This transformation will not occur overnight and will require an all-of-government approach. Electric vehicle targets will have limited success if they are not coupled with an array of policies to support domestic production and give American workers the opportunity to build the vehicles of the future. It is essential that the Build Back Better Act and the Infrastructure Investment and Jobs Act pass into law as they help set up the foundation for future success. Senator Debbie Stabenow (D-MI) and Rep. Dan Kildee (D-MI-5) are leading the charge in Congress to make sure that future jobs will be protected for decades to come. Their provision in the Build Back Better Act ensures that key consumer rebates for electric vehicles (EV's) create incentives for creating and maintaining good paying, union jobs in the United States. We greatly appreciate the Administration's support for this innovative approach. [EPA-HQ-OAR-2021-0208-0749-A1, p. 2]

Commenter: Lombardy, Anthony

As an American, concerned with the building of more radiation producing nuclear plants, and the increasing number of environmentally damaging mining operations, I'm writing to express my opposition to the EPA's proposed GHG emission standards for passenger cars and light trucks. I respectfully urge you to abandon them as soon as possible and keep the current standards that have drastically reduced pollution with the use of cleaner gasoline and diesel powered vehicles. Electric Vehicles have been wrongly called zero-pollution cars and light trucks. The unsafe and environmentally damaging means that will be needed to generate sufficient electricity, and extricating the rare minerals required to manufacture Electric Vehicles and their batteries, will produce an even more toxic environment that pollutes the atmosphere, waters, and land. Even the EPA has given accolades in it's comments on the status of new gasoline and diesel powered vehicles which emit extremely low emissions and provide high mileage rating unthought of in the past. The extremely high voltage & amperage that power Electric Vehicles are dangerous to first responders, service technicians, and the vehicle occupants - not to mention deadly if directly or indirectly contacted. Due to the extreme heat produced by the battery to power the electric motors, and the vehicle‘s many operational functions, as well as cooling the battery itself, the risk of hard to extinguish high voltage electrical fires is much higher compared with conventional vehicles. In addition, the mileage ratings and charging times being touted for Electric Vehicles is for optimum conditions, and with power sapping comfort, operating, and assistance, devices turned off. The current policy by the EPA is the correct course, not the taxpayer subsidized production and purchasing of Electric Vehicles. Improving gasoline and diesel powered vehicles is the correct route to protecting the health, climate, and pocketbooks for all Americans. [EPA-HQ-OAR-2021-0208-0722-A1, p. 1]

Commenter: Maine Department of Environmental Protection

Furthermore, as battery costs have declined and vehicle ranges increased, a number of automakers have announced plans to fully electrify their fleets in the coming years, signaling a rapid shift towards zero emission technologies not only in the United States, but throughout the world. With nearly 40 percent of the national LDV market already subject to the California standards, EPA's 2023 LDV Proposal can help ensure these vehicles and their environmental benefits are available to all consumers coast-to coast. [EPA-HQ-OAR-2021-0208-0225-A1, p.2]

Commenter: Maryland Department of Environment

Maryland, like many states and local jurisdictions, has made substantial investments in EV incentives and EV infrastructure. We support the federal government taking action to increase initiatives and incentives to further deploy EV and other LDV clean technology the key pieces in the widespread implementation of EVs. Based on numerous studies, Maryland views charging infrastructure as being crucial for the widespread implementation of ZEVs. Over the past five years Maryland has invested over eleven million dollars in the installation of public and private chargers throughout the State. These charges are located at private residences, along public corridors, public areas, and at the workplace. It is important to focus on a mix of charger technologies and locations to meet the needs of the consumer. Moving forward the state will continue its leadership role by investing over sixteen million dollars over of the next three years in the installation of public and private chargers located throughout the State. In addition, Maryland has continued to work with private businesses and Utilities to invest in Maryland’s charging infrastructure. As a result of this effort, Maryland is now recognized as one of the top ten states in the country for charging infrastructure.1 Despite all of this work, studies suggest that Maryland will still need significant investment in chargers if it is to support expected 2030 EV sales. Because of this, states will need strong federal programs to provide the additional infrastructure that states will need to support projected EV volumes. [EPA-HQ-OAR-2021-0208-0241-A1, pp.1-2]

Commenter: Merlotti, J.

Besides electrical charging, EV batteries require significant mining of rare earth minerals Lithium and Cobalt - that create harmful environmental issues of their own.

'There is no way there’s enough raw materials being produced right now to start replacing millions of gasoline-powered motor vehicles with EVs,' said Lewis Black, CEO of Almonty Industries Inc, which mines the hardening metal tungsten in Portugal and South Korea. 3/1/21

A shift to green energy will create energy dependence for the US on foreign states – many of which are not allies of the US.

For further reference, please see:

https://www.reuters.com/article/us-usa-mining-insight/to-go-electric-america-needs-more-mines-canit- build-them-idUSKCN2AT39Z

https://interestingengineering.com/clean-evs-and-dirty-lithium-mining-business

https://www.nbcnews.com/business/autos/amid-clean-energy-push-u-s-swapping-fossil-fueldependence- n1270851 [EPA-HQ-OAR-2021-0208-0189-A1, p. 3]

Second, renewable energy is complementary to fossil fuels, not a replacement. The only feasible way for the US to produce enough non-fossil fuel or 'green' electrical energy for EVs would be to develop more nuclear energy plants (which has no current momentum). Solar and wind simply cannot supply the needed energy for the current electrical demand and mass scaling of EVs.

Reduced Refueling Time

The EPA states a significant saving in refueling time – when the opposite is generally true for EVs vs ICE.

The proposal assumes access to garages or carports for overnight/pre-drive charging. There are ~280M vehicles in the US and 140M Homes. Only 63% of homes (140M x 63%) or 88M homes have a garage or carport. This implies only 88M/280M = 31% of vehicles in the US have access to garage or carport for pre-drive charging – leaving the majority of EVs nearly 70% in need of public charging stations for simple commuting. With minimum recharging times up to 30 minutes to 1.5 hours for fast/high power charges, this will create a net increase, not decrease in 'refueling' time for the average consumer.

Then, as for long distance driving, range for EVs is dramatically impacted. These known facts negatively impact refueling time. For reference, see:

https://www.caranddriver.com/shopping-advice/a32603216/ev-range-explained/

The EPA needs to clearly define their claim of reduced refueling time for EVs

Cost savings risks and other risks for EVs. Where is the risk/impact/cost of battery fires in this EPA proposal? For reference, see the massive recall by Chevrolet on their Bolt:

https://www.wsj.com/articles/gms-chevy-bolt-recall-casts-shadow-over-ev-push-11630246736

Where are the power efficiency impacts of operating EVs in hot/cold climates in this EPA proposal? (>80 and <60 Fahrenheit)?

For reference, see:

https://www.wired.com/story/electric-cars-cold-weather-tips/

The EPA should ask for NHTSA assistance to recommend acceleration governors for EVs do to the much faster acceleration 0-50 for an EV and the risks associated with slower ICE vehicles at intersections and merging traffic, and/or increased motivation for racing.

For reference, see:

https://www.caranddriver.com/features/g36420161/evs-compared-gas-powered-vehiclesperformance/

The EPE needs to include high cost ($5K to $6K minimum) of EV battery replacement and/or associated faster depreciation for the many consumers that own vehicles more than 8 years. Most used EVs will be purchased by lower income households that can’t afford an expense of this magnitude.

There are many additional costs/risks the EPA does not address in this proposal – that need to be included for a comprehensive proposal – especially for such a massive endeavor as proposing to change the power source for the US motor vehicle fleet. [EPA-HQ-OAR-2021-0208-0189-A1, pp. 4-5]

Commenter: Metropolitan Mayors Caucus

At the same time, public awareness of the climate crisis, as well as technological advances in fuel efficiency and transportation electrification has quickened [EPA-HQ-OAR-2021-0208-0504, p.1]

Commenter: Minnesota Pollution Control Agency (MPCA) and Minnesota Department of Transportation (MnDOT)

Transportation is also a sector where strong technology solutions already exist to achieve significant near-term emission reductions. Our country needs to act to take advantage of the opportunity to shift towards electrification and biofuels and be a global leader in the development, production, and use of clean vehicle technology. [EPA-HQ-OAR-2021-0208-0211-A1, p.2]

EPA's proposed standards can be achieved with very little electrification and do not reflect the commitments auto manufacturers have made to aggressively electrify their fleets. The 2012 standards were found to be reasonable and achievable during EPA's Midterm Review and electric vehicle (EV) technology has only gotten better and more affordable since then. EPA notes in its proposal that the technology needed to achieve these emissions standards is widely available and currently in use, and that the standards will only require broader and quicker penetration of existing technologies. The MPCA and MnDOT agree with this assessment. An industry's technological readiness for achieving a standard should serve as a backstop for a standard [EPA-HQ-OAR-2021-0208-0211-A1, p.3]

Commenter: Moore, Kenneth

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, pp. 323.]

While the purchase costs of electric vehicles is currently higher than fossil fuel vehicles, that's about to change. With increased production and advances in better e-technology, the range and purchase costs of electric vehicles will soon be on part with fossil cars and trucks.

Commenter: Motor & Equipment Manufacturers Association (MEMA)

MEMA Supports Continued Investments in Supply Chain and Technology Improvements. MEMA supports investments to strengthen and improve the U.S. manufacturing supply chain. MEMA strongly encourages continued analysis of potential challenges for the U.S. manufacturing supply chain for the transition to higher levels of vehicle electrification. This is particularly important for the resources needed to manufacture, recycle, and dispose of (or repurpose) electric vehicle batteries. We support further investments in developing our limited domestic material processing capacity. MEMA generally supports investments and requirements for battery recycling as this would be a force for progress in technology development and strengthening the critical U.S. supply chain if implemented correctly and thoughtfully. Over the long-term, the U.S. must create greater sourcing of these critical components and technologies for the domestic market and the U.S. supply chain. Increasing and diversifying supplies of components and materials in the U.S. are vital to domestic vehicle parts manufacturers. MEMA supports policies that will create a more sustainable supply chain in the U.S. and encourages a virtuous cycle of recycling and repurposing.

Along those same lines, as the markets for these advanced vehicle technologies continue to grow and strengthen, the technologies should also continue to improve. These technologies must be required to continue to innovate and provide cost-effective emission reduction solutions. It is important that performance standards are set to ensure continuous improvements in these advanced technologies (e.g., lower emissions over the full lifecycle, battery performance, range requirements and deterioration limitations). Setting performance standards will provide protections and incentives for consumers that invest in the technology. This will ensure and sustain supplier technology investments. [EPA-HQ-OAR-2021-0208-0249-A1, p. 15-16]

Commenter: National Association of Clean Air Agencies (NACAA)

EPA touts in this proposal the 'proliferation of recent announcements by automakers [that] signals a rapidly growing shift in investment away from internal-combustion technologies and toward high levels of electrification. These automaker announcements are supported by continued advances in automotive electrification technologies, and further driven by the need to compete in a global market as other countries implement aggressive zero-emission transportation policies.' By way of example, EPA cites announcements made this year by General Motors, Volvo, Volkswagen, Honda, Ford, Fiat, Stellantis and Mercedes-Benz (see 86 Fed. Reg. 43,729-30). [EPA-HQ-OAR-2021-0208-0255-A1, p. 4]

Clean Technology. NACAA supports LDV clean technology, investments in building the infrastructure needed to support this clean technology and steps taken to facilitate this clean technology. States and localities across the country are investing considerable resources to proactively pursue policies and programs to advance and support deployment of clean vehicle technologies in order to achieve their clean air, GHG emission reduction and public health goals. Such state and local initiatives fully support NACAA’s request that EPA can and should include in the final rule aggressive steps to support the widescale deployment of ZEVs.

By way of example, the Drive Clean Louisville team plans for and explores opportunities for electric vehicles and clean fuel transportation within the local government and community through the development of grant funding opportunities and policies focused on reducing tailpipe emissions from light- and heavy-duty mobile sources throughout the metropolitan area. Strategies include ones to increase cleaner alternatives to fossil fuels and/or engines that incorporate the most effective emission control technologies. Among the specific projects under this program is the Green Fleet Challenge, under which the Louisville Metro Government seeks to collaborate with local businesses and organizations to collectively increase the number of battery electric vehicles (BEVs) or plug-in hybrid vehicles (PHEVs) in their respective fleets (for larger entities, Louisville is asking partners to match the local government fleet at least one-to-one), These efforts will help Louisville achieve its goals of reducing GHG emissions by 80 percent by 2050 and attaining the ozone NAAQS to protect public health.5

The state of Minnesota is supporting the growth of electric vehicles through a variety of investments and outreach and education efforts. To date, the Minnesota Pollution Control Agency (MPCA) has dedicated the full 15 percent of funds allowed under the Volkswagen settlement fund to electric vehicle (EV) charging infrastructure and has allocated $13.2 million of its VW settlement funds to heavy-duty vehicle electrification. In 2019, the MPCA offered $170,000 in grants for EV charging stations at businesses that wanted to electrify their fleet vehicles. The Minnesota Department of Transportation (MnDOT) also launched a Clean Transportation Pilot Program, offering $2 million annually to support innovative projects that reduce GHG emissions, including potential electrification projects. In fall of 2019, MnDOT began offering an EV incentive through the MnPASS program, which allows transit buses, motorcycles and vehicles with two or more occupants to use express lanes for free during peak travel times; solo motorists are allowed to pay a fee to use these lanes. This pilot program will also give Minnesotans who purchase or lease a new or used BEV or PHEV a one-time credit ($250 for a BEV and $125 for a PHEV) for use in MnPASS lanes. The Minnesota Public Utilities Commission (MPUC) opened a docket to discuss EV programs and potential effects for Minnesota. MPUC directed utilities to develop EV pilot programs and rates that encourage charging EVs during hours when electricity demand is otherwise low. The MPUC process and development of utility programs is ongoing. Finally, many groups around the state are working to educate consumers and support local governments and businesses in converting their vehicle fleets. Drive Electric Minnesota is a public-private partnership working to educate Minnesotans about the benefits of EVs and support EV-friendly legislation in the state. This partnership also supports Communities Charging Ahead, which helps local governments plan for and advance electrification in their communities. The Twin Cities Clean Cities Coalition and Midwest Electric Vehicle Opportunities: Learning, Events, Experience (known as Midwest EVOLVE) puts on ride and drive events around the state to help familiarize people with EVs. The American Lung Association of Minnesota has also been working actively to educate light-duty EV customers and plan ride and drive events for heavy-duty and medium-duty EVs.

Ventura County Air Pollution Control District (VCAPCD) operates several programs and participates collaboratively in others with nearby counties to support EV adoption and infrastructure deployment. In-house programs include 1) the state-sponsored Carl Moyer Memorial Air Quality Standards Attainment Program, under which incentive funding (50 to 75 percent of eligible costs) is provided for publicly available EV charging stations and workplace charging; 2) AB 923 DMV Fees, under which local DMV fees added for vehicle registration can be used to fund incentives for EV infrastructure similar to the Carl Moyer Program; 3) the Community Air Protection Program – another state-sponsored program – this one targeting disadvantaged and low-income communities using the Carl Moyer Program guidelines for EV infrastructure incentives; and 4) the Clean Air Fund – a 100-percent local program funded by an endowment that generates approximately $30,000 per year – that in the past has provided funding for several EV charging stations in locations owned by the City of Thousand Oaks, some public (e.g., in parks, the municipal center) and others for the city fleet. Collaborative programs in which VCAPCD participates include 1) Electric Drive 805 (of which VCAPCD is a founding partner and steering committee member), a coalition dedicated to achieving a rapid, equitable transition to plug-in electric vehicles to reduce pollution from cars and trucks in the region; 2) the California Electric Vehicle Infrastructure Project, which offers incentives for the purchase and installation of electric vehicle charging infrastructure at publicly accessible sites throughout California; and 3) South Central Coast Incentive Project, for which VCAPCD is a funding partner with other air districts and community choice aggregate clean power suppliers in Santa Barbara and San Luis Obispo Counties.6,7,8

New Jersey provides the most generous EV purchase incentives in the country for passenger vehicles. The Charge Up New Jersey program offers an incentive of up to $5,000 for the purchase or lease of a new EV with an MSRP of less than $55,000. Both pure BEVs and PHEVs are eligible for the rebate. Zero-emission vehicles are exempt from the New Jersey state sales tax, so state residents will save 6.625 percent on the purchase or lease of a new or pre-owned pure BEV. It Pay$ to Plug In, the inaugural EV charging station grant program of the state's Department of Environmental Protection, has funded over $10 million in charging stations: $5.4 million for DC fast chargers and $4.6 million for Level 2 chargers. In addition, the New Jersey Board of Public Utilities established minimum requirements for utility filings regarding light-duty, publicly accessible EV charging infrastructure. Thus far, two of the state's four utilities have approved programs: $20.7 million for Atlantic City Electric and $166.2 million for Public Service Electric and Gas.

More examples are provided in an April 21, 2021 letter to President Biden, in which a bipartisan coalition of Governors from 12 states – California, Connecticut, Hawaii, Maine, Massachusetts, New Jersey, New York, New Mexico, North Carolina, Oregon, Rhode Island and Washington – describes actions taken within their respective states to move 'quickly towards a zero-emission transportation future [that] will protect the health of all communities.'9 [EPA-HQ-OAR-2021-0208-0255-A1, pp. 5-7]

As many states and localities continue to make significant investments and put forth bold efforts to ready the market to deploy LDV clean technology, we look to and encourage the federal government to step up and increase such efforts as well, and to use this rulemaking to, at a minimum, adopt EPA's Alternative 2, augmented with a MY 2026 standard that is 10 grams/mile more stringent, so that, together, we can create a pathway that will not only reduce air pollution and protect public health and the environment, but also create high-paying jobs, spur economic development and contribute to fuel security in our nation. [EPA-HQ-OAR-2021-0208-0255-A1, p.7]

Commenter: National Coalition for Advanced Transportation (NCAT)

The Electric Vehicle Market Has Grown and Will Continue to Grow. Electric Vehicle Sales and Investments. Sales and Growth: Electric vehicle sales in the U.S. have continued to grow dramatically. Over two million electric vehicles (battery electric vehicles and plug-in hybrid electric vehicles) have been sold cumulatively in the U.S. from January 2010 to the present. 18 Nearly 375,000 electric vehicles have been sold in 2021 as of August. 19 In the last year, electric vehicle sales have “skyrocket[ed].”20 A total of 43,721 electric vehicles (28,460 battery electric vehicles and 15,261 plug-in hybrid electric vehicles) were sold during the month of August 2021 alone in the United States, which captured 4% of total light-duty vehicle sales that month. 21 The share of electric vehicles in new car sales grew dramatically to 4.4 percent in 2020, substantially higher than 2.5 percent in 2019.22 This increase in electric vehicle sales has continued despite low gas prices, and even as car sales generally declined due to the pandemic.23

Projected sales: President Biden’s recent Executive Order on Strengthening American Leadership in Clean Cars and Trucks set a goal that 50% of all new passenger cars and light trucks sold in 2030 be zero emission vehicles (including battery electric, plug-in hybrid electric, or fuel cell electric vehicles). 24

It is clear that electric vehicle sales have and will continue to increase, and that many projections are underestimates.25 Even the very conservative U.S. Energy Information Administration (EIA) predicts that battery electric vehicle sales will increase faster than any other type of vehicle sales, growing by 6% per year on average with 200- and 300-mile range vehicles reaching almost 2 million vehicles (combined) per year in 2050.26 EVAdoption predicts that by 2030, electric vehicle sales will be nearly 30% of all new car sales nationwide and nearly 57% in California.27 In the nearer-term, IHS Markit estimates that electric vehicles will double their 2020 market share by the end of 2021, and make up 10% of new car sales nationwide by 2025.28 The Goldman School of Public Policy at the University of California, Berkeley has summarized the estimates of some of these projections and others, showing that electric vehicles will likely be between 5% and 35% of new vehicle sales by 2035. [Figure 3 can be found on p. 7 of Docket number EPA-HQ-OAR-2021-0208-0239-A1] [EPA-HQ-OAR-2021-0208-0239-A1, p. 5-6]

Declining Electric Vehicle Costs. Declining Battery Costs: Electric vehicle battery costs have continued to decline, reducing the cost of electric vehicles relative to other vehicles.71 Bloomberg New Energy Finance finds that the cost of lithium-ion batteries fell 89% from 2010 to 2020—with a 13% drop in just 2020 alone.72 This trend is expected to continue due to advances in battery chemistry and the opportunities presented by economies of scale as the battery market grows.73

Declining Purchase Price: Electric vehicles are rapidly moving toward purchase price parity, in part because of declining battery costs. Between 25% and 40% of a battery electric vehicle’s total price is typically attributable to the battery. 74 UBS75 and BNEF76 both predict that by 2025, battery prices will have dropped so much that battery electric vehicles will no longer cost more to manufacture than conventional fuel vehicles. The Goldman School of Public Policy predicts this price parity in the mid to late 2020s.77 By 2022, there will be at least six electric vehicles models priced below $30,000. 78 [EPA-HQ-OAR-2021-0208-0239-A1, p. 12-13]

Significant Investments in Electric Vehicle Charging and Related Infrastructure. The number of public and private electric vehicle chargers has increased dramatically. There are now more than

44,000 public charging stations across the U.S. with over 108,000 ports.86 Notably, this includes nearly 20,000 DC fast chargers nationwide.87 On average, the number of public chargers increased 30% from 2015 to 2019 in the top 50 most populous metropolitan areas.88 This trend of charging infrastructure build out is only accelerating. For example, Shell announced plans to build 500,000 charge points globally by 2025.89 Tesla's global network has grown to include over 3,000 Supercharger Stations with more than 27,000 individual connectors, as of August 1, 2021.90 In 2020, Tesla opened 743 new Supercharger locations around the world, which is an average of two new locations every day. Tesla's charging network also includes over 14,000 Destination Charging locations and over 28,000 Destination Charging connectors.91 Electrify America plans to invest $2 billion in charging infrastructure through 2026.92

Utilities are investing significantly in the build out of infrastructure related to electric vehicle charging. "Throughout 2020, approved utility investment in transportation electrification increased three times over the amount approved in 2019" and almost $3 billion in utility electric vehicles programs have been approved through February 2021.93 Utilities have long-term planning horizons for considering investments in improvements to the electricity grid to support transportation electrification. In addition to preparing the grid to support increased electric vehicle adoption, utilities across the country have been planning and implementing significant transportation electrification infrastructure programs. As an example, in August of 2020, the California Public Utilities Commission (CPUC) approved NCAT member Southern California Edison's Charge Ready 2 program, a $437 million program that will fund the installation of approximately 38,000 charging ports.94 This program builds upon Southern California Edison's initial $22 million Charge Ready pilot in 2016, supporting the installation of 1,300 light-duty electric vehicle charge ports. NCAT member Exelon is part of the Electric Highway Coalition, a partnership among 14 U.S. utilities to create a seamless network of rapid electric vehicle charging stations connecting major highway systems, across the country from the Atlantic Coast through the Midwest, South and into the Gulf and Central Plains regions. Through approved programs at its utilities, Exelon will enable the installation of more than 7,000 residential, commercial and/or utility-owned charging ports across Maryland, D.C., Delaware and New Jersey.95 [EPA-HQ-OAR-2021-0208-0239-A1, p. 13-15]

Benefits of Electric Vehicles to the Electric Grid. Electric vehicles will provide substantial benefits for the management of the electric grid. By improving utilization of the existing power grid and spreading fixed costs over a larger base of sales, electric vehicle use can benefit not just electric vehicle owners, but other electricity consumers as well. For instance, transportation electrification can benefit all customers by putting downward pressure on electricity rates, as fixed costs are spread over a larger base of kWh sold.

Although electric vehicles are expected to increase the demand for electricity,109 they are also a valuable grid resource that can be used to help manage the time and intensity of energy consumption, which helps lower electricity bills and helps avoid otherwise necessary upgrades to the electric grid, and will likely—in the future—facilitate storing energy and transferring it back to buildings or the grid.110 Many utilities are switching to time of use (TOU) rates that price energy based on the day, time, and season.111 As of March 2020, about half of U.S. investor-owned utilities had optional TOU rates.112 These can be used separately or in addition to residential TOU rates to incentivize electric vehicle customers to charge at off-peak times when it is cheaper and also beneficial for the grid.113 Another form of smart charging involves vehicles being plugged in but not charging until they receive a signal from the grid indicating that demand has declined.114 These technologies have benefits for electric vehicle consumers and grid managers, but also for all customers whose rates could decline as electric vehicles help to shift demand.115 California recently undertook a major study of vehicle-to-grid integration—encompassing TOU rates and using electric vehicle batteries as distributed energy resources—and is now working to implement the report's 92 policy recommendations in order to realize the benefits of electric vehicle integration.116

Electric vehicle charging is also increasingly connected to and supported by renewable energy. TOU rates can be coordinated with renewable energy availability, like in Charge Forward, NCAT member PG&E and BMW's pilot program that helped consumer to delay charging to align with renewable energy.117 NCAT member Southern California Edison also introduced a TOU rate connected to renewable energy availability, 118 and has implemented demand response programs through its Charge Ready infrastructure programs that demonstrate how electric vehicle charging load can be shifted to absorb midday excess renewable generation that may otherwise be curtailed. 119 NCAT member EVgo, a fast-charging network, powers its 800-charger network using 100% renewable energy.120

Several utilities including the Sacramento Municipal Utility District (SMUD) have active Vehicle-to-Grid (V2G) research and development projects planned or in progress including both electric school buses and light duty electric vehicles. V2G figures prominently in SMUD's 2030 Zero Carbon Plan pursuant to which SMUD is planning to eliminate its fossil fuel based generation assets by 2030 and could expect over 250 MW/400 MWh of energy storage from V2G. [EPA-HQ-OAR-2021-0208-0239-A1, p. 17-18]

Commenter: NATSO, Representing America's Travel Centers and Truck Stops et al.

The Proposal Does Not Acknowledge the Consequences of GHG Emissions Standards that Favor EVs over Other Technologies

GHG emissions standards that favor EVs over other technologies have led to unintended consequences that ultimately run counter to EPA's regulatory objectives. For example, the 2012 Final Rule5 encouraged regulated utilities to aggressively pursue offering EV charging on the backs of lower-income Americans. Regulated utilities are seeking to convince public utility commissions that they should be able to charge all of their ratepayers – regardless of income – a higher dollar figure on their monthly electric bill in order to underwrite the utilities' investment in EV charging stations. Unfortunately, the cost burden will hit hardest on those least able to afford it. Individuals who struggle to pay their monthly bills should not be required to underwrite investments that the private sector is willing and better equipped to make. EV drivers – who today have above-average incomes and drive cars that cost much more than average – can and should pay the costs of charging their vehicles.

Absent more meaningful guardrails around regulated utilities' ability to own and operate EV charging stations, it is reasonable to believe that the Proposal would perpetuate this activity throughout the country. There is no public policy rationale for pursuing this approach with respect to refueling, as it will only decrease transparency and competition, increase costs, and stifle innovation. And, this model of utilities adding charging stations funded by ratepayers will stunt the growth of such infrastructure because the private sector will have no way to compete and therefore not invest. Because the private sector cannot operate electric charging competitively with infrastructure underwritten by ratepayers, the private market will not build new infrastructure in states using that model. The result will be fewer, not more, EV charging stations. This undermines EPA's regulatory objectives.

The Proposal does not sufficiently acknowledge the costs that all ratepayers will inevitably absorb in order to underwrite their regulated utility's investment in EV charging stations. A competitive, private recharging market will lower the overall costs that consumers pay for electricity as a transportation fuel. The retail fueling industry provides approximately 150,000 locations across the country for drivers to currently refuel. This refueling capacity drives aggressive price competition that, in turn, keeps prices low for consumers.

The overarching structure of the wholesale and retail electricity market is not designed for – and thus incompatible with – the retail fuels market. If the regulated utilities' practice of charging all of their ratepayers more money to underwrite the utilities' investment in owning and operating charging stations were to become the prevalent model, the country will risk replacing one of the most price-transparent and price-competitive consumer markets in the world (retail fuel pricing) with one of the least price-transparent and price-competitive markets in the United States (utility electricity pricing).

Because the Proposal's cost analysis limits the discussion to costs that EV drivers will bear, it understates the true public costs of refueling EVs. In reality, many American businesses and individuals will subsidize those costs through higher electricity bills, and the amount of that subsidy will be unnecessarily high because it will be divorced from the competitive forces that keep prices down. [EPA-HQ-OAR-2021-0208-0570-A1, p.4]

Commenter: New Mexico Environment Department

Increasing standard stringency drives technology innovation in the automotive industry and creates jobs in electrifying the transportation fueling system. EPA's Regulatory Impact Analysis acknowledges the available and planned capacity of the automobile industry to advance GHGe-reduction technology. Five automobile manufacturers that account for approximately one-third of the new vehicles sold in the United States (US) signed onto the California Framework and already plan to meet the stringency of Alternative 1. Additionally, this year many automobile manufacturers, including General Motors, Volvo, Volkswagen, Honda, Ford, Fiat, Stellantis, and Mercedes-Benz, announced their planned shift to greater investments in automotive electrification technology and to strategically increase production of zero-emission vehicles. [EPA-HQ-OAR-2021-0208-0205-A1][p.2]

Commenter: New York State Department of Environmental Conservation

Over the past five years, New York and two dozen other states in the U.S Climate Alliance have led the way with policies and programs to support the electric vehicle transition. New York is investing more than $1 billion in zero emission cars, trucks and buses and zero emission vehicle (ZEV) fueling infrastructure over the next five years, including an $85 million competition to deploy innovative clean transportation strategies in communities overburdened by vehicular emissions. [EPA-HQ-OAR-2021-0208-0238-A1, p.1]

Commenter: NGVAmerica

We support electrification where it makes sense and even anticipate that in the near future an increasing larger share of heavy-duty natural gas vehicles will employ hybrid electric powertrains.[7] Significant investments are being made to bring natural gas/hybrid powertrains to market. Light-duty natural gas fueled vehicles could someday employ similar hybrid-electric powertrains as hybrid vehicles become more prolific. [EPA-HQ-OAR-2021-0208-0214-A1, p.3]

Commenter: Northeast States for Coordinated Air Use Management (NESCAUM)

The Northeast states have a long history of taking actions to reduce GHG emissions and air pollution from the transportation sector. Seven of NESCAUM's member states have exercised their authority under Section 177 of the Clean Air Act to adopt California's Advanced Clean Car standards, including requirements for automakers to deliver increasing volumes of ZEVs. Together with California, the states that have adopted or are in the process of adopting these standards represent approximately 40 percent of the national LDV market. Transportation electrification is a critical component of state plans to reduce emissions from cars and trucks to meet their climate and air quality goals. In addition to state efforts to advance the ZEV market, strong federal standards are needed to accelerate the transition to ZEVs. [EPA-HQ-OAR-2021-0208-0259-A1, p. 3]

Zero-emission technologies have advanced rapidly since EPA established its MY 2017 and later standards in 2012, and the pace of innovation has only accelerated since the 2018 mid-term evaluation. Battery costs continue to decline, and the number of ZEV and plug-in hybrid electric vehicle (PHEV) models offered for sale in the United States is rapidly increasing. As EPA discusses in its proposal, the proliferation of announcements by automakers of their intention to electrify their fleets signals a rapidly growing shift in investment away from internal combustion technologies and toward zeroemission technologies. [EPA-HQ-OAR-2021-0208-0259-A1, p. 3]

The automakers' electrification plans are supported by continuing technological advancements and driven by the need to compete in a global market in which other countries are implementing aggressive zero-emission transportation policies. Likewise, California is currently developing new ZEV requirements for passenger vehicles beyond MY 2025. The new requirements are expected to put market growth on pace for all new vehicle sales being ZEVs or PHEVs by 2035. Several states, including NESCAUM states, are watching this development closely and considering plans to follow suit. In fact, New York recently enacted legislation setting a goal for all new passenger cars and trucks sold in New York State to be zero-emission by 2035.4 [EPA-HQ-OAR-2021-0208-0259-A1, p. 3]

Commenter: Noyes, James

[The following comments were submitted as testimony at the virtual public hearing on August 26, 2021. See Hearing Testimony – 26Aug2021, pp. 262-263.]

There's obviously a very strong drive to move toward electrification, but as everyone is aware, there are very significant technology and cost barriers there, and there's also the very long life of internal combustion engines that are on the road. We've seen in California very aggressive programs to electrify the state that are having effect, but, frankly, they're having effect slowly with still the large dominance of the internal combustion engine.

Commenter: Ohio Attorney General Office, et al.

The proposed rule considers as a benefit 'reductions in energy security externalities caused by U.S. petroleum consumption and imports.'[68] On one hand, that is a concern of the Administration’s own choosing, as the United States produced more energy than it consumed in 2019 for the first time in [62] years, [69] and remained a net exporter in 2020.[70]

Regardless, the proposed rule entirely fails to mention the additional risks to the transportation sector, even if certain risks are alleviated in the energy sector. China dominates the lithium-ion battery market, and is poised to capture a greater share with time.[71] China is home to three-quarters of the global manufacturing capacity for lithium-ion batteries, while the United States has only 12 percent.72 Not only does China own the final manufacturing process, but China also 'controls 80 percent of the world’s raw material refining in the lithium-ion battery supply chain, 77 percent of the world’s cell capacity, and [60] percent of the world’s component manufacturing.'[73] This is not merely a problem of manufacturing, which through various incentives could theoretically be on-shored. China controls [90] percent of the supply of rare-earth magnets, which work to power electric vehicles.[74] Dependence on China for our transportation is a national security threat—one that cannot be overcome overnight. The EPA failed to consider whether the proposed timeframe to change our vehicle fleet will create an overreliance on China, given the current lack of manufacturing and raw materials in United States control. Such failure renders any final rule arbitrary, but more importantly, dangerous. [EPA-HQ-OAR-2021-0208-0258-A1, p.10]

Commenter: Peavler, Jean

This would also make us even more dependent on China, as around 80% of the manufacturing capacity for electric vehicle batteries is in China. A vast majority of the chemical processing and refining for the raw materials (cobalt and lithium) used in these batteries is also performed in China. We are already too dependent on China and need to decrease this, not increase it!

We would also be even more dependent on the electric power grid, which is vulnerable to cyber attacks as well as power plant failures. [EPA-HQ-OAR-2021-0208-0395, p. 1]

Commenter: Piper, Edward

More fuel efficent CAFE requirements incentivize vehicle manufacturers to make battery powered vehicles. These high energy density batteries have all the energy components internally in the battery in a small confined space (as compared to internal combustion engines or fuel cells which have air as one of the reactants). In the event of malfunction or damage this energy can be released in a castastrophic way more difficult to control than a burning liquid hydrocarbon fuel. [EPA-HQ-OAR-2021-0208-0520, p. 1-2]

Commenter: Plug In America, the National Association of Electric Vehicle Drivers

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, p. 78.]

We are on track for EV sales to roughly double from last year to something around four percent market share for 2021. Thus, an aspiration to achieve eight percent EV market penetration by 2026 is just simply too cautious.

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, p. 79.]

For more than a decade American automaker Tesla has taken the world by storm showing true American leadership and, as noted in the proposal, many other automakers are now moving forward and have committed to reach 50 percent market share EVs by 2030.

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, p. 80.]

In his call for a $174 billion package of support to electrify transportation, President Biden has shown the same level of transformational vision. We would challenge EPA to be no less visionary. This will enable us to assert American leadership in tomorrow's energy and transportation technologies, to create millions of good-paying jobs across numerous industries, and to reclaim our skies and to protect future generations from the devastation of climate change.

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, p. 81.]

Just one quick question. In your testimony you said that for 2021 that some data was indicating that for the U.S. we were on target to hit a four percent share this year.

That's information in your public testimony. Could you provide some additional information on that? That would be very helpful. Thank you.

Yes, sure. We're a little bit over three and a half percent right now but it's accelerating. So the numbers I've seen are close to four percent by the end of the year, but, yes, I can share that.

Commenter: Price, Heather

[The following comments were submitted as testimony at the virtual public hearing on August 26, 2021. See Hearing Testimony – 26Aug2021, p p.294-295.]

So, in terms of health and air quality, electrifying our vehicle fleet is really the only solution that we have. And as we clean up our electrical grid, then everything, right, this really does get at the root of the climate crisis and how we're going to address it. It means electrifying everything using zero carbon sources of electricity, such as wind and solar. It means electrifying our vehicle fleet and coming up with ways of recycling the batteries because, yes, there are issues with batteries and with the pollution there. But one of the issues also with batteries, people talk about, oh, recycling. Well, the elements that are in those batteries are there. So, the elements within those batteries are always there. They're transitioning between redox states, but they're not going into the atmosphere the way that, say, when you burn toxic fossil fuels and those go into the atmosphere either as methane or as carbon dioxide, depending on fuel source.

Commenter: Roush Engineering

Attached are two reports Roush Engineering recently completed for the Center of Applied Environmental law and policy that we believe are relevant to the proposed rulemaking, particularly with respect to continuing improvements in effectiveness and cost compliance technologies.

• CAELP Report 1 - Gasoline Engine Technologies (09.24.2021)
• CAELP Report 2 - 48V and BEV costs (09.24.2021 [EPA-HQ-OAR-2021-0208-0210-A1, p. 1]

Commenter: Schrier, Paul

As an American consumer, I stand against the proposed rule change that would make finding affordable vehicles even more difficult because of the following reasons:

Perhaps most telling is problems galore with EVs themselves, which are being recalled due to vehicle fires, sudden losses of power, and failures to start. Within the last year recalls by General Motors, Hyundai, and Ford involved 132,500 electric vehicles and cost a combined $2.2 billion.

Unsurprisingly, these issues have resulted in a lack of consumer confidence. After all, who wants to buy a vehicle that might burst into flames at any moment, or refuse to start when youre already fifteen minutes late to work? [EPA-HQ-OAR-2021-0208-0466, p.1]

And to top it all off, the United States doesn’t currently have the resources or processing capability to make EV batteries -- meaning Bidens push for EVs will primarily benefit China, which is leading the race as one of the largest and fastest-growing EV markets in the world. [EPA-HQ-OAR-2021-0208-0466, p. 1]

Commenter: Shevelew, Jonathan

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, pp. 116-117.]

To encourage manufacturers to continue to invest funds and resources into reducing the emissions from fossil fuel-based engines is an absurd approach with diminishing returns, especially when we've already accepted the fact that these types of engines will disappear.

Commenter: Southern Environmental Law Center

In addition to lower fuel costs associated with more efficient internal combustion vehicles, stricter emission standards will also encourage manufacturers to make EVs more widely available—which will help drive the market closer to the Biden administration’s goal of having 50 percent of all new light-duty vehicles sold in the U.S. in 2030 be zero-emissions vehicles.

Owning an EV saves the typical driver between $6,000 and $10,000 over the lifetime of the vehicle as compared to a gas car due to reduced fuel and maintenance costs.[36] [EPA-HQ-OAR-2021-0208-0244-A1]

Commenter: Stabnau, Angela

I am Not a supporter of electrical cars. There is NO disposal facility and no way of recycling the battery. ExampleFORD mach e - 6 months after driving the battery went dead. No longer chargeable. Label on battery states "Do Not throw in garbage." There are No COREs on these smart car batteries. Call FORD - they have no suggestions of Recycling. There is No where on Planet Earth willing to take these. There is No current plan. No ones talking about it. The parks involvement in these vehicles would be contributing to the poisoning of our planet. Thank you for your consideration. [EPA-HQ-OAR-2021-0208-0712-A1, p. 1]

Commenter: Stellantis

An ‘All of Government’ Approach is Needed to Accelerate Electrified Future

The auto industry, labor and Federal and State governments have critical roles to play in transitioning the market to achieve the ambitious targets set forth at the White House. The current electric vehicle market represents 2.5% of total industry sales.3 The EV market must grow to three to five times todays levels in just four years to achieve even the conservative electrification rates of 8- 13% EPA4 and NHTSA5 modeling suggests is needed by MY2026 in these draft rules.

Stellantis is committed to doing our part to reduce CO2 and electrify our fleets. In turn, we are relying on a commitment from the Biden Administration and U.S. policymakers to provide the full suite of supportive policies included in the Build Back Better Plan. Infrastructure and affordability are just two of many critical policies necessary to create EV market 'tailwinds.' While EPA is not directly responsible for all of these needed actions, the proposed rules require increased electrification, and increasing electrification cannot happen without growing the EV market. The market policies outlined below (and more deeply explored in Appendix A) are needed to grow the EV market: [EPA-HQ-OAR-2021-0208-0532-A1, pp. 3-4; Appendix A can be found at docket number EPA-HQ-OAR-2021-0208-0532-A1, pp. 21-32]

Expand and Scale the Charging Network to EV Volumes Required by Proposed Rule – Availability and accessibility of an electric vehicle refueling infrastructure are critical to address consumer concerns over range limitations and re-fueling access – a key barrier to EV market growth. Stellantis estimates nearly 850 thousand additional chargers, costing at least $7.6 billion, will be needed through MY2026 to support the number of EVs required to meet EPA's proposed GHG standards. These numbers significantly increase beyond MY2026. State and federal governments, together with charging companies and utilities need to establish a comprehensive charging infrastructure plan to meet these needs and provide confidence to American drivers. [EPA-HQ-OAR-2021-0208-0532-A1, p. 4]

Develop Domestic Battery Supply Chain (Raw Materials, Manufacturing, and Recycling) - At present, most critical minerals necessary for the production of advanced EV motors and batteries are mined and processed outside of the U.S. As the domestic demand for EV grows, the demand for critical minerals, new technology manufacturing facilities, and battery recycling will grow. Developing a U.S. national policy on recycling (recognizing the greater North American supply chain) offers a strategic chance to lessen this risk while avoiding end-of-life landfill waste for batteries.

Increase Research & Development - EVs remain more expensive than equivalent ICE vehicles. Federal research funding is needed primarily in battery technology to accelerate advancement in electrified vehicle technology with the goal of achieving cost and functional parity with today's ICE vehicles. The Department of Energy should expand research on alternative lower cost substitutionary materials to achieve the needed cost reductions. [EPA-HQ-OAR-2021-0208-0532-A1, p. 4]

Meeting the Proposed Rule Requires Unprecedented Increases in Electrification

Establishing a pathway to first meet the stringency proposed by EPA and then grow further to meet 2030 electrification goals of the Biden administration will require significant growth in electrification from today's levels - more than both EPA or NHTSA predict in their draft rules. EPA in its Regulatory Impact Analysis projects a 7.8% market penetration of plug-in hybrid and full battery electric vehicles (EVs) by MY2026 in response to the proposed GHG requirements.10 NHTSA in its own analysis projects a higher EV market penetration of 13% by MY2026.11 This is a three to fivefold increase of EVs, respectively, from calendar year 2020 sales of 2.5%.12 Third-party sources, such as IHS Markit, believe automakers will need to achieve even higher EV market penetration rates of 17% by MY2026 to meet the proposed compliance requirements, assuming an available market and the necessary supporting measures and polices are realized.13

Stellantis believes EPA has overestimated the potential for ICE improvements on a pathway that is focused on significant EV growth. Unlike the mid-term evaluation where conventional ICE technology was seen as the dominant lever in achieving compliance, we now see a post-MY2026 environment focused on high levels of electrification to accommodate President Biden's Executive Order as well as the pending California Air Resources Board ZEV rule requiring 70% electrification in 2030 and 100% electrification in 2035 (Executive Order N-79-20). So, even if manufacturers could achieve these proposed M2023-2026 standards with conventional ICE technology, it would make little economic sense to pursue a duplicate ICE investment path only to abandon it a few short years later to meet 2030 electrification goals.

The rate of improvement called for in proposed rule (10% in MY2023 and 5% per year to MY2026) significantly outpaces historical improvements achieved with ICE technology. Eleven of 14 major automakers have fallen behind EPA's 2019 standards even as they have been adding technology since 2012. To meet these proposed requirements, significant market penetration of strong electrification (e.g., hybrid, plug-in electric, or fuel cell technology) is needed.

In comments to the SAFE rulemaking, The Auto Alliance supported this conclusion in finding that only 2.5% of MY2018 vehicles would meet the MY2025 standards per the 2012 final rule and all the vehicles meeting the MY2025 standards were equipped with hybrid, plug-in electric, or fuel cell technology.14 In recent analysis performed by IHS Markit for the Alliance for Automotive Innovation, only 11.6% and 5.1% of MY2020 vehicles achieve the proposed MY2023 and MY2026 GHG footprint standards, respectively.15 Of the 5.1% of vehicles that met MY2026 standards all were electrified products (i.e., none were non-hybrid ICE models).

If the only MY2020 vehicles that achieve the proposed MY2026 GHG standards are hybrid, plug-in electric, or fuel cell technology, and a compliant fleet can be thought of as a 50/50 mix of vehicles above and below the target, it's reasonable to project that a compliant fleet in MY2026 will have a market penetration rate of 20 to 50% of models equipped with hybrid, plug-in electric, or fuel cell technologies, depending on the technology mix. This market penetration rate is significantly higher than the 8-13% modeled by the Agencies16 and will increase the cost of compliance. [EPA-HQ-OAR-2021-0208-0532-A1, pp. 9-11]

Expand and Scale the Charging Network to EV Volumes Required by Proposed Rule

Nationwide EV charging infrastructure that is accessible, reliable, and deployed in a timely manner is necessary for broad market adoption of electric vehicles. The 2021 National Academies report on improving light-duty vehicle fuel economy cites location and availability of charging stations as the number one reason for a consumer to avoid an electric vehicle.36 Without comprehensive charging infrastructure, there can be no EV market.

While residential charging at home is the predominant means of charging, public and privately shared charging is essential for owners or renters who have no access to off-street charging, or who live in multi-unit dwellings, have long work commutes, or travel for extended distances.37 Accessible charging must also consider the needs of all types of consumers. An August 2021 report published by Mobilyze.ai highlights the following observations:38

1) 'the majority of early EV adopters have access to dedicated off-street parking at home, where they do the majority of their charging today,'39

2) 'dedicated off-street parking at an owned residence only exists for an estimated 47% of vehicles in the United States,'40 and

3) 'only 9.7% of residents from the top 50 most populous U.S. cities have convenient access to public charging near where they live.'41

Consumer acceptance of EV's demands that charging is simple, fast, affordable and accessible to all types of vehicle owners. Chargers must be strategically placed along interstate corridors to meet consumer needs for long distance commutes and extended travel where higher number of fast, higher power Direct Current Fast Chargers (DCFC) will be needed to minimize recharging times.

Careful planning will be necessary for high powered public chargers to ensure accessibility while also considering other factors such as grid upgrades to meet the power demand, feasibility with getting electrical power to the location, and all the while minimizing implementation cost and time.

Understanding the criticality of a robust charging infrastructure to building an EV market, it is important to quantify the growth needed given the proposed rule and the longer term goals of the Biden administration. The large increase in light-duty vehicle EVs is shown in Figure 6, which estimates a 7 million (MY2026) and 29 million (MY2030) EV cumulative car parc based upon the 7.9% EV sales penetration in MY2026 EPA says is needed to meet the proposed rule and President Biden's executive order calling for 50% EV sales by 2030. The growth rate anticipated by these projections is exponential from today's levels and will require and equally exponential growth in charging infrastructure to accommodate. [EPA-HQ-OAR-2021-0208-0532-A1, pp. 23-24; Figure 6 can be found on p. 24 of Docket number EPA-HQ-OAR-2021-0208-0532-A1]

To determine the number of chargers needed nationally to accommodate the growth anticipated, federal regulatory agencies should look to the most successful North American EV markets such as California and its California Energy Commission (CEC), for policies used to forge a broad public EV charging infrastructure network. The California CEC recently published an EV charging infrastructure assessment report highlighting the need for increased shared private and public EV chargers. This report shows that California, the most successful EV market in the nation, currently has a ratio of 1 charger per 6.9 EVs on the road.42 This ratio is critical since it provides insight from the nation's leading EV market on the amount of charging infrastructure that is needed for the rest of the country.

As stated above, achieving EPA's stated 7.9% EV sales rate would mean approximately 7 million EV's on the road by MY2026. Using the CEC ratio of 1 public charger for every 6.9 EVs on the road, Figure 7 demonstrates that approximately 970K privately shared and public chargers would be needed nationwide to support 7 million EVs by MY2026 (a 850K or 8x increase compared to today). If an EV sales rate of 50% is assumed by MY2030, approximately 4.2 million chargers will be needed to support a 29 million EV car parc, a 35-times increase from today. [EPA-HQ-OAR-2021-0208-0532-A1, p. 25; Figure 7 can be found on p. 25 of Docket number EPA-HQ-OAR-2021-0208-0532-A1]

Figure 8: EV Charger Gap further highlights the large gap between the DOE's count of EV privately shared and public charger ports installed today (121,000 ports43) and what is needed to support the future EV car parc. [EPA-HQ-OAR-2021-0208-0532-A1, p. 26; Figure 8 can be found on p. 26 of Docket number EPA-HQ-OAR-2021-0208-0532-A1]

As a result, significant federal funding will be required to accomplish the kind of growth needed in charging infrastructure. Analysis shown in Table 2 below estimates the cost of meeting the growth in charging infrastructure estimated above. [Table 2 can be found on p. 27 of Docket number EPA-HQ-OAR-2021-0208-0532-A1]

The above analysis shows a low end estimate of $7.6 billion in EV charging infrastructure funding is needed to support EPA's expected EV penetration rate (7.9% sales) in MY2026 based upon a 7 million EV car parc, and $36 billion needed to support a (50% EV sales target) 29 million EV car parc by MY2030.

This estimate could greatly increase, as demonstrated by the high end estimate, due to changes in assumptions such as the DC fast charger power level demanded, percent of DC fast chargers needed, installation costs, and other factors.

The installation cost variability is due to factors such as ease of getting electricity from the grid to the charger location site, site power level needed (sub-station upgrades), retrofit versus new construction, and the number of chargers per site, etc. Similarly, if future demand increases towards higher cost DC fast charging to reduce charging times over lower cost Level 2 chargers, further infrastructure funding may be needed.

This analysis highlights the significant financial funding lift that will be necessary to ensure an EV charging ecosystem for current and future EV owners – an increase in public, workplace, and privately shared chargers of 8-times in MY2026 and 35-times in MY2030. Stellantis supports the continued efforts by the federal government to help fund a long-term comprehensive charging infrastructure plan that includes charger installation funding and associated incentives. Recent examples of U.S. legislative funding activities under development are the Infrastructure and Build Back Better bills, which include funding for charging infrastructure and tax credits for alternative refueling properties.

Federal agency leadership is needed to help coordinate public and private stakeholders such as state agencies, utilities, electric vehicle supply equipment (EVSE) manufacturers to achieve the significant growth outlined above. Permitting and building codes for new and existing construction will need to be streamlined to ensure the make-ready ground work is laid for EV chargers. Given the exponential market growth anticipated, federal and state plans for charging infrastructure growth need to include all costs. Today, charger installation and permitting remains a significant challenge, and it is not uncommon for site upgrades required to accommodate charging infrastructure to be at least as costly as the actual EV charger itself. Funding should be allocated for the upkeep and maintenance costs of EV charging equipment throughout its lifespan, to maintain a robust network.

Implement Fleet Purchase Requirements

Fleet purchase requirements can help to ensure a robust market for electrified vehicles. In order to have a substantial increase in electrification, three factors must be satisfied: a robust supply of EVs, adequate infrastructure, and market demand. Industry as a whole, including Stellantis, has committed to broad electrification of our fleets. Besides infrastructure, one of the biggest unknowns is the rate of market adoption of EVs. A purchase requirement would help create additional certainty during this relatively rapid transition to electrification.

In California there is a proposed Advanced Clean Fleets (ACF) rule which will compel government and big businesses to purchase some medium and heavy-duty ZEV vehicles as they replace their fleet. We think a similar approach to fleets could be implemented for light-duty vehicles too. Fleet applications are generally more suitable to early electrification because of the centralized charging points, where it is easier to predict and plan for the total infrastructure needs. The Alliance for Automotive Innovation (AAI) recently requested CARB to expand the ongoing ACF rulemaking to include light-duty vehicles, stating:

‘In addition to providing a known and stable market for ZEVs, public and private fleet purchase requirements significantly increase consumer awareness as people use and see ZEVs in use. For example, rental cars offer potential EV buyers a risk-free opportunity to experience and drive EVs. Moreover, since the rental car fleet typically turns over much faster, these EVs will move into the used vehicle market quickly, further expanding EV penetration in all communities – including underserved communities.’44

President Biden’s EO14008 directs the Federal government to use its buying power to purchase ZEVs specifically, noting:

‘By providing an immediate, clear, and stable source of product demand, increased transparency and data, and robust standards for the market, my Administration will help to catalyze private sector investment into, and accelerate the advancement of America’s industrial capacity to supply, domestic clean energy, buildings, vehicles, and other necessary products and materials.’45

Further, EO 14088 establishes the National Climate Task Force, which is tasked with revitalizing the Federal Government’s sustainability efforts with a plan to procure:

'…clean and zero-emission vehicles for Federal, State, local, and Tribal government fleets, including vehicles of the United States Postal Service.'46

To remove the ambiguity of implementation, the EPA under the direction of the National Climate Task Force (EPA Administrator Reagan is a member) could craft a purchase mandate.

We also believe large commercial fleets such as transportation network companies (TNCs) and rental car companies could also be well suited to electrification, potentially under a ZEV purchase mandate.

Develop Domestic Battery Supply Chain (Raw Materials, Manufacturing, and Recycling)

Stellantis supports recycling policies that will avoid EV battery end-of-life landfill waste in addition to creating sustainable supply chains for battery manufacturers. The United States does not currently produce enough EV battery raw materials and therefore is at risk to being impacted by changes to supply chains controlled by other countries. Developing a U.S. national policy on recycling offers a strategic chance to lessen this impact and risk.

This is also true for retired EV batteries from vehicles that still retain significant capacity for other usages in the energy grid chain. These secondary-use batteries can lessen the risk to national energy security and trade by keeping that raw material in usage until recycling at end-of-life from that new capacity.

However, an end-of-life battery policy requires federal leadership to develop unified requirements across the country. This policy would promote the growing segment of vehicles and accommodate the anticipated increase in volumes of these vehicle batteries coming to market and starting to accumulate mileage. Already, states have individually begun debate on different approaches to battery requirements that would cause confusion for the customer base and for the dismantlers operating effectively under the current business model. EPA and NHTSA, in consultation with other agencies, are urged to act to avoid a patchwork state approach and exercise clear leadership.

Increase Research and Development

Stellantis is investing billions of dollars to create 4 full BEV platforms with the ability to scale up to 2 million vehicles per platform per year utilizing high energy dense and efficient batteries, optimizing segmentation for full market coverage and utilizing cross shared components and systems.

Stellantis platforms will be designed for interchangeability of battery cell chemistry, electric drive motors, power inverters and software control. Hardware and software will be designed with upgrade capability throughout the lifecycle (in-house software with Over-The-Air capability). This flexibility will enhance competitiveness, cost, efficiency, weight, and capabilities.

Stellantis currently has or is completing several key technology joint ventures, ranging from epowertrain and e-transmission operations to battery cell chemistry and production and digital cockpit and personalized connected services. These partnerships will provide Stellantis the opportunity to leverage not only in-house competencies, but also the expertise of the partners in order to bring new technology and solutions to market more rapidly, while optimizing capital allocation to further enhance Stellantis' competitiveness in the marketplace.

Stellantis is doing its part, committing billions to develop cutting-edge EV technology. Federal research funding is also needed; supporting DOE grants, national lab projects, and USABC etc. This will accelerate precompetitive advancement in electrified vehicle technology with the goal of achieving cost and functional parity to conventional ICE vehicles today. Achieving cost and functional parity is critical to removing customer barriers to adoption, such as range anxiety and the significant incremental cost increase. Several examples of needed research are:

• Alternative lower cost battery materials
o Increased battery energy density
• Extended battery durability
• EV battery design for re-use & recycling
o Reduced EV recharge times (fast charge capability)
• Improved electric motor efficiency

Similarly, federal funding is needed to help the automotive industry transition their facilities to manufacture electrified vehicles and their associated components. Stellantis supports federal manufacturing incentives such as the Section 48C Advanced Energy Investment Tax Credit included in the Build Back Better bill, providing advanced energy investment credit at $2.5 billion per year over a ten-year period. [EPA-HQ-OAR-2021-0208-0532-A1, pp. 27-30]

Commenter: Tesla

Under Section 202(a)(2) Electrification Is the Most Cost-Effective, and Fully Developed Light Duty Vehicle Technology that Provides the Greatest Degree of Emissions Reduction and Should Form the Basis for the Standard's Level of Stringency

A. EPA Fails to Fully Analyze and Recognize EVs as the Best Emission Reducing Technology Deployed Today

In 2010, EPA set MY 2012-2016 light duty vehicle GHG standards and recognized that the new technologies would occur in the future including the initial commercialization of electric vehicles.96 Similarly, in 2012, the agency set standards that would result in annual sales of strong hybrids, plug in hybrids and electric vehicles being up to 7% of the market.97

Unfortunately, EPA ignores the rapid cadence of technological development and deployment since setting standards in 2012 and yet again states, 'The feasibility of the proposed standards does not rely on dramatically increased penetration of electric vehicles into the fleet during the 2023–2026 model years.'98 By not including EVs into the feasibility analysis the result is a dramatically weaker rule that under deploys commercially available technology that can cut millions of tons of CO_2 and does not fully comport with EPA's statutory obligations. As the agency is aware, despite the SAFE rule's recent dramatic rollback in the existing standards' stringency, the role of electric vehicles in the market is far beyond a level of initial commercialization. However, in the proposal, EPA fails to account for the rise in electrification technology that has occurred over the last decade. While EPA points to a handful of manufacturer statements (and there are many more) on near term electrification plans,99 the agency's proposal fails to consider the depth and pace of electrification technology deployment that has already occurred. The cadence of EV sales accelerated even during the pandemic, while other vehicle sales decreased.100 This market growth has continued through the first half of 2021 as EV sales doubled compared to 2020 and now stand at 7% globally101 – a trajectory of growth far greater than EPA's expected penetration rate (including PHEVs) of under 8% by MY 2026.

More directly, EPA makes numerous omissions as to the role electrification can play in establishing the stringency level of proposed standards. As previously mentioned, EPA utilizes a MY 2017 baseline that omits a significant and exponential increase U.S. EV sales.102 Moreover, the Agency's RIA states emphatically:

It is important to note that our conclusion that the proposed program is technologically feasible is based in part on a projection that the standards will be met largely with the kinds of advanced light-duty vehicle engine technologies, transmission technologies, electric drive systems, aerodynamics, tires, and vehicle mass reduction already in place in vehicles within today's fleet. Furthermore, the proposed standards do not rely on a significant penetration of electric vehicles into the fleet during the 2023-2026 model years.103

Similarly, the agency does not attempt to account for the new full electric pick-up trucks set to come on the market, such as the Tesla Cybertruck and others, in the near term.104 Even more troubling is the willful refusal to revisit admittedly over-estimated battery costs in the agency's analysis where the agency states:

Likewise, the battery costs used in the SAFE FRM were considered too high by EPA. However, given that significant levels of vehicle electrification will not be necessary in order to comply with the proposed standards (past analyses by EPA have estimated BEV penetrations of less than 5 percent, in general), we did not consider updating vehicle electrification costs to be of paramount importance for this proposal, although we may update battery and other vehicle electrification costs for the final rule.105

Despite this assertion the agency analysis still suggests, 'we believe it is likely that an even higher percentage of the industry-wide light-duty vehicle fleet could be electrified during the time period of our proposed MY2023 and later standards.'106

Thus, in combination, despite being the most efficacious emissions reduction technology, the agency refused to analyze fully the role EVs can play in terms of setting near term compliance levels simply because it was 'not necessary for compliance.' The agency has its analysis backwards. EPA must look at the technologies at hand to establish its level of stringency not set a compliance level and then exclude the full contribution of readily available technologies. Moreover, embarking on a path that ignores electrification reinforces that in proposing these standards the agency has chosen not to utilize the technology forcing authority present in Section 202 of the Clean Air Act,107 and leaves American technological ingenuity on the cutting room floor. [EPA-HQ-OAR-2021-0208-0278-A1][pp.11-13]

B. EPA Should Utilize Greater Near Term EV Deployment in Setting the MY 2023-26 Standards Under the Relevant Factors Required by Section 202(a)(2)

Over the last decade, EPA has underestimated the role that EVs should play in setting the stringency of the standards. In 2010, 'EPA did not project reliance on the use of any plug-in hybrid or battery electric vehicles when projecting manufacturers’ compliance with the 2016 standards.'108 In 2012, EPA and NHTSA stated: 'At this time we do not estimate whether the number of people who will choose to purchase EVs at private-market prices will be more or less than the number that auto makers are expected to produce to comply with the standards.'109 Yet, when looking at technological feasibility under the standards the EPA acknowledged in its 2012 standards rulemaking that:

[T] the agency is not limited in determining the level of new standards to technology that is already being commercially applied at the time of the rulemaking. It can, instead, set technology forcing standards, i.e., ones that make it necessary for manufacturers to engage in research and development in order to bring a new technology to market. There are certain technologies that the agency has considered for this rulemaking, for example, that we know to be in the research phase now but which we are fairly confident can be commercially applied by the rulemaking timeframe, and very confident by the end of the rulemaking timeframe.110

Rather shockingly, with Tesla now the most valuable automobile manufacturer and having deployed almost two million EVs globally, EPA fails to set technology forcing standards. This is at odds with experience and logic. As a leaked draft of the upcoming IPCC, Working Group 3 report states, 'The vast majority of GHG emission reductions by 2050 in the transport sector are projected to come from electrification of the light duty vehicles. These technologies are now commercially available.'111

In its proposal EPA lays out a number of factors it utilizes when assessing the 'requisite technology' that will support establishing a level of stringency in the standard. When analyzing feasibility and these factors, it should be clear that electrification technology – which is already commercialized – should form the basis for the agency implementing a far stronger standard than proposed. In considering all these factors, the agency should reconsider the stringency level because EVs are now proven beyond any doubt and meet all the elements.112

(1) Electric Vehicles Are the Most Effective Vehicle Technology for Reducing Emissions.

EPA has long considered, in other contexts, electric vehicles to be the most effective technology, stating over a decade ago, 'From a vehicle tailpipe perspective, EVs are a game-changing technology.'113 In discussing electric vehicles in the proposal the EPA also finds that 'the GHG performance for these vehicle types is significantly better than that of conventional vehicles.'114

Recently, in a detailed study, the National Academies of Sciences deemed EVs the greatest opportunity to improve the energy efficiency of light-duty vehicles — i.e., passenger vehicles and light trucks — over the period of 2025-2035, as well as to reduce greenhouse gas pollutants from this sector.115 Additionally, study after study shows EVs are a superior technology for reducing air pollution and GHG emissions on their lifetime.116 On well to wheels analysis including upstream emissions, the DOE has repeatedly found EVs to be far superior in emission performance than ICE technology.117 Moreover, as the carbon intensity of domestic electricity generation continues to decline, EV emission performance becomes better and better over time.118 [EPA-HQ-OAR-2021-0208-0278-A1][pp.13-14]

As EPA notes in its technical review, it failed to complete a review of battery cost for EVs, asserting it was unnecessary given the agency does not rely on significant EV penetration for MY 2023-26.124 As per the EPA's discussion, we agree battery costs in the SAFE rule were too high. UBS reports that leading manufacturers are estimated to reach battery pack costs as low as $67/kWh between 2022 and 2024.125 Recently, others have also projected costs significantly lower than EPA's past projections. BNEF's recent estimate is that pack prices go below $100/kWh on a volume-weighted average basis by 2024, hit $58/kWH in 2030,126 and could achieve a volume-weighted average price of $45/kWh in 2035.127 The National Academies of Sciences found high-volume battery pack production would be at costs of $65-80/kWh by 2030128 and DNV-GL has predicted costs declining to $80/kWh in 2025.129 In short, had the agency rightfully determined that EVs offer the best compliance technology near term and revisited battery pack costs, it would have found dramatically decreasing costs battery costs that further support that EV deployment will accelerate rapidly near term and represents the best possible emissions reduction technology. [EPA-HQ-OAR-2021-0208-0278-A1][p.15]

Commenter: Toyota Motor North America, Inc. (Toyota)

EPA has Underestimated the Level of Electrification Needed to Meet the Standards

A Big Jump in A Few Years

The proposed GHG standards present a formidable challenge in attaining the levels of electrification being projected for compliance. EPA estimates the share of BEVs, FCEVs, and PHEVs will need to grow from an average of 2.4 percent1 today to 8 percent (NHTSA is projecting 12 percent for its proposed CAFE regulation) by 2026. Efforts to build the market must start now to more than triple the share of these technologies in just four years. For perspective, it's taken conventional hybrids 20 years to eclipse 3 percent of the U.S. market, even though hybrids require no new infrastructure, have no range anxiety issues, can be refueled virtually anywhere, and require no behavioral changes. [EPA-HQ-OAR-2021-0208-0531-A1, p. 3]

As described below, Toyota believes the task is even greater than projected by EPA because more electrification will be needed to comply with the proposed standards, which overestimate the likely contribution of ICE vehicle improvements and thus underestimate the level of BEV, FCEV, PHEV, and conventional hybrid volumes likely needed for compliance. [EPA-HQ-OAR-2021-0208-0531-A1, p. 4]

Commenter: U.S. Chamber of Commerce ('the Chamber')

Bolster U.S. supply chains for strategic minerals to ensure affordability and implementation feasibility

The COVID-19 pandemic has led to disruptions of supply chains for U.S. businesses across a broad range of sectors, products, and services. The supply chains in multiple sectors, including the automotive sector, continue to be severely impacted, illustrating the need for a holistic and coordinated government response to ensure the affordability and feasibility of implementing ambitious climate policy.

Nowhere is this need more evident than in the growing challenges associated with securing reliable and affordable resources necessary for the manufacture of electric vehicle batteries. The automotive sector is not the only industry sector that relies on high-capacity batteries – other sectors do as well, including cloud computing and data centers, renewable energy storage systems (RESS), telecommunications and aerospace, and consumer devices. Lithium-ion batteries are deployed in both the stationary storage and transportation markets and are the major source of power in consumer electronics and telecom applications.3 High-capacity batteries are also used in a variety of aerospace applications in order to ensure safety, reliability, and performance. The cumulative demand, plus the surge forecasted to meet demand for these strategic minerals from ambitious climate policies, is expected to increase by five times4 for some minerals over the coming decades due to strong demand in the U.S. marketplace and around the world.

Ensuring a secure and resilient supply chain for strategic minerals and other battery components will be particularly important in the years ahead to ensure affordability and to avoid bottlenecks that could potentially disrupt any dramatic increase in the sale of electric vehicles (EV). For example, because batteries are metal-rich products that comprise approximately 30 percent or more of the cost of an electric vehicle, the cost and availability of those metal inputs are key to accelerating the manufacture and sale of EVs in the years ahead.

As it stands today, however, the U.S. is highly dependent for such inputs on a handful of foreign countries, including China, where the production and processing of strategic minerals used in high-capacity batteries is concentrated.5 As outlined in China’s 13th Five-Year Plan, China has pursued aggressive investments in high-capacity battery development, temperature adaptability, recovery and disposal.6 According to a recent DOE report, China currently has nearly 80 percent of the world’s lithium-ion battery manufacturing capacity,7 and as shown in the graphics below from Benchmark Mineral Intelligence, this manufacturing dominance is accompanied by similar dominance in mining, processing, and refining of key inputs such as lithium, cobalt, nickel, and graphite. Moreover, BMI recently reported that of the more than 200 lithium-ion 'megafactories' planned between now and 2030, 149 will be in China, while only 11 are planned for North America.8 [EPA-HQ-OAR-2021-0208-0524-A1, pp. 3-4] [Graphics can be found at docket number EPA-HQ-OAR-2021-0524-A1, p. 4]

Securing stable supplies of cobalt and nickel is a top concern for high-capacity battery development, and is also relevant for smaller lithium-ion batteries used in a range of consumer devices. According to one report, the Clean Energy Ministerial target of 30 million global EV sales by 2030 would require 314 kilotons of cobalt per year—more than three times the current global cobalt demand for all uses.9 Similarly, nickel mining capacity coming online through 2025 is insufficient to meet battery production needs, leading to further constraints in the nickel supply chain.7

Copper is another resource of concern when it comes to the future of electric vehicles as markets simultaneously demand more data centers and consumer devices. Because an electric vehicle requires approximately four times as much copper as a conventional vehicle, total copper demand for the EV sector is expected to increase more than six-fold by 2030 as the pace of deployment accelerates.10 With copper prices continuing a multi-year rise and now nearing alltime highs, establishing expanded domestic mining and processing capacity is clearly of importance. Batteries used in data centers and for consumer electronics devices have similar dependencies on cobalt, copper, and other critical components.

The significance of securing supplies of these high-capacity battery inputs is extremely important for the success of any significant increase in EV penetration. The Alliance for Automotive Innovation notes that automakers and suppliers will invest $330 billion by 2025 to expedite the transition to EVs.

As EPA considers revising the greenhouse gas standards for light duty vehicles, the agency and the federal government at large should consider how to address supply chain concerns related to strategic minerals and should incorporate consideration of these supply chains issues in the agency’s regulatory benefit-cost analysis and decision-making. [EPA-HQ-OAR-2021-0208-0524-A1, p. 5]

Commenter: Valero Energy Corporation (Valero)

In addition to providing for increased production of renewable fuels and improvements in vehicle efficiency, EISA's statutory purposes include enhancing energy independence and security, consumer protection, and promotion of research and deployment of GHG capture and storage options. The proposed rule undermines each of these objectives:

• By subsidizing accelerated electric vehicle adoption through the extension of multipliers and ignoring the upstream GHG emissions associated with generation of electricity and production of batteries, the rule fails to address the energy security consequences of encouraging greater dependence on electric vehicles that rely on batteries requiring rare earth and other metals sourced substantially outside of the United States and its sphere of influence.14 [EPA-HQ-OAR-2021-0208-0601-A2, pp.6-7]

• Regarding consumer protection, although EPA concludes that the prohibitive up-front costs of electric vehicles will eventually be offset by fuel savings from improved efficiency, this conclusion is inconsistent with the findings of comprehensive assessments by Arthur D. Little Consulting and an April 2021 Report by Argonne National Laboratory.15 Further, the preamble acknowledges that consumers will be impacted by higher vehicle purchase costs and that this may particularly impact consumers' ability to obtain credit. Although EPA projects that the proposed rule will result in doubling the current electric vehicle fleet in a four-year period, the preamble omits any consideration of harm to consumers resulting from increased costs and diminished reliability resulting from increased electricity demand. It does not appear that EPA has considered the findings of a recent IEA report noting that there are insufficient mineral resources or processing capability to supply the need for electrification of the transportation sector. 16 EPA should evaluate whether such scarcities have the potential to result in significant price increases to consumers as well as shortages of batteries and vehicles. [EPA-HQ-OAR-2021-0208-0601-A2, p.7]

Commenter: Volvo Car Corporation

Electrification and US Govt Role

According to consumer research studies, US customers still have some hesitancy with respect to electric vehicles. Several factors play into this hesitancy including cost, range anxiety, low gas prices, lack of infrastructure, and/or lack of awareness of the benefits. So it is clear policymakers and automakers need to continue to educate consumers and pursue policies that incentivize and encourage EV purchases.

It is essential that the US government pursue policies that encourage and develop the US electric vehicle market via federal and state incentives. Also, government support for infrastructure development is critical. If incentives and infrastructure are not in place, the US will not grow the EV market and US EV production and thus the US will likely risk achieving the broader climate change goals.

Volvo Cars supports the Administration’s goals of increased electrification. To accomplish this important goal, we believe EV incentive policies should be non-discriminatory, provide equal treatment for all manufacturers and afford all consumers the broadest choice of vehicles for all models and price points. Volvo Cars is very concerned about the recent Senate Finance Committee and House Ways and Means Committee action on EV incentives. These proposals severely limit consumer choice and thus adoption of EVs, and so we believe this would significantly hinder the Administration’s climate change goals.

Volvo Cars is encouraged by the current plans to add electric charging stations. This is a great initiative to support wider adoption of EVs in the US. Such an initiative would also create economic stimulus and support the US economic recovery following the COVID-19 pandemic. [EPA-HQ-OAR-2021-0208-0253-A1, p. 3]

Commenter: Weck, Will

Hello, my name is Will Weck. I'm here today as a private citizen, and I appreciate you giving me the opportunity to comment on this proposed rule. I am a political science student at Belleville West High School in Belleville, Illinois. As a Senior, that also means that I have the privilege to drive a car, but with the new proposed legislation, my little Mazda could be the last gas-powered car I ever own.

I would like to begin with recognizing the merits that I find factual. America is witnessing a changing climate, and that can mainly be contributed to overall warming of the planet due to carbon emissions. Sure, significant action needs to be taken and taken soon to protect our environment for our generation and those to come, but that shouldn't be accomplished by devastating humanity and the American market.

For over a century, American auto manufacturers have been building vehicles powered by gasoline, but these new regulations on carbon emissions cannot simply be achieved by reengineering motors for fuel efficiency. Instead, cars will be built lighter, cheaper, and with smaller, less powerful engines, creating quality and safety problems all around. Consumers will not be satisfied with these changes, but at the same time, according to 2020 auto sales stats, backed up by Forbes, electric cars only made up 2% of new car sales. Clearly, America is not ready to pull the plug and go all-in on electric. This leaves many consumers who prefer gas-powered large SUVs and trucks with fewer options, since most will have to be phased out with the new regulations.

Take the new Ford F-150 Lightning, for example. This was designed to be the replacement for its gas powered equivalent, the F-150, which is expected to be phased out by 2030. Not only is American infrastructure not prepared for a full sweep of electric vehicles, but American companies and corporations aren't all going to be ready to fit the bill to outfit their fleet with electric vehicles and their garages and parking lots with chargers.

I support American business, and the freedom of choice. I urge you to reconsider this rule and instead focus on offering electric vehicle incentives, while leaving gas and diesel options for those who are not ready to change. [EPA-HQ-OAR-2021-0208-0507, p. 1-2]

Commenter: World Resources Institute (WRI)

ZEV Market Share Projections and their Consequences

The ZEV market share is increasing rapidly in the United States as battery prices fall and as OEMs introduce a much wider range of ZEV models in all market segments, including forthcoming pickup truck and SUV offerings. Even with the currently relatively limited model offering ZEV market share reached 10.7% in California during the first two quarters of 2021.1

These developments are reflected in President Biden's Executive Order of August 5, 2021, setting a national goal that 50 percent of all new passenger cars and light trucks sold in 2030 be zero-emission vehicles. This Executive Order also indicates that the administration will be pursuing a variety of policies to promote electric vehicles independent of this rulemaking.

Despite the very dynamic nature of the ZEV market, EPA chose not to update the battery cost assumptions used in its compliance modeling even though EPA considers the assumed battery costs to be too high.

Likewise, the battery costs used in the SAFE FRM were considered too high by EPA. However, given that significant levels of vehicle electrification will not be necessary in order to comply with the proposed standards (past analyses by EPA have estimated BEV penetrations of less than 5 percent, in general), we did not consider updating vehicle electrification costs to be of paramount importance for this proposal, although we may update battery and other vehicle electrification costs for the final rule.2

This is a fundamental error. While EPA is correct in observing that "significant levels of vehicle electrification will not be necessary in oder to comply with the proposed standard," this in no way obviates the need for EPA to properly evaluate likely ZEV penetration in order to determine whether a more stringent standard is appropriate.

Indeed, based on the admittedly flawed battery price assumption used, EPA projects that the fleet-wide ZEV market share would only be 7.8% in MY2026 under the proposal—less than the ZEV market share in California today. This projection is dramatically lower than the ZEV market share projections made by independent analysts using up-to-date battery cost data. The table below compares EPA's fleetwide market share projections to those made by Bloomberg New Energy Finance3 assuming current policies, and two projections from the Rhodium Group,4 one based on current policies (RhG–C) and one based extended tax credits and charging infrastructure investments (RhG–I) similar to those proposed by the Biden administration and currently under active consideration in Congress.

EPA's flawed battery price assumptions and resulting underestimate of ZEV market penetration rates have a dramatic impact on the emissions rates that would be required of ICEVs under the proposal as well as the alternatives considered. [EPA-HQ-OAR-2021-0208-0207-A1, p. 2-3]

Commenter: Wyman, Stephen

EPA regulations must push existing technologies to the fore, highlighting GHG reducing methodologies that have existed for decades, yet are somewhere between scarce and unknown in vehicles available today.

First: FSHEV (Full Series Hybrid Electric Vehicles) like: Nissan's Note E-Power; GDLS' (General Dynamics Land Systems) RST-V (Reconnaissance, Surveillance and Targeting Vehicle; a.k.a., Shadow)... This technology can scale from the smallest to the largest of vehicles in use today.

Second: The, "skateboard," undercarriage that allows larger battery capacity unobtrusively. This technology is to be applied to the Ford F-150 Lightning as well as being planned for use in a variety of BEV (Battery Electric Vehicle) platforms. The skateboard can also be used in: buses, truck trailers, train cars and RVs (Recreational Vehicles).

Third: Regenerative braking could be applied to all axles and the associated motor/generator could also help heavy vehicles climb hills; move train cars around the railroad yard and tractor trailers around shipping and receiving docks. [EPA-HQ-OAR-2021-0208-0307, p. 1]

EPA Response

EPA acknowledges all of the comments above.

In response to comments on the need for charging infrastructure, or that EPA should conduct a cost analysis for future infrastructure needs or otherwise provide a detailed discussion of infrastructure issues in this rule, EPA disagrees with commenters' statements that inadequate charging infrastructure will act as a critical constraint toward meeting the levels of EV penetration projected under this final rulemaking, and accordingly believes that a more detailed or quantitative analysis of this issue by EPA is unnecessary for this rule. EPA understands that charging infrastructure and fast charging capability is a relevant issue to the adoption of EVs. While policies and incentives to promote infrastructure are largely outside EPA's authority and are outside the scope of this rulemaking, EPA supports the Administration's goals to advance infrastructure in this area and concludes that existing infrastructure and rates of expansion are sufficient. EPA agrees with NCAT's observation in its comments that charging infrastructure has been growing rapidly in recent years, with over 100,000 public charging ports available today. A recent National Renewable Energy Laboratory report found that the amount of public and workplace charging is keeping up with projected needs, based on Level 2 and fast charging ports per plug-in electric vehicle.[34] We note that the Infrastructure Investment and Jobs Act includes up to $7.5 billion to advance EV charging infrastructure,[35] and that this infrastructure is rapidly being prepared for implementation.[36] In addition, EPA acknowledges the many comments received—including from C2ES, EEI, Energy Strategy Coalition, Maryland Department of Environment, NACAA, NCAT, and NY State Department of Environmental Conservation—describing current and planned charging investments across many states by

[34] Brown, Abby, Alexis Schayowitz, and Emily Klotz. 2021. *Electric Vehicle Charging Infrastructure Trends from the Alternative Fueling Station Locator: First Quarter 2021*. Golden, CO: National Renewable Energy Laboratory. NREL/TP-5400-80684. https://www.nrel.gov/docs/fy21osti/80684.pdf, last accessed December 2, 2021.

[35] This includes $5 billion for a National Electric Vehicle Formula Program and $2.5 billion for grants for electric vehicle charging infrastructure, hydrogen fueling infrastructure, propane fueling infrastructure, and natural gas fueling infrastructure. The Infrastructure Investment and Jobs Act (Public Law No: 117-58) is available at: https://www.congress.gov/bill/117th-congress/house-bill/3684, last accessed December 2, 2021.

[36] Beggin, R., "Biden administration announces EV charging network plan," The Detroit News, December 13, 2021.

government, utilities, and other parties. EPA also notes that many electric vehicle owners can charge at home and thus are not dependent on the development of public infrastructure for the bulk of their charging needs. Given the evident rate of activity to address EV infrastructure needs, EPA believes that the outlook for deployment of charging infrastructure is consistent with growth in projected needs during the time frame of the rule and sees no reason to expect that this trend will change.

Nonetheless, EPA acknowledges that additional charging infrastructure may be needed in the coming decade while noting the ongoing progress towards installing new infrastructure and the significant uncertainty associated with estimating the ultimate need. For example, Hyundai commented that about 2 million chargers would be needed in 2030 to support a rate of 50% new EV sales. Stellantis projected a need more than twice as high at approximately 4.2 million chargers. This difference mirrors the wide range of estimates in the literature. A white paper from ICCT compared a dozen recent studies of public infrastructure needs. It found that the ratio of EVs to public chargers varied by more than a factor of 10 across the studies: from about 12 to 129 EVs per public charger—including the authors' own estimate of 24.[37] EPA notes that the above referenced estimate from Stellantis assumed a ratio of 1 charger for every 6.9 EVs , which resulted in a relatively high projection of total chargers needed. This ratio was based on a California-specific assessment of future public and shared private charger needs that EPA notes may not be applicable to the nation as a whole.

Future charging needs will depend on many factors including the level of EV adoption, geography, vehicle characteristics, and charging and driving behavior. EPA understands that access to charging may become a relevant environmental justice issue, if EV penetration increases and charging infrastructure or home charging capability is not equally distributed, although it is as yet uncertain and thus difficult to establish to what extent such inequities may develop. Given the level of activity, investment, and progress in EV charging infrastructure to date and planned, EPA does not expect that charging infrastructure will act as a significant barrier to achieving the levels of EV penetration projected during the 2023-2026 time frame of this final rule. EPA plans to continue to study the market needs and associated costs and availability of charging infrastructure and consider the findings in the context of a subsequent rulemaking.

Regarding comments on other aspects of EV infrastructure, several commenters discussed the importance and challenges associated with residential charging access. While many electric vehicle owners can charge at home, EPA recognizes and agrees that home charging can be dependent on the ability to install a charger and/or park in a location with sufficient electrical access, that this capability varies with different types of housing, that charging access can be

[37] Gordon Bauer, Chih-Wei Hsu, Mike Nicholas, and Nic Lutsey, "Charging Up America: Assessing The Growing Need for U.S. Charging Infrastructure Through 2030", July 2021, The International Council on Clean Transportation, https://theicct.org/publications/charging-up-america-jul2021, last accessed December 2, 2021.

incentivized, and in any case is likely to be implemented in response to growth in consumer demand. While EPA understands that not all potential BEV buyers have a way to charge at home, we believe that the projected penetration of BEVs under this final rule is not likely to result in major shifts toward this category of potential customers.

NATSO raised a concern that the proposal may incentivize utilities to further invest in EV charging infrastructure and pass those costs onto ratepayers, including those with lower incomes. As noted above, we recognize that utilities are one of the groups investing in charging stations along with state and local governments, the federal government through the Infrastructure Investment and Jobs Act, OEMs, dedicated EVSE companies and others. EPA considers it to be outside the scope of this rulemaking to take a position on which entities own and operate charging stations or how those costs are borne.

In response to comments that penetration of EVs was underestimated in the proposal, that a more rapid transition to zero-emission technologies is needed, and that EPA did not properly credit the degree to which EVs can contribute toward meeting a stringent standard, EPA notes that the final rule analysis projects a higher penetration of EVs than in the proposal, and this updated projection is in better agreement with estimates from industry analysts. As described elsewhere in the Preamble and this document, we believe that this projected level and rate of penetration is achievable and appropriate within the time frame of the rule. Regarding Stellantis' comment that 20 to 50 percent of vehicles would have to be hybrid or plug-in vehicles in order to meet the proposed standards, EPA disagrees, based on the analytical modeling results presented in RIA 4.1.4 by which we project cost minimizing compliance pathways, and notes that the projections of EV and hybrid penetration in this final rule are higher than in the proposal.

In response to comments that the current proposal must be followed by stronger limits on GHG emissions, EPA agrees that further reductions in GHG emissions from the light-duty vehicle fleet are possible beyond MY 2026 and is planning to follow this final rule with a subsequent multi-pollutant rulemaking that will include not only light-duty vehicles but also medium duty class 2b and 3 vehicles (see the Preamble to this final rule at I.A.2). EPA believes that the final standards provide for an appropriate transition to a stronger future program.

In response to comments on the potential for automakers to reach higher levels of EV and HEV penetration than we projected and that EPA failed to account for the current pace of electrification, we recognize the widespread investments made by OEMs on electrification, the rapidly increasing pace of electrification, and the potential for growth in EV penetration during the time frame of the rule. We agree that vehicle standards have historically driven the adoption of advanced GHG-reducing technologies and have considered the progress that has been made to date as we considered the appropriate level of stringency of the final standards. The analysis for the final standards, which are more stringent than the proposed standards, projects a significantly higher penetration of EVs than in the proposal. We believe that this level of penetration is appropriate and will build upon the penetration rate already achieved, as well as the stated ambitions of automakers to continue to increase the electrification of their fleets. In the final rule, our projections of EV penetration align more closely with industry projections, and provide for an appropriate transition to stronger standards. EPA continues to monitor current trends in light duty electrification and decarbonization of electricity generation and recognizes the importance of continued GHG reductions in the electricity generation sector as the share of EVs grows in the light duty fleet.

EPA received several comments related to the need for complementary policies and incentives and an “all of government approach” to support increased market penetration of EVs, including, among other areas: public charging infrastructure, supply chain development, workforce training, fleet purchase requirements, EV and battery recycling, end of life issues, economic and purchase incentives, consumer education, grid infrastructure, state and local measures and federal engagement with such measures, and other measures to address the cost and risk of making a transition toward EVs. In response to these comments, EPA notes that many of these policies and incentives are outside of EPA’s statutory authority to control and are outside the scope of this rulemaking, but we continue to monitor developments in each of these areas. EPA supports the goals of the Administration to address these areas individually and as part of an all-of-government approach, including recent passage of the Infrastructure Investment and Jobs Act as previously noted. Many commenters described the investments the auto industry and other segments of the transportation and utility sectors have made and continue to make in these areas. EPA appreciates these efforts and believes that efforts like these will contribute to resolving these issues over time. As stated in RTC 2.2, the level of EV penetration we project during the time frame of this rule is consistent with recent independent market forecasts. EPA believes that the projected level of penetration is also consistent with trends already underway, such as the current level of sales and sales growth that is taking place under the current status of infrastructure, incentives, and other complementary policies, and with the measures currently underway and planned by the industry as mentioned above and by other commenters. As discussed in Preamble III.C, EPA believes that the level of EV penetration anticipated in the final rule is reasonable and achievable, given the multitude of product announcements from vehicle manufacturers, as well as the effect of existing programs, such as the California Framework.

In response to comments on the need for metric-based checkpoints to evaluate the state of progress on infrastructure and other issues described above and to signal the need for preemptive actions to ensure progress, EPA notes again that such measures are outside of EPA’s statutory authority to control and are outside the scope of this rulemaking. EPA also notes the Administration’s initiatives in these areas as described above, as well as the progress in these areas described by other commenters.

In response to comments on the development of a supply chain supporting the manufacture of EVs, please see responses on this topic in RTC Section 19. As described in that section, EPA believes that a wide range of actions cited in that section, including investments and partnerships by the automotive industry and investments and initiatives by the federal government (for example, the recently passed Infrastructure Investment and Jobs Act that provides significant funding to the Department of Energy to promote supply chain development),[38] indicate that the automotive industry has recognized the need to establish a supply chain for electrified vehicles and is taking appropriate action to address this business need. EPA also believes that the abovementioned federal investments and initiatives indicate that the federal government is taking appropriate actions to support its development. EPA believes automakers are taking appropriate and sufficient steps, and the standards adopted in this rule will encourage continued attention to the need for adequate supply chains. EPA will continue to study the impact of critical material cost and availability, changes to the supply chain, employment, and similar issues and will consider our findings as we undertake a subsequent rulemaking.

In response to comments on the demand, cost, and availability of critical minerals and materials and that EPA should conduct a risk analysis on this issue, EPA acknowledges that critical minerals and materials can affect the cost and/or production capacity of batteries and other electrification components, and that uncertainties regarding critical minerals may affect their future projected costs as demand grows. On the other hand, the industry is reacting rapidly to meet anticipated demand (see related discussion in RTC Section 19). It is uncertain at this time whether future costs of critical minerals can be reliably forecast using the data available today. We have included a sensitivity in the analysis supporting this final rule that examines the impact of higher and lower battery costs. EPA recognizes and supports efforts by the Department of Energy and the Administration to pursue initiatives that can reduce the risk associated with these materials by building the domestic supply chain and developing domestic sources for these materials. During the time frame of this rule, our assumptions for future battery costs in this final rule are consistent with projections by the Department of Energy, leading analysis firms and general industry consensus. Where future costs beyond the time frame of the rule are used to determine annualized costs, we have remained conservative with respect to some projections due to these uncertainties. While we project a relatively modest penetration of electrified vehicles during the time frame of the current rule, we plan to continue to study the impact of critical material cost and availability, changes to the supply chain, employment, and similar issues and consider our findings in the context of a subsequent rulemaking.

In response to comments on the energy security and environmental impacts of an increased penetration of EVs, EPA responds to most comments on the energy security topic in RTC Section 19. In further response to similar comments in this section, EPA first notes that the use of imported materials or minerals to build vehicles is not a direct analogy to the issue of energy security associated with use of imported petroleum, because the minerals used in production of batteries, motors, and other components are not an energy source that is consumed to power the vehicle, but rather, once supplied, remain with the manufactured vehicle for its useful life. EPA expects in many if not the vast majority of cases these materials can be recycled from old vehicles and reused, and the motivation for recycling becomes particularly strong if the materials

[38] Department of Energy Fact Sheet: “The Bipartisan Infrastructure Deal Will Deliver For American Workers, Families and Usher in the Clean Energy Future,” November 9, 2021. Accessed on December 6, 2021 at https://www.energy.gov/articles/doe-fact-sheet-bipartisan-infrastructure-deal-will-deliver-american-workers-families-and-0

are in short supply. With regard to the environmental impacts of mining, EPA notes that the mining of virgin materials for any manufactured product can have environmental impacts. EPA believes that over the long term, recycling could dramatically reduce any environmental impacts that may accompany the mining of materials used in electrified vehicles, as the need for virgin materials will be reduced. EPA understands that some materials necessary to the production of electrified vehicle components are currently sourced from other countries. As described in RTC Section 19, EPA notes that the Administration has identified a goal to advance domestic production capacity for these minerals and components, and also notes ongoing work by the Department of Energy to ensure that these materials can be recycled efficiently. We also note that the issue of dependence on imported materials and minerals is not unique to EVs, but also affects conventional vehicles, which use an array of imported and strategic materials, such as platinum and palladium for catalysts, computer chips for engine control and entertainment systems, and other parts and materials that are sourced from other countries. Materials like these were imported for use in other industries long before the recent growth in their use in electrification. While some battery chemistries include cobalt which carries environmental and other impacts depending on how it is sourced, cobalt content is being rapidly reduced and can be eliminated entirely by use of other chemistries that are already gaining market acceptance. While increased demand for critical minerals can cause costs to increase, at the same time the increased value of these materials favors their recycling, and there is little evidence to suggest that minerals that have significant market value will not provide similar incentives for recycling as other materials in the automotive sector, thus reducing demand on production from mining operations. See also our response to comments on energy security and electrified vehicles in RTC Section 19.

In response to comments suggesting that the final rule constitutes a wholesale shift of our transportation infrastructure to EVs and/or overreliance on the electric power grid, EPA disagrees with this characterization. We project that over 80 percent of new vehicles in a fleet complying with the standards in MY 2026 will remain powered by gasoline, with a much greater share of the on-road vehicle stock remaining gasoline powered as well. Similarly, regarding comments suggesting that the rule will mandate electric vehicles, or that GHG emission standards favor EVs over other technologies, EPA disagrees with these characterizations. Again, while we project cost-minimizing compliance pathways that include electrified vehicles, we also project that more than 80 percent of vehicles complying with the standards in MY 2026 will use gasoline technologies. Ultimately, the decision of which technologies to deploy to meet these performance based standards rests with the manufacturer. Similarly, EPA disagrees with comments suggesting that we are proposing to change the power source of the US vehicle fleet, as we project that more than 80 percent of the fleet will continue to be powered by gasoline during the time frame of the rule.

In response to comments recommending that ZEV sales targets be established, see our response to a similar comment in Section 2 of this Response to Comments document. Our modeling for this final rule projects that electrified vehicles will play an increasing role in meeting the final GHG standards, and we believe that the final performance-based standards do in fact support the transition to more EVs in the fleet, including, for example, commenters' call for the creation of competitive market conditions, early investment in supply chains, and similar issues.

In response to comments that the standards should encourage hybrid vehicles over electric vehicles, or gasoline and diesel vehicles over electric vehicles, or that any specific technology should be favored over others or brought to the fore, EPA's final standards are performance based standards that do not mandate a specific technology. Projected penetrations of specific technologies are primarily an outcome of their cost and effectiveness, and ultimately their implementation in the market is the result of manufacturer decisions that may differ from our projections. To the degree that multipliers may encourage EVs, EPA believes that it is appropriate to encourage EVs because of their inherent benefits as a game-changing technology that can potentially eliminate tailpipe criteria pollutants and GHG emissions. Our ABT program in combination with performance-based standards allows manufacturers the greatest flexibility to produce a variety of vehicles to meet consumer demand at the least cost while achieving significant emission reductions. While we project that cost minimizing compliance pathways for manufacturers to meet the performance based standards of the current rule will likely include EVs and PHEVs, we also project that more than 80 percent of new vehicles in a fleet complying with the standards in MY 2026 will use gasoline technologies, including conventional hybrids which run on gasoline. Automakers are free to choose the technologies that they feel best support their compliance with the standards and market demand.

In response to comments that call for standards that ensure continuous technology advancement, the final rule contains performance-based standards that call for significantly greater year-over-year increases in stringency than the SAFE rule. Based on our technical analysis, the standards finalized in this rule will significantly drive technology adoption and bring about significant emissions reductions while appropriately balancing our consideration of statutory factors such as cost, technology availability and lead time.

In response to comments on the impact of multipliers on penetration of other technologies, our analysis for this final rule considers the impact of multipliers in modeling a potential compliance pathway for the industry, which includes consideration of the impacts on penetration of ICE and hybrid vehicles as well as other available technologies. See the discussion of the overall analysis in Preamble I.C and III.A, of flexibilities and multipliers in II.B, and penetration rates in III.B.3.

In response to comments that the battery costs in the proposal were too high, we have reduced battery costs significantly in the analysis for this final rule, and they are now in better agreement with industry consensus for the time frame of the rule. Regarding comments about appropriate battery learning curves, we have also made changes for the final rule. For a full discussion on battery costs and learning see Preamble III.A and RIA 2.3.4 and 4.1.1.2. As the industry evolves and matures, EPA continues to study and update costs for all forms of electrification, including hybrid vehicles, and expects to employ updated costs as they become available for future analyses . See also our detailed responses to other specific comments on battery costs in Preamble III.A.

In response to comments stating that hybrid vehicle costs "are double what is reasonable" (ACEEE) or are "not a plausible result" (ICCT) or are otherwise too high, commenters have not indicated what they consider reasonable or plausible, provided new data to support that position, or explained why they find the existing costs in the NPRM analysis to be not reasonable or plausible. ICCT suggests that this conclusion was based on analyzing incremental total vehicle costs from the output files of the SAFE proposed rule analysis, but does not provide detail showing how these incremental vehicle costs were determined, and it is not clear that the results would be the same for the 2021 EPA NPRM analysis. While ICCT cites a 2015 study that provides estimated direct manufacturing costs for hybrid components, it is not clear whether the commenter's method of deriving an incremental hybrid cost from a total vehicle cost in a CCEMS output file from the SAFE NPRM analysis accurately represents what was assumed for direct manufacturing costs of non-battery components in input files for the 2021 EPA NPRM analysis. Similarly, ACEEE also makes reference to incremental costs, and cites the 2021 NAS report, but does not explain the implication that the direct manufacturing costs in the NAS report would contradict the incremental vehicle costs referred to by the commenter. In considering cost and other inputs for the analysis for the final rule, EPA carefully considered a range of potential updates (see Preamble III.A). This included consideration of whether a potential update to a specific category of technology costs was likely to have a significant influence on the conclusions of the analysis, whether significant new cost information had become available, and whether a potential change could be implemented within the analytical framework of the analysis. For example, many of the comments received on battery costs cited specific data and forecasts that were readily comparable to the direct manufacturing costs that had been used in the analysis, the comparison suggested that updating these costs would have a significant effect, and the update could be reasonably implemented within the framework of the analysis. With regard to non-battery costs, we concluded that, in comparison to the effect of the reduction in battery cost, and also considering that battery costs for hybrids had also been thereby reduced, the impact of further changes such as to non-battery costs for hybrids or EVs was not likely to have a significant impact. We also performed a low battery cost sensitivity case, which would capture a significant degree of the effect of a reduced electrified vehicle cost from other sources such as lower non-battery costs. With regard to hybrid vehicle and EV non-battery costs, we believe the analysis of non-battery costs performed for the SAFE final rule was sufficient for the purposes and time frame of the final rule, and that the potential magnitude of changes to hybrid, stop-start and non-battery costs likely would not be sufficient to change the fundamental findings of the analysis for this final rule with regard to relative penetrations of hybrid vehicles and electric vehicles. EPA notes that the projected penetration of EVs under the final rule is consistent with projections of EV penetration from leading independent organizations, suggesting that the costs that were used as inputs to the analysis were on the whole appropriate. We acknowledge, however, that advancement of technology and cost reduction in electrified vehicle non-battery components continues to take place, and we intend to further update technology costs in analyses for future rulemakings.

In response to comments that EPA should consider an increased focus on higher power 48-volt mild hybrids, particularly in P2, P3, or P4 configurations, and other synergistic mild hybrid technologies, EPA understands that suppliers are currently working to develop such systems and agrees that they show promise for further reducing emissions if adopted by manufacturers. In future analyses EPA may consider these technologies as they begin to enter production applications and empirical data on their cost and effectiveness becomes available.

EPA continues to study updates in full, mild, and stop-start hybrid costs, and non-battery costs, and expects to update these costs in a subsequent analysis for a future rulemaking as new information becomes available.

In response to comments on accounting for the cost of refueling time, our analysis of the cost of refueling time can be found in Preamble VII.C. While the means of refueling and the time necessary differ between liquid fueled and electric vehicles, today the vast majority of BEV charging events take place at home in an unattended status and there is a time saving due to avoidance of a separate trip to a refueling station. In the final rule analysis we have modeled the vast majority of BEVs as 300 mile BEVs, with very limited penetration of shorter range BEVs, which is likely to reduce the number of charging events needed in the modeling as well as the likelihood of frequent need for public charging. While we understand that not all potential BEV buyers have a way to charge at home and would thus need to rely on public charging if they purchase a BEV, EPA believes that the projected penetration of BEVs under this final rule is not likely to result in major shifts toward this category of potential customers. Further, as the penetration of BEVs has been relatively limited to date, there is currently very little data on which to estimate the degree to which buyers will utilize public charging in the future and hence little basis for quantifying the cost of charging time needed by those buyers. Further, refueling a conventional vehicle requires active attention during the refueling process, whereas charging an electric vehicle does not require the vehicle to be actively attended, even at a public charging station; therefore placing a valuation on the time required for public charging is subjective. EPA expects to continue studying these issues to account for the relative cost of refueling time as effectively as possible.

In response to comments relating to total cost of ownership for EVs, and that total cost of ownership of EVs is lower than for ICEVs, our analysis includes the effects of fuel cost savings (discussed in VII.C of the Preamble and Chapters 6 and 10 of the RIA). Other comments relating to fuel cost and cost of ownership differences between EVs and gasoline fueled vehicles are addressed in Section 17.1 and 17.2.1 of this Response to Comments document.

In response to comments that additional cost reductions for EVs call for additional research, EPA agrees that EV cost reduction is a very active area of ongoing research in the industry, and notes that this activity has resulted in significant cost reductions to date, and promises to continue reducing costs in the future.

In response to comments that reference cost parity, while the date of cost parity is not a metric that bears directly on our analysis, we agree that cost parity is rapidly being approached in some vehicle market segments and that this trend is likely to continue.

In response to comments on the impact of EVs on the reliability of grid electricity, EPA disagrees that the penetration of EVs anticipated under the final rulemaking will have a negative impact. For example, a DOE study[39] has concluded that "sufficient energy generation and generation capacity is expected to be available to support a growing EV fleet as it evolves over time, even with high EV market growth." EPA understands that increased penetration of EVs would lead to increased electricity demand. On the other hand, the impact of this electricity demand on the grid infrastructure will depend on several factors, such as the time of day when vehicles are charged, and the advent of vehicle-to-grid (V2G) services. Most currently produced EVs allow the user to conduct charging at off-peak times, such as at night, when rates are often cheaper and added electricity demand is easy to accommodate; for these reasons, home EV charging already often occurs during off-peak hours, and many EVs already allow the user to schedule charging for specific times of day. Even with a mix of charging times, studies indicate that sufficient excess capacity exists for the levels of fleet penetration anticipated in this final rule. While higher levels of EV penetration might occur after the time frame of the rule, during that time frame it is likely that V2G services will begin to be available. V2G technology may even improve grid reliability by allowing EVs to charge when electricity demand is low, and drawing on them when demand is high and the vehicles are not in use. V2G could thereby promote grid reliability and enable increased utilization of renewable energy sources, such as wind and solar, at the same time. EPA also agrees with the NCAT's comment that time of use (TOU) rates and the use of managed (or "smart") charging could also produce many of these benefits by shifting charging to off-peak times or times when excess renewables would otherwise need to be curtailed.

In response to comments on safety and reliability of EVs, and electrical safety and fire risk, EPA finds no evidence that the nature of an electric vehicle necessarily leads to lower reliability, greater safety risk to service or emergency personnel, or a greater probability of a fire. The smaller number of moving parts in an EV is consistent with a potential for greater reliability and lower maintenance costs. Reliability issues are a common occurrence with all new technologies, and where they have been seen to occur with EVs, EPA sees no evidence that these issues are not being addressed as part of the normal course of product development. Regarding electrical safety, all vehicles sold in the U.S. are required to pass Federal Motor Vehicle Safety Standard (FMVSS) standards. For example, this includes FMVSS No. 305, "Electric-powered vehicles: Electrolyte spillage and electrical shock protection." In addition, for all commercially produced vehicles, manufacturers routinely publish guides to emergency responders to show where mechanical means may be used to access the interior of the vehicle after a crash without disturbing airbags or other hazardous components, including high voltage pathways. In regard to fire safety, EPA sees no evidence that EV fires are more frequent on a per-vehicle or per-mile basis than for gasoline powered vehicles. While some manufacturers have recalled electric vehicles due to specific fire risks, there is also evidence that these were caused by specific defects in manufacturing, that are being recognized and addressed by the manufacturers. EPA also disagrees with comments that batteries are inherently unsafe, that they contain all of the reactants necessary to combust, or that they generate large amounts of heat during operation

[39] Department of Energy, US DRIVE, Grid Integration Tech Team and Integrated Systems Analysis Tech Team, Summary Report on EVs at Scale and the U.S. Electric Power System, November 2019.

sufficient to jeopardize the safety of the vehicle. Electric vehicles and their battery systems are designed to maintain appropriate temperature operation and are safeguarded against usage that would cause excessive heat generation. Battery chemistries being used in electrified vehicles lack the necessary oxygen to combust without exposure to air. Additional comments and responses related to vehicle safety are discussed in Section 21 of this Response to Comments.

In response to comments on the need for battery recycling and/or the current availability of recycling, EPA disagrees with comments suggesting that EV batteries must be disposed of in landfills, that no one is considering how to recycle them, or that they otherwise are not of value for reuse or recycling. Many companies are actively pursuing business models on the recycling of materials in batteries or the reapplication of modules and cells for other purposes. EPA notes comments from the Alliance that it is actively working with government and stakeholders in the recycling industry to develop a robust system for battery recycling. Currently, the growth and visibility of battery recycling companies has been limited due to the fact that there does not yet exist a sufficient rate of used automotive traction batteries being generated by the in-use vehicle fleet because most EVs on the road have not yet reached the end of their useful life. Second-life applications, in which cells, modules, and batteries from old vehicles are used in other applications such as stationary energy storage, are likely to create additional market demand for decommissioned vehicle batteries. Further, the Department of Energy has an active research program on lithium-ion battery recycling, for example, the ReCell Center[40] and the Federal Consortium for Advanced Batteries (FCAB).[41] The recently passed Infrastructure Investment and Jobs Act provides more than $7 billion to promote the supply chain for batteries,[42] including funding for battery processing and manufacturing research, battery recycling research, and for local governments to establish or enhance battery collection, recycling, and reprocessing programs. See also our response to comments on supply chain development in RTC Section 19. Based on EPA's understanding of battery recycling and the research and commercial activity and investments surrounding it, EPA believes that it is premature and ultimately incorrect to conclude that EV batteries will not be recycled. EPA continues to study these issues and the development of the battery recycling industry.

In response to comments concerned with EV range and efficiency in extreme weather, EPA understands that cold and hot weather operation can increase EV energy consumption due to use

[40] Argonne National Laboratory, "DOE launches its first lithium-ion battery recycling R&D center: ReCell," February 15, 2019. Accessed on December 6, 2021 at https://www.anl.gov/article/doe-launches-its-first-lithiumion-battery-recycling-rd-center-recell

[41] Federal Advanced Battery Consortium, "National Blueprint for Lithium Batteries 2021-2030," June 2021. Accessed on December 6, 2021 at https://www.energy.gov/sites/default/files/2021-06/FCAB%20National%20Blueprint%20Lithium%20Batteries%200621_0.pdf

[42] Department of Energy Fact Sheet: "The Bipartisan Infrastructure Deal Will Deliver For American Workers, Families and Usher in the Clean Energy Future," November 9, 2021. Accessed on December 6, 2021 at https://www.energy.gov/articles/doe-fact-sheet-bipartisan-infrastructure-deal-will-deliver-american-workers-families-and-0

of cabin heating and cooling, and that power demand for heating can have a greater relative impact on energy consumption in EVs than in conventional vehicles where the engine generates waste heat that is available for cabin heating. For earlier EVs, with limited range and battery capacity, energy consumption associated with interior climate control had a significant effect on the vehicle utility (range). However, most recent EVs have a substantial amount of battery capacity and range and as such the increased energy consumption associated with interior climate control has a smaller impact on vehicle utility. EPA continues to study this issue because we recognize that EV energy consumption is an important factor for the environmental performance of an EV and we may consider these issues in a future rulemaking.

In response to comments that EPA neglected to account for the cost of battery replacement and depreciation for EVs, EPA disagrees that battery replacement will typically be necessary or that depreciation of EVs must be greater than for other vehicles. Based on current experience with vehicles in use in the field, and consultations on this topic that EPA has conducted with experts, stakeholders, and manufacturers, EPA finds no evidence that battery replacements will typically be necessary for EVs during their useful life, and therefore did not include the cost of battery replacement in the cost of EVs. While some early generation EVs have shown lower resale value than comparable conventional vehicles, EPA also notes that this is a commonly observed effect for relatively new technologies in a rapidly advancing field in which new models rapidly improve upon their predecessors. Vehicles from some manufacturers such as Tesla have in fact shown a below average rate of depreciation, suggesting that high depreciation is not inherent to all electric vehicles. Based on these observations EPA does not see evidence to suggest that EVs as a mature technology will necessarily experience higher rates of depreciation than that of conventional vehicles.

In response to comments stating that electric vehicles are not zero emission due to upstream emissions, EPA understands that electric vehicles consume electricity which currently is derived from a variety of sources, including from fossil fuels that generate GHG emissions at the power generating plant. However, due to rapidly declining costs and improved technologies, the share of renewable energy on the grid has been growing rapidly in recent years and we believe that it will continue to grow rapidly in the future. Studies have shown that even in areas where the grid is powered largely by fossil fuels, EVs have a net emissions benefit, which only increases as the grid gets cleaner.[43] Regarding comments that the need for clean energy for EVs will result in construction of additional nuclear power plants, EPA sees no evidence that new nuclear power plants will play a significant role in serving increased electricity demand. While some forms of renewable energy, such as wind and solar, are intermittent in nature, the utility industry is actively developing technology to manage this capacity, including energy storage and vehicle-to-grid technology. By enabling increased use of renewable energy for transportation, EVs offer the potential to go much farther toward net reductions in GHG emissions than gasoline vehicles. Although EVs are currently assigned 0 grams per mile in compliance calculations, the associated

[43] Bieker, G., “A Global Comparison of the Life Cycle Greenhouse Gas Emissions of Combustion Engine and Electric Passenger Cars,” ICCT Report, 2021.

upstream emissions are included in our GHG inventory calculations (see Preamble section IV and Chapter 5 of the RIA), and we find that the net GHG reductions offered by EVs are significant even when upstream emissions are taken into account, and even without assuming that the bulk of the energy feedstock is renewable.

In response to comments on increased acceleration of EVs, EPA does not regulate vehicle acceleration levels, and disagrees that EVs must necessarily have dangerous levels of acceleration. The acceleration rate that is designed into a vehicle is the result of manufacturer design decisions and customer demand. There is no inherent reason that EVs cannot be designed with the same level of acceleration as conventional vehicles. Regarding the opposite comment that vehicles meeting the standards will be lighter, cheaper, and with less powerful engines, there is no evidence to suggest that this will be the case. The weight, size, power, and acceleration of new vehicles has continued to increase even as emissions standards have continued to increase in stringency over the last decade. Automakers are free to consider consumer demand for these attributes and select the technologies that best allow them to be preserved while complying with the standards.

In response to comments on the overall consideration of relevant costs and risks in its analyses, for example that there are “costs/risks the EPA does not address in this proposal,” EPA is aware of the issues related to vehicle electrification and takes them into account by evaluating their relevance and impact in the context of a rulemaking and considering evidence available in the literature and through its own analyses. Costs are discussed in Preamble I.D, Preamble III.B, Preamble VII.I, and Chapter 6 of the RIA, and impacts on emissions are described in Preamble IV and V and Chapter 5 of the RIA.

In response to comments that EPA should consider the costs and risks to OEMs and technology suppliers in adapting supply chains to meet the standards, particularly with respect to ZEVs, EPA does consider the impact of its rulemakings on various segments of the industry, including suppliers. EPA has considered the significant activity, investment, and progress that is occurring in public and private contexts to prepare the manufacturing base for EV production at the levels of penetration anticipated during the time frame of this rule, and considers this activity to represent an appropriate market response to the anticipated need to meet the standards.

In response to comments from the Alliance suggesting that electricity rates may become more expensive as renewable generation is added, and citing rates in Germany and California as evidence, EPA disagrees with this assertion. Electricity rates are a result of many factors including national, regional, and state policies and conditions, regional costs of feedstocks, and many other economic and policy factors, all of which must be taken into account when considering the basis for observed electricity rates. The cost of renewable energy capacity is declining faster than other sources and its levelized cost is already highly competitive with or significantly less costly than other sources of new generating capacity,[44] and despite recent increases in commodity costs, renewable energy capacity continues to grow faster than other sources.[45] While integration of renewables with the grid is a consideration that could affect electricity costs at high levels of renewables, EPA does not expect that this rule will drive higher levels of renewables on the grid than utilities are already anticipating, and as noted previously, the grid is generally expected to be capable of serving near term electricity needs for an increase in EVs.[46,47] As the commenter indicates, "it is difficult to estimate how much electricity prices will rise in a precise time frame (e.g. 2024-2026)," which is within the time frame of this final rule. EPA agrees that making such an estimation based on the factors the commenter describes is difficult and uncertain; this applies not only to predicting electricity rates paid in the future for charging EVs on a largely renewable grid, but also to the commenter's later suggestion that it should also be considered when modeling the impact of electricity cost on the cost of future battery production. EPA disagrees that modeling today's rates observed in just one country (Germany) and just one state (California) would be a valid way of identifying the potential future increases in electricity costs due to large increases in renewable energy, or to support or quantify such a relationship.

In response to the Alliance comments on the influence of variations in battery cell chemistry, form factor, and pack design on battery costs, EPA understands the influence of these factors and has considered the latest BEV battery formats and chemistries in the analysis that led to reduction of battery costs in the final rule analysis. See additional discussion in Preamble III.A and RIA 2.3.4 and 4.1.1.2. Regarding commenter's observation that there may be near-term costs to develop supply chains, commenter offers no data to quantify this consideration. EPA generally considers the cost of keeping up with advancements in technology as part of the indirect costs represented by the RPE markup, as well as the normal cost of doing business in a competitive industry that is already increasingly shifting to electrification as discussed in the Preamble and elsewhere.

In response to comments from the Alliance on the potential impact of increased raw material costs on battery costs, EPA agrees that mineral and material costs pose uncertainties for predicting future battery manufacturing costs as demand for these commodities grows. EPA is familiar with the cited 2019 MIT study and has considered its findings in characterizing future

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[44] International Energy Agency, Levelized Costs of New Generation Resources in the Annual Energy Outlook 2021, February 2021.

[45] International Energy Agency, Renewables 2021: Analysis and forecast to 2026, December 2021.

[46] Department of Energy, US DRIVE, Grid Integration Tech Team and Integrated Systems Analysis Tech Team, Summary Report on EVs at Scale and the U.S. Electric Power System, November 2019.

[47] CNBC, "'We could handle it right now' - AEP chief says U.S. power grid can sustain influx of EVs," November 12, 2021. Accessed on December 2, 2021 at https://www.cnbc.com/2021/11/12/we-could-handle-it-right-now-aep-chief-says-us-power-grid-can-sustain-influx-of-evs.html

battery costs beyond the time frame of the rule, as discussed in RIA 4.1.1.2. Further response to this comment can be found in Preamble III.A. Regarding use of a two-part learning curve, although this may be one way to address the impact of material costs, it still would require data for future costs and learning rates for those costs, both of which are uncertain at this time. Because it is difficult at this time to quantify the effect of material costs or their potential to limit battery cost reductions in the mid to long term, EPA believes that the use of a lower bound in the primary battery cost case as described in RIA 4.1.1.2 is, at this time, an appropriate modeling means to acknowledge the potential constraints of material costs on battery cost reduction, until better information becomes available; we also note that we performed a lower battery cost sensitivity that omits this lower bound. EPA has consulted with DOE and Argonne National Labs on these issues and finds support for the interim use of the lower bound we have selected for use in the current analysis. EPA continues to study this issue to identify an appropriate way to represent how material and mineral costs influence the potential for future reductions in battery cost in the face of uncertain inputs.

In response to the Alliance suggestion that EPA should forecast the penetration of different battery chemistries, EPA monitors trends in battery chemistries in consultation with the Department of Energy and Argonne National Laboratory, including through participation in the continued development of the ANL BatPaC model. We note that manufacturers are increasingly seeking to reduce cobalt content. Since the relative use of costly minerals such as cobalt is a dominant factor in the cost differences between different chemistries, and because we expect that near term and future choice of cathode chemistry will largely be reduced cobalt varieties, EPA believes that separate modeling of all currently known chemistries is unnecessary. Additional discussion responsive to comments on the basis of learning curves can be found in the discussion of the learning assumptions RIA 4.1.1.2.

EPA acknowledges and appreciates the extensive status report provided by the Alliance on mineral production across the world.

In response to the Alliance comments that EPA should account for the cost of home charging infrastructure, as described previously, for the current rulemaking EPA has chosen to continue using the CCEMS model and the cost structure that was employed in the EPA proposal and SAFE final rulemaking, and has made changes only to a limited number of inputs that we believe would have a significant influence on the conclusions of the analysis. In comparison to the influence of battery costs, charger cost is relatively small. Costs of home charging infrastructure, proportions of usage of Level 2 vs. Level 1 charging, and the cost of EVSE equipment continue to evolve, and costs for EVSE equipment are expected to continue to decline. EPA plans to study these trends as they stabilize so that they can be better established in a future analysis. Regarding the comment on “expenditures on electricity consumed by BEVs and PHEVs,” these are not infrastructure costs but fuel costs, and are discussed in Chapter 6 of the RIA. Regarding cost/benefit differences between long- and short-range EVs, we believe these differences are minimized by our choice in the final rule updates to model primarily BEV300 with very limited penetration of BEV200.

In response to Alliance comments on the modeling of material costs in BatPaC, and the statement that it does not account for the 2021 surge in raw material prices, EPA understands that material prices are volatile. However, EPA disagrees that temporary spikes in prices are relevant to the modeling conducted for this analysis. Material cost inputs to BatPaC attempt to represent a reasonable longer term perspective, and do not try to represent transitory price surges or collapses that happen to be active at the time of publication. The default inputs published in a given edition of the model do not simply represent spot prices for these materials at the time of publication, but represent the expert model developers' best attempt to balance between reported prices and expert opinions of trends that could impact future prices.

EPA appreciates the Alliance's analysis of the contribution of material costs to battery pack costs, which is generally consistent with EPA's understanding. As stated previously, EPA believes that NMC811 and other low-cobalt and cobalt-free cathode chemistries are more relevant than higher cobalt chemistries when considering a near- to mid-term time frame. Table VII-4 in the Alliance comment indicates that for NMC811, doubling the price for lithium, cobalt and nickel in combination would result in a 19.5 percent cost increase. While recognizing that this hypothetical doubling of material prices is not based on any empirical data or forecast, EPA notes that the associated 19.5 percent increase in battery cost is within the range of the higher battery cost sensitivity, which models a more than 30 percent increase in battery cost from the primary case during the time frame of the rule.

EPA also appreciates the Alliance's analysis of the contribution of rare earth costs to permanent magnet motor costs. EPA did not perform a sensitivity on permanent magnet motor rare earth costs because it is a relatively small portion of total battery and non-battery costs for an electrified vehicle. While the commenter mentions that "the average electric vehicle uses between 2 and 5 kg of rare earth magnets," EPA notes that this represents current industry practice under today's magnet prices and availability, and does not necessarily reflect the quantities that will be used in advanced designs that continue to reduce reliance on these materials. For example, the Chevy Volt shifted to ferrite magnets for one of its motors, and Tesla and other manufacturers have shown that induction motors, which use no magnets, are another viable alternative. From a cost modeling perspective, increasing the resolution of our costing methodology to include explicit representation of magnet costs would also call for an accounting for lower-cost, advanced designs that minimize or eliminate the use of magnets. EPA continues to study and update the cost of non-battery components, and is also conducting a new teardown project to better determine the magnitude and direction of non-battery costs for electrified vehicles based on the newest and most advanced designs.

In response to Alliance comments that environmental, social and governance (ESG) considerations could impact critical material prices, EPA agrees that some manufacturers may choose to represent these considerations in their material acquisition policies, but notes that there is little to no data to quantify the extent of this practice in the future or how it would affect material prices collectively across the industry, and the commenter did not provide such data. As noted previously, our high battery cost sensitivity models a more than 30 percent increase in battery cost from the primary case, which could represent additional costs such as potential ESG costs which at present are too uncertain to quantify.

In response to the Alliance suggestion that EPA does not acknowledge the net cost to the economy from "the shift from recycling of engines and transmission to the recycling of batteries in EVs," EPA disagrees with this characterization of how battery recycling will evolve, and also with the presumption that it will represent a net cost. EPA believes that the relatively modest projected market penetration of EVs during the time frame of the rule is unlikely to cause engine recyclers to be compelled to rapidly shift their business to battery recycling and thereby experience a cost of retooling or retraining; instead, over a longer term, the recycling of batteries and cells could as likely generate new entrants to the recycling industry, pursuing new business opportunities and creating new jobs and thus could generate a net benefit. In any case, during the time frame of this rule, the vast majority of vehicles being scrapped will continue to be vehicles with engines and transmissions. As to the potential difference in the value of materials recovered, this depends on the battery chemistry; although some chemistries have more valuable mineral content than others, all contain significant quantities of copper and aluminum. The economics of battery recycling remains uncertain and difficult to quantify with any certainty, given the early stage of development of the industry and the aforementioned uncertainties regarding future mineral prices. As mentioned, EPA continues to study the development of battery recycling technology.

In response to the Alliance's suggestions that EPA should account for the net cost to society of charging infrastructure development, supply chain adaptation, shifting of recycling from engines to batteries, and similar comments, EPA notes that these impacts are separate from the technology costs experienced directly by consumers and auto manufacturers and are not within the scope of this rule's technology cost analysis.

Similarly, regarding the suggestion that EPA should estimate convenience costs to EV users such as the cost associated with a vehicle that has a shorter range than a conventional vehicle and takes longer to charge, these are also currently outside the scope of our analysis. EPA understands that BEVs present some differences in consumer behavior, and is studying how to represent consumer acceptance in our technology and compliance modeling. EPA is studying the issues surrounding consumer acceptance and willingness to pay, and although we recognize that such issues currently lack well-established and accepted methodologies by which they can be quantified appropriately, we hope to be able to further consider these issues in a future analysis. EPA agrees with the commenter's statement that "[as] automakers have extended the range of BEVs from less than 100 miles to 200-300 miles, their perceived disadvantage compared to ICE vehicles has lessened." In the same vein, we also believe that our decision to model primarily the longer-range BEV300 reduces the importance of many of these issues. Regarding the comment on the cost of time spent charging, this was addressed in a previous response above.

In response to Alliance comments on the applicability of technology assumptions to all manufacturers, and appropriate production volumes for developing battery costs, and modeling of BEV400 and BEV500, see Preamble III.A.

In response to Alliance comments on impacts of raw material sourcing, cell production, and pack assembly on U.S. content, EPA acknowledges the comment but it is outside the scope of this rulemaking, as EPA GHG standards are not related to domestic content.

EPA acknowledges the report placed into the docket by Roush concerning 48V and battery electric vehicle costs. EPA notes that the sources cited in the report are largely known to EPA, and thus have been considered in its ongoing costing analyses.

In response to comments from Valero that the rule undermines the statutory purposes of EISA such as consumer protection and energy security, EPA considers these comments largely out of scope because EISA pertains primarily to Corporate Average Fuel Economy (CAFE) standards issued by NHTSA and this rule concerns GHG standards issued by EPA under authority of CAA 202(a). Response to comments on energy security and critical minerals, in addition to the responses found in this section, may be found in Section 19 of this Response to Comments document. We address comments regarding fuel savings and consumer impacts in Section 17.

12.2. Engine Technologies

Commenters Included in this Section

Alliance for Vehicle Efficiency (AVE)
BorgWarner Inc.
Consumer Federation of America
Fuels Freedom Foundation
International Council on Clean Transportation (ICCT)
National Propane Gas Association (NPGA)
Olmstead, Thomas
Roush Engineering
Shevelew, Jonathan

Commenter: Alliance for Vehicle Efficiency (AVE)

AVE supports performance-based credits to incentivize rapid adoption of emission-reducing technology in ICE vehicles.

President Biden's January 25th Executive Order asks EPA '…to immediately commence work to confront the climate crisis.'5 In this regard, AVE recommends EPA enact standards that will advance adoption of all GHG-reducing vehicle technologies to accelerate faster adoption of CO2 goals and climate benefits.

In 2012, however, EPA chose to focus on incentivizing specific technologies that had the potential to transform the light-duty sector at the expense of near-term carbon reduction.

'EPA believes that these temporary regulatory incentives are justified under CAA section 202 (a) as they promote the commercialization of technologies that have, or of technologies that can be critical facilitators of next-generation technologies that have, the potential to transform the light-duty vehicle sector by achieving zero or near-zero GHG emissions and oil consumption, but which face major near-term market barriers. However, providing temporary regulatory incentives for certain advanced technologies will decrease the overall GHG emissions reductions associated with the program in the near term. EPA believes it is worthwhile to forego modest additional emissions reductions in the near term in order to lay the foundation for the potential for much larger ‘game-changing’ GHG emissions and oil reductions in the longer term.'6

AVE’s recommendation is a logical response to the President’s proclamation and the Administration’s further acknowledgement below on the need for more investment in ICE vehicles:

“There are going to be a lot of gas-powered cars on our roads for a long time, so, there's simply no way to meet our climate goals with EVs alone.' - Transportation Secretary Pete Buttigieg July 8, 2021, speaking to the Bipartisan Policy Center.7

In the Proposed Rule, EPA acknowledges the challenges of bringing zero or near-zero emissions vehicles to market. EPA also acknowledges the challenges and costs associated with adopting specific emission reducing technologies to a significant percentage of an OEMs’ fleet. As indicated in EPA’s 2020 Trends Report, '…it has taken, on average, approximately 15-20 years for new technologies to reach maximum penetration across the industry.'8 EPA further states that the revised standards would result in significant benefits for public health and welfare, primarily through substantial reductions in both GHG emissions and fuel consumption and associated fuel costs paid by drivers, and the benefits of the proposed standards would be far in excess of costs.'9

AVE believes that with performance-based credits, EPA can send a strong signal to automakers to add more GHG-reducing advanced technologies to all vehicles and subsequently accelerate the additional public health benefits these technologies will bring.

Furthermore, over-reliance on credit multipliers to meet the Proposed Rule’s standards could reduce the real-world benefits that zero and near zero technologies can bring to the environment. Multiplier credits may make adoption of advanced technologies for ICE vehicles a more attractive compliance pathway. AVE is concerned, however, that, in the interim, ICE vehicles may see fewer innovations in emission-reducing technology added to future models should OEMs focus primarily on maximizing technology specific credits to reach future compliance standards. [EPA-HQ-OAR-2021-0208-0256-A1,pp.3-4]

The chart below identifies the lengthy timeframe to achieve significant penetration for new emission reduction technologies. Performance-based standards would likely accelerate penetration of advanced technologies for all types of vehicles (ICE, hybrids, PHEV, EV) and would bring an immediate and substantial improvement to the U.S.’s efforts to reduce carbon. [EPA-HQ-OAR-2021-0208-0256-A1, p.5] [Chart can be found at docket number EPA-HQ-OAR-2021-0208-0256-A1, p. 5]

EPA's Proposed Rule makes note of announcements from automakers signaling "a rapidly growing shift in investment away from internal combustion technologies and toward high levels of electrification."10 EPA does not, however, cite recent announcements that indicate several OEMs will not be making new investments in ICE architectures.11 EPA should account for the environmental impact of these decisions as OEMs will likely sell over 50-60 million ICE vehicles during the 2023-2026 model years.

As such, AVE recommends that in their regulatory analysis, EPA also account for how multipliers may impact near-term technology improvements to ICE and hybrid vehicles.

With well over 16 million ICE vehicles sold per year, and with each currently emitting 4.6 metric tons of carbon annually,12 even a mere 5% improvement in ICE performance would lead to reduction of approximately 3.75 million tons of additional carbon emissions per year – 15 million tons from 2023 to 2026. [EPA-HQ-OAR-2021-0208-0256-A1, pp. 5-6]

Commenter: BorgWarner Inc.

Technology Neutrality

We strongly urge EPA to define "zero emissions" as less than one gram of CO_2 per kilometer to allow for technologies that could make a timely real-world difference in CO_2 emissions. For example, hydrogen combustion is an advanced technology that has been under development for some time and could be more rapidly deployed in high volumes to make an impact on the environment. This technology can be readily adapted from existing systems and therefore, could be a used as a bridging strategy to significantly decrease CO_2 during the transition to electric and fuel cell vehicles. [EPA-HQ-OAR-2021-0208-0260-A1, p. 2]

The U.S. should consider legislation to transition to the 5-cycle test. The 5-cycle test is currently used by all manufacturers and better reflects the overall real-world gains that might not be evident from the 2-cycle test. EPA and NHTSA have long recognized that the 2-cycle fuel economy results are greater than most drivers achieve. The development of the 5-cycle procedure for estimating "label" fuel economy offers more accurate estimates, but still may not capture all technologies, for most drivers. Use of the 5-cycle test would also help eliminate or substantially reduce credit adjustments. [EPA-HQ-OAR-2021-0208-0260-A1, p. 3]

Commenter: Consumer Federation of America

First, there are likely to be at least 100 million gasoline vehicles sold before the transition is complete. They are likely to be on the road for a quarter of a century. Therefore, it is important to make sure that they are as efficient as possible. Doing so can 'help' the transition because setting high standards on the gasoline part of the fleet will speed the adoption of electric vehicles, and a significant amount of the gain in efficiency – vehicle design and operation – may be applicable to the electric portion of the fleet. [EPA-HQ-OAR-2021-0208-0297-A1, p. 24]

Commenter: Fuels Freedom Foundation

Automakers have made great strides in advancing spark-ignition engine technology, and have done so without the well-documented GHG emission reduction potential of fuels with properties to facilitate engine performance, such as high-octane fuels that are the standard in other parts of the world. ICEs deploying advancements such as high-compression engines burning high-octane fuel are for the nearterm lower in upfront cost and less disruptive to the consumer behavior, making them a viable pathway to facilitate large-scale GHG emissions reductions within and beyond the MY2023-2026 timeframe. And, critically, ICE evolution complements rather than supplants the maturation and growth of EVs and other alternative vehicle technologies.5 [EPA-HQ-OAR-2021-0208-0231-A1, p. 2]

Commenter: International Council on Clean Transportation

EPA also acknowledges that the engine maps in the proposed rule are outdated and that it has more up-to-date baseline and future engine maps within its OMEGA model. Despite this, EPA declined to incorporate these updated engine maps. EPA claims that the inclusion of these maps will not make a material difference (see DRIA 2021 page 4-3), but EPA's argument boils down to saying it doesn't matter that the outdated maps understate efficiency, as the difference between baseline and future efficiency is still roughly the same using either the outdated maps or the new maps. ICCT does not see how this is possible, as baseline technology efficiency maps (i.e. nonturbocharged and non-HCR engine maps) within the updated OMEGA model are unchanged. Thus, EPA's argument is valid only if there is no additional penetration of turbocharged or HCR engines from the baseline to 2026, i.e. if the proposed standards are completely ineffective in improving vehicle technology. [EPA-HQ-OAR-2021-0208-0522-A1, p. 3]

Outdated engine maps: The engine maps that are included in the agency modeling are severely outdated. For example, all base naturally aspirated engine maps are based on an unidentified 2013 or older vehicle, all turbo (non-Miller cycle) maps are based on a vehicle whose specifications match that of the 2011 MINI R56 N18 / BMW N13 engine, the hybrid Atkinson cycle map (for PS and PHEV) is based on the 2010 Toyota Prius, and the HCR1 map is based on the 2014 Mazda SkyActiv 2.0L engine. Essentially, EPA is assuming there will be no efficiency improvements in any of these technologies through at least 2026, or for 12 to 16 years from the model year of the vehicle used to generate the maps. As just two examples of how absurd it is to assume no improvements in any of these engine technologies for at least 12 years, the turbocharged engine introduced by Honda in 2016 was significantly more efficient than the engine used to generate all the turbocharged maps in the proposed rule and the 2018 Camry hybrid improved fuel economy by 15% (XLE/SE) to 25% (LE) compared to the 2017 Camry hybrid.10 And these (unincorporated) improvements were already in the market by 2016 and 2018 – still 8 to 10 years before 2026.

Miller Cycle effectiveness: EPA DRIA (page 2-13) acknowledges that VW is already using Miller Cycle engines as the base engine in the Passat, Arteon, Atlas, and Tiguan and that a hybridspecific version of this engine with CEGR and VGT is under development by VW that demonstrates a peak BTE of 41.5%. The fact that Miller cycle is already included on the standard engine for many of VW's most popular vehicles supports that Miller cycle is a cost-effective addition to turbocharged engines. Yet there are no Miller cycle applications in 2026 beyond the specific Mazda and Volvo models that already had Miller cycle in 2017.

For additional information, see: ICCT 2018 comments page I71

Turbocharging effectiveness: EPA added a 2nd generation turbocharged downsized engine package based on EPA benchmark testing of the Honda L15B7 1.5L turbocharged, direct-injection engine to its 2018 MTE, which was not used in EPA's proposed rule.11

For additional information see: EPA DRIA page 1-8

HCR engine effectiveness: EPA added an engine map in its 2018 MTE for Atkinson (ATK2+CEGR) technology based on EPA benchmark testing of the MY2018 Camry 2.5L A25A FKS engine. However, EPA's proposed rule continued to use developmental engine test data and GT-POWER engine modeling within the 2016 TSD.12

For additional information see:

EPA DRIA page 1-8 I

ICCT 2016 Camry

ICCT 2018 comments

Cylinder Deactivation on Turbocharged Vehicles: The modeled benefit of adding cylinder deactivation to turbocharged vehicles is less than 25% of the benefit from adding DEAC to a basic engine. While adding DEAC to a turbocharged engine has smaller pumping loss reductions than for naturally aspirated engines, DEAC still has significant pumping loss reductions and has the additional benefit of enabling the engine to operate in a more thermal efficient region of the engine fuel map. The agencies also failed to provide even the most basic information supporting their effectiveness estimates for TURBOD.

For additional information see: Joint NGO 2020 Reconsideration Petition, pages 62-64

Engine downsizing and secondary mass reduction restrictions: While EPA did not address this issue in the RIA for the proposed rule, the agencies have previously taken the position that the assumption that an engine should always be resized in response to tractive load changes was 'impractical'.13 Instead, the engine is 'only resized when mass reduction of 10% or greater was applied to the glider mass'.14 This reflects a lack of understanding of how manufacturers design engines. Engines are commonly shared across a variety of models and trim levels, with a wide variety of weight and roadload. Further, different models can have different target performance levels. Thus, the idea that somehow the existing 'baseline' engines are perfectly designed for every vehicle is absurd. In reality, most versions of the vehicles into which a single engine is used do not precisely meet their performance targets. Generally this means that performance exceeds the target, as the engine is sized to ensure that the worst case application still meets its performance target. Which in turn means that a modest amount of load reduction can justify the use of a smaller engine. The complexity issue is also not a real factor, as engines are only downsized during periodic complete redesign cycles. Finally, only downsizing engines for large changes in tractive load artificially increases the overall performance of the fleet, the consumer benefits of which the proposed rule does not address. Due to the large uncertainties in when and how to downsize engines for the variety of vehicles, the only acceptable solution is to always model the appropriate amount of engine downsizing to maintain performance.

For additional information see:

Joint NGO 2020 Reconsideration Petition, pages 124-125

2019 Supplemental Comment of H-D Systems15 [EPA-HQ-OAR-2021-0208-0522-A1, pp. 4-6]

Miller Cycle cost: EPA erroneously included the cost of the Atkinson Cycle engine in its cost estimate for Miller Cycle. Most of the cost of the Atkinson engine is due to increased scavenging to maintain performance and extend the efficiency region. However, for the Miller cycle, this performance function is duplicative of the 24-bar turbo system with a variable geometry turbocharger added in the Proposed Determination to maintain performance for the Miller cycle.17 Thus, Atkinson cycle costs are valid for naturally aspirated engines, but these costs should not be applied for the Miller cycle.

For additional information see: ICCT 2018 comments page I71

Advanced cylinder deactivation cost: FEV's 2016 teardown analysis for ICCT found advanced cylinder deactivation cost to be based on variable valve lift (VVL) technology plus NVH improvements. The agencies' cost estimate is over 5 times higher than FEV's calculated costs. The rationale for especially high agency costs is unclear, but their costs appear to account for fingerfollower de-lashing on a fixed block of cylinders (half the cylinders of a V6 or V8), which is not needed for dynamic cylinder deactivation. These findings are corroborated by EPA's communications with NHTSA and other officials, as shared in interagency emails and posted in the rulemaking docket. EPA indicates that the agencies' assumed cost for ADEAC is 2 to 4 times the cost of industry-quoted costs for the version of the technology in production in MY2019. 18 This is troubling that the assumed agency cost would so wildly diverge from important information, and that the agencies would choose not to share this clearly applicable information other than buried in interagency dialogue.

For additional information see:

ICCT 2018 comments pages I71-I72

FEV 2016

Turbocharging cost: The agencies have overestimated turbocharging costs by hundreds of dollars per application of the turbocharging package. Much of this may be due to the agencies not appropriately downsized engines to maintain constant vehicle utility and performance. Compared to FEV's 2016 engineering teardown analyses, as well as EPA's detailed technology benchmarking analysis for the 2016 TSD, the agencies greatly increased turbocharging costs in the SAFE rule and, hence, in the proposed rule. Based on the FEV teardown and EPA analysis, turbo-downsizing costs for 18-bar turbocharging range from a -$391 (i.e., a benefit due to moving from 6 to 4 cylinders) to a cost increase of $315 (for shift from I4 to I3) and $376 (for shift from V8 to V6).19 The agencies current cost assessments for 18-bar systems range from $638 to $1,052 for the same configurations. (Table 1) [EPA-HQ-OAR-2021-0208-0522-A1, pp. 7-8; The tables can be found on p. 8 of Docket number EPA-HQ-OAR-2021-0208-0522-A1]

New comments on technology

Roush has released two reports commissioned by CAELP to assess the current state-of=the-art in light-duty engines and powertrains (Roush 2021 LDV)24 and to assess the cost and effectiveness of 48-volt mild-hybrid systems and Battery electric vehicles (Roush 2021 48v).25 Statements from Roush's executive summaries are copied, below. In addition, ANL made a presentation at a 2020 webinar in Europe that supports many of the Roush comments and recommendations (AVL 2020).26 References to additional information in the Roush reports and AVL webinar are included below each of the following summaries.

Roush's recommended near-term areas of focus (2025) are as follows:

Naturally Aspirated Engine: 'Based on a review of published data, information from major automotive suppliers, and proprietary knowledge of potential product plans, Roush recommends that EPA focus on Atkinson cycle engines with higher geometric compression ratio, lower bore-tostroke ratios, and increased cooled EGR dilution. For consistent ignition and acceptable burn rates these engines should have some combination of a) Intake, cylinder head, and piston design improvements for high in-cylinder turbulence; b) High energy ignition systems such as high energy spark plugs, plasma ignition, prechamber ignition, etc.; and c) In-cylinder fuel reforming technologies such as Direct EGR or pilot fuel injection during negative valve overlap.' (Roush 2021 LDV page 11). Additional information can be found at:

- Roush 2021 LDV Section 2.3 pages 23-25 on higher compression ratios and higher Miller/Atkinson ratios.
- Roush 2021 LDV Section 4.0 pages 31-35
- AVL 2020 slide 24: BSFC for Lambda=1

Turbocharged Engines: 'Future turbocharged engines should contain increased use of the Miller cycle with a smaller bore to stroke ratio, higher geometric compression ratio (with higher Miller ratios), and higher EGR dilution rates. Therefore, Roush recommends that EPA focus on Miller cycle engines with advanced boosting technologies such as variable geometry turbochargers, electrically assisted turbochargers, or a combination of a turbocharger and an electric supercharger. Similar to naturally aspirated engines, for consistent ignition and acceptable burn rates EPA should focus on future turbocharged engines which contain combinations of a) Intake, cylinder head, and piston design elements for high in-cylinder turbulence; b) High energy ignition systems such as high energy spark plugs, plasma ignition, passive prechamber ignition, etc.; and c) In-cylinder fuel reforming technologies such as Direct EGR or pilot fuel injection during negative valve overlap.' (Roush 2021 LDV page 11). Additional information can be found at:

- Roush 2021 LDV Section 2.3 pages 23-25 on higher compression ratios and higher Miller/Atkinson ratios.
- Roush 2021 LDV Section 5.0 pages 36-38 • Roush 2021 LDV Section 9.0 pages 48-49
- AVL 2020 slide 24: BSFC for Lambda=1
- AVL 2020 slide 27: E-Turbocharger waste heat recovery
- AVL 2020 slide 62: WLTP % CO2 reduction and slide 63: cost per % FC reduction [EPA-HQ-OAR-2021-0208-0522-A1, pp 10-11]

Full Hybrid Powertrains: 'The torque provided by the electric motor partially decouples engine output from the driver pedal. This effectively makes the hybrid system an energy management tool that can optimize engine speed-load demands to maximize the time spent in the high-efficiency parts of the engine operating map. Accordingly, low load engine operation is minimized by using the electric drive. EPA should focus on the expanded application of energy management capabilities in full hybrid powertrains to also minimize operation under the low-speed high torque areas of the engine which are prone to knocking by torque augmentation with the electric motor. The instantaneous torque capability of the electric motor can effectively support transient torque demand. This will allow both naturally aspirated and turbocharged engines that are part of a hybrid powertrain to be optimized for a narrow operating range incorporating higher compression ratios and increased EGR dilution (maintaining stoichiometric operation), thereby prioritizing efficiency over peak torque at low engine speeds and transient response, while maintaining good drivability.' (Roush 2021 LDV page 12). Additional information can be found at:

- Roush 2021 LDV Section 7.0 pages 41-44
- AVL 2020 slide 24: BSFC for Lambda=1
- AVL 2020 slides 25-26: Dedicated Hybrid Engine Efficiency Roadmaps (45% Lambda=1, 51% ideal)
- AVL 2020 slides 35-42: WLTP CO2 reduction potential of various hybrid configurations
- AVL 2020 slide 43: Relative comparison of attributes for three powertrain architectures
- AVL 2020 slide 62: WLTP % CO2 reduction and slide 63: cost per % FC reduction

Roush also made several project recommendations, with estimated GHG reductions:

Future Pickup /Full-Size SUV GHG Reduction: 'Two powertrain configurations are recommended for study and could support future rulemaking. The first option synergistically combines available technologies (without a major redesign of the underlying engine architecture) to give maximum fuel economy benefit for a relatively low cost, hence high effectiveness. It combines a naturally aspirated DI engine with advanced cylinder deactivation and a 30kW 48V P2 mild hybrid system. The 48V hybrid system is used to actively smooth out crankshaft torque pulsations to enable aggressive cylinder deactivation strategies (advanced deac – like the Tula

Skipfire System). Such a system will also enable start-stop, electric creep, regen braking, slow-speed electric driving, and a heated catalyst. Depending on system integration factors Roush estimates a reduction in GHG emissions of 20% or more, compared to a baseline naturally aspirated directinjection V8.' (Roush 2021 LDV page 13). Additional information can be found at:

• Roush 2021 LDV Section 13.1 page 65

Compact SUV GHG Reduction: 'A 30kW 48-volt P2 system mated to a low bore-to-stroke ratio miller cycle engine with electrified boosting, advanced cylinder deactivation, cooled EGR and a heated catalyst can provide a fuel economy benefit close to a full high voltage hybrid powertrain at a much lower cost. The 48V electric motor can supplement the engine torque under low- speed high load conditions, thereby avoiding this knock-prone area of the engine map. Also, the use of an advanced boosting system, combining a turbocharger and a 48V electric supercharger, will reduce engine backpressure (larger turbine) and improve scavenging, reduce combustion residuals, and reduce the propensity for knock. This combination enables the use of a higher compression ratio, thereby increasing engine efficiency. A combination of a high-energy ignition system (high energy spark plug/ plasma ignition) and fuel reforming by pilot fuel injection during NVO can be used to increase cEGR tolerance at low loads. The initial part of such a project should include engine and combustion modeling, followed by prototype engine testing. The overall GHG reduction potential will require modeling and optimization of engine design, calibration parameters, and boosting system sizing and control. Roush estimates a reduction in GHG emissions exceeding 30% is possible compared to a level 1 (NHTSA) turbocharged engine.' (Roush 2021 LDV page 14). Additional information can be found at:

• Roush 2021 LDV Section 2.3 pages 23-25 on higher compression ratios and higher Miller/Atkinson ratios.
• Roush 2021 LDV Sections 2.4 and 2.5 pages 26-28 on low bore-to-stroke ratio benefits
• Roush 2021 LDV Section 13.2 page 66

Effect of Negative Valve Overlap (NVO) fuel reforming on EGR tolerance on an engine: 'Incylinder fuel reforming by using pilot fuel injection during NVO has shown to significantly improve cooled EGR (cEGR) tolerance, combustion stability, and engine efficiency. Such a system can have wide application in turbocharged and NA engines across different vehicle segments with minimal hardware requirements. Depending on the base engine, Roush estimates an efficiency improvement, and the corresponding reduction in GHG emissions, in the range of 5 to 10% is possible and low cost, therefore correspondingly high effectiveness.' (Roush 2021 LDV page 14). Additional information can be found at:

• Roush 2021 LDV Section 10.0 pages 50-52
• Roush 2021 LDV Section 13.3 page 66

Benchmarking a production passive prechamber engine for knock resistance and EGR tolerance: 'Prechamber combustion systems are one of the most promising technologies for improving the dilution limit of engines, thereby improving system efficiency. It can also enable extremely fast burn rates increasing the knock tolerance of turbocharged engines, allowing higher compression ratios and the associated efficiency improvements. The Maserati Nettuno engine in the 2021 Maserati MC20 will be the first application of a passive prechamber engine in production. However, the primary objective in the MC20 is high performance. It would be very valuable to study the effect of the system on knock tolerance, burn rates, dilution tolerance (EGR and air), and emissions. The effort should focus on quantifying possible efficiency gains in a non-performance application.' (Roush 2021 LDV pages 14-15). Additional information can be found at:

- Roush 2021 LDV Section 13.4 page 67
- AVL 2021 slides 29, 31, and 33

Evaluation of production-intent high energy ignition systems: 'High energy volume ignition systems can enable combustion of dilute (cEGR or air diluted) in-cylinder mixtures resulting in a step-change in engine efficiency compared to conventional spark plugs. Such systems can be a drop-in replacement for a spark plug, thereby representing a cost-effective GHG improvement option. Such systems should be evaluated for maximum efficiency potential, in conventional, 48V mild hybrid, and full HV hybrid applications. Roush estimates that systems such as plasma ignition can support good combustion stability with high amounts of cooled EGR, thereby achieving engine efficiency improvements in the range of 5-10% over a baseline turbocharged DI, dual VVT engine. Microwave ignition systems, on the other hand, have the potential to achieve levels consistent with prechamber ignition systems. This would enable lean-burn engines with low engine-out NOx emissions which can achieve brake thermal efficiency which exceeds 45% in light-duty vehicle applications, compared to a level of 36-38% for a baseline turbocharged DI, dual VVT engine.' (Roush 2021 LDV page 15). Additional information can be found at:

- Roush 2021 LDV Section 11.0 pages 53-62
- Roush 2021 LDV Section 13.5 page 67 [EPA-HQ-OAR-2021-0208-0522-A1, pp. 11-14]

Atkinson Cycle engine restrictions (HCR0, HCR1, HCR2)

We applaud EPA for allowing HCR2 technology to be used in their modeling for some segments of the fleet, especially given NHTSA's refusal to do so. Comments have been previously submitted that provided extensive justification for HCR technology benefits beyond HCR1 and it is good to see EPA responding positively to these comments. For example:

Joint NGO 2020 Reconsideration Petition, pages 64-68

ICCT 2018 Camry study

ICCT 2018 comments, pages I2-I12

However, EPA also argued in the DRIA that Atkinson Cycle engines (HCR0, HCR1, HCR2) cannot be used on V8 engines or pickup trucks, ‘The restriction within the analysis of HCR technologies to naturally aspirated engines with cylinder counts of 6 or less during compliance modeling was a means of restricting Atkinson Cycle from application to trucks and other applications having a specific need for additional torque reserve (e.g., trailer towing or high payload applications).’ (DRIA page 2-13)

NHTSA in its proposed rule elaborated on this point, stating that:

‘Pickup trucks and vehicles that share engines with pickup trucks are also excluded from receiving HCR engines; the duty cycle for these heavy vehicles, particularly when hauling cargo or towing, are likely unable to take full advantage of Atkinson cycle use, and would ultimately spend the majority of operation as an Otto cycle engine, negating the benefits of HCR technology.’ (NHTSA NPRM page 49662)

These arguments are backwards and wrong. Engines in pickup trucks and high-performance vehicles are sized and powered to handle higher peak loads. This means larger engines that operate at lower loads relative to their maximum capacity on the 2-cycle – and during most realworld driving. According to supplemental tables for the 2020 EPA FE Trends report found online, pickups have 18% to 19% higher power to weight than cars and truck SUVs (Table 2). Which in turn means that pickup trucks and high-performance vehicles will spend more time in Atkinson Cycle operation than lower performance vehicles on both the test cycles and in the real world, not less. [Table 2 can be found on p. 15 of Docket number EPA-HQ-OAR-2021-0208-0522-A1]

As acknowledged by the agencies, these engines have the ability to switch between Otto cycle and Atkinson cycle. Thus, the specific need for ‘additional torque reserve’ is met by switching to Otto cycle. NHTSA’s claim that these vehicles ‘would ultimately spend the majority of operation as an Otto cycle engine’ is ludicrous. Given the high output of these engines, the vehicle would have to be driven on a race track to spend most of the time in Otto cycle. The one exception is towing, which does impose constant high loads on the engine. However, even pickup trucks spend relatively little time towing. Strategic Vision data finds that ‘75 percent of [pickup] truck owners use their truck for towing one time a year or less’.27 Thus, only 25 percent of pickup trucks tow even occasionally. This means that the large majority of pickup trucks spend the vast majority of driving at low loads relative to the engine’s capability, where Atkinson Cycle engines are very effective.

Note that Atkinson Cycle engines have been used on the Toyota Tacoma pickup V6 engine since 2017, illustrating that Atkinson Cycle engines are cost-effective for use on pickups and the claim that an Atkinson Cycle engine that switches to Otto cycle on demand cannot provide the additional torque reserve is not accurate.

The only legitimate concern with Atkinson Cycle engines for pickup trucks and high-performance vehicles is compression ratio. The HCR engines evaluated by EPA have very high compression ratios, which can raise combustion temperatures and necessitate a modest reduction in peak power. However, combustion temperatures can be lowered with cooled EGR and any remaining peak performance effect can be handled by modestly decreasing compression ratio.

Based on a 2014 paper by Speth et al.,28 the brake efficiency improvement for increasing compression ratio from 13:1 to 14:1 is 0.9%.29 Modeling with Autonomie found that the fuel-consumption reduction, if performance is maintained, is 1.32 times the brake efficiency improvement. So, increasing the compression ratio from 13:1 to 14:1 would reduce fuel consumption by 1.19%.

In summary, HCR technology is likely to have higher benefits on pickup trucks, due to the higher power-to-weight of the engines used on pickup trucks. Any concerns with compression ratio can easily be handled by determining the compression ratio reduction needed to maintain performance during Otto Cycle operation and analytically adjusting the HCR0, HCR1, and HCR2 modeling output efficiency for pickup trucks and high-performance vehicles. Thus, all restrictions on HCR engines should be removed. Further information is contained in previously submitted comments: Joint NGO 2020 Reconsideration petition pages 68-73 ICCT 2018 Camry study ICCT 2018 comments, pages I2-I12 [EPA-HQ-OAR-2021-0208-0522-A1, pp. 14-16]

10 Up to 10% of the fuel economy gain might be explained by modest roadload and mass reductions, but a large amount is clearly due to improvements in engine and powertrain efficiency.

29 This is extrapolated from the modeled results, as the benefits of increasing compression ratio decrease as the baseline compression ratio increases. For example, the paper found that increasing the compression ratio from 10.5:1 to 11.5:1 would improve brake efficiency by 1.9%, or more than twice the 0.9% benefit of increasing from 13:1 to 14:1.

Commenter: National Propane Gas Association (NPGA)

Today there is innovative demonstration and deployment of dual-fuel engine vehicles that blend propane and dimethyl ether (DME), which combines clean emission profiles and propane infrastructure without the significant financial requirements necessary to proliferate other, less mature alternative energies. [EPA-HQ-OAR-2021-0208-0252-A1, p.2]

Bi-Fuel Engine Technology

In addition, bi-fuel engine conversions offer the emission reduction advantages and extend vehicle mileage. A bi-fuel engine typically uses either gasoline or autogas through the same internal combustion system.36 A bi-fuel autogas vehicle is equipped with two fuel tanks, injection systems, and fuel lines to store both autogas and gasoline.37 Bi-fuel engines increase the driving range of the vehicle, which can be a more valuable feature for rural fleet vehicles.38 Bi-fuel autogas engines also provide flexibility in fueling infrastructure as well as the option for fleet vehicles to switch fuels depending on other factors. The advantage of doubling the driving range is most attractive to police fleets and national parks.39 Further, state government fleets convert light- to heavy-duty vehicles to bi-fuel autogas engines as part of state disaster plans.40 In fact, the U.S. Department of Energy Clean Cities program has developed initiatives to increase bi-fuel autogas vehicles throughout multiple states as an asset for emergency response.41 The availability, emissions profile, and comparatively low cost combined with simple infrastructure and advancing technological research distinguish autogas in the alternative fuel marketplace. [EPA-HQ-OAR-2021-0208-0252-A1, pp. 4-5]

The multiplier incentive program should include provisions for alternative fuels, including autogas, to achieve the agency's ambition for effective GHG emission reduction. [EPA-HQ-OAR-2021-0208-0252-A1, p. 5]

Commenter: Olmstead, Thomas

As laid out in The 2020 EPA Automotive Trends Report Greenhouse Gas Emissions, Fuel Economy, and Technology since 1975, there are numerous technologies manufacturers can use to improve fuel economy and reduce GHG emissions including Turbo, GDI, CD, seven or more speeds, CVTs, stop/start, alternative fuel vehicles, and many more, but not all manufacturers have fully adopted the technologies: [Table ca be found at docket number EPA-HQ-OAR-2021-0208-0190-A1, p. 2] If all of the manufacturers used these technologies, fuel economy and GHG emissions would be reduced. [EPA-HQ-OAR-2021-0208-0190-A1, pp. 1-2]

Commenter: Roush Engineering

Attached are two reports Roush Engineering recently completed for the Center of Applied Environmental law and policy that we believe are relevant to the proposed rulemaking, particularly with respect to continuing improvementss in effectiveness and cost compliance technologies.

- CAELP Report 1 - Gasoline Engine Technologies (09.24.2021)
- CAELP Report 2 - 48V and BEV costs (09.24.2021 [EPA-HQ-OAR-2021-0208-0210-A1, p. 1]

Commenter: Shevelew, Jonathan

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, p. 118.]

It's imperative that we push them harder by making the financial penalties so severe that not investing in the transition would be a disastrous business decision for them. The costs associated with transitioning their products to ZEVs needs to be less than the penalty for not doing it.

EPA Response

In response to comments on the impact of technology multiplier incentives on near-term ICE and HEV technology improvements (AVE), we did not conduct a separate analysis of the impact of multipliers on near-term technology improvements to ICE and HEVs. We have set fuel neutral, performance-based standards and increased the level of stringency for the final rule which will result in additional emissions reductions. We acknowledge that if an OEM chooses to implement significant levels of BEVs, then the given OEM's ICE vehicles and or HEVs would not be required to improve as much as part of the fleet-wide average standards as an OEM that chooses a non-BEV path. For the final rule we have adopted a narrower set of advanced technology multipliers, limited the multipliers to two model years (2023 and 2024), reduced the numerical value of the multipliers, and maintained the 10 g/mile multiplier credit cap as originally proposed. Please see Preamble section II.B.1 for additional details regarding the advanced technology multiplier incentives and changes made to the incentives for the final rule. Also, see section 6.1 within this Response to Comments document for our response to similar comments regarding the multiplier incentives.

With respect to comments on defining "zero emissions" as less than one gram of CO2 per kilometer to allow for H2 internal combustion engines (H2-ICE) (BorgWarner), we have set fuel neutral, performance-based standards and manufacturers are free to choose specific fuels, including hydrogen, as part of their compliance plan for meeting the revised GHG standards. Changes to what constitutes "zero emissions", e.g., the definition of Light-duty Tier 3 Bin 0 or any other changes to the Light-duty Tier 3 Standards are outside of the scope of this rulemaking. We did not propose or seek comment on changes to the definition of the Tier 3 Bin emissions compliance level or how EPA defines "zero emissions" as a means of achieving the proposed GHG standards.

Regarding comments that EPA should consider legislation to transition to the 5-cycle test (BorgWarner), legislative changes are outside the scope of the rulemaking. Changes to the test cycles used for demonstrating compliance with the light-duty vehicle GHG standards are also outside of the scope of the rulemaking. We did not propose or seek comment regarding changes to the test cycles used for determining light-duty GHG compliance.

With respect to comments received regarding the ability of manufacturers to achieve additional GHG reductions using advanced high-compression internal combustion engines and high octane fuels (Fuels Freedom Foundation), engines with high geometric compression ratios (e.g., 13:1) using the over-expanded Atkinson Cycle are already mass-produced and widely available within U.S. light-duty vehicle applications, in particular passenger cars and cross-over utility vehicles from both Toyota and Mazda, all with minimum specified octane requirements of 87 AKI (e.g., regular grade fuel) and thus are using widely available grades of gasoline. EPA does not anticipate manufacturers pursuing strategies relying on higher octane fuel beyond the use of widely available, higher octane grades of gasoline (e.g., 89 AKI or 91 AKI) in the MY 2023-2026 timeframe but nothing in this rule would preclude such strategies. To the extent the commenter is suggesting EPA set a minimum octane standard, that issue is beyond the scope of the rule. We did not propose or seek comment on setting a minimum octane fuel standard as a means of achieving the proposed GHG standards.

In response to comments related to the inclusion of outdated engine efficiency maps within the CCEMS analysis relative to previous EPA analyses using OMEGA and that this results in understating incremental improvements in powertrain efficiency (ICCT), the commenter's assumptions are incorrect since they did not take into consideration the powertrain efficiencies of the baseline technologies already within the light-duty vehicle fleet (e.g., naturally aspirated GDI) used within CCEMS and OMEGA and thus are incorrect with respect to the inference that we used the wrong incremental powertrain efficiencies in the CCEMS analysis. The incremental differences between technologies such as GDI relative to Turbocharging levels 1 or 2, or GDI relative to HCR0 or HCR1, are comparable between CCEMS and OMEGA. In other words, the relative differences between control cases and no-action cases are comparable between the two analytical approaches. This is because the incremental effectiveness between baseline and added powertrain technologies (e.g., turbocharging/downsizing, HCR0, HCR1) are comparable between OMEGA and CCEMS despite differences in individual brake thermal efficiency maps for some of the underlying data. Similar to OMEGA, CCEMS continues adding powertrain and other technologies until the standards being assessed are met. When doing so, the technology penetrations and per vehicle costs are comparable between previous analyses using OMEGA and the analysis for this rule using CCEMS as long as specific technologies are not excluded or restricted within either of the models (see RIA Chapter 1.2.2)

In response to comments that EPA erroneously included Atkinson Cycle costs within the cost estimates for Miller Cycle (ICCT), the costs that EPA included for Atkinson Cycle reflect the use of a rapidly changing, high-range-of-authority camshaft phasing system for the intake camshaft. This is used both for load control via varying of trapped air/fuel charge and to limit the maximum effective compression ratio for knock control. A similar system is used by Mazda in their boosted Miller Cycle engines, while VW has used an alternative valvetrain control system (translating to different lobes on the intake camshaft) in some applications. We believe that such a level of valvetrain control is necessary for non-hybrid, light-duty vehicle applications of Miller Cycle both for knock control and for prevention of low-speed preignition, and thus such valvetrain costs are included within our costs of turbocharged/downsized engines, and do not constitute a double-counting of costs. Such systems can also significantly improve part-load off-boost efficiency of Miller Cycle engines by allowing load control via camshaft phasing.

With respect to the comment that turbocharged engine costs within the CCEMS analysis for this rule are significantly higher than previous analyses (ICCT), we acknowledge that the costs for turbocharged engines within the analysis for this rule may be a high estimate. For this reason we believe our cost estimates may be somewhat conservative and we intend to update turbocharged engine costs within analyses for future rulemakings.

Comments regarding the NHTSA proposed rule (ICCT) regarding Atkinson Cycle and its application to light-duty pickup truck applications are incorrect. Neither EPA's proposed nor final rule addresses whether Atkinson Cycle engines have the ability to "switch" between Otto Cycle and Atkinson Cycle, although EPA believes such operation would be inconsistent with the design of currently available implementations of Atkinson Cycle as well as previous EPA benchmarking data of non-HEV applications of Atkinson Cycle engines from Mazda and Toyota. Atkinson Cycle engines operate over-expanded throughout the entire speed-torque operational range and, based upon detailed EPA benchmarking and engineering analysis, do not "switch" to Otto Cycle.[48] We disagree with comments that non-HEV pickup truck applications with significant trailer towing capability can apply Atkinson Cycle (ICCT). Some pickup truck applications require significant torque reserve, such as for trailer towing requirements which include trucks with high rated gross-combined vehicle weights (GCWR, i.e., combined truck payload + trailer capacity). Many of these applications exceed 18,000 lbs. GCWR. Non-HEV applications of Atkinson Cycle engines, which EPA has extensively benchmarked, would not have sufficient torque reserve for such applications without either a) a significant increase in per-cylinder engine displacement, which has potential negative implications for both brake-thermal-efficiency and criteria pollutant emissions or b) the use of strong hybridization. For non-HEV applications, turbocharged/downsized engines and Miller Cycle provide sufficient torque reserve to allow high GCWR and trailer towing and are thus a more suitable technology for such applications. Electric hybridization can also be used to supply sufficient torque reserve for such applications, depending on its specific design characteristics (motor torque output, battery energy reserve, etc.)

In response to comments regarding the incremental effectiveness of advanced engine technologies such as HCR and Turbocharging (ICCT), we disagree that our input assumptions on incremental effectiveness are too low. The incremental effectiveness of HCR1 technology package within CCEMS is consistent with the incremental effectiveness of the Toyota A25A-FKS engine benchmarked by EPA, which itself is nearly identical to the 2-cycle incremental effectiveness of the previously tested EPA developmental engine referred to by the commenter.[49] The incremental effectiveness of the TURBO1 technology package within CCEMS is consistent with the incremental effectiveness of the Honda L15B7 engine.

In response to comments regarding Miller Cycle engines for dedicated-hybrid-electric applications (ICCT), we acknowledge that such applications might be suitable for future vehicle and truck applications requiring high torque reserve. EPA plans to initiate a future rulemaking to establish multi-pollutant emission standards over the longer term, for MY 2027 and later (see the Preamble to this rule at section I.A.2). EPA will again review GHG emission-reducing technologies, including Miller Cycle and other potential dedicated hybrid engine applications, as part of the regulatory impact analysis for the MY2027 and later light-duty GHG standards rulemaking. Other technologies, such as negative valve overlap and higher power 48V P2 hybrid systems (as suggested by ICCT and Roush), merit further investigation. EPA will again review GHG emission-reducing technologies, including negative valve overlap and higher power 48V

[48] See Figures 22 and 23. Kargul, J., Stuhldreher, M., Barba, D., Schenk, C., Bohac, S., McDonald, J., Dekraker, P. Benchmarking a 2018 Toyota Camry 2.5-Liter Atkinson Cycle Engine with Cooled-EGR. SAE Technical Paper No. 2019-01-0249, 2019, doi:10.4271/2019-01-024.

[49] See Table 7. Kargul, J., Stuhldreher, M., Barba, D., Schenk, C., Bohac, S., McDonald, J., Dekraker, P. Benchmarking a 2018 Toyota Camry 2.5-Liter Atkinson Cycle Engine with Cooled-EGR. SAE Technical Paper No. 2019-01-0249, 2019, doi:10.4271/2019-01-024.

hybrid systems as part of the regulatory impact analysis for the MY2027 and later light-duty GHG standards rulemaking.

In response to comments recommending the use of dedicated EGR systems[50] or more advanced versions of Miller Cycle or other internal combustion technologies not included within our analysis (ICCT), the report on internal combustion engine technologies cited within the comments and also submitted separately by Roush did not include a detailed cost analysis for such internal combustion engine technologies, and thus no clear conclusion can be drawn regarding these technologies on per-vehicle cost of compliance. As discussed in section VI.A, VI. B of the preamble to the final rule and Chapter 2.3 and Chapter 4 of the RIA, EPA has demonstrated a reasonable cost and technologically feasible pathway to meet the final standards even without more advanced, and in some cases, more expensive, ICE technologies. Our technology assessment is consistent with several manufacturers' public statements that they are choosing to deemphasize the further development of ICE technologies to focus their resources on vehicle electrification (e.g., MHEVs, HEVs, PHEVs, and BEVs).[51,52] Consistent with EPA's LD GHG program, manufacturers may choose whether or not to implement these more advanced ICE technologies as part of their preferred pathway in meeting the final GHG standards. EPA will again review further advancements to ICE technologies in our planned future rulemaking for standards for MY 2027 and later. The updated battery costs used within the final rule CCEMS analysis better reflect recent improvements in battery chemistry, topology and manufacturing (see RIA Chapter 2.3.4 and RIA Chapter 4.1.1.2). These updates to battery costs used in CCEMS for the final rule analysis reduced Li-ion battery costs by an approximate average of 25 percent. A result of these changes is a projected trend between model years 2023 and 2026 of increased technology penetration of electrified technologies such as BEV/PHEV, HEV, and MHEV along with a projected trend of increased penetration of relatively inexpensive ICE technologies such as HCR1. In addition, the analysis shows a trend in the opposite direction of decreased penetration of more expensive ICE technologies such as turbocharging/downsizing. The inclusion in the analysis of more advanced, and likely more expensive, ICE technologies such as dedicated EGR and more advanced versions of Miller Cycle would likely not reverse a general projected trend towards increased electrification, considering recent cost reductions for automotive lithium-ion batteries and the anticipated battery cost reductions through 2026, and thus would likely not lower the cost of compliance of the final and alternative standards that were analyzed.

[50] E.g., internal combustion engines that use one or more cylinders primarily for fuel reformation rather than for extracting work.

[51] Motavalli, J. Phasing Out Internal Combustion Engines? It's Already Happening. Autoweek, April 30, 2021. https://www.autoweek.com/news/a36292118/phasing-out-internal-combustion-engines/

[52] Plumer, B. Tabuchi, H. 6 Automakers and 30 Countries Say They'll Phase Out Gasoline Car Sales. The New York Times, November 11, 2021. https://www.nytimes.com/2021/11/09/climate/cars-zero-emissions-cop26.html

Comments related to other alternative fuels such as propane Autogas or bi-fuel DME/propane Autogas (NPGA) are outside the scope of the rulemaking. We did not propose or seek comment on providing multiplier incentives for propane Autogas or bi-fuel DME/propane Autogas as a means of achieving the proposed GHG standards and we do not believe multiplier incentives for these fuels are appropriate for the same reasons we do not believe multiplier incentives are appropriate for natural gas vehicles (including that these fuels are not near-zero emissions technology which warrant incentives).

The comment regarding increasing civil penalties (Jonathan Shevelew) are beyond the scope of this rulemaking. Civil penalties for violations of motor vehicle emissions standards assessed pursuant to 42 USC §752.[53]

12.3. Other Technologies

<u>Commenters Included in this Section</u>

American Honda Motor Company (Honda)
Attorney General of Missouri et al.
Bay Area Air Quality Management District
Center for Climate and Energy Solutions (C2ES)
Ghost Locomotion, Inc.
Ingevity Corporation
International Council on Clean Transportation
National Corn Growers Association (NCGA)
Nissan North America, Inc.
South Coast Air Quality Management District

Commenter: American Honda Motor Company (Honda)

Platform Level Technologies (aerodynamics, mass reduction)

In reviewing the agency's modeling of Honda's fleet, we noticed significant increases in adoption of aggressive aerodynamic and mass reduction improvements. While Honda continues to seek opportunities for emissions reductions in these areas, we believe these agency estimates are overly optimistic given the short regulatory window, limited time for technology implementation across our fleet, and natural asymptotes associated with vehicle design. For example, agency modeling of aerodynamic improvements in Honda's fleet climb from 4% in

[53] Title 42 - The Public Health and Welfare Chapter 85 - Air Pollution Prevention And Control Subchapter II - Emission Standards For Moving Sources Part A - Motor Vehicle Emission and Fuel Standards, §7524. Civil penalties.

MY2020 to over 12% in MY2026, as shown in Figure 5 [Figure 5 can be found at docket number EPA-HQ-OAR-2021-0208-0565-A2, p. 13.]

This represents a tripling of fleet average aero improvement over one product redesign cycle. While aerodynamic improvements to Honda's fleet have and will continue to occur, they are progressing at a pace well below those modeled by the agency. Part of this can be attributed to market and customer demands, which continue to show preference for larger vehicles, creating a natural limitation for design. Since roughly 70% of vehicle drag is a function of size and shape – functional attributes of the vehicle and the category to which it belongs – major development efforts would be required to yield further improvements that avoid packaging compromises or changes to fundamental attributes that customers seek.

Mass reduction is another area where agency modeling anticipates further emissions reduction opportunities. While Honda continues to make improvements in this area as well, it is important to note that ongoing efforts to improve vehicle safety and meet future crashworthiness targets often involve countermeasures offsetting such mass reductions. As such, we believe the agency's estimates regarding mass reduction opportunities across the fleet are overly optimistic in the proposed rule's timeframe.

In summary, Honda believes the above platform technologies are, or will soon be, reaching the point of diminishing returns given safety requirements and other key design considerations. As such, agency modeling assumptions may be incorrectly prioritizing these technologies and the remaining benefits they can deliver beyond a MY2017 base year vehicle. [EPA-HQ-OAR-2021-0208-0565-A1, pp. 13-14]

Commenter: Attorney General of Missouri et al.

The EPA's proposed rule goes to some effort to highlight the hoped-for positive outcomes of the mandated rush to adopt supposedly more environmentally friendly fuel-cell technologies. As discussed above, there are many examples of negative externalities that must be taken into account. [EPA-HQ-OAR-2021-0208-0288-A1, p.16]

Commenter: Bay Area Air Quality Management District

A primary area for innovation is zero emission technologies. Zero emission vehicles (ZEVs) have significantly lower greenhouse gas emissions, especially in states with cleaner grids such as California. And due to the fact that ZEVs emit zero criteria pollutant emissions from their tailpipe, they also provide important local air pollution benefits. Continued innovation in ZEV technology will further drive down costs, foster greater economies of scale, and bring larger volumes of battery electric and fuel cell electric vehicles into those communities that need clean vehicles most. [EPA-HQ-OAR-2021-0208-0283-A1, p. 3]

Commenter: Center for Climate and Energy Solutions (C2ES)

Hydrogen fuel cell electric vehicles and other zero-emissions technologies represent a powerful, if nascent, opportunity to expand options for decarbonizing transportation, particularly in medium- and heavy-duty applications. Federal policy support for zero-emission vehicles should also include investments in research, development, demonstration, and deployment to accelerate these technologies. [EPA-HQ-OAR-2021-0208-0287-A1, p.4]

Commenter: Ghost Locomotion, Inc.

The vision of an electric consumer vehicle mass market is within sight. The proposed standards, combined with the President's Executive Order and automakers' electric vehicle commitments, make it possible for the majority of new light-duty vehicles offered for sale in the United States soon to be electrically driven.

As automakers roll out increasingly electric fleets, they will also be equipping these cars with more autonomous capabilities. Although higher-level autonomous driving may affect various of the regulatory elements analyzed in the proposals, scant attention is given to the impact that a progressively more autonomous fleet may have on these analyses.

It is axiomatic that well-designed autonomous driving systems can operate more quickly and more accurately than human drivers, and are not subject to fatigue, distraction or other driving impairments. The safety promise of an autonomous future will begin when Level 4 autonomous systems are deployed for personal transportation.[1] Level 4 systems will not abdicate responsibility to the driver at the last minute nor defer to a driver with slower computational abilities and response times, but instead will retain responsibility for making driving and fallback decisions.

The marriage of electrification and autonomy, however, is endangered. Current systems generally operate either only semi-autonomously or with such compute complexity that use of the ADAS or ADS systems shrinks the available power supply in electric vehicles, substantially diminishing the available battery range. According to one industry analyst: ‘In general, most assisted driving system developers agree that battery electric AVs will lose about 40-50% of the range available from the base vehicle.’[2] Yet, emerging ADS technology can solve this dilemma and conserve battery power with more efficient algorithms and general purpose sensors, requiring substantially less computing power.

To meet the aggressive goals for EV deployment, the EV market will need to extend beyond consumers who choose them solely or mostly for environmental reasons. They must also meet the growing consumer demand for autonomy — with drivers able to safely rely on the autonomous system for highway driving. If autonomous operation unduly limits range, electric vehicles will be less consumer-friendly and less likely to proliferate at a pace necessary to meet the current EV goals. High-level autonomy free of additional range anxiety will likely spur demand for electric vehicles.

Ghost Locomotion Inc. (‘Ghost’) appreciates the opportunity to provide input into how technology, such as that being developed by Ghost, will affect the driving environment envisioned in the proposals.[3] A high-autonomy and low-compute system can:

• Provide autonomy without undue battery drain, particularly if coupled with a credit system such as that proposed by Ghost below.

• Reduce fatalities even beyond those expected due to the rebound effect and mass reduction; and

• Allow consumers to redirect time typically spent driving and put it towards other productive use.

Ghost Technology

Ghost is developing a unique Level 4 autonomous driving system. Ghost technology is centered around a revolutionary approach to crash avoidance. The Ghost approach tracks the motion of clusters of pixels in a scene to determine the relative distance and velocity of the object to the vehicle. Based on this information, and other information collected about the environment, Ghost technology makes next step driving decisions.

Unlike other systems, the Ghost approach is not dependent on a pre-set classification of images and is not subject to the error conditions of mis- or not recognizing objects. The Ghost system does not need to know what an object is in order not to hit it. As a result, it can manage many of the edge cases other systems cannot.

Preserving Battery Range

Current systems offer either high autonomy or low power draw, but not both. The Ghost system uses more efficient algorithms and general purpose sensors. The resulting compute efficiency requires significantly less energy than robotic-based and/or other compute-intense systems now in use. More efficient autonomous driving capability protects battery range, an essential precursor for a successful marriage between electric drive and autonomy.

That the market for autonomous and electric vehicles will grow together is clear.[4] One estimate projects that 7% of the total automotive market will have autonomous capability by 2023, and that more than half the total market will have Level 3 and higher capability by 2030.[5] At the same time, the proposed regulations support the President's vision and automakers' commitments to substantially expand their electric-drive offerings by 2030. Autonomy and electric vehicles offer a 1-2 punch, encouraging consumers to modernize their vehicles, accelerating both the safety benefits offered by autonomy and the environmental benefits offered by electric power.

The technology paths, however, are not necessarily compatible. Operating in autonomous mode can strain the power supply and result in a significant drain in available range. Tesla, for example, has estimated an approximate 25% range reduction when operating in driver-assist mode.6 A study by Nature Energy suggests that, with regard to certain LiDar systems, aerodynamic drag can also contribute to battery drain, particularly for suburban driving.[7]

The agencies should consider ensuring that electric vehicle range is maintained through a credit program aimed at encouraging low-compute and high-autonomy systems. The credits could be expressed similarly to how the agencies value off-cycle credits or alternatively could be applied through a multiplier. The program could, for example, offer credits for higher-level autonomous systems operating at 120 watts or below, with additional credit opportunities should the systems be able to operate at wattages below that level (e.g., 75 watts or 50 watts). To reflect how systems are used in the real world, wattage should be measured when the system is operating with full redundancy, and not when redundancies are in standby mode.

Such a credit program would acknowledge the impending linkage between autonomous and electric vehicles and support systems that allow consumers to take advantage of autonomy without losing benefits associated with their electric vehicles. By recognizing and potentially encouraging systems that draw less power the agencies can help catalyze a driving environment devoid of both motor vehicle fatalities and motor vehicle emissions.

An advanced AV credit system would be consistent with the agencies' proposed consideration of expanding the off-cycle credit program.[8] Flexibility and opportunities for credits can spur technological innovation, new investments, and greater deployment of EVs. Indeed, CARB's Zero Emission Vehicle (ZEV) program has played a key role in Tesla's success.[9]

Fewer Fatalities

Ghost's breakthrough approach to crash avoidance has the potential to substantially reduce crash occurrence on highways, including those attributed to mass reduction and those associated with the rebound effect resulting from better fuel efficiency.[10]

Much of the benefit tied to autonomous driving results from minimizing human error. Ghost believes that crash avoidance is more than a by-product of autonomy. It is an essential capability and necessary foundation for any autonomous driving system, just as the central nervous system in humans is designed to instantly react and move the body out of harm's way when an object is rapidly approaching. It is indeed the missing link to the success of autonomous driving systems.

The data is clear that driver assistance features or additional sensors alone cannot solve our motor vehicle safety problems. More comprehensive crash avoidance must be deployed to avert the vast majority of motor vehicle fatalities. In a 2019 article updating an earlier study, researchers at Carnegie Mellon University suggested that if all light duty vehicles in the fleet were equipped with three current driver assistance systems — forward collision warnings, lane departure warning and blind spot alert — it ‘could prevent or reduce the severity of as many as 1.6 million crashes, including 7200 fatal crashes,’ with the highest reduction for fatal crashes associated with Lane Departure Warning.[11] While that is substantial progress, with more than 35,000 motor vehicle fatalities annually, it is not alone sufficient to meet the safety need.

The safety impact analyses in the proposals point largely to crash protection considerations. The additional fatalities estimated are largely due to the increased on-road exposure and/or possible crash incompatibility due to mass reduction in certain vehicles. As more advanced crash avoidance systems deploy into the fleet, the relationship between exposure and crash risk may need to be reconsidered and adjusted. Trailblazing crash avoidance will upend this dynamic, minimizing risk associated with exposure and also reducing any impacts from mass reduction or longer vehicle retention.

Productive Time Recouped

The agencies have long recognized time as a significant private benefit. The proposals monetize the productive time recaptured as part of the cost/benefit analyses.

NHTSA estimates these savings by calculating the amount of refueling time avoided—including the time it takes to find, refuel, and pay—and multiplying it by DOT's ‘value of time of travel savings estimate.’ EPA similarly considers ‘the costs of time spent refueling ... calculated as the total amount of time the driver of a typical vehicle would spend refueling multiplied by the value of their time. If less time is spent refueling vehicles under the proposed standards, then a refueling time savings would be incurred.’[12]

Level 4 autonomy represents another opportunity to recapture time. With Level 4 operation, the autonomous driving system operates all aspects of the dynamic driving task within its Operational Design Domain and retains responsibility to manage unexpected or emergent conditions. Only with Level 4/5 operation is a driver able to focus their attention on a task other than driving. With education and experience, consumers will increasingly demand the ability to redirect their commuting time and put it to use in other productive ways. This evolution is likely to occur during the time frame encompassing the useful life of the vehicles subject to the proposals, and while it may be too speculative at this point to quantify the value of the time saved, the agencies should nonetheless recognize this as a benefit of Level 4/5 autonomy.

The Energy Efficiency Gap

According to NHTSA's proposal, automakers maintain that consumers tend to value the benefits of better fuel economy over a period of approximately 30 months, even though the actual benefits may extend further.

Ghost maintains that consumers will value the benefits of autonomous driving for much longer, and indeed for as long as the autonomous driving system is able to be updated and remain competitive within the market. A critical aspect of software-centric autonomous driving will be its ability to update the software systems on an ongoing basis. The speed with which the systems can be updated means that the reliability and performance of these systems can be regularly enhanced. As a result, while consumers may not readily recognize the longer-term financial benefits of a more fuel-efficient vehicle, they should continue to acknowledge the ongoing benefits of a self-learning and self-improving autonomous driving system.

Conclusion

The advent of reliable, safe, and low-compute Level 4 autonomous driving will have a profound impact on how consumers in the United States use their vehicles. In the coming decades, vehicles are likely to be both electrically driven and autonomous. The result should be fewer crashes, less congestion, and more time recouped. It is possible to achieve these results without unduly draining battery range — thus allowing for a fully compatible electric and autonomous future which can not only eviscerate motor vehicle emissions but motor vehicle fatalities as well. [EPA-HQ-OAR-2021-0208-0242-A1, pp. 1-7]

[1] The Levels of Autonomy are defined by SAE J3016_202104.

[3] Ghost's founders have a history of successfully developing highly secure software systems. CEO John Hayes previously founded Pure Storage to store and protect critical customer data for Fortune 500 companies. Pure Storage is now publicly listed on the New York Stock Exchange. CTO Volkmar Uhlig architected the L4 Pistachio Microkernel, which protects biometric data on billions of Apple and Android devices worldwide. Ghost was founded in 2017 and, in addition to its primary location in Mountain View, California, includes a software formal verification team in Sydney, Australia and a radar development team near Dallas, Texas.

[4] Steps such as the recent enactment of SB 500 in California — mandating that future Level 3-5 autonomous driving systems be installed only on electric vehicles — represent this movement. Other states are likely to follow California's path. Market analysts, moreover, opine that the pace of vehicle development and refresh may become shorter with electric vehicles than what has become traditional with regard to ICE vehicles. See Robinet (IHS Markit), "Preparing for the new, faster EV product cadence," SAE International (Aug. 30, 2021). See also https://www.ucsusa.orgiaboutinews/california-bill-requires-all-new-self-driving-vehicles-be-zero-emission-2030.

[10] Mass reduction can increase or reduce safety risk, depending on whether weight is removed from smaller/lighter vehicles (increasing crash incompatibility) or from larger/heavier vehicles (reducing crash incompatibility). The rebound effect results in higher risk exposure by virtue of more time spent traveling on the roadways. NHTSA estimates that the proposed standards will result in an additional 1822 fatalities: 115 associated with mass reduction, 584 due to the increased exposure arising from the rebound effect of consumers driving more in response to better fuel efficiency, and 1123 attributed to delays in vehicle turnover mostly associated with the increased cost of the new motor vehicles and the fewer safety features incorporated into older ones. (NHTSA NPRM, 86 Fed. Reg. 49602, 49742 (Sept. 3, 2021). For its part, EPA estimates an additional 2288 fatalities, with 1952 (about 85%) associated with increased driving and the remainder with increased fatality risk. (EPA NPRM, 86 Fed. Reg. 43726, 43793 (Aug. 10, 2021).

[12] See NHTSA Draft Technical Support Document, pp. 388 and 415-416; EPA NPRM, pp. 204). Recaptured time does not include time that is otherwise recouped — such as using the restroom or buying snacks at the gas stations. Nor does it include routine trips to the gas station (e.g., every Sunday evening) because that time has already been institutionalized into the

consumer's regular activities. This analysis may become more complex with regard to electric vehicles, as some owners can charge at home overnight, others at shopping malls or grocery stores, and yet others may need to take the time to charge at other publicly available stations.

Commenter: Ingevity Corporation

In this NPRM, EPA maintains a narrow 'tailpipe only' view of GHG emissions, which does not appropriately account for the full lifecycle GHG emissions and the GHG reduction benefits of alternative technologies and fuels.

The purpose of EPA's GHG regulation is to reduce GHG emissions, and, given the long survival period of CO2 in the atmosphere, there is little difference on the effect of GHG emissions whether they are produced during the production of the vehicle and battery, from the tailpipe, or during the production of electricity. The problem is that EPA's well-to-wheels analysis inherently tipped the scale in favor of electric vehicles by ignoring the substantial amount of energy used to produce lithium ion batteries. Many studies are now being made on lifecycle emissions, and there are wide estimates in the magnitudes of upstream emissions.

EPA's exclusive recognition of battery electric vehicles as 'game-changing' technology and making electric vehicles the sole beneficiary of valuable 0 g/mile CO2 credit incentives have been based on a narrow well-to-wheels (tailpipe only) view of emissions. However, in 2016, Argonne National Laboratory issued a report evaluating the full life-cycle (or cradle-to-grave) emissions of several fuel pathways, including fossil natural gas and battery electric vehicles .21 The study finds that BEVs are expensive to operate and do not provide significantly larger GHG reductions than gasoline hybrid electric vehicles (HEVs) that operate at half the cost. The study also finds that CNG vehicles, utilizing fossil natural gas, provide 70% of the GHG reductions at 20% of the cost of avoidance in comparison to BEVs .22 The table below summarizes these findings. [The table can be found on p.10 of Docket number [EPA-HQ-OAR-2021-0208-0227-A1]]. [EPA-HQ-OAR-2021-0208-0227-A1, p,10]

The Manufacturers of Emission Controls Association (MECA) recently completed a comprehensive scientific analysis for cradle-to-grave (full lifecycle) greenhouse gas (GHG) emissions for traditional ICE vehicles, HEVs, PHEVs, and NGVs (including NGVs fueled by RNG). As shown in the table below, the results show a NGV crossover SUV operating on RNG has 92% lower emissions than a similar ICE version operating on gasoline and 67% lower emissions than a BEV operating on the 2030 California energy grid. Such analyses confirm that EPA's 'tailpipe only' view is limiting and restricts alternative, and in some cases more effective and lower cost, GHG reduction technologies from being adopted by OEMs and consumers. Ingevity believes the EPA should adopt a full-lifecycle approach as it is the most appropriate and effective method to evaluate alternative vehicle and fuel technologies to achieve real-world GHG reductions. [The tables can be found on p.11 of Docket number [EPA-HQ-OAR-2021-0208-0227-A1] [EPA-HQ-OAR-2021-0208-0227-A1, p.11]

Commenter: International Council on Clean Transportation

Direct Injection (GDI) cost: ICCT submitted direct injection cost data in our 2018 comments based on a 2016 FEV teardown cost study (FEV 2016)16, which found costs to be about 26% lower than the agencies assessment. The FEV teardown study costs were ignored and have not been incorporated into EPA's proposed rule.

For additional information see:

ICCT 2018 comments pages I69-I70

FEV 2016

Cooled Exhaust gas recirculation (CEGR) cost: ICCT submitted CEGR cost data in our 2018 comments based on a 2016 FEV teardown cost study, which found CEGR costs (DMC) in to be roughly $100 less than the agencies assessment after applying learning to 2025. The FEV teardown study costs have not been incorporated into EPA's proposed rule. Supporting FEV's teardown cost analysis, CEGR costs in EPA's 2018 MTE were changed to a single EGR loop from a higher cost low-pressure/higher pressure dual loop system, but its updated CEGR costs were not used in the proposed rule.

For additional information see:

ICCT 2018 comments page I70

FEV 2016

EPA DRIA page 1-9

HCR cost: DMC costs for HCR in the SAFE rule, which are unchanged in EPA's proposed rule, were about $200 more than in EPA's 2016 TAR. This is a clear case where the agencies appear to have not used the best available data from EPA, which extensively analyzed this technology and its associated cost, nor have the agencies justified how they increased the associated costs in this proposal.

For additional information see: ICCT 2018 comments pages I70-I71 [EPA-HQ-OAR-2021-0208-0522-A1, pp. 6-7]

Commenter: National Corn Growers Association (NCGA)

Describing use of these new technologies, EPA notes that as of MY 2020, more than half of light-duty gasoline spark ignition engines now use direct injection (GDI) engines and more than a third are turbocharged.[6] However, further advancements from these and additional engine technologies such as higher compression ratios and greater downsizing are limited by current fuel formulations in the marketplace. [EPA-HQ-OAR-2021-0208-0246-A1, p. 2]

Commenter: Nissan North America, Inc.

Autonomous and Connected Vehicle Credits. Nissan strongly believes that autonomous and connected vehicles are the future of the industry, and an important tool in increasing consumer and pedestrian safety. Continued investment by both the industry and the government is critical to the development of this technology. Nissan encourages EPA to work with NHTSA to establish a federal regulatory framework to incentivize manufacturers to develop technologies that offer environmental benefits, including awarding credits to manufacturers for producing vehicles with safe and proven connected or automated technology. The Proposed GHG Rule and Proposed CAFE rule make no mention of autonomous vehicles or the potential positive impact such vehicles could have in the pursuit of vehicle emissions reductions. [EPA-HQ-OAR-2021-0208-0529-A1, p. 10]

Commenter: South Coast Air Quality Management District

The District believes EPA should reasonably count on that acceleration, not merely because of the urgency of the needed GHG reductions, but also because the advanced state of zero emission technology already makes it unwise to bet against aggressive rates of adoption. Even as the air quality planning jurisdiction of the South Coast Air Quality Management (which includes the entirety of Orange county and parts of Los Angeles, Riverside and San Bernardino counties) itself has more on-road electric vehicles and higher electric vehicle market share in new sales than any other state, the buyers in this area are just keeping pace with the electric vehicle adopters in major markets in European countries and China. [EPA-HQ-OAR-2021-0208-0215-A1, p.3]

EPA Response

We acknowledge the comments supporting increased introduction of ZEVs as a means of reducing GHG emissions (Bay Area Air Quality Management District, Ghost Locomotion, South Coast Air Quality Management District) and agree in general with comments regarding criteria pollutant and GHG emissions reduction potential, decreasing costs, economies of scale, and increased pace of new ZEV model introduction. We have also included updated Li-ion battery costs within our analysis for the final rule to better reflect recent advances in BEV technology (see RIA Chapter 2.3.4 and RIA Chapter 4.1.1.2).

Regarding the establishment of a credit program for higher-level autonomous vehicle systems (Ghost Locomotion) or other types of automation and connected technologies (Nissan), this is outside the scope of the rulemaking. We did not propose or seek comment on establishing autonomous and/or connected vehicle credits to comply with the GHG standards.

With respect to comments regarding a “mandated rush to adopt fuel cells,” we neither proposed nor are adopting any mandates for fuel cells in light-duty vehicles. Furthermore, use of fuel cell technology is not required to meet the final standards and our modeling of light-duty vehicle GHG compliance under the final standards did not project any penetration of light-duty fuel cell technology into the light-duty fleet during the timeframe of the final standards(see RIA Chapter 4).

Regarding a comment on life cycle emissions of BEVs vs. HEVs and CNG (Ingevity), the commenter cites a study on life cycle emissions by Argonne National Laboratories to posit that EPA somehow "tipped the scales" with respect to advanced technology multipliers for BEVs. We disagree with this comment. The cited study relied on outdated data with respect to road load reduction, Li-ion battery energy density, and the energy sources either currently used within the U.S. electric grid or near-term electric generation energy source trends. As a result, the cited 2016 ANL study predicts average conventional internal combustion engine (ICE), CNG, HEV, BEV90, and BEV210 life cycle GHG emissions to be approximately 350-450, 320-370, 240-345, 250-300, and 250-440 gCO_{2e}/mi, respectively. A more recent analysis based on more recent vehicle data from the 2020 EPA Trends Report, and more recent energy source data from the 2020 International Energy Agency - World Energy Outlook, shows life cycle BEV GHG emissions of 100-160 gCO_{2e}/mi, less than half that of the older ANL study despite an assumption of increased BEV range within the more recent study.[54,55,56]. The commenter (Ingevity) also cites a MECA analysis of natural gas vehicle GHG emissions, however only provided isolated data tables without either a copy of the study or a citation that would allow review of the study's methodology. Such a review would be crucial for determining whether or not the study included a full accounting of factors of critical importance to NGV life-cycle GHG emissions, such as fugitive methane emissions during extraction, refining, compression, and end-use. The GHG life-cycle emissions for BEVs within the table from MECA analysis also conflict with the life-cycle emissions from ANL study also cited by the commenter (Ingevity). BEV life cycle emissions within the table from the MECA analysis are only one-third to one-half of those cited within the ANL analysis. EPA's decision to not include the emissions associated with battery production, as the commenter recommends, is based on our current assessment of existing LCA studies, and the degree of uncertainty in the study results relative to magnitude of the impact on overall emissions. EPA is not making any determination here about the potential value of LCA for informing standards in the future, and we will continue to monitor further developments in LCA studies on the impacts of battery production.

With respect to comments regarding road-load reductions (Honda), we disagree that the projected levels of mass reduction within our GHG compliance analysis are overstated and/or too high. Our GHG compliance analysis for the final rule summarizes mass reduction expressed as an industry average fleet reduction in curb weight within RIA Chapter 4.1.4.1, Table 4-31. The compliance analysis had a 5% curb weight reduction for the "no-action scenario" and a 5.2% curb weight reduction for the final rule for MY2023. For MY2026, the compliance analysis had a 5.4% reduction for the "no-action scenario" and a 6.3% reduction for the final rule. We assume a level of mass reduction already exists within the current fleet and continues to exist

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[54] Bieker, G. (2021) A Global Comparison of the Life Cycle Greenhouse Gas Emissions of Combustion Engine and Electric Passenger Cars. ICCT.

[55] U.S. EPA. The 2020 EPA Automotive Trends Report - Greenhouse Gas Emissions, Fuel Economy, and Technology since 1975. EPA-420-R-21-003, January 2021.

[56] International Energy Agency. (2020). World energy outlook 2020. http://www.iea.org/weo

within the “no-action scenario” with a small, further decrease in fleet average mass for the final rule versus the “no-action scenario”. The incremental decrease in fleet average curb weight between the no-action case and the final rule is approximately 0.2% in 2023 and less than 1% for MY2026 and is feasible within the timeframe of the rulemaking. Our modeled projections represent one set of compliance pathways, but manufacturers are free to, and certainly will, make their own compliance decisions about product mix, use of credits, pace of technology development and adoption, etc. With respect to aerodynamic improvements being optimistic (Honda), the percentages cited in the comments are relative to a MY2015 fleet average drag coefficient (C_d) baseline by vehicle class, not an absolute reduction in drag force or drag coefficient of their existing vehicles and thus include aerodynamic reductions already incorporated from previous vehicle design cycles reflecting approximately a decade of improvement through MY2026, not merely improvements through MY2026 from today.

Regarding comments on the costs of GDI, CEGR, and HCR (ICCT), we acknowledge that the costs from the FEV teardown studies and the EPA Technical Assessment Report may be more appropriate than the higher estimated costs used within our CCEMS analysis. We will update the costs for these specific technologies within our analyses for future rulemakings.

With respect to comments that further technological advancements with respect to higher compression ratios or greater engine downsizing are limited by current fuel formulations in the marketplace (NCGA), the full comments stated that “Higher octane fuel is an essential tool for automakers to meet revised standards, but higher octane must also be clean octane to meet emission reduction goals. Clean octane from today’s ethanol is 50 percent lower in GHG…” and thus the implication within the comments is that reformulating the fuel should be accomplished via increasing octane levels using ethanol. Such a change to gasoline is outside the scope of the rulemaking. We did not propose or seek comment on high octane fuel or requiring the use of ethanol to increase octane as means of achieving the proposed GHG standards. Higher octane fuels (e.g., “premium” fuel with an anti-knock index of 91 or higher) are already widely available within the marketplace and manufacturers already have the option to demonstrate light-duty GHG compliance using premium (i.e., higher octane) E10 certification gasoline if premium grade fuels are required by the manufacturer for specific vehicle models.

13. Modeling of Costs and Emissions Reductions

<u>Commenters Included in this Section</u>

American Enterprise Institute (AEI)
California Air Resources Board (CARB)
Elders Climate Action (ECA)
Energy Innovation Policy and Technology LLC
Environmental Defense Fund (EDF)
International Council on Clean Transportation
New York State Department of Environmental Conservation
Securing America's Future Energy
Securing America's Future Energy

Commenter: American Enterprise Institute (AEI)

The Environmental Protection Agency Proposed Rule to Revise Existing National GHG Emissions Standards for Passenger Cars and Light Trucks Through Model Year 2026 is fatally flawed methodologically, and in particular cannot satisfy a standard benefit/cost test even assuming the quantitative estimates provided in the Proposed Rule and the accompanying Regulatory Impact Analysis. It does not provide a reliable guide for the estimation of the magnitude of an assumed greenhouse gas externality in the passenger car and light truck sector, and it does not and cannot provide a rigorous basis for an updated analysis in support of the future promulgation of greenhouse gas policies generally. Accordingly, the Proposed Rule is inappropriate; it must not be finalized in its current form, and any such finalization must reflect a very substantial revision of the underlying analysis. Any such updated analysis based upon the same or similar methodologies and assumptions similarly will be fatally flawed. [EPA-HQ-OAR-2021-0208-0254-A1, p. 1]

Accordingly, the Proposed Rule is analytically deficient, as it is based upon a benefit/cost framework fundamentally incorrect. It cannot be viewed as appropriate, and should not be finalized in its present form. [EPA-HQ-OAR-2021-0208-0254-A1, p. 2]

The EPA Calculation of Net Benefits is Fatally Flawed The Proposed Rule calculates a net economic benefit of the Proposed Rule in present value terms between $86 billion and $140 billion through 2050.13 This calculation is fatally flawed for several reasons:

• The use of purported 'global' rather than domestic benefits is illegitimate. [EPA-HQ-OAR-2021-0208-0254-A1, p. 5]

The Proposed Rule cannot satisfy any plausible benefit/cost test even under the assumptions and quantitative findings presented in the Proposed Rule and the accompanying RIA. The future climate effect of the Proposed Rule — a maximum of 0.0013 degrees C by 2100 — would be effectively zero. The annual increase in global real GDP would be a maximum of 0.075 percent, a figure that cannot be statistically significant given the normal variation in global GDP growth.

Fuel savings — roughly double the asserted environmental benefits of the Proposed Rule — are not a legitimate 'benefit' of a rule aimed at a purported environmental externality. 'Fuel savings,' asserted by the EPA to be roughly twice the purported environmental benefits of the Proposed Rule, are illegitimate as an economic benefit, as the purported environmental benefits of reduced fuel use are reported separately, and thus there remains no further divergence between the market price and the social cost of petroleum fuels. The EPA fails to consider the adverse consumer effects of a forced reduction in fuel consumption.

The asserted 'energy security' externality of petroleum consumption and imports is fundamentally incorrect. The asserted health benefits of reduced emissions of particulate matter are not consistent with the available scientific analysis, and represent double counting given other regulatory efforts under the Clean Air Act to reduce ambient particulate concentrations to levels that 'protect the public health' 'with an adequate margin of safety.' The EPA analysis of the value of refueling time savings for a vehicle fleet characterized by lower per-mile fuel consumption should be combined with a similar analysis for the time costs of recharging a larger fleet of electric vehicles. EPA fails to do so. The use of asserted global rather than domestic environmental benefits of the Proposed Rule is illegitimate, and would yield important inefficiencies. The discount rate analysis presented in the Proposed Rule and the RIA is not correct because the use of resources for future environmental improvement is an investment by definition.

The use of different discount rates for the asserted benefit and cost streams yielded by the Proposed Rule is illegitimate. The interests of future generations — the intergenerational equity question — is served by a bequest of the most valuable possible capital stock, an outcome dependent upon the use of a correct and consistent discount rate by the current generation. Accordingly, the Proposed Rule is analytically deficient, as it is based upon a benefit/cost framework fundamentally incorrect. It therefore is not appropriate, and should not be finalized in its present form. [EPA-HQ-OAR-2021-0208-0254-A1, pp. 16-17]

Commenter: California Air Resources Board (CARB)

In the Absence of California's Standards, More Stringent Standards Would Reduce Greenhouse Gases and Ozone-Forming NOx Pollution in the State

To illustrate the significance of this proposal, CARB staff have estimated its criteria and GHG emissions benefits in California if the state were not able to enforce its own GHG and ZEV standards. Besides the proposed standards, staff also analyzed the impact of the more stringent Alternative 2. The impacts of the preferred alternative, or a hybrid of Alternative 2 and the preferred alternative varying by model year, would be similar – and all would aid significantly in protecting public health and meeting state and federal air quality standards. This analysis, shown in the enclosed Emission Analysis in Support of Comments on Revised 2023 and Later Model Year Light-Duty Vehicle Greenhouse Gas Emissions Standards, acknowledges that California currently does not have a waiver of preemption from U.S. EPA for its light-duty vehicle GHG emissions and zero-emission vehicles (ZEV) standards. 13

U.S. EPA's proposal would revise current federal GHG standards beginning in model year 2023 and increase in stringency year-over-year through model year 2026. The preferred alternative would increase in stringency from model year 2022 to 2023 by 10 percent, followed by a nearly five percent stringency increase in each model year from 2024 through 2026. This is far better than the Final SAFE Rules, which become only 1.5 percent more stringent each year.14 U.S. EPA is not proposing to revise GHG emissions standards for model year 2021 and model year 2022. [EPA-HQ-OAR-2021-0208-0643-A6, pp. 9-10]

Comprehensive Emissions Estimates Consider the Fuel Lifecycle.

The emission estimates of reductions from the standards may be comprehensively described as well-to-wheel, or WTW, emissions that reflect the lifecycle of motor vehicle fuel from the production, distribution, and the use (e.g., combustion) of the fuel. These stages may be divided into two categories: well-to-tank (WTT) and tank-to-wheel (TTW). The WTT emissions are described as 'upstream' and are those associated with fuel extraction, processing, production, and distribution to refueling stations for consumers. The TTW emissions are described as 'downstream' and are from the vehicle tailpipe and evaporative emissions from the vehicle's fuel system.

These estimates reflect the upstream (WTT), downstream (TTW), and total (WTW) criteria and GHG emission reductions from EPA's GHG emission standards for vehicles of model years 2023 and newer if they applied in California and CARB's greenhouse gas emission and zero-emission vehicle standards did not. These estimates are quantified for the years by when the South Coast air basin must meet the National Ambient Air Quality Standards (NAAQS) for ozone as well as key milestones years for California's GHG emission reduction goals. CARB estimated the emission benefits of U.S. EPA's proposed GHG emission standards for passenger vehicles using the latest version of CARB's emission inventory tool, EMission FACtor 2021 (EMFAC2021).15

Figure 1, below, shows fleet average CO2 emission rate assumptions embedded in EMFAC2021, the U.S. EPA's preferred alternative (identified as the Proposal) and Alternative 2 scenarios, and U.S. EPA's 2012 National Program GHG emission standards that were replaced by the Final SAFE Vehicles Rule. The reduction factors can be calculated by dividing the U.S. EPA proposed standards by the EMFAC2021 standards for model years 2023 and later. Table 1 lists the ratios of GHG standards between U.S. EPA's preferred alternative (proposed) scenarios and default EMFAC2021 estimates. The GHG reduction factors in Table 1are computed between U.S. EPA's preferred alternative and California's standards and do not reflect emission credits for air conditioning systems or 'off-cycle' technologies whose emission benefits are not recognized by the federal test procedures. [EPA-HQ-OAR-2021-0208-0643-A6, pp.10-11] [Figure 1 can be found at docket number EPA-HQ-OAR-2021-0208-0643-A6, p. 11] [Table 1 can be found at docket number EPA-HQ-OAR-2021-0208-0643-A6, p. 11]

The Numbers: Avoided GHG and NOx Emissions in California

Staff analysis showed that absent CARB's GHG and ZEV standards, U.S. EPA's preferred alternative federal GHG standards for passenger vehicles will reduce, in tons per year (tpy) and tons per day (tpd), upstream oxides of nitrogen (NOx) emissions of:

• 25 fewer tons per year NOx, or 0.07 tons per day, in calendar year 2023,

• 411 fewer tons per year NOx, or 1.19 tons per day, in calendar year 2031,

• 609 fewer tons per year NOx, or 1.76 tons per day, in calendar year 2037.

To consider this in context, NOx emissions in the South Coast air basin are approximately 278 tons per day as of calendar year 2021 for all mobile sources (annual average).16 These emissions must be reduced to 141 tons per day to meet the 1997 ozone NAAQS of 80 parts per billion (ppb), which has a deadline of 2023. To meet the 2008 standard of 75 ppb, which has a deadline of 2031, NOx emissions must be reduced to 96 tpd. A significant portion of the reductions described above will occur in the South Coast air basin because of its high concentration of people, vehicles, and refineries; they are a significant part of the solution to meeting the air quality standards in California.

Every reduction is needed to meet these health-based standards. Other regions in California are also in non-attainment with federal standards for ozone, and reductions of all sizes are likewise needed there, although the South Coast air basin faces the most significant ozone air quality challenge in the country.

In addition, the U.S. EPA's preferred alternative standards for passenger vehicles would reduce, statewide, GHG emissions by:

• 8.5 million metric tons in 2030, and
• 16.8 million metric tons in 2045.

Based on EMFAC2021, a typical passenger vehicle emits about 4.3 metric tons of CO2 per year. The statewide decreases in GHG emissions are equivalent to:

• 2.0 million passenger vehicles in 2030,
• 3.9 million passenger vehicles in 2045.

In comparison, in the absence of CARB's GHG and ZEV standards, U.S. EPA's more stringent Alternative 2 would reduce, statewide, WTT NOx emissions by:

• 33 tons per year NOx, or 0.09 tons per day, in calendar year 2023,
• 449 tons per year NOx, or 1.29 tons per day, in calendar year 2031, and
• 658 tons per year NOx, or 1.90 tons per day, in calendar year 2037;
and statewide GHG emissions by:

- 9.3 million metric tons in 2030, and
- 18.0 million metric tons in 2045.

These statewide GHG emissions reduction from Alternative 2 would be equivalent to emissions from:

- 2.2 million passenger vehicles in 2030, and
- 4.2 million passenger vehicles in 2045. [EPA-HQ-OAR-2021-0208-0643-A6, pp. 11-12]

Commenter: Elders Climate Action (ECA)

Needed GHG Reductions Cannot Be Achieved Without Zero Emission Standard.

The emissions reductions likely to be achieved by an approximation of the regulatory policy proposed by EPA in this rulemaking was investigated in a modeling analysis performed by the Rhodium Group: "Pathways to Build Back Better: Investing in Transportation Decarbonization" (May 13, 2021).30 Assuming that EPA would restore the Obama GHG emission standards with a one-year delay, the analysis estimated that the regulation would reduce GHG emissions from the transportation sector 22% by 2031. Public investments such as the tax credits proposed for enactment as part of the current Build Back Better reconciliation bill was estimated to increase the share of ZEVs sold by 2031 to achieve a 24-26% reduction in GHG emissions from the sector. Adding a 90gr/mi standard for CO2 emitted from future vehicles is estimated to increase ZEV sales as a share of total LDV sales in the range of 53% to 61% (Fig. 9) contributing to a 27-28% reduction in transport emissions by 2031 (Fig. 10).

A ZEV sales mandate for the years 2026-2030 is not investigated with respect to GHG emissions reductions, but the report includes an estimate that ZEV sales would need to reach 99% of total LDV sales by 2030 to achieve a zero emission fleet by 2045 (Fig. 2). Assuming the electric power sector achieves zero emissions by 2035 as President Biden has proposed, the LDV portion of the transport sector could achieve zero emissions by 2045 if a zero emission standard applies to all new LDVs by 2031. [EPA-HQ-OAR-2021-0208-0521-A1, p. 11]

Commenter: Environmental Defense Fund (EDF)

Accordingly, EDF modeled the costs and benefits of EPA's proposed GHG standards using available versions of EPA's Optimization Model for reducing Emissions of Greenhouse Gases from Automobiles ("OMEGA") model, both to show the OMEGA model's projected costs for the Proposal, and to assess the effect of the modeling assumption in the Proposal that automakers would incur costs associated with application of off-cycle technologies achieving 10 g/mi in MY 2020-2022 and 15 g/mi in MY 2023-2026 (the maximum allowed under the respective rules).

Key findings

OMEGA modeling confirms the feasibility of the agency's Proposed Standards using EPA's own analytical tools, as well as the feasibility of increasing the stringency of the MY 2026 standard by 10 g/mile particularly where those reductions are delivered through additional ZEV deployment. [EPA-HQ-OAR-2021-0208-0688-A1, p. 24-25]

Approach

Model

EDF conducted modeling using two versions of OMEGA that are publicly available: the latest public version 1.4.56 (referred to hereafter as PD OMEGA), which was published in early 2017 and used to project technology costs in EPA's 2016 Draft Technical Assessment Report and Proposed Determination; and version 1.4.59 (referred to hereafter as FOIA OMEGA), which was the latest operative version as of mid-2018, and was provided to EDF in mid-2020 pursuant to a FOIA request and ensuing litigation.50

PD OMEGA is fully documented by EPA and has been used to support the mid-term review of the original MY 2022-2025 GHG standards. It includes a slightly broader range of GHG control technology relative to FOIA OMEGA, particularly the inclusion of Miller cycle engines.

The GHG effectiveness estimates for control technology in PD OMEGA are based on EPA's Lumped Parameter Model (LPM), which accounts for overlap between the GHG control effectiveness of individual control technologies. The LPM estimates are supported by EPA's Advanced Light-Duty Powertrain and Hybrid Analysis ("ALPHA") model, which is a full vehicle simulation model. EDF also has access to a version of PD OMEGA which includes cost and GHG control effectiveness adjustments made by ICCT.51 These adjustments were developed based on direct interactions with automakers and technology suppliers. PD OMEGA utilizes a MY 2015 vehicle fleet as its baseline vehicle fleet, which is now fairly dated.

FOIA OMEGA utilizes a 2016 vehicle fleet as its baseline, one year newer than PD OMEGA. Its GHG effectiveness estimates for control technology are based solely on EPA's ALPHA model. ALPHA is a full vehicle simulation model which allows the effect of control technology to be assessed on a second-by-second basis during actual on-road driving simulation. In general, FOIA OMEGA's technology costs are identical to those in PD OMEGA, except in one case: Its costs for cooled exhaust gas recirculation are much lower than those in PD OMEGA and very close to those estimated by ICCT. However, FOIA OMEGA omits the consideration of Miller cycle engines, presumably due to the contemporaneous lack of an engine map for ALPHA assessment (such a map is now available). Miller cycle engines are an important aspect of mild hybrid systems. EPA highlights the benefits of Miller cycle engines in the Draft RIA for the current Proposal (pp. 2-11ff). Thus, its absence in FOIA OMEGA (and in the CAFE model used by EPA for its current Proposal) significantly raises the average cost of meeting GHG standards in the range being evaluated here. There is also no updated documentation for FOIA OMEGA. Only the model itself and the pre-processing spreadsheet were provided to EDF as part of EPA's response to the FOIA request. [EPA-HQ-OAR-2021-0208-0688-A1, p. 26-27]

Off-Cycle Control Technologies and Multiplier Credits

We evaluate both the reference and the EPA's Proposed Standards case using two approaches to off-cycle control technology. The 2020 Rule provides manufacturers with a menu of off-cycle control technologies and their individual credits, and manufacturers are allowed up to 10 g/mi off-cycle credits from the technologies listed in the menu. The California Framework Agreement includes up to 15 g/mi off-cycle credits from the technologies listed in the menu. Starting in MY 2023, the EPA Proposal also allows up to 15 g/mi off-cycle credits.

One approach assumes that manufacturers only have access to 3 g/mi off-cycle controls, which is how OMEGA applies off-cycle controls notwithstanding the higher levels allowed by the various standards described above. The cost of these 3 g/mi is contained in PD OMEGA and FOIA OMEGA and applied whenever it is necessary and cost effective to comply with the GHG standards, as is the case with all other control technologies. The remainder of the requisite GHG reductions is accomplished using 2-cycle tailpipe control technology. [EPA-HQ-OAR-2021-0208-0688-A1, p. 27]

Since PD OMEGA and FOIA OMEGA both internally considered the application of 3 g/mi offcycle control, we only added 7 g/mi under the 2020 Rule's standards, for a total of 10 g/mi of off-cycle control, as allowed under these standards. Under the California Framework emissions reductions and EPA Proposed Standards, we added 12 g/mi off-cycle control outside of the model, for a total of 15 g/mi off-cycle control. By comparing the projected technology cost using the two approaches, we can evaluate the cost effectiveness of the external off-cycle controls relative to other available control technology.

We only evaluated the technology cost of the 10 g/mi alternative in 2026 under the first approach to off-cycle controls. That is, off-cycle credits are limited to the 3 g/mi level included in the PD OMEGA and FOIA OMEGA input files. No additional off-cycle credits are considered, as these controls were not found to be as cost effective in the analyses of the Proposed Standards.

OMEGA does not allow the simulation of advanced technology vehicle multiplier credits. Thus, we model both the California Framework reductions and EPA's Proposed Standards with no advanced technology vehicle multiplier credits. [EPA-HQ-OAR-2021-0208-0688-A1, p. 28]

Table 8 presents technology costs with and without an external addition of off-cycle controls (in the latter case, 7 g/mi under the 2020 Rule standards and 12 g/mi under the California Framework Agreement and EPA's Proposed Standards.) Technology costs are presented for cars and trucks separately, as well as for the entire new vehicle fleet. The car/truck splits of the MY 2015 and MY 2016 baseline fleets differ, and both differ from the current mix of vehicles. Because of this, we show fleetwide costs resulting from the OMEGA and CAFE models as well as a second fleetwide cost using the new car/truck sales split from AEO2021 (40% cars). [EPA-HQ-OAR-2021-0208-0688-A1, p. 29] [Table 8 can be found on p. 29 of Docket number EPA-HQ-OAR-2021-0208-0688-A1]

Relative Cost Effectiveness of 2-Cycle Versus Off-Cycle Controls

EDF's OMEGA analysis confirms that EPA over-estimated the technology cost for the Proposal by assuming manufacturers would add up to 15 g/mi off cycle controls at an inflated cost of $76 per g/mi in both its reference case and control case. In the final rule, EPA should decrease the assumed cost of off-cycle controls and re-evaluate the level of off-cycle controls applied.

EPA added off-cycle controls to each of their runs of the CAFE Model used in the Proposal. Ten g/mi off-cycle controls were added to the 2020 Rule's standards (and the standards for MY 2020). Fifteen g/mi off-cycle controls were added to the reductions under the California Framework and EPA's Proposed Standards. These off-cycle controls were assumed to cost $76 per g/mi. The CAFE Model adds the cost and effectiveness of these off-cycle controls before it begins its process of evaluating and adding 2-cycle emission control technology. (As an aside, the CAFE model's fuel-savings calculations do not reflect that these off-cycle controls reduce fuel consumption.)

Table 9 demonstrates the impact of imposing these off-cycle controls on the projected technology costs of the 2020 Rule's standards, the California Framework Agreement, and the Proposed Standards. Fleetwide costs (cars and trucks, Framework and non-Framework manufacturers) are shown in all instances for simplicity. [Table 9 can be found on p. 30-31 of Docket number EPA-HQ-OAR-2021-0208-0688-A1]

Starting with the 2020 Rule's standards for MY 2026, the assumption that manufacturers will apply 7 g/mi off-cycle controls at a cost of $534 increases total compliance costs by over $400. In other words, achieving the additional 7 g/mi of GHG control via 2-cycle technology only costs about $100 across the three models. Since manufacturers are applying a significant level of offcycle controls currently, the $76 per g/mi GHG assumed in the CAFE modeling must be too high.

Moving to the emissions reductions expected in MY 2026 for automakers that entered into the California Framework Agreement, the application of 12 g/mi off-cycle controls at a cost of $916 increases total technology costs by $500 using EPA technology costs and $700 using ICCT technology costs and effectiveness. Again, achieving the 12 g/mi of GHG control via 2-cycle technology only costs a fraction of the assumed cost of off-cycle controls ($200-$400 versus $900).

Finally, under EPA's proposed MY 2026 standards, the application of 12 g/mi off-cycle controls at a cost of $916 increases total technology costs by $430-$450 using EPA technology costs and $670 using ICCT technology costs and effectiveness. Again, achieving the 12 g/mi of GHG control via 2-cycle technology only costs a fraction of the assumed cost of off-cycle controls ($250-$500 versus $900). Accordingly, we encourage EPA to lower its projected costs of adding off-cycle technologies. [EPA-HQ-OAR-2021-0208-0688-A1, p. 30-31]

EDF used OMEGA to project the technology cost of standards for MY 2026 that were 10 g/mile lower than the MY 2026 levels proposed. OMEGA modeling confirms the feasibility of such standards. Using EPA's technology costs, compliance with the 10 g/mi alternative would cost $502-$529 more per vehicle than EPA's projected cost for the Proposed Standards. Using

ICCT's technology costs and effectiveness values, the fleetwide average cost of the 10 g/mi alternative relative to EPA's projected cost for the Proposed Standards is only $245 per vehicle.

Both sets of additional costs are lower per g/mi of GHG control than the off-cycle controls assumed by EPA in its modeling.

Because available OMEGA input files use dated, and thus inaccurately high, costs for vehicle electrification, the model does not convert many, if any, vehicles powered by internal combustion engines (ICEVs) to ZEVs under the range of standards evaluated here, despite dramatic changes in the marketplace and automakers' announced plans to introduce new ZEV models. Accordingly, EDF has also conducted an analysis of the role of vehicle electrification outside of the model for this scenario. Our analysis shows that BEVs are likely to be the most cost-effective pathway to compliance with GHG emission standards in the 2026-2028 timeframe. Vehicle electrification could enable compliance with the 10 g/mi alternative at very low to negative costs.52

Table 10 presents the projected incremental technology costs of EPA's Proposed Standards and the 10 g/mi more stringent MY 2026 alternative versus the reference case. Due to the outdated high costs for vehicle electrification assumed in both versions of OMEGA, the projected levels of vehicle electrification in these OMEGA runs was very low. The cost of complying with the 10 g/mi alternative using battery electric vehicles (BEVs) is addressed in the last section below. [Table 10 can be found on p. 32-33 of Docket number EPA-HQ-OAR-2021-0208-0688-A1]

As can be seen in Table 10, the two OMEGA models with EPA technology costs and effectiveness project roughly similar costs for the 10 g/mi alternative relative to the reference case ($1,306-1,416), as well as relative to the Proposed Standards ($502-$529). Based on these models, compliance with the 10 g/mi alternative is only $246-$356 more than EPA's projected cost for the Proposed Standards ($1,306-$1,416 less $1,060). As with the Proposed Standards, the FOIA version of OMEGA projects slightly higher costs than PD OMEGA. We again attribute this to the absence of Miller cycle engines in this version of OMEGA and possibly the difference in the baseline fleet used in the two model versions.

As was the case with the Proposed Standards, projected compliance costs are much lower with the ICCT technology costs and effectiveness values. The fleetwide average cost of the 10 g/mi alternative relative to the reference case decreases to $730 per vehicle and only $245 compared to the Proposed Standards.

One important factor in all the OMEGA-based costs shown in Table 10is that they include a maximum of 3 g/mi off-cycle credits. EPA's estimate of the cost of 1.5-3 g/mi of off-cycle emission control embedded in the PD and FOIA OMEGA input files is only $50-56 per g/mi, one-third less than the $76 per g/mi 2020 Rule estimate utilized by EPA in this Proposal (taken from the 2020 Rule analysis). Still, even at this lower cost, PD OMEGA projects that only 1% of vehicles receive the lower 1.5 g/mi level of off-cycle controls and 10% receive the higher 3.0 g/mi level of control.

At the same time, as shown in the 2020 Trends Report, manufacturers have already qualified for an average of 5 g/mi off-cycle controls for cars and nearly 10 g/mi for trucks in MY 2019. Manufacturers only add off-cycle controls if they are cheaper than 2-cycle tailpipe controls. This indicates that the cost of off-cycle controls must be far less than even that assumed by EPA in the OMEGA model versions we are using and that in fact the models undervalue off-cycle control compared to 2-cycle emission control technology. Since the overall cost of compliance was less in MY 2019 than it will be in MY 2026, had we added additional off-cycle controls at costs competitive in MY 2019, the compliance costs projected here would be much lower than shown. At the same time, the incremental costs of the 10 g/mi alternative over the Proposed Standards is still much less than the cost of off-cycle controls assumed by EPA in its analysis of the proposed rule. As described above, EPA projected in its Proposal that manufacturers would add 15 g/mi off-cycle emission controls at a cost of $76 per g/mi. PD OMEGA using ICCT technology costs and effectiveness levels projects that an additional 10 g/mi of GHG control would cost $250, or $25 per g/mi CO2. This is only one-third the cost of off-cycle controls which EPA assumed all manufacturers would deploy. PD OMEGA and FOIA OMEGA with EPA costs and effectiveness values project that an additional 10 g/mi of GHG control would cost $500-$530, or $50-$53 per g/mi CO2. This is two-thirds the cost of off-cycle controls which EPA assumed all manufacturers would deploy. Thus, the incremental cost of the additional 10 g/mi of GHG control is far more cost effective than technology which EPA assumed the industry would employ under the Proposal.

As mentioned above, the battery costs assumed in all of the OMEGA input files are many years out of date and therefore much too high. As a result, even FOIA OMEGA adds fewer than 1% ZEVs to the fleet in the above compliance simulations. The potential for electrification to further facilitate compliance with the 10 g/mi scenario is addressed below. [EPA-HQ-OAR-2021-0208-0688-A1, p. 31-34]

The results are shown in Table 11. The average cost shown is weighted 40% cars, 26% CUVs, 22% SUVs and 11% pickups, which was the vehicle split in the U.S. developed by ICCT. The 40% car fraction is consistent with AEO2021. The BEV300 costs shown include indirect costs and can be taken as representative of a typical retail price equivalent cost though do not account for any consumer tax incentives. Negative numbers in this table reflect that the cost of an ICEV exceeds the cost of a BEV300. [Table 11 can be found on p. 35 of Docket number EPA-HQ-OAR-2021-0208-0688-A1]

As can be seen, the average cost of a MY 2026 BEV300 exceeds the average cost of a MY 2026-compliant ICEV by less than $1000; the costs reach parity in MY 2027; and the BEV300 is $350 cheaper than the MY 2026 ICEV in MY 2028, again without considering any consumer tax incentives.

BNEF projects vehicle cost parity in Europe are even earlier, ranging from MY 2025-2026 depending on market segment.55 Again, focusing on the fleetwide average cost of a BEV300 is conservative, as the highest selling BEVs in the U.S. thus far are cars and CUVs, although Ford has announced that it will produce a BEV version of its popular F150 pickup in the spring of 2022.

Even at $971, a BEV300 is far more cost effective than additional ICEV emission control. In the Proposal, EPA projected a fleetwide GHG level of 171 g/mi under the proposed 2026 standard. Thus, a manufacturer would only need to sell 5.8% more BEVs under the 10 g/mi alternative than the proposed standard to comply with the former. On a fleet average basis, these BEVs would cost $57 per vehicle, much lower than the $245-$529 shown in Table 10. [EPA-HQ-OAR-2021-0208-0688-A1, p. 35]

Commenter: International Council on Clean Transportation

Off-Cycle credit cost: The agencies use an arbitrarily and unrealistically high estimate of off-cycle credit costs in their compliance modeling. In the 2016 TSD, EPA did not assess 'particular off-cycle technologies or their costs and credits,' but used an OMEGA sensitivity run for two-cycle technologies as a proxy. Specifically, EPA used the OMEGA model to estimate the average cost to comply with the previous standards (with a then-projected CO2 target of 199 grams CO2 per mile in 2025) under the 'Perfect Trading' run (which treats the entire U.S. Fleet as one manufacturer). In that case, EPA found that the cost per g/mi reduction was $34. EPA also then made a second increment of off-cycle credits available in the model. To calculate the cost for these credits, EPA increased the price premium from 30 percent to 60 percent. EPA did not offer any justification for using projections of the cost to comply with the 'Perfect Trading' sensitivity run or for the 60% cost premium. In fact, the use of off-cycle credits for compliance demonstrates that off-cycle credits are more cost-effective than test cycle technologies, not less.

For additional information see: Joint NGO 2020 Reconsideration Petition, pages 50-56 [EPA-HQ-OAR-2021-0208-0522-A1, p. 9]

Off-Cycle credit cap revision

EPA revised the off-cycle credit caps from 10 g/mi in the SAFE rule to 15 g/mi in the proposed rule. This would be fine if off-cycle technologies were treated the same as on-cycle technologies when determining the next incrementally most cost-effective technology to add to a vehicle. However, the model used by EPA for the proposed rule arbitrarily forces manufacturers to add off-cycle technologies to the 15 g/mi cap before evaluating the addition of on-cycle technologies. These off-cycle credits are valued at $78/g/mi, or almost $400 for the 5 g/mi increase in the cap. Even Tesla is charged this $400 cost premium, which can be seen in the Tesla valuation in Table 4-16 of the DRIA. [EPA-HQ-OAR-2021-0208-0522-A1, p. 16]

As many on-cycle technologies can reduce CO2 emissions at far less cost, arbitrarily forcing high cost off-cycle credits on manufacturers increases the cost of complying with the proposed rule by well over $200 per vehicle. This should be fixed in the final rule by (1) revising the cost for off-cycle credits to a reasonable level and (2) revising the model to treat off-cycle technologies the same as on-cycle technologies, i.e. both should be evaluated for inclusion based on their relative cost effectiveness. If EPA lacks the time and resources to fix this in the final rule, at a minimum EPA should acknowledge that this overstates the costs of complying with the standards and commit to fixing it in future rulemaking. [EPA-HQ-OAR-2021-0208-0522-A1, p. 16]

Commenter: New York State Department of Environmental Conservation

We have known since 2016 that standards comparable to those EPA is proposing can be met with existing technology. In that year, the Draft Technical Assessment Report on the Midterm Evaluation of Light-Duty Vehicle Greenhouse Gas Standards and CAFE Standards for MY 2022-2025, conducted in collaboration by EPA, National Highway Traffic Safety Administration, and California Air Resources Board (CARB), concluded that the MY2022-2025 standards could be achieved using 'advanced gasoline vehicle technologies with modest penetrations of lower cost electrification and low penetrations of higher cost electrification.' GARB also noted that emerging technologies likely to be available in the 2022-2025 timeframe could perform better, or be lower cost, than the technologies modeled in the assessment and that vehicle manufacturers have a history of outpacing agency expectations and are likely to continue to do so. [EPA-HQ-OAR-2021-0208-0238-A1, p.2]

Commenter: Securing America's Future Energy

Reevaluate Baseline Market Expectations

In the analysis supporting the rule, EPA assumes an even split of the vehicle market between cars and trucks.[63] EPA's own analysis indicates that trucks already represented 60 percent of the market for new light-duty vehicles in 2019, a share that has been growing steadily for years.[64] This reflects the fact that the three domestic automakers have narrowed their selection of sedans to just a handful of cars in contrast to a full line of crossovers, SUVs, and pickup trucks.[65]

Because the emission reductions achieved by the rule are a function of the ratio of cars to trucks that automakers sell, overestimating the market share of cars versus trucks will overstate the potential benefits of the rule. While that will not affect the actual stringency of the rule, it would result in EPA overstating the likely effect of the rule in public pronouncements, suggesting that the rule will achieve greater emission reductions than are reasonably likely to happen. EPA should adjust its assumptions to more accurately reflect market forecasts. [EPA-HQ-OAR-2021-0208-0527-A1, p.17]

Organization: **Stellantis**

Agency Modeling Compounds Stringency Increase of Redefinition

Since the agencies' Regulatory Impact Analysis (RIA) assumed manufacturers earned 15 g/mi of off cycle credit, and did not assess the actual ability to achieve 15 g/mi, this action acts as a de facto stringency increase. While the RIA applies 15 g/mi to all manufacturers from MY2023-2026, it is not possible to achieve this cap for several reasons.

First, electric vehicles cannot claim many of the 'ICE-specific' credits and with a growing number of EVs from all manufacturers, this becomes a growing constraint. Second, manufacturers will lose their ability to claim many existing off-cycle credits without product redesigns that are outside the scope and timing of this rule as noted by EPA in the proposed rule:

‘At this time no manufacturer has introduced an exhaust waste heat exchanger to be used to warm up the engine or transmission. The systems in use are engine-coolant loop-based and are taking heat from the coolant to warm-up the engine oil and transmission fluid.’ 23

Per EPA’s acknowledgement above, manufacturers would need to redesign their products to claim the warm-up credits and the same is true of passive cabin ventilation. It will take many years of lead time for these new designs to be developed, validated, and introduced across the fleet. The active warm-up and passive cabin ventilation credits represent a large portion of currently claimed off-cycle credits (worth as much as 8.7 g/mi) that will no longer be available in MY2023 with existing technology.

Consequently, the 15g/mi contribution assumed in the RIA from off-cycle credits cannot be achieved. This needs to be reflected in the modelling, so that other offsetting technology levers (e.g., electrification) can be pulled to more accurately reflect the technology and cost needed for fleet compliance.

EPA Response

In response to comments about our benefit-cost analysis, EPA follows applicable guidance and best practices when conducting its benefit-cost analyses, including OMB Circular A-4, EPA’s Guidelines for Preparing Economic Analyses. For information on EPA’s estimates of monetizing GHG reductions see Section 14.1 of this Response to Comments document and Chapter 3.3 of the RIA. We consider our analysis methodologically rigorous and a best estimate of the projected benefits and costs associated with the final rule.

We address comments regarding fuel savings in Section 17.

We address comments pertaining to energy security in Section 19.

EPA agrees with the commenters that the initial analysis fleet is important. In the analysis for the final rule, EPA has updated the initial analysis fleet from a MY 2017 based fleet (having a 50/50 split of cars and trucks) to a MY 2020 based fleet (having a 44/56 percent split of cars and trucks).

EPA agrees with EDF, ICCT, Stellantis and other commenters that the off-cycle costs and the off-cycle modeling approach used in the proposed rulemaking could be improved. In response to the comments, EPA has made updates to the off-cycle credit modeling approach for the final rule. In addition, Stellantis argued that the 15 g/mi off-cycle credit cap could not be achieved and that our modeling should reflect that. While EPA believes that some OEMs may in fact use the opportunity under the off-cycle credit cap to reach the 15 g/mi cap for MY2023-2026, our modeling analysis does not project usage of off-cycle credits greater than 10 g/mi. This is discussed in RIA 4.1.1.1 where we describe our updated cost estimates for each gram per mile of off-cycle credit and our updated modeling approach.

13.1. Modeling Approach using CAFE Model, including Modeling Inputs/Assumptions

Commenters Included in this Section

Alliance For Automotive Innovation
Alliance for Vehicle Efficiency (AVE)
American Enterprise Institute (AEI)
American Honda Motor Company (Honda)
BorgWarner Inc.
California Air Resources Board (CARB)
Center for Biological Diversity, et al.
Center for Climate and Energy Solutions (C2ES)
Consumer Federation of America
Consumer Reports (CR)
DENSO International America, Inc. (DENSO)
Environmental Defense Fund (EDF)
Kreucher, Walter
Michalek, Jeremy and Whitefoot, Kate S.
National Coalition for Advanced Transportation (NCAT)
Peterson, Doug
Rivian Automotive, LLC
Toyota Motor North America, Inc. (Toyota)
Union of Concerned Scientists (UCS)
Zero Emission Transportation Association (ZETA) and EVHybridNoire (EVHN)

Commenter: Alliance For Automotive Innovation

The Need for Updated Tools and Modeling Inputs

EPA uses many outdated datasets, assumptions, and tools in its analysis supporting the GHG NPRM. Its choices significantly lower the projected challenges of meeting the proposed standards and inflate the projected benefits. These older inputs are used despite new data, based on credible information, like recently submitted greenhouse gas compliance data. This is readily available within the U.S. Federal Government, as demonstrated by NHTSA's CAFE NPRM, which was signed on the same day as the GHG NPRM.

The GHG NPRM states that:

[I]t is notable that, although each analysis is based on projections from the then-available fleet data forward to model years 2025 or 2026, the results of each of these earlier analyses, as well as the updated analysis we have performed for our proposed standards, have all produced very similar results in several key metrics. For example, the estimated projected cost to manufacturers to implement similar standards in 2025–2026 has remained fairly consistent since 2012.143

Auto Innovators does not agree that updated analysis produced similar results. Key metrics, such as the portion of the fleet that must be electrified to comply with standards, have changed with reasonably updated assumptions.

EPA should make use of the most recent version of CCEMS.

EPA uses the version of CCEMS developed for use in the SAFE final rule with some modifications to its inputs.144 The Department of Transportation has developed a more recent version of CCEMS, which it used for the CAFE NPRM.145 It is unclear why the Agencies did not coordinate and use the same version of CCEMS. By using an older model, and older data, EPA ignores many recommendations highlighted in the peer review of modeling tools for GHG policy analysis.146

The baseline fleet should be updated from MY 2017 to MY 2020.

The EPA analysis begins with a MY 2017 fleet,147 even though a reasonable representation of manufacturer compliance positions and vehicles is available with the MY 2020 fleet.148 While some updates to the characterization of tire rolling resistance, aerodynamic drag, and other fuel saving technologies may yet need additional characterization to more accurately reflect the technologies used in MY 2020, the MY 2020 fleet is preferred over the MY 2017 fleet as a baseline for compliance modeling. Using the MY 2020 fleet will account for important shifts in consumer preferences related to fuel prices, and adoption of fuel-saving technologies (like advanced engines, and electric vehicles), as well as significant changes to the mix of vehicles sold at an industry level. These changes substantively affect the benefit-cost analysis, and the projection of actions manufacturers may take to comply with a rapid increase in stringency of GHG and CAFE standards. Analysis using a MY 2020 baseline fleet will also highlight the importance of electrification in meeting standards and lay bare the risks for the industry as adoption of electrified technology moves beyond the “innovator” stage, to “early adopters” and “early majority” consumers. Use of electrified vehicle technology is a key metric for policy analysis, as highlighted in President Biden’s Executive Order targeting 50% electric vehicle sales share in 2030.149,150 [EPA-HQ-OAR-2021-0208-0571-A1, p. 47-48]

Off-cycle credit assumptions should be reconsidered.

Technologies that earn off-cycle credits are an important pathway for manufacturers to comply with GHG and CAFE standards. The EPA analysis assumes that manufacturers earned 10 g/mi, or even 15 g/mi by MY 2020,151,152 but compliance data shows that this was not the case.153

Furthermore, the costs for off-cycle technologies used in today's study are based off an average technology cost from an older EPA compliance pathway study, conducted around the time of the Draft Technology Assessment Report. An analysis with compliance pathways that rely significantly on a rapid adoption of off-cycle technologies, at a cost pegged to the output average technology cost of older studies, would be expected to skew the results of the current analysis towards those of the older analysis. Also, it is important to recognize that many off-cycle technologies on the credit menu are specific to vehicles with ICEs, and these may not be applicable for battery electric vehicles, or plug-in hybrid vehicles. As manufacturers introduce significant numbers of battery electric vehicles in their production plans to meet GHG/CAFE standards, especially towards the MYs 2026-2030 timeframe, EPA does not describe what off-cycle technologies might be recognized to earn 15 g/mi at a fleet level, with a raised cap and greater EV penetration.

Auto Innovators encourages EPA to update how off-cycle technologies are modeled to better address these topics above. Auto Innovators encourages EPA to update the number of off-cycle credits assumed in the analysis so that it more closely aligns with what manufacturers have actually earned in MYs 2018-2020 and are likely to earn (particularly with the proposed revised definitions) in MYs 2021- 2026. This update to inputs is more realistic (though imperfect) and will likely highlight the significant amount of electrification needed to comply with rapidly rising GHG and CAFE standards, including in the near-term.

Modeling of HCR2 engines should be reconsidered.

For this NPRM, EPA has resurrected highly optimistic effectiveness estimates for future Atkinson cycle engines based on a speculative engine map, and has used the results as "HCR2" technology. This usage diminishes the integrity of the analysis and distorts discussions of technological feasibility and economic practicability of future standards. While some commenting organizations have purported that EPA's 2016 characterization of HCR2 is a reasonable characterization of engines in the market today, like Toyota's 2.5L on the Camry and RAV4,154 or Mazda's 2.5L on the CX-5,155 history has shown that the HCR2 assumptions used in the analysis significantly and unreasonably overestimate the real-world fuel saving capability of state-of-the-art Atkinson engine technology in these applications. The EPA HCR2 engine map assumes engine accessory drive improvements ("IACC") and engine friction reduction ("EFR") have already been used to the maximum extent possible, so reapplying these technologies again in the modeling (as the EPA analysis does) incorrectly double-counts the potential effectiveness of these technologies. EPA incorrectly states that HCR2 technology, as modeled, exists in the fleet and is widely available for adoption. Tables 3, 4, and 5 [Tables 3, 4, and 5 can be found on p. 50-51 of Docket number EPA-HQ-OAR-2021-0208-0571-A1] below compare existing vehicles with advanced high-compression ratio engines to the modeled results for such vehicles, demonstrating the optimistic and speculative nature of the HCR2 technology modeling. [EPA-HQ-OAR-2021-0208-0571-A1, p. 49-50]

EPA projects that manufacturers will broadly apply HCR2 technology to improve fuel economy, and this is no surprise given the unrealistically high projected effectiveness estimates, and relatively low cost in comparison with other technologies. Moreover, EPA projects that many manufacturers should have already applied very advanced configurations of HCR technology between MYs 2017 and 2022 to a greater extent than is observed in the fleet as actually produced.

Table 6 shows the technology penetration rates of HCR2 in the EPA analysis, by manufacturer, in the "Safe-to-Proposal" alternative published in EPA's NPRM, and the DOT 2020 baseline. Note, projected HCR0 penetration rates, also significant in the EPA analysis for many manufacturers, are not included in this table for brevity. [EPA-HQ-OAR-2021-0208-0571-A1, p. 51] [Table 6 can be found on p. 52 of Docket number EPA-HQ-OAR-2021-0208-0571-A1]

Batteries and Electric Vehicles

Batteries

Automotive-grade batteries will play a prominent role in many important fuel-saving technologies, and Auto Innovators encourages the Agencies to regularly review assumptions about batteries and high-voltage automotive systems.

Auto Innovators appreciates DOT's and DOE's continued collaborative effort to refine the BatPac model assumptions, considering battery chemistries, battery cell sizes, and battery pack architectures. Auto Innovators encourages continued benchmarking, teardown, and technical review of production systems, and the use of information to inform technical specifications of packs and estimates of current direct manufacturing costs that likely reflect the commercial state-of-the art as demonstrated by production vehicles. Given high levels of investment in research and development, and production processes, and the considerable uncertainty of what approaches will succeed or fail, it is possible that NHTSA's estimates of battery pack direct manufacturing costs (after learning factor) will be meaningfully low, or high in the MY 2027 timeframe and beyond.

EPA appears to use previous generation assumptions and battery costs from the SAFE Final Rule record, despite updated battery pack assumptions, and direct manufacturing cost assumptions being available for use in the DOT analysis.

To the extent that some manufacturers begin to vertically integrate and technically differentiate on battery systems, Auto Innovators encourages the Agencies to consider costs and specifications that are reasonable for the industry as a whole to inform policy analysis, and not to assume that intellectual property and proprietary production processes that have been the result of billions of dollars of research and development paid by one manufacturer will be readily available to all manufacturers. In the BatPac model, production volume can affect direct manufacturing cost estimates, and Auto Innovators points out that many battery cells vary (size, shape, chemistry) to suit the application. Even battery packs that share cells may require different housings and assembly processes, requiring separate production lines, resulting in economies of scale lower than would be projected if all these parts were the same. Total industry volumes of battery electric vehicles are not an appropriate volume assumption for BatPac. Auto Innovators recommends that EPA update their approach to that used in the DOT analysis to estimate battery costs for strong hybrids, plug-in hybrids, and battery electric vehicles, considering vehicle type and synergies with other fuel saving technologies. That analysis could be improved by using the BatPac results for BEV400's and BEV500's, instead of scaling up BEV300 costs.

Battery electric vehicles should be carefully considered in the GHG analysis

More battery electric vehicles have been stated as a policy objective by some state governments, and by executive order. The market is emerging, and there is considerable uncertainty around the types of battery electric vehicles consumers may adopt, their costs to build, their costs to charge and operate, and how they will be used. Policymakers should carefully consider what complementary programs may be needed to unlock to the projected benefits of this technology.

The EPA proposal considers battery electric vehicles with limited range (BEV200, BEV300), and in response to rapid increases in stringency, the analysis assumes a very large portion of the market may adopt vehicles with less range than comparable internal combustion engine vehicles. The DOT analysis considers that longer range battery electric vehicles (BEV400, BEV500, in addition to BEV200, BEV300) will be required to attract "early adopters" and "early majority" to these alternative fuel vehicles. BEV400 vehicles are already on the market and are necessary to meet the demands of some of the earliest battery electric vehicle adopters. Auto Innovators encourages EPA to include BEV400 and BEV500 in their analysis tool, and to adopt DOT phase-in caps from the CAFE NPRM in place of the phase-in caps used in the EPA proposal, as the EPA proposal likely overestimates the number of consumers who would accept BEV200's, especially given today's charging infrastructure. Even if there are more charging stations, rapidly adding energy to a small pack is difficult, and pack size may limit charge rate.160 Longer range means battery packs with more storage capacity, and more capacity generally means additional cost of equipment. Battery electric vehicles with larger packs are even more expensive relative to their internal combustion engine counterparts than their lower range siblings, taking longer to pay back the upfront investment based on fuel savings alone, which policymakers should carefully consider when designing consumer incentive programs and analyzing regulatory policies. Auto Innovators encourages the Agencies to regularly review assumed phase-in caps, and the market acceptance of vehicles with limited electric range for some segments (i.e., trucks and SUV's) as the market for battery electric vehicles and charging infrastructure mature.

Both the EPA and DOT proposals assume that EVs will be driven like their ICE counterparts, but early data suggest this is not the case. In each agency's analysis, benefits like fuel savings accumulate as miles are driven. The benefits of EVs could be overestimated (perhaps significantly so) if multi-vehicle households shift their mileage towards ICE vehicles and drive the EVs less than projected. The Agencies should review the data used to create vehicle miles traveled (VMT) assumptions, and study how EVs are accumulating miles over time relative to comparable ICE vehicles, and how these differences trend as the market for EVs matures. Coordinated policies and programs (like charging infrastructure) will be important to realize the benefits as projected with the current VMT schedules in the modeling tools, and to entice drivers to choose EVs for all kinds of trips, in all kinds of driving conditions.

Approach to Fuel Cost Savings

Energy savings associated with EVs.

In both EPA and DOT analysis, a large portion of the projected benefits are attributed to fuel savings, either from using less energy to travel the same number of miles, from switching to a lower cost fuel (electricity), or from a combination of both. At this time, there is a tremendous amount of uncertainty related to the future of the electricity grid, and electricity rates (both residential rates including transmission costs, and whatever rates that may be offered to consumers at public vehicle charging infrastructure). Researchers and scientists from National Renewable Energy Laboratory ("NREL") have highlighted challenges with integrating variable renewable energy generation into the electric grid beyond 30% generating capacity, with challenges including higher transmission costs, and costly overhead associated with storage and standby generation.161 Notably, states with higher portions of renewable electricity generation like Hawaii, California and Massachusetts also have some of the highest electricity rates in the country.162,163 Studies from the NREL have outlined how renewable power sources, such as solar, could be integrated into the electric grid to meet the nation's ambitious emissions goals, and these studies acknowledge that costs increase when the timing of electricity generation and electricity demand are not synchronized.164 Without public charging infrastructure, many EVs will be charged at night, at residences, when solar arrays are not generating electricity. EPA inputs estimate the cost of delivered electricity ($/kWh) as $0.122 in 2021, and $0.133 in 2040. DOT inputs estimate the cost of delivered electricity ($/kWh) as $0.121, and $0.120 in 2040. States with a larger percentage of renewable electricity generation typically have end-use rates 1.5 to 2.5 times higher than those assumed by the Agencies, with delivered costs ($/kWh) increasing as more renewable generating capacities are added. (Increases in transmission costs and increases in standby generating costs partially offset or exceed cost reductions of solar and wind generation). As the U.S. electricity generating industry transforms towards renewables, Auto Innovators urges policymakers to consider the possibility that electricity rates may be considerably more expensive relative to gasoline than projected in the GHG NPRM and CAFE NPRM analyses (as indicated by higher electricity rates in states that are already working toward renewable electricity generation), and this could significantly erode projected fuel savings and consumer demand for EVs. As the penetration rate of EVs increases, the projected electricity rates will become an important modeling input for assessing costs, benefits, and consumer adoption of EVs. Auto Innovators encourages policymakers to consider the possibility that electricity rates may double from 2021 to 2040 (in 2018$ terms) when considering policies for light-duty vehicle GHG and CAFE, and to use real-world data to inform an electricity price forecast.

Fuels and Benefit-Cost Analysis

Both EPA and DOT recognize fuel savings as significant in the benefit-cost analysis. These fuel savings accumulate to consumers based on assumed prices of fuel, fuel efficiency for combinations of technologies, and travel over the lifetime of the vehicle. Each analysis recognizes that independent of regulations, consumers will adopt fuel saving technologies that pay back quickly.165

Fuel prices vary significantly across the U.S. California has some of the highest gasoline prices in the country, often 50% higher than in other states with large automotive markets.166 Many manufacturers' sales vary significantly by region. Some manufacturers have higher sales concentrations in California and Section 177 states than other manufacturers, and this may affect corporate strategy and the incorporation of fuel-saving technologies on vehicles. Auto Innovators encourages policymakers to consider the importance of regional factors carefully before exporting California policy as a baseline for federal standards.

Both the EPA and DOT analysis use—and have used—forecasts from the U.S. Energy Information Administration for fuel prices in their central analyses. Over the last decade (as shown in Figure 4 below), these fuel price forecasts have significantly overestimated the national average price of gasoline, which has in turn overstated the projected benefits of increases in stringency and improving fuel economy for consumers in the near term. Over the last decade, the long-term price outlook for gasoline has steadily declined as well, both in the EIA forecasts, and in private sector forecasts. [Figure 4 can be found on p. 59 of Docket number EPA-HQ-OAR-2021-0208-0571-A1]

Interestingly, DOT included a sensitivity case for gasoline prices, as forecast by Global Insight. This is a credible source, alongside the EIA forecast. Both forecasts have a similar trajectory and values from 2022-2029, but they depart significantly in 2030 and beyond. Gasoline prices are volatile, and difficult to predict. Both EPA and DOT show U.S. consumption of gasoline decreasing significantly in the long term, as fuel efficiency of light duty vehicles improves in response to stringent alternatives, and as the fleet transitions towards electrification. Auto Innovators encourages policymakers to review the assumptions underlying the EIA gasoline price forecast, including assumed domestic consumption of fuel, and the extent to which plug-in vehicles are assumed to be adopted, and review the extent to which those assumptions are consistent with the policy objectives for light-duty vehicle electrification as stated in recent executive orders. If the EIA Central Case gasoline forecast assumes fewer than 50% plug-in vehicles by 2030, Auto Innovators encourages use of the Global Insight gasoline price forecast in the Central Case for both EPA and DOT analysis. To the extent that gasoline prices may remain low in the long-term (perhaps reflecting depressed demand for gasoline, as shown in both of the Agencies' analysis), consumers may require additional incentives to transition towards plug-in vehicles.

Many of the projected benefits of the proposal are backloaded, taking years for consumers, and society, to realize payback on fuel-saving technologies. If gasoline prices do not increase significantly in the 2030 and beyond timeframe, this would have significant bearing on the benefit-cost analysis, and the projected benefits of the proposed rule. Policymakers should carefully consider this possibility given the trends of fuel price forecasts over the last decade, and consumption projections.

Tools and Inputs for Compliance Modeling

Compliance modeling tools should simultaneously consider all federal and state regulations that significantly affect light-duty vehicle GHG emissions, fuel economy, and related technology mandates.

Auto Innovators supports the use of a compliance modeling tool that is capable of simultaneously modeling individual manufacturer compliance at the fleet (manufacturer, domestic car, import car, and light truck) level with the multitude of GHG and fuel economy regulatory requirements in the U.S. (including EPA GHG regulations, NHTSA CAFE regulations, CARB GHG regulations, CARB zero-emission vehicle regulations, and the California Framework Agreement). This is the challenge that manufacturers face in developing compliance plans—numerous similar, but not fully coordinated and harmonized regulations, all of which product plans must account for. While no presently available vehicle regulatory compliance modeling tool fully considers all of these requirements, the CAFE Compliance and Effects Modeling System ("CCEMS") comes closest for the time being. Therefore, we support use of CCEMS by EPA for modeling compliance, and urge the Agencies to jointly develop a tool that is more fully capable of considering all requirements.

The consumer-facing costs of the EVs should be included and shown as part of the anticipated increased costs of future vehicles.

Fully accounting for the costs of EVs in assessing the technology costs of GHG and CAFE regulations is becoming increasingly important. Simply assuming that other regulations such as the California ZEV mandate will create specific outcomes in isolation from EPA's own regulatory efforts— e.g., including them in a baseline or reference case—is a flawed approach. As noted above, manufacturers must plan simultaneous compliance with all regulations, and the technology decisions made for compliance with one also affect compliance with the others. Conducting the analysis in a way that assumes the costs of meeting other related regulations are incurred separately from compliance with the proposed GHG regulations will lead to under-reporting of expected vehicle cost increases associated with meeting the multitude of related standards simultaneously. We recommend that cost increases associated with the technology required to meet all of the related GHG, fuel economy, and technology-forcing regulations at minimum be shown as part of the consumer-facing costs (expected per-vehicle cost increases) over the regulatory period.

Insofar as the revised standards cause a reduction in engine-out emissions due to less combustion of gasoline, the amount of tailpipe emissions will not decline proportionately. The structure of the Clean Air Act and the EPA/CARB regulations define limits on tailpipe emissions of criteria air pollutants in terms of grams of pollution per mile. Vehicle manufacturers and their suppliers seek to fully comply with those standards on a least cost basis, since any unrequired expenditures on emissions control could place an individual vehicle manufacturer or supplier at a competitive disadvantage. If engine-out emissions are reduced due to the revised CAFE/GHG standards, vehicle manufacturers can adjust the design of their catalyst systems to reduce compliance costs while maintaining compliance with the gram-per mile standards. One way vehicle manufacturers and suppliers do this is by reducing the use of expensive coatings on the catalyst. Thus, from a technical point of view, the benefits of reduced engine-out emissions are not experienced in public health terms but in savings to manufacturers/suppliers and consumers in the costs of emissions control. Insofar as the Agencies seek to claim benefits from reduce engine-out emissions (due to greater fuel economy), they should estimate the savings in catalyst costs that result. While complex catalyst systems can add $200 to $400 to the cost of manufacturing a new vehicle, the incremental cost savings from the changes in coatings to catalysts will be only a small fraction of the total cost of the system. For the entire fleet, those savings will be a small fraction of the purported public health benefits that are currently claimed in the RIAs.

Coordination Between the Agencies' Analysis

While DOT and EPA use similar tools to conduct analysis, EPA is using an old version of inputs, with a few meaningful tweaks, to conduct the analysis. The differences are notable (Table 9). [Table 9 can be found on p. 61 of Docket number EPA-HQ-OAR-2021-0208-0571-A1] [EPA-HQ-OAR-2021-0208-0571-A1, p. 55-60]

Forecasts for conventional fuel prices are also uncertain. Despite recent rises in the price of gasoline, historically forecasts have overestimated the national average price of conventional fuels. We urge the Agencies to review the assumptions underlying the Energy Information Administration ("EIA") gasoline price forecast, and if the EIA gasoline price forecast assumes fewer than 50% plug-in vehicles by 2030 (the goal set by the Biden Administration), Auto Innovators encourages use of the Global Insight gasoline price forecast in the Central Case for both EPA and NHTSA analysis. Policymakers should carefully consider the possibility that gasoline prices will not increase significantly past 2030, and the impacts that would have on longer-term projections of private benefits from fuel savings. [EPA-HQ-OAR-2021-0208-0116]

Commenter: Alliance for Vehicle Efficiency (AVE)

• AVE urges EPA to consider the costs and risks to OEMs and technology suppliers associated with converting and expanding automotive supply chains to meet future standards as more ZEV vehicles are introduced into the marketplace. [EPA-HQ-OAR-2021-0208-0256-A1, p. 2]

Fleet Mix: AVE urges EPA to incorporate real-world sales data as forecasted by IHS Markit (below) to account for the historical changes in fleet mix since 2012. In 2012, EPA modeling predicted significant reductions in light truck sales:

"Between MY2008 and MY2025, the agencies' forecast [for light-duty truck sales] showed declines from 17.8% to 5.8% for Chrysler, from 14.5% to 12.0% for Ford, from 26.8% to 27.8% from General Motors, and from 58.3% to 44.5% for the aggregate of these three manufacturers."25 [EPA-HQ-OAR-2021-0208-0256-A1, p. 10; Table can be found at docket number EPA-HQ-OAR-2021-0208-0256-A1, p. 10]

IHS Markit predicts an additional 23% increase in light truck sales from the end of 2021 to 2026. Real-world modeling in the Proposed Rule will assist manufacturers with future planning to reflect consumer's vehicle choices.

Post-2026: As indicated in President Biden's August 5, 2021, Executive Order, EPA will soon embark on setting standards beyond 2026. As EPA looks to increase the stringency of these standards, the agency must foster innovation for multiple technology pathways that demonstrate feasibility and maximize the environmental benefits of all available technology. As technology solution providers, AVE members will help the U.S. reach its climate goals. [EPA-HQ-OAR-2021-0208-0256-A1, p. 10]

The U.S. light-duty marketplace of today is quite different from that of 2012 when EPA and NHTSA issued joint emissions and fuel economy standards. The challenges of the global marketplace have forced OEMs and technology suppliers to change the way they operate and invest in advanced vehicle technologies. Performance-based standards that reflect real world data, including LCA and upstream emissions, provides industry the best opportunity to compete globally while offering consumers reasonably-priced vehicles that will meet the U.S.'s carbon reduction goals.

EPA should also consider adjusting future standards to reflect the global pressures facing OEMs and technology suppliers if the United States is going to continue leading the world in producing advanced vehicle technologies for the next generation of vehicles. A single technology solution will not accomplish our goals and EPA should set standards that encourage as many solutions as possible.

AVE encourages EPA to use this rulemaking as an opportunity for regulators to provide certainty across the automotive industry, foster more U.S. jobs and innovation, and solidify the United States' position in the world as a leader in mobility innovation. [EPA-HQ-OAR-2021-0208-0256-A1, pp. 10-11]

Commenter: American Enterprise Institute (AEI)

• The EPA analysis of the value of refueling time savings for a vehicle fleet characterized by lower per-mile fuel consumption should be combined with a similar analysis for the time costs of recharging a larger fleet of electric vehicles. EPA fails to do so. [EPA-HQ-OAR-2021-0208-0254-A1, p. 2]

Commenter: American Honda Motor Company (Honda)

Base Year Fleet

The agency requests comment on its use of a MY2017 base year fleet, and whether it would be more appropriate to update the base year in the final rule to one reflecting the most recent year of final compliance data. The agency notes a history of seeking to use the most recent base year data available, though it suggests that base year selection has only modest impact on model results for the projected fleets:

When performing compliance analyses, EPA will often attempt to utilize the most recent base year data that is available as finalized compliance data, which at the time of this analysis was for

MY2019. It is important to note that because the model applies technologies to future vehicles for all alternatives being analyzed, including the ‘‘No Action’’ scenario, the vintage of the base year normally will not have a significant impact on the model results for projected fleets.19

It is Honda’s belief that selection of the base year fleet can have meaningful impact on modeling results, at least at an OEM-based level of granularity. Fundamentally, the base year defines the sets of technologies already applied in the market, and thus sets constraints regarding 'technology walks' to further emissions reductions. In other words, it defines the low-hanging fruit that are available for providing further improvement to the fleet. By selecting an overly dated base year fleet, the agency’s modeling could erroneously assume application of technology that, in reality, did not occur. Use of a MY2017 base year permits the modeling to apply 'imagined' technology to model years that have already passed, ignoring actual technology application decisions and potentially widening the gap between simulated results and what is achievable with the current vehicle fleet.

Figure 4, at right, illustrates this point at an industry level.20 Starting with a 2017 base year fleet, the agency projects technology application and market shift such that the simulated fleet in 2020 averages 222 g/mi, a 38 g/mi reduction over 3 model years (2018-2020). However, the actual 2020 fleet achieved 246 g/mi, 24 g/mi higher than what was derived via the NPRM simulations using the 2017 base year fleet. Figure 4 can be found at docket number EPA-HQ-OAR-2021-0208-0565-A2, p. 10]

This can also impact OEM-specific fleets. Consider, for example, the agency’s modeling of HCR1 and HCR2 engines in Honda’s fleet. As a result of the use of a MY2017 base year fleet, the computer model brings these engines into Honda’s fleet beginning in Model Year 2018. However, in reality, this did not occur. We are concerned that incorrectly modeled technology application choices can result in overly optimistic scenarios yielding fleet performance and credit banks that would not be possible had the base year been updated. Ultimately, this leads to greater potential for divergent findings between the agency’s estimated compliance costs and those facing a manufacturer.

Honda would like to better understand the agency’s position regarding baseline fleet selections and welcomes further dialogue on the topic. In the meantime, in response to the agency’s request for comment on this topic, we support use of a more recent baseline fleet, such as the MY2020 fleet utilized by NHTSA in its proposed rule. Doing so should have the added benefit of helping further align core agency assumptions, an important element of regulatory harmonization. [EPA-HQ-OAR-2021-0208-0565-A1, pp. 9-11]

Commenter: BorgWarner Inc.

Vehicles Sales Mix Assessment

We strongly encourage EPA to update their impact assessment based on the most-current actual and projected sales mix of trucks and cars, instead of the 50/50 split used in the analysis to date. The actual U.S. sales mix in 2020 and 2021 was 76% light trucks / 24% cars and 78% light trucks / 22% cars, respectively. Similarly, the 2022 forecast is 80% light trucks / 20% cars. The projected sales mix in 2026 is 83% light trucks / 17% cars. i Since the sales mix can dramatically impact modeling and conclusions in the regulatory rulemaking process, using real-world data is critical when setting meaningful and realistic standards. [EPA-HQ-OAR-2021-0208-0260-A1, p. 3]

Commenter: California Air Resources Board (CARB)

ZEV-Only Manufacturers Should be Fully Considered in Credit Modeling.

ZEV-only manufacturers effectively never have a need for the credits they earn under the GHG emission standards, as they can only over-comply. Such ZEV-only manufacturers earn significant credits per vehicle under the GHG standards given the large difference between the standard and the zero or near-zero emission level at which their vehicles are counted.

Further, the annual EPA Automotive Trends Reports show that ZEV-only manufacturers are active sellers of credits in the marketplace and many of the other manufacturers of conventional vehicles have been active purchasers of such credits. This history supports recognizing that future credits earned by ZEV-only manufacturers will likely be purchased and used by other manufacturers and should be included in subsequent modeling runs to better reflect likely compliance. Additionally, even though financial details of credit transactions are not disclosed, this history of credit purchase and usage shows that such credits are being acquired at lower cost than otherwise would be expended by the purchasing manufacturer to comply. Accordingly, U.S. EPA should endeavor to model the credit market as it exists, including that credits generated by ZEV-only and other manufacturers are sold to lower the overall compliance costs of the standards, rather than only modeling each manufacturer’s credits and compliance strategy in a silo. [EPA-HQ-OAR-2021-0208-0643-A6, pp. 33-34]

Zero-Emission and Electrification Technology Supports Alternative 2.

CARB agrees with U.S. EPA that more stringent standards can be met with advanced gasoline vehicle technologies already in vehicles on the road and zero-emission and electrification technologies that continue existing manufacturer trends.93 In addition to conventional technologies, U.S. EPA correctly recognizes the breadth of public announcements, resource commitments, and projections to incorporate zero-emission technology extensively, and in many contexts exclusively, into vehicles.94 The Revised 2023 and Later Model Year Light Duty Vehicle GHG Emissions Standards Draft Regulatory Impact Analysis (DRIA) in section 2.3.3, beginning at page 2-13, discusses manufacturer plans for zero-emission technologies, investments, and vehicle models.

CARB reaches the same conclusions based on the information it has reviewed. The trend towards zero-emission technology is well underway. In 2020, 8% of new vehicle sales in California were ZEVs and PHEVs. As CARB explained in its comments to U.S. EPA on its proposal to restore California’s waiver for its GHG and ZEV standards, manufacturers are expected to increase ZEV production. Manufacturers have invested heavily in zero-emission technology, reduced its costs, greatly improved its capability, and made tangible, public commitments to new vehicles. Nationally, between August 2020 and August 2021, sales of vehicles with zero-emission technology, whether battery-electric, fuel cell, or plug-in hybrid, went from 2.1% to 4.0%,[95] and were 5% of sales in July 2021.[96] Scrutiny of credits generated by ZEV-only manufacturers indicates that current sales of ZEVs are higher than U.S. EPA estimates, which further supports the feasibility of the proposed standards and Alternative 2 specifically.

Accordingly, CARB recommends that U.S. EPA utilize a newer baseline than the 2017 model year used in the analysis for the proposal. Notably, Tesla is the largest ZEV-only manufacturer and is listed in the baseline market input files used by U.S. EPA as having nationwide sales of less than 50,000 vehicles. However, Tesla has substantially increased sales since 2017 with the expansion from two to four vehicle models, including the more popular Model 3. In the 2020 model year baseline market input file used by NHTSA in its recent proposal to revise the fuel economy standards for model years 2024 through 2026, Tesla's nationwide sales are listed as nearly 200,000 vehicles, an approximate four-fold increase.[97] Tesla also has publicly announced plans for production of a roadster model and a truck application and U.S. EPA has also recently certified models from both Rivian and Lucid Motors adding support for including some representation of growth in sales (and corresponding credits) from ZEV-only manufacturers in future modeling analysis.

Looking ahead at other manufacturers, the annual alternative fuel vehicle projections submitted to CARB to assist with infrastructure planning predict increasing ZEV sales. These reports include three- to five-year future model year sales projections for battery electrics, plug in hybrids, and hydrogen fuel cell vehicles. Based on this data, new vehicle sales in California of ZEVs and PHEVs are projected to reach 25% by 2023.[98]

This prediction is corroborated by manufacturer projection they will increase their number of available models to at least 82 by model year 2023. Ford Motor Company, General Motors, and Stellantis announced on August 4, 2021, in support of this proposal, a goal for 40-50% US ZEV sales by 2030.[99] Ford followed up with plans to double its production target of the Lightening full-size electric pickup truck.[100] Nissan has announced 40% of their US sales will be BEVs by 2030.[101] Audi also recently announced its new corporate strategy, 'Vorsprung 2030', which states that the company will introduce its last new combustion engine product in 2026, and completely phase out its internal combustion engines by 2033.[102]

Sales are also expected to increase because vehicles will better meet consumer needs and at lower costs. Several start-up manufacturers have product releases imminent that are pushing vehicle range even higher with greater vehicle utility. Rivian’s R1T pickup truck and R1S SUV are expected to start shipping in September of this year.[103] Lucid’s Air sedan is expected to ship in the second half of this year.[104] The company has also shown a concept SUV based on the Air’s platform that is planned to go on sale in 2023.[105] Those vehicles reflect 'clean-sheet' design approaches that take full advantage of the integration and design opportunities that a dedicated BEV platform can provide. The Rivian models have options for over 400 miles of range and the Lucid Air will offer over 500 miles.

U.S. EPA also requested comment on how it should treat California's GHG and ZEV standards here.80 For the reasons explained in its comments on that proceeding, CARB urges EPA to quickly reverse its SAFE 1 actions. Assuming EPA does so before it finalizes these standards, it would be reasonable for EPA to model compliance, manufacturer costs, and development of technology to meet its final standards from a no-action baseline that includes California's greenhouse gas emission and zero-emission vehicle standards in those states in which they would then be in effect. [EPA-HQ-OAR-2021-0208-0643-A6, pp. 29-30]

Commenter: Center for Biological Diversity, et al.

Relative to the 2020 Final Rule, EPA has made several improvements to its modeling of GHG standards, making its analysis more reasonable and accurate. These include allowing high-compression ratio level 2 technology (HCR2) to be used in modeling automakers' potential compliance pathways under the standards, Proposal, 86 Fed. Reg. at 43,769,74 as well as using global social cost of carbon values instead of domestic values, id. at 43,769.75 However, EPA's modeling and analysis still includes inputs, assumptions, and methodologies that overstate the costs and understate the benefits of more stringent GHG standards. [EPA-HQ-OAR-2021-0208-0651-A1, p. 29-30]

EPA's simplified calculation of consumer costs likely understates the net consumer benefits of stronger GHG standards.

In the 2020 Final Rule, EPA's consumer benefit calculations incorporated several costs and several benefits which do not appear to have been incorporated into the consumer impacts calculations in the Proposal. On the cost side, in addition to price increase/technology cost, EPA previously included increased financing costs, increased insurance cost, increased taxes and fees, implicit opportunity cost, and lost consumer surplus. See, e.g., 2020 Final Rule, 85 Fed. Reg. at 24,991, Tbl. VII-80 et seq. On the benefit side, in addition to fuel savings, EPA previously included a mobility benefit and refueling benefit. See id. In the NPRM and RIA, it appears that EPA identified and calculated several of these costs and benefits. See, e.g., DRIA at 6-7 (identifying as non-emission benefits drive value, refueling time, and energy security benefits); DRIA at 3-15 to 3-26 (quantifying annual energy security benefits of the Proposal). EPA should provide an explanation for why these costs and benefits were not incorporated into the consumer impact calculations for the Proposal.

EPA's exclusion of several categories of costs and benefits in this Proposal understates the benefits of more stringent standards. This is because, based on the numbers in EPA's prior modeling, the omitted benefits were consistently larger than the omitted costs. See 2020 Final Rule, 85 Fed. Reg. at 24,991, Tbl. VII-80 et seq. For example, at a 3 percent discount rate, EPA calculated total increased financing and insurance costs and increased taxes and fees from MY 2021 through MY 2026 to be -$323/vehicle under the 2020 Final Rule. 85 Fed. Reg. at 24,991, Tbl. VII-80. By comparison, EPA projected the total mobility and refueling benefit under the 2020 Final Rule to be -$489/vehicle. See id. Assuming the relative magnitude of these impacts is similar for the Proposal, exclusion of these costs and benefits will, on net, decrease projected consumer benefits. [EPA-HQ-OAR-2021-0208-0651-A1, p. 49-50]

Commenter: Center for Climate and Energy Solutions (C2ES)

Base Year Fleet

EPA should use the MY 2019 data as a baseline rather than the MY 2017 base year fleet used in the proposal to ensure the standards accurately reflect the higher levels of zero-emission vehicle proliferation in the current light-duty market. Data from MY 2019 is available and reflects the implementation of the standards set in the 2012 Final Rule prior to the implementation of the SAFE rule. In particular, the increased market proliferation of electric vehicles as well as the improvements in costs of zero-emission vehicles should be considered. From 2017 to 2019, plug-in electric vehicle sales increased 67 percent in the United States, as more models became available and costs fell. Despite a small decrease in overall sales from 2018 to 2019, due largely to the discontinuation of a popular model, increased model choice is clearly linked with significant year-over-year growth in sales, and given automaker commitments to greatly expand the number of zeroemission model offerings through 2025, this more recent data indicates a strong upward trend in the U.S. electric vehicle market.24 [EPA-HQ-OAR-2021-0208-0287-A1, p.7]

Commenter: Consumer Federation of America

• In the EPA's proposed revision to the SAFE 2 rule, it has corrected numerous errors made by the Trump administration. These corrections include fixing the valuation of greenhouse gases and other pollutants, returning the rebound rate to 10 percent, lowering the discount rate and updating the availability of technologies. [EPA-HQ-OAR-2021-0208-0297-A1, p. 2]

In comments CFA2 has submitted to the agencies previously, we noted over three dozen (41) errors that took more than a decade to correct, as shown below in Table 1.1. The Table also shows that the Trump administration, in its SAFE 2 rule, reintroduced over two dozen (28) of these errors. The impact of reintroducing these errors into the standards was dramatic. A benefit-cost ratio calculated by CFA shows the standards in place before the Trump administration to be 5-to-1, but subsequently has been reduced to a mere 1.1-to-1. Reversing many of these errors through this proposed rulemaking and taking into account key changes (like the projected price of gasoline) has restored the cost-benefit ratio to about 2.2-to-1. [EPA-HQ-OAR-2021-0208-0297-A1, p. 3; Table 1.1 can be found at docket number EPA-HQ-OAR-2021-0297-A1, p. 4]

Doubling the benefit-cost ratio is an important step in justifying the rule, but there are a number of areas we think EPA could have gone further with superior assumptions and methods for modeling the impact of standards. Before we turn to those points of difference, it is important to stress what EPA has gotten right. In the next section, we discuss three ways in which the Trump Administration got the big picture wrong and EPA got it right: compliance with broad statutes governing energy efficiency/emissions, the Administrative Procedure Act, and the overall approach to regulation. [EPA-HQ-OAR-2021-0208-0297-A1, p. 5]

Estimating the cost of increasing fuel economy has been a matter of great debate for decades. As noted above, empirical analyses that look at actual costs show that regulators overestimate the cost by a factor of two, and automakers overestimate it by much more than that.

David Greene, one of the leading experts on fuel economy, recently conducted a review of the literature. He concluded that an estimate of 27 percent of increased auto costs, or about $150 for every mile per gallon improvement, was too high. He gave two reasons for this.13 First, backward-looking analysis of cost increases that included used vehicles (as his analysis did), were double-counting the cost of increasing fuel economy because the sellers of vehicles were capturing a significant part of the capitalized value of better fuel economy equal to about 20 percent of the estimated cost of efficiency) in their sales price. This factor alone would lower the estimate to 21.6 percent of the increase in price or about $120 for each 1-mile improvement in the MPG. Second, real-world experience showed that there was a learning process in which costs fell as automakers gained more experience with increasing fuel economy. Over the redesign cycle of vehicles (e.g., five years) this learning rate would lower the cost by about 10 percent. Thus, one might argue that the appropriate numbers would be about 20 percent per year and $108 per MPG, as shown in Table 4.1 [EPA-HQ-OAR-2021-0208-0297-A1, p. 14; Table 4.1. can be found at docket number EPA-HQ-OAR-2021-0297-A1, p. 15.]

There is a third factor that is implicit in Greene's analysis. The distribution of the cost of vehicles is skewed. The much more expensive vehicles purchased by upper-income households are likely to include a larger amount of costs incurred to upscale the vehicles, rather than for fuel economy. In a subsequent analysis, Greene estimated the cost of improving fuel economy directly with an econometric model that corroborated the above concerns. The simple adjustment to a constant 20 percent of total cost moves the estimate much closer to the empirical evidence offered by Greene, which suggests that costs are about two-thirds of what was found in the literature review—about 18 percent or $99/MPG.

EPA's analysis of the cost of the National Program currently yields an estimate in fuel savings that is similar, $97/MPG. This estimate reflects considerable technological progress over the early years of the National Program, which is consistent with the historical pattern. A recent study by the ICCT offers an estimate of going forward costs of improvement close to the rate of the national program (national program = 3.3%, ICCT = 4% per year). The ICCT study also includes continuing technological progress.

Cost Whiplash

The whiplash of the current rule is depicted in Figure 4.1. The reasons for the whiplash are the severe constraint on technology choices imposed by the model and the very high markup assumed. By imposing constraints on the use of technologies, ignoring emerging technologies and assuming many more electric vehicles would be necessary, NHTSA has adopted a price that is far above EPA's estimates and those of independent third parties, as shown in the upper graph of Figure 4.1. Greene's analysis suggested that a 2 percent per year was a reasonable cost estimate. Over the redesign cycle of vehicles (e.g., five years) this learning rate would lower the cost by about 10 percent. Thus, one might argue that the appropriate numbers would be about 20 percent per year and $108 per MPG. [EPA-HQ-OAR-2021-0208-0297-A1, p. 15]

Automakers also regularly state that compliance costs are higher than what regulators estimate, when in fact, they comply with efficiency standards at a lower cost than the regulators' estimates. New car prices, for the most part, have since the Great Recession failed to match the rate of inflation, all the while increasing in fuel economy. While new vehicle prices are indeed rising, this is due to the switch from cars to trucks and SUVs, which have a higher MSRP.

CFA analysis has further shown that after factoring in inflation, a full 27 percent of the 'all-new' 2017 vehicles went down in price and increased their fuel economy by 1 to 10 MPG compared to their 2011 counterpart14. This is without considering that fuel economy technology is only one of the many different improvements that increase a vehicle's MSRP, such as safety technology, convenience items, and design changes that are equal or higher drivers to increased vehicle costs. When using historically supported evidence, the best estimate of fuel economy technology costs is about $100 per MPG of improvement. Using this estimate, 94 percent of the 'all-new' 2017 saw a net positive benefit for the drivers, as the fuel savings exceeded the cost of fuel efficiency technology over the first five years of ownership defined and defended by the TAR. [EPA-HQ-OAR-2021-0208-0297-A1, pp. 16-17]

MACROECONOMIC BENEFITS

Importance In our earlier comments to the EPA, we demonstrated that the benefits of reduced emissions achieved through greater efficiency have substantial macroeconomic benefits that are inextricably linked to the reduction in the cost of driving. EPA considers the macroeconomic benefit of improved energy security, but not the benefits that flow from consumer pocketbook savings. The social cost of carbon reflects some of the benefits foregone by reducing emissions, but not all. In fact, a 2010 agency memo placed in the record calculated a substantial macroeconomic benefit which roughly equaled the consumer pocketbook savings.20

We again call on the agency to recognize this benefit, which is as measurable and certain as many of the other benefits it counts. The need to acknowledge these benefits is more significant than ever.

First, the Biden administration has correctly made the case that a vigorous response to climate change based on efficiency and a shift in power sources (from petroleum to low-emissions electricity) will be good for the economy. The benefits come directly from the jobs needed to create the new technologies and indirectly from the re-spending of the energy savings. These are precisely the same benefits that are identified in the general literature on energy efficiency savings. It is inconsistent to claim the external benefit of emissions reductions for security or public health purposes and not for macroeconomic purposes.

Second, over time, the macroeconomic benefits may become the single largest category of benefit, embodied in an industrial revolution – a shift from coal and oil to clean electricity – as large as the last such revolution (from wind and water to fossil fuels). From the consumer/economic point of view, the decarbonization of the economy may become the 'secondary' benefit.

Increasing the benefit-cost ratio dramatically makes the case for the proposed rule all the more compelling. Therefore, we will repeat the earlier argument.

Econometric models that use general flows of resources between economic activities have been used to assess the impact of increasing efficiency. In a sense, the coefficients in the macro models are representations of the relationships in the economy through which the micro-level effects flow. Simply put, when the cost of driving declines, consumers have more money to spend on other things. These other things tend to be much less energy-intensive than driving. This flows through the economy and stimulates economic growth and increases job creation. No matter the level or approach, the evidence strongly supports the conclusion that there is a positive impact.

Increasingly, research shows that energy savings from energy efficiency improvements can deliver more comprehensive benefits across the whole economy, such as increases in employment, GDP, trade balances, energy security, etc.…

One way to look at the macroeconomic impacts is to separate them into:

The cost and effects derived from investing in energy-efficient goods and services, and the effects derived from the energy savings (or reduced costs) from realizing an improvement in energy efficiency…

Increased energy efficiency can lead to more competitive production for 'business consumers' or energy, while for final consumers, increased efficiency mainly leads to a demand shift from energy consumption to other goods. For the consuming sectors, it is relatively straightforward to observe how investment in energy efficiency and energy savings can lead to increased spending and economic activity with second-round effects such as employment, government revenue, and price effects (if other investment and spending is not crowded out). There are likely to be positive income effects, unless household wage demand increases as the labor supply becomes more competitive.21

One way to gain an appreciation of the impact of energy costs is to consider how transportation costs are dealt with in the economy and models of the economy. The economic reality of the flow through to consumers of transportation fuel costs is reflected in the way econometric models describe the growth of the economy. Such models are built on input/output tables, and transportation costs are a significant input in the models. In building these models, the pass-through of transportation costs is assumed since transportation plays a fundamental role in the overall cost of production.

Transportation is an economic factor of production of goods and services, implying that relatively small changes can have substantial impacts on costs, locations and performance…

Transport also contributes to economic development through job creation and its derived economic activities. Accordingly, a large number of direct (freighters, managers, shippers) and indirect (insurance, finance, packaging, handling, travel agencies, transit operators) employment are associated with transport. Producers and consumers make economic decisions on products, markets, costs, location, prices which are themselves based on transport services, their availability, costs and capacity.22

Typically, the more places that are touched by a sector, the larger its multiplier. Because most economic models are built on the flow of goods and services through the economy, they depend on the geographic scope and nature of activity within the economy being modeled. Transportation is generally seen as a central input to measuring broader economic activity. In modeling the impact of higher fuel economy with these econometric models, it is important to understand certain market factors. As the cost of transportation declines, demand for transportation increases because the demand for goods and services increases due to their lower costs. In addition, as the population and economy grow, the need for commercial transportation increases as well. Nevertheless, the fuel savings from greater efficiency are much larger than the increase in consumption. The net effect is to reduce expenditures on fuel as a percent of total output. In fact, the reduction in energy consumption may be so large that the absolute level of consumption is lowered. This has a positive effect on the economy.

In 2010, NHTSA noted one of the important externalities of reduced consumption, the downward pressure on prices, is a consumption externality. 23 Derived from an auto standard, it provides a comprehensive discussion of the macroeconomic benefits that we find in all efforts to apply these models. 'Lower prices allow for additional purchase of investment goods, which, in turn, lead to a more comprehensive capital stock. These price reductions also allow higher levels of government spending while improving U.S. competitiveness, thus promoting increased exports relative to the growth-driven increase in imports. As a result, GDP is expected to increase because of this rule.24

The EPA reviewed the literature on the macroeconomic impact of reduced energy consumption.25 It ran econometric models driven by pocketbook savings. The analysis models three effects on impacts of the rule that trigger adjustments in the economy – increased cost for vehicles, decreased consumption of gasoline, and a reduction in the price of petroleum. It does not model the impact of reduced pollutants (carbon and non-carbon) or other changes (like reduced fueling time). It found a very substantial multiplier effect increasing the GDP by just under 1 percent, or $340 billion, by 2050. Discounting the incremental growth of the economy at 3 percent, which is the discount rate used as the base case in this paper, the total is just under $100 billion, and it is reached by 2030. This is slightly larger than the total consumer pocketbook savings.

This combination of effects—price increases for vehicles and lower demand and world oil prices—would impact all sectors of the economy that use light-duty vehicles and fuels as intermediate inputs (e.g., delivery vehicles) to produce final goods. Households would also be impacted indirectly as consumers of final goods and directly as consumers of fuels and light-duty vehicles.

However, it is important to note that these potential impacts do not represent additional benefits or costs from the regulation. Instead, they represent the effects on the U.S. economy as its direct benefits and costs are transmitted through changes in prices in the affected markets, including those for vehicles and their components, fuel, and the various resources used to supply them.26

Estimating the Size of the Macroeconomic Benefit

These impacts, as discussed in the EPA memo, are an indirect effect of the rule, a genuine externality. This approach has become quite common with detailed analyses of energy efficiency across a range of activities (autos, appliances, buildings, industries),27 sectors (e.g. energy, manufacturing, service, particularly as it impacts the use of labor),28 and with a variety of analytic approaches (qualitative, econometric).29 These efforts to model the economic impact of energy efficiency have proliferated with different models30 being applied to other geographic units, including states31 and nations.32 The results differ across studies because the models are different, the impact varies according to the size of the geographic unit studied and because the assumptions about the level and cost of energy savings differ. These differences are not an indication that the approach is wrong. On the contrary, all the analyses conclude that there will be increases in economic activity and employment. Given that different regions and different policies are being evaluated, we should expect different results.

The rule of thumb – an approximate doubling of the economic impact – that emerges in the literature reflects the observation on jobs.33 Similarly, in a study of 52 examples of increases in industrial productivity, where the benefit was monetized, the productivity savings were 1.25 times as large as the energy savings.34 Table 6.1 shows examples of the multiplier, with the GDP impact expressed as a multiplier of the value of net pocketbook savings. [EPA-HQ-OAR-2021-0208-0297-A1, pp. 19-22; Table 6.1. can be found at docket number EPA-HQ-OAR-2021-0297-A1, p. 23.]

In this analysis, we take a very cautious approach to estimating the induced macroeconomic benefits of efficiency. We apply the multiplier to 90 percent of the pocketbook savings. The benefits excluded from the multiplier effect (10 percent of pocketbook, other values, such as driving, reduced fueling time, public health, and environmental) are 25 percent larger than the total of the technology costs. This ensures that we do not double count the indirect effect, although that might have an induced multiplier effect of its own.

We also do not include a separate impact of the consumption externality, the effect that U.S. consumption has on lowering the market price of energy. In petroleum, this number is substantial. Agencies have estimated it but have not included it in their cost-benefit analysis. Where they have presented the calculations, it is equal to about one-fifth of what we call the macroeconomic multiplier.35 In the appliance sector, this effect has been modeled by considering the impact of reduced electricity demand on the price of natural gas.36

We do not apply the multiplier to the value of environmental, public health, and other externalities. Although these have been monetized in the traditional cost-benefit analysis, that monetization does not generally include macroeconomic multipliers. Since it could be argued that these costs are reflected in the model coefficients that are a representation of empirically observed real-world relationships, out of an abundance of caution, we do not apply the multiplier to these benefits, which is the traditional approach.

While we have chosen to add the rebound effect back into the pocketbook savings, we do not add it into the macroeconomic effect since the rebound effect spends the money on consumption, meaning no change in the multiplier. To err on the side of caution, we assume the lowest value in the table and set the multiplier equal to the net pocketbook savings. Macroeconomic models measuring the outcome in the change in GDP yield a 're-spending' effect that clusters around 90 percent.37 [EPA-HQ-OAR-2021-0297-A1, p. 22]

Commenter: Consumer Reports (CR)

Model Shortcomings

Consumer Reports recognizes the limited time EPA has had to develop the analysis for this proposal, and that EPA has consequently relied heavily on the models and assumptions developed to support the SAFE rule. However, the use of these models and assumptions results in EPA significantly undercounting the benefits from this proposal. The following sections highlight some of those issues, and provide recommendations on how to improve the analysis to support strong standards. [EPA-HQ-OAR-2021-0208-0602-A1, p.19]

a. Consumer Valuation of Fuel Economy and the Energy Efficiency Gap

Consumer Reports and others have contributed significant input into both the previous regulatory record, and legal record around past rulemakings, regarding the treatment of consumer valuation of fuel economy and the energy efficiency gap. We continue to stand behind the argument that there is a market failure in the automotive market, and that automakers will not deploy cost effective fuel savings technologies that consumers want unless driven to do so by regulations. EPA itself within the RIA concludes that an energy efficiency gap does indeed occur stating: "it appears that markets on their own have not led to adoption of a number of technologies with short payback periods in the absence of the standards."53 [EPA-HQ-OAR-2021-0208-0602-A1, p.19]

EPA also explores if the energy efficiency gap might be caused by low consumer valuation of fuel economy, or as a result of the market and automaker decisions. Consumer Reports has decades of experience doing survey work to understand what consumers want, and we assert that this market failure rests firmly in the hands of automakers.54 The exact reason is unclear to us at this time, but some combination of the potential explanations outlined on pages 8-5 and 8-6 of the RIA is plausible. [EPA-HQ-OAR-2021-0208-0602-A1, p.19]

EPA goes on to state that: "It appears possible that automakers may operate under a different perception of consumer willingness to pay for additional fuel economy than how consumers actually behave."55 Yet despite this statement, EPA uses the same 2.5 year payback period to both estimate consumer valuation of fuel economy in their sales model, and assumes that automakers apply all technology with a payback period of less than 2.5 years within the baseline of their analysis, despite specifically recognizing that automakers have not done this in this in the past. [EPA-HQ-OAR-2021-0208-0602-A1, p.19]

Consumer Reports recommends that EPA appropriately reflect the energy efficiency gap in their future modeling for this and future rulemakings. Although there is uncertainty in the exact numbers with respect to what, if any, technology automakers will deploy in the absence of standards, and the exact amount of fuel savings consumers value, the record and literature clearly show that these values should be very different. EPA should attempt to model automaker behavior based upon their past historical actions with respect to the application of technology within the baseline. EPA should also update their consumer valuation of fuel economy assumptions in their sales model to more appropriately match the literature on consumer willingness to pay. [EPA-HQ-OAR-2021-0208-0602-A1, pp.19-20]

b. Modeling of Off-Cycle Credits

EPA assumes that all automakers apply 15 g/mi of off-cycle credits starting in MY2023 regardless of the cost effectiveness of these technologies relative to other compliance options. EPA also uses an average cost of $78 per g/mi improvement in emissions which seems very high.56 Given that the standards require an average of 49 g/mi in total emissions reductions, complying with entirely off-cycle credits would cost automakers $3,800 per vehicle, while EPA's modeling finds that the average cost of compliance in MY2026 is only $1,044.57 [EPA-HQ-OAR-2021-0208-0602-A1, p.20]

While CR has not directly examined the CAFE model used by EPA directly, a close examination of table 4-16 of the RIA also provides some details as to the impact of these assumptions. Tesla jumps off the page as having compliance costs that average around $390 per vehicle despite being an all-electric vehicle manufacturer that easily complies with the rule with no additional credits. When comparing Telsa's compliance costs with the average automaker compliance cost for MY2026 of $1,044/vehicle we see that they are modeled to be spending 37% as much as the average automaker just to add 5 g/mi of off-cycle credits. While Tesla may indeed make a financial decision to use the off-cycle program to generate additional credits (see section 3.c.iii of this comment for discussion of why EPA should consider not allowing this) to sell to other automakers, they will only do so if they can make a profit doing it. If we assume that all automakers are modeled to be spending a similar amount on off-cycle credits, this implies that the average automaker is spending 37% of their compliance budget on 5 g/mi of improved performance and 63% of their compliance budget on an average of 44 g/mi of improved performance. While the presence of Automakers who agreed to the California framework agreement complicates this analysis, and it is not perfect for that reason, it is nonetheless clear that assumptions surrounding off-cycle credits are having a significant effect on the cost analysis in ways that imply completely irrational behavior by automakers. Either off-cycle credits have significantly lower costs to automakers than assumed by EPA, or automakers will choose other compliance pathways that avoid using these expensive credits. [EPA-HQ-OAR-2021-0208-0602-A1,p.20]

The most obvious way to address this modeling issue would be to simply not expand the off-cycle credit limit to 15 g/mi as Consumer Reports has recommended in section 3.c.iii. However, if EPA does continue to include expanded off-cycle credits, they should do significant modeling sensitivities around their assumptions related to these credits and their effect on the overall cost-benefit analysis. [EPA-HQ-OAR-2021-0208-0602-A1,p.21]

c. Battery Costs

EPA notes that: "The battery costs used in the SAFE FRM were considered too high by EPA. However, given that significant levels of vehicle electrification will not be necessary in order to comply with the proposed standards (past analyses by EPA have estimated BEV penetrations of less than 5 percent, in general), we did not consider updating vehicle electrification costs to be of paramount importance for this proposal, although we may update battery and other vehicle electrification costs for the final rule." Consumer Reports recommends that EPA update their battery costs to be more in line with the current state of the electric vehicle market. This has the potential to have a significant impact on the cost-benefit analysis of the rule, especially with regards to the ability for EPA to push further, and set a stronger standard than the preferred alternative that is more in line with the administration's climate commitments. [EPA-HQ-OAR-2021-0208-0602-A1, p.21]

d. Maintenance and Repair Costs

EPA has not historically quantified the change in maintenance and repair costs from changes in the vehicle fleet driven by greenhouse gas standards. However, the growing percentages of battery electric and plug-in hybrid vehicles in the fleet means that strong standards are likely to contribute significant consumer savings in the form of reduced repair and maintenance costs. Two recent studies, one by Consumer Reports,58 and one by Argonne National Laboratory,59 have attempted to quantify the change in maintenance and repair costs for vehicles with different powertrains. Although both studies use different methods, and place slightly different numbers on the specific costs, they both come to the same general conclusion that vehicles with electrified powertrains are likely to provide significant lifetime consumer savings from lower maintenance and repair spending. Consumer reports for example concludes that both BEVs and PHEVs are estimated to save $4,600 over the lifetime of a vehicle when discounted to the present value at the time of purchase, with a discount rate of 3%. Applying these savings to the preferred alternative, which EPA's modeling estimates includes 7.8% EVs, would result in over $5B of additional present value consumer benefits for MY2026 alone. Given the magnitude of these benefits, and the inevitable growth in electrification of the fleet, it is imperative that EPA capture this important consumer benefit in their cost benefit analysis. [EPA-HQ-OAR-2021-0208-0602-A1, pp.21-22]

e. Use of AEO2021 energy prices

While the use of energy price data from the DOE's Energy Information Agency's (EIA) Annual Energy Outlook (AEO) in cost-benefit analysis is standard practice, 2020 was an extreme outlier given the COVID-19 pandemic. Because of this, EIA's AEO2021 is heavily influenced by this outlier event which shut down the entire global economy and crashed energy prices. However, energy prices have rebounded sharply as demand has recovered quicker than supply. The result is that current gasoline prices are now much much higher than the AEO projections, and in fact AEO2021 projects that gasoline prices won't even reach their current levels of $3.19 a gallon60 until 2044. One possible solution is that EPA could instead use energy prices from EIA's AEO2020 which was performed prior to the pandemic. Although the prices projected in AEO2020 are still well below current gasoline prices, they are at least closer. At a minimum EPA should acknowledge that the use of these energy price projections developed in the middle of a pandemic causes them to likely underestimate future consumer savings from this rule. [EPA-HQ-OAR-2021-0208-0602-A1, p.22]

Commenter: DENSO International America, Inc. (DENSO)

Updated GREEN-MAC-LCCP Model

DENSO requests EPA to consider updating their modeling with the updated IMAC-GHG-LCCP. Because the GREEN-MAC-LCCP has been updated recently by SAE CRP, and developed into IMAC-GHG-LCCP, leading to the notable change of higher occurrence of warmer days across US. Therefore, CO2 reduction benefits of the related cooling technologies compared with baseline systems may be affected by the IMAC-GHG LCCP. [EPA-HQ-OAR-2021-0208-0282-A1, p. 7]

Commenter: Environmental Defense Fund (EDF)

III. EPA's own analytical tools confirm the feasibility and cost effectiveness of the MY2023-26 standards EPA utilized NHTSA's CAFE model to project the costs and benefits of its Proposed Standards. EDF previously filed comments describing the tendency of this model to over-estimate compliance costs and under-estimate benefits.46 [EPA-HQ-OAR-2021-0208-0688-A1, p. 24]

As discussed in more detail and shown in table 8, below, using the technology costs and effectiveness contained in the version of OMEGA (v.1.4.56) used in EPA's mid-term review of the MY 2022-2025 standards conducted in 2016-201747 (PD OMEGA) and the more recent version of OMEGA (v.1.4.59) that EPA provided to EDF as required by the Freedom of Information Act (FOIA OMEGA), see NRDC v. EPA, 954 F.3d 150 (2d Cir. 2020), the OMEGA model projects compliance costs per vehicle $173-$259 lower than the CAFE model on a common fleetwide basis. Incorporating estimates of technology costs and effectiveness from the International Council on Clean Transportation (ICCT) into PD OMEGA further reduces pervehicle costs by $434-$574. As discussed further below, the two versions of the OMEGA model available include a maximum of only 3 g/mi off-cycle credits. OMEGA's cost per g/mi reduction of off-cycle controls is only two-thirds of the cost per g/mi reduction that EPA assumed in its recent Proposal. In the modeling runs we conducted, and which are described below, OMEGA projects that only 10 percent of industry-wide new vehicle sales will achieve the full 3 g/mi reduction using off-cycle technologies. At the same time, manufacturers have already added 5 g/mi of off-cycle controls to their cars and 10 g/mi to their trucks, per EPA's 2020

Automotive Trends Report. This indicates that these off-cycle controls are readily applicable and of low cost. While the level of off-cycle technology assumed by EPA in its CAFE modeling is reasonable, its assumed cost is out of proportion to the cost of 2-cycle emission control technologies.48 This resulted in EPA projecting compliance costs that are inaccurately high. Because of the interaction between compliance costs and vehicle sales in the CAFE model, this error affects sales, as well.

EPA's assumption that non-Framework manufacturers will apply 10 g/mi off-cycle controls under the 2020 Rule at a cost of $706 inflates total compliance costs by over $400 per vehicle. The assumption that (1) automakers that executed agreements with California and (2) all manufacturers under the Proposal would apply 15 g/mi off-cycle controls at a cost of $1143 inflates total compliance costs by $500 per vehicle using EPA's technology costs and $700 per vehicle using ICCT's technology costs and effectiveness.49 This impact is greater when using ICCT technology costs and effectiveness because the difference between these lower ICCT costs and the unreasonably high EPA costs for off-cycle control is greater. [EPA-HQ-OAR-2021-0208-0688-A1, p. 25]

In EPA's 2016 Draft Technical Assessment Report (EPA-420-D-16-900) and Proposed Determination on the Appropriateness of the Model Year 2022-2025 Light-Duty Vehicle Greenhouse Gas Emissions Standards under the Midterm Evaluation (EPA-420-R-16-020) ("Proposed Determination"), EPA premised off-cycle control costs on the cost of 2-cycle tailpipe CO2 controls on the assumption that off-cycle controls would be cost-competitive since manufacturers were requesting the ability to apply these controls. The off-cycle control costs EPA assumed for this Proposal are clearly not consistent with this approach. We conclude that EPA should decrease its estimated cost of off-cycle controls to reflect manufacturers' use of these controls through MY 2020 and confirm that the results of CAFE modeling are consistent with this use. [EPA-HQ-OAR-2021-0208-0688-A1, p. 26]

Modeling conducted with each version of the model supports our primary conclusion that the CAFE model EPA used to assess its proposed GHG standards significantly over-estimates the cost of compliance with those standards. [EPA-HQ-OAR-2021-0208-0688-A1, p. 27]

Cases

The reference case for our analyses is a combination of the 2020 Rule standards and the voluntary GHG emissions reductions reflected in the California Framework Agreements. The latter applies to five manufacturers which have signed an Agreement: BMW, Ford, Honda, Volkswagen and Volvo. The 2020 Rule standards apply to the remaining manufacturers. These inputs are the same as those modeled by EPA in its CAFE model runs. The technology cost for the combination of the 2020 Rule's standards and the Framework emissions reductions was determined using the same approach taken by EPA. The total annual cost of the 2020 Rule's standards for the non-Framework manufacturers was added to that of the California Framework emissions reductions for the Framework manufacturers and divided by total vehicle sales.

We also project the total technology costs for two sets of “control” scenarios. The first is EPA’s proposed GHG standards. The incremental technology cost for EPA’s proposed GHG standards is the total cost less the cost of manufacturers meeting the combination of the 2020 Rule’s standards and the emissions reductions achieved due to the California Framework.

The second control scenario is EPA’s MY 2026 alternative that is 10 g/mi more stringent than the proposed MY 2026 standard. While EPA did not report along with the Proposal a separate evaluation of the costs and benefits of this alternative, we modeled this alternative as consisting of increasing the stringency of the Proposed Standards for MY 2026 by 10 g/mi for both cars and trucks across the full range of footprint values. [EPA-HQ-OAR-2021-0208-0688-A1, p. 27]

The second approach includes this 3 g/mi off-cycle control internal to OMEGA and adds 7-12 g/mi off-cycle control outside of the OMEGA model runs, at a cost of $76 per g/mi off-cycle control (the cost per g/mi used by EPA in this Proposal). In this second approach, the 2020 Rule’s GHG standards are numerically relaxed by 7 g/mi and a cost of $534 added to the OMEGA-projected cost to reach the total technology cost for the 2020 Rule’s GHG standards. Similarly, EPA’s proposed GHG standards and the emissions reductions required by the California Framework Agreements are numerically relaxed by 12 g/mi and a cost of $916 added to the OMEGA-projected cost to reach the total technology cost for the 2020 Rule’s GHG standards. This second approach is analogous to the approach embedded in the CAFE model used by EPA in this Proposal. The level and cost for off-cycle controls is specified in the model’s input files and applied prior to any additional technology needed to meet the GHG standards. Using this approach, EPA’s Proposal adds 15 g/mi off-cycle controls at a cost of $1145 per vehicle in MY 2026. [EPA-HQ-OAR-2021-0208-0688-A1, p. 28]

Proposal Cost Findings

EDF used three sets of technology costs for the reference case and the two control scenarios:

1) PD OMEGA with EPA technology costs and effectiveness

2) PD OMEGA with ICCT technology cost and effectiveness adjustments, and

3) FOIA OMEGA with EPA technology costs and effectiveness

The incremental cost of the Proposal is compared to that estimated by EPA using the CAFE model with 15 g/mi of external off-cycle emission control. As we did not include the effect of the advanced technology vehicle multipliers in our OMEGA modeling, we show EPA’s projected costs also with no multipliers. However, had we included these multipliers, projected costs would be lower.

The incremental cost of the 10 g/mi alternative is compared to the cost for the reference case and the Proposal, as EPA did not project the impact of the 10 g/mi alternative on technology costs. [EPA-HQ-OAR-2021-0208-0688-A1, p. 28]

This OMEGA analysis shows that the CAFE model greatly over-estimates the technology costs of the Proposal. This supports the feasibility of the EPA standards as the OMEGA model projects technology costs are far less than estimated by EPA in the Proposal. EPA should recognize that the CAFE Model greatly over-estimates compliance costs when projecting technology costs for the final rule. [EPA-HQ-OAR-2021-0208-0688-A1, p. 30]

Commenter: Kreucher, Walter

CAFE IS NO LONGER AN EFFECTIVE POLICY TOOL

In all the cases the Agencies evaluated in the notice of proposed rulemaking, the predicted fleet average fuel economy continues to increase by 17 – 22 miles per gallon above the standard (or in the case of CO2 by 40 to 50 grams per mile below the 2026 standard) without any increase in stringency beyond the 2026 Model Year standards. Thus, we are led to the conclusion that either the assumptions the Agencies makes are wildly optimistic, and thus arbitrary and capricious, OR the need for CAFE standards is obviated by the low cost of technology, high fuel prices, and strong consumer demand for energy efficient vehicles. If the latter is the case, CAFE is no longer an effective policy tool and the statutory standards laid down in EISA are sufficient going forward. If the former is true the rule must be withdrawn in its entirety. THE EPA BASES ITS CO2 TAILPIPE STANDARDS ON MARKET PENETRATION OF ZEVS Both the EPA Greenhouse Gas proposal and the NHTSA CAFE proposal rely on the current market penetration of electric vehicles which both agencies acknowledge are driven by state mandates. Further, as pointed out in the Regulatory Impact Analysis, there will be a de minimus impact on climate as a result of the proposals. [EPA-HQ-OAR-2021-0208-0199-A1, p. 2]

ELECTRIC VEHICLES ARE MORE COSTLY THAN THE AGENCIES PREDICT

NHTSA claims that the ‘analysis projects continued cost learning over time and shows battery electric vehicles reaching price parity with conventional vehicles in the 2030s for most market segments – after which market adoption of BEVs accelerates – although other estimates show price parity occurring sooner.’8 This assumption is arbitrary and capricious. The 2021 Model Year9 EPA/NHTSA Fuel Economy Guide contains information on twentythree battery electric vehicles. None of the battery electric vehicles saved the customer money using the methodology employed by the National Highway Traffic Safety Administration and EPA for calculating the cost and benefits10 of technology. Based on MSRPs, the average net cost premium for an electric vehicle was $22,400 MORE than its gasoline counterpart11.

THE DRIVING RANGE FOR AN ELECTRIC VEHICLE IS LOWER THAN PREDICTED BY THE AGENCIES

The EPA reports the estimated driving range for electric vehicles. These estimates should be viewed with caution as they represent the maximum driving range under ideal condition of 72°F with all accessories including the heater and the air conditioning system in the off position.

AAA published a study12 where they tested six electric vehicles at 20° with the heater turned on.

• The range decreased by an average of 42% compared to the range listed in the EPA mileage guide.

• AAA tested the vehicles at 95° with the air conditioning turned on. The range decreased by an average of 39%.

• AAA tested the vehicles under normal acceleration rates and driving speeds. The driving range decreased by an average of 51%.

Further, electric vehicle manufacturers recommend charging their vehicles to only 80% of capacity13 to avoid the risk of battery fire. This reduces the driving range even further.

THE AGENCIES HAVE CORRUPTED THE INTENT OF CAFE

Based on published EPA information14, Tesla is credited with a CAFE fuel economy of 763 miles per gallon equivalent for its passenger car fleet in 2019 and 445 miles per gallon equivalent for its light truck fleet. This allows Tesla to generate OVER $67 billion in CAFE credits since 2017. Tesla generated more CAFE credits in 2019 than it earned in revenue selling its vehicles.

One might congratulate Tesla for its benevolence in generating these credits.

HOWEVER, one must take a closer look at what this actually means. The CAFE MPG established by EPA equates to an eye-popping on-road driving range of over 2200 miles. Even the Agency does not believe their own CAFE numbers because they say in their Mileage Guide owners can expect about 330 miles on a full charge (average of all Tesla models for the 2021 model year). AAA, in their 2019 study, says this range is closer to 200 miles on a full charge (165 miles at 80% charge) under typical driving conditions. Thus, the real-world on-road driving range is less than 7% of the range granted Tesla for CAFE purposes.

EPA manipulates the CAFE values for electric vehicles by assuming the 0.1515 petroleum equivalence factor applies to electric vehicles plus the Agency factors in additional credits for air conditioning efficiency and off-cycle operation. The Agency has done this in an arbitrary and capricious manner that is not grounded in reality to promote a costly technology.

It should be noted that the CAFE Model uses a much lower fuel economy for electric vehicles thus artificially increasing the benefits to air quality and other societal benefits by requiring additional electric vehicles.

The Agencies further propose in the rulemaking to modify these generous credits to add a vehicle multiplier for EVs and FCVs. Under the proposal, each vehicle counts as 2.0 for MYs 2022-2024, and 1.75 for MY 2025, subject to a cap on all vehicle multipliers. A clear indication that even they do not think the standards are achievable. [EPA-HQ-OAR-2021-0208-0199-A1, pp. 6-7]

THE PREDICTED FUEL SAVINGS WILL NOT OCCUR NOR WILL THE REDUCTIONS IN EMISSIONS

The Agencies predicts a modest drop in fuel usage and emissions as a result of the proposal. In reality none of this will occur. Because of the ‘Tesla-like’ CAFE fuel economies EPA arbitrarily assigns to electric vehicles AND the Agency proposed multipliers to EV sales, only a relatively small (less than 10% of what is predicted by the analysis) handful of costly, electric vehicles will be necessary to meet the proposed standards. Mitsubishi will need to produce less than 1000 battery-electric vehicles (BEVs) to meet the 2026 Model Year standard. Many manufacturers will have met these goals in 2021 under the current rules. [EPA-HQ-OAR-2021-0208-0199-A1, p. 8]

Commenter: Michalek, Jeremy and Whitefoot, Kate S.

Benefit-cost analysis: EPA analyzes three alternative options for rules and estimates their costs and benefits but then selects a proposed rule that has lower net benefits than one of its alternatives. We discuss concerns with this choice and recommend that EPA choose the option with the highest estimated net benefits. [EPA-HQ-OAR-2021-0208-0300-A1, p. 2]

Modeling vehicle scrappage effects: EPA is adopting the model of vehicle scrappage effects used in the SAFE rule’s FRIA in the new proposed rule to estimate the effects of the policy on externalities via induced changes in used vehicle scrappage rates. We provide a working paper summarizing an empirical analysis that we are conducting that is able to reject some of the assumptions made in the prior literature and in the SAFE PRIA and FRIA, and we provide recommendations for the range of assumptions that appear to be consistent with empirical evidence. [EPA-HQ-OAR-2021-0208-0300-A1, p. 3]

Vehicle Scrappage

EPA’s PRIA for the proposed rule considers effects that the regulation of new vehicles may have on the scrappage of used vehicles as well as resulting effects on vehicle miles traveled and associated externalities. EPA has chosen to use a model from the final regulatory impact assessment of the SAFE rule. The SAFE FRIA used a scrappage model that was substantially modified after extensive criticism of assumptions made in the SAFE PRIA.

‘Note that the scrappage model received many negative comments following the SAFE NPRM, but the FRM version of he model incorporated changes such that it no longer generates the inexplicable sales and VMT results of the NPRM version’ (PRIA p 5-10)

EPA notes in the PRIA for 2023 and later model years that

‘EPA’s project to review new vehicle demand elasticities is also reviewing the literature on the relationship between new and used vehicle markets and scrappage.’

To support this review, we are attaching a working paper from Carnegie Mellon researchers Connor Forsythe, Akshaya Jha, Jeremy Michalek and Kate Whitefoot investigating the externality implications of the scrappage effect of policies like the LDV standards by empirically identifying the effect of policy-induced changes in fleet size on fleet travel distance and highway gasoline consumption. Figure 1 from that paper is shown below. [Working Paper can be found at docket number EPA-HQ-OAR-2021-0208-0300-A2, and Figure 1 can be found at OAR-2021-0208-0300-A1, p. 10]

Economic theory, originally proposed by Gruenspecht (1982) and others suggests that regulation of new vehicles can put upward pressure on new vehicle prices, which puts upward pressure on used vehicle prices, because they are (imperfect) substitutes. Increased used vehicle prices may lead owners with vehicles near the point of scrappage to sell, rather than scrap, those vehicles, keeping them on the road longer. More vehicles on the road may result in more vehicle travel, which has associated externalities, including air emissions, congestion, crashes, and noise. Prior work has found empirical evidence of all of the elements of this effect linking new vehicle regulation to travel-related externalities except for the effect of vehicle scrappage on fleet travel and fuel use (Figure 1).

In lieu of empirical evidence for this link in the chain, modelers in the academic literature and in government, including EPA's SAFE PRIA, typically make the assumption that vehicle travel is attached to the vehicle, so that if a vehicle is scrapped the travel associated with that vehicle will disappear, rather than shift to other vehicles or modes. Our study tests this assumption by leveraging the staggered removal of safety inspection requirements across US states as an instrument to identify the effect of policy-induced changes in fleet size on fleet-wide travel distance and fleet-wide fuel consumption. We find that removal of safety inspections in US states increased fleet size by 3-4%, on average, and we use that change in fleet size to identify the effect of fleet size on fleet travel distance and highway gasoline consumption. Though our estimates contain uncertainty, we are nevertheless able to reject several assumptions made in the SAFE PRIA and FRIA as well as the academic literature.

Figure 4 summarizes our preliminary empirical findings in relation to assumptions made in the academic literature and in regulatory impact assessments. These results reject the assumptions made in the SAFE PRIA as well as the gasoline consumption assumptions made in the SAFE FRIA, which are being used in the current proposed rule. Potential reasons that these prior assumptions are not consistent with our empirical findings include (1) when vehicles are scrapped, travelers may shift some of their travel needs to other vehicles and/or (2) vehicles selected for scrappage due to policy changes are systematically different from other vehicles of the same age and class (e.g.: driven less frequently). [Figure 4 can be found at docket number EPA-HQ-OAR-2021-0208-0300-A1, p.12]

We cannot reject the assumption in the SAFE FRIA, adopted in the proposed rule, that changes in fleet size have no non-rebound effect on fleet-wide travel distance. However, we do not endorse the assumptions in the SAFE FRIA and the proposed rule because the assumptions lack grounding in theory or evidence and have some implications that are difficult to defend. The SAFE FRIA assumes that non-rebound fleet VMT is constant regardless of fleet size, which can lead to implausible predictions of VMT per vehicle when fleet size changes substantially. The FRIA assumptions appear to be an attempt to patch the issues with the SAFE PRIA and avoid the implausible predictions about fleet VMT implied by that model, but this patch makes its own assumptions about VMT that are difficult to justify and have questionable implications.

Given our findings, we recommend that EPA's regulatory impact assessment consider a range of potential assumptions for the effect of policy-induced changes of fleet size on fleet travel distance, fleet gasoline consumption, and associated externalities. On the low end, our analysis cannot reject the possibility that policy-induced vehicle scrappage delay has no effect or a negative effect on fleet travel and gasoline consumption, though we expect the effect is likely nonnegative in practice, so using a lower bound of zero for sensitivity analysis may be reasonable. On the high end, our analysis does reject common assumptions that the travel associated with vehicles scrapped early is foregone when the vehicle is scrapped. It appears that at least some of the associated travel likely shifts to other vehicles in the fleet, and our analysis cannot reject elasticities up to 0.64 for fleet travel distance and 0.33 for highway gasoline consumption, so these may serve as reasonable upper bounds for sensitivity analysis. [EPA-HQ-OAR-2021-0208-0300-A1, pp. 10-12]

Distinguishing between transfers and costs

EPA should appropriately account for transfers between manufacturers and suppliers within the cost-benefit analysis. Some of the costs incurred by manufacturers in response to the regulations are transfers between manufacturers and suppliers. Specifically, a portion of profit losses by manufacturers due to higher vehicle component costs may be realized as profit gains by their suppliers. Historically, EPA's cost-benefit analysis has treated these transfers as regulatory compliance costs on the automotive industry, which effectively ignores suppliers altogether in the cost-benefit analysis. While we believe that EPA should consider the feasibility and economic costs of the regulation on manufacturers when setting the standards, transfers within the automotive industry (such as transfers between manufacturers or transfers between manufacturers and suppliers) should not be treated as costs for the purpose of calculating the net benefits of the regulations. [EPA-HQ-OAR-2021-0208-0300-A1, p. 5]

Omitting regulatory flexibilities from the cost-benefit analysis

When evaluating the costs and benefits of the regulations and alternative options, EPA should consider all provisions of flexibilities available to manufacturers, including off-cycle, averaging, banking, and trading of credits. NHTSA was prohibited by Congress from considering certain credits in their cost-benefit analysis, such as off-cycle credits and trading credits across manufacturers. However, EPA is not subject to these restrictions. Ignoring these flexibilities overestimates the compliance costs of the regulations and presents a distorted picture of which regulatory alternative has the highest net benefits. The cost-benefit analysis should represent the proposed regulation and alternatives as accurately as possible and therefore should include all credit provisions. [EPA-HQ-OAR-2021-0208-0300-A1, p. 6]

Commenter: National Coalition for Advanced Transportation (NCAT)

Modeling inputs relating to electric vehicles tend to underestimate electric vehicle penetration and overestimate electric vehicle cost:

As explained in the Proposed Rule, EPA chose to continue to use certain model inputs from the modeling conducted several years ago for the 2020 Rule, including the continued use of MY 2017 as the base year fleet and use of the electric vehicle battery cost data from the 2020 Rule modeling effort.156 However, electric vehicle penetration has grown significantly since that time, see Section IV, A above, and battery costs have continued to decline dramatically, see id. EPA even acknowledged that the agency may consider updating the battery costs for the final rule, noting that EPA's latest assessment suggests they could have been lower. 157 There was a 13% drop in electric vehicle battery cost in just 2020 alone.158 EPA's approach was very conservative in light of these older model inputs relating to electric vehicles. [EPA-HQ-OAR-2021-0208-0239-A1, p. 23]

Commenter: Peterson, Doug

The cost benefit analysis itself is hopelessly flawed, greatly underestimating the benefits of climate mitigation by ignoring benefits that are outside the realm of quantification. How are we to assign monetary value to the extinction of countless animal species? What is the dollar amount associated with the pain a family feels when their loved ones die in a wildfire, or drown in the basement of their flooded apartment? With so much uncertainty about the extent of the misery that climate change will inflict on future generations, and how long that misery will endure, how are we to quantify their future misery and include it in our so-called cost benefit analysis? The people who will suffer the most from climate change have yet to be born, and they have no way of participating in this rulemaking process. Their valid arguments, and those of innocent wildlife, can only be voiced by advocates like myself, and I protest in the strongest terms that the undeniable value of their well-being has been excluded from the EPA's cost benefit analysis. The limitation of the analysis to the historical period that ends in 2050 is an obvious flaw, ignoring the well-established scientific view that the severest harms of climate change will endure well beyond that date, perhaps for centuries. The geographic limitation of the analysis is also a central flaw; the analysis is restricted to U.S. costs and benefits. But the harms generated by our carbon dioxide are projected beyond our national borders, causing severe harms to innocent, vulnerable foreigners, many of whom have very small carbon footprints. From a moral standpoint, the cost benefit analysis has no validity whatsoever, greatly underestimating the large, unquantifiable benefits of climate change mitigation.

Perhaps the greatest unquantifiable element left out of the EPA's invalid utilitarian calculus is the staggering weight of our nation's moral indifference. The cost benefit analysis ignores the profound harm caused by our unwillingness to fulfill our obligations under the Paris Climate Agreement. The international effort to defeat climate change can only succeed if we can build trust with the international community, convincing other nations that we finally intend to contribute our fair share 5 to the global effort, that the unprecedented tragedy of the commons currently taking place is one that we acknowledge and abhor. The notion that our nation is leading the global effort against climate change borders on being delusional; we have been dragging our heals. If the world looks to the United States and sees that we still have no intention of surrendering one iota of comfort and convenience, all hope is lost. The EPA's cost benefit analysis places no value on that loss, and I reject it out of hand for its simplemindedness, an immoral manifestation of our habitual scientism. The well being of planetary life is beyond quantification; it is priceless. The Clean Air Act was signed into law as an expression of our nation's collective belief that our shared environment is extraordinarily precious, and the EPA fails to implement the will of the American people when it sidelines its core mission in deference to immediate economic concerns. The only way for the EPA to adequately regulate carbon dioxide is to enforce an effective regulatory framework that quickly achieves real reductions that are visibly significant in the eyes of the international community. If unquantifiable benefits that our society values were somehow monetized and included in the cost benefit analysis, and the analysis was revised to include future benefits beyond 2050, and the analysis included benefits accruing to people outside our national boundaries, the benefits would increase by many orders of magnitude, dwarfing the upfront costs. But they cannot be monetized, and the cost benefit analysis is poppycock. This kind of quantitative analysis is entirely inappropriate for assessing the efficacy of any climate change mitigation strategy because it excludes significant, valuable benefits that cannot be quantified. It is also a very poor tool for balancing tangential concerns outlined in the Clean Air Act with the EPA's core mission. By excluding benefits that are unquantifiable, cost benefit analysis systematically devalues benefits that are at the very heart of environmental preservation while overvaluing immediate economic concerns. It is inherently invalid and misleading, warping the EPA's view of its priorities. A more compassionate, comprehensive analysis that acknowledges the real limitations of quantitative accounting leads to the conclusion that the immeasurable benefits of restraining tailpipe carbon dioxide far outweigh the precise costs. [EPA-HQ-OAR-2021-0208-0692-A1, p. 4-5]

Commenter: Rivian Automotive, LLC

Reevaluate Baseline Market Expectations

EPA's calculations are built upon outdated baseline market data. Specifically, EPA used the MY 2017 base year fleet, a baseline that remains unchanged from the analysis underpinning the SAFE Rule. The agency states that the vintage of the base year will "not normally have a significant impact" but that certain broad shifts in the market, such as in the average vehicle power-to-weight ratio, can affect the incremental costeffectiveness of technology application in the modeling.13 Rivian questions whether the significant growth in the BEV market in the later years of the last decade—a trend that would not be visible in the MY 2017 data—would not also constitute a "broad market shift" and thus have impacts on the model runs that ought to be reflected. For example, could greater BEV volumes in the base year fleet affect credit-trading and technology application decisions in the model? If nothing else, greater BEV volumes in the base year fleet would imply greater growth potential and higher penetrations of this technology by the end of the regulation window and could support greater stringency than the agency currently proposes. While we understand that this proposal was developed on an expedited timeline, rulemaking documents acknowledge that finalized compliance data through MY 2019 was available during the analysis and development phase. We encourage incorporation of the most recent base year data for the final rule in accordance with typical practice. 14

The agency also appears to assume a 50/50 car/truck market share split despite the overwhelming popularity of trucks in the current market.15 In fact, EPA's own reporting of actual market data shows that trucks had already achieved a 60 percent market share by MY 2019 and this has only continued to climb.16 Assuming a 50/50 split nonetheless would have the effect of unreasonably overweighting cars in the calculation of projected fleet average compliance targets, potentially overstating those targets and thus the rule's final benefit. 17 EPA should clarify the market share split it assumes in its calculations and better convey its rationale. [EPA-HQ-OAR-2021-0208-0274-A1, p. 5-6]

Commenter: Toyota Motor North America, Inc. (Toyota)

EPA has Overestimated the GHG Performance from ICEs

Toyota has provided extensive information, in public comments and under CBI, on the effectiveness of CO2 reduction technologies including those for advanced gasoline engines.2 The data has consistently documented that even advanced ICE-only powertrains will fall short of the proposed standards and that while future advancements are possible, a point of diminishing returns is in part driving the transition to electrified powertrains, including conventional hybrids. EPA notes manufacturer plans and announcements of "a rapidly growing shift in investment away from internal-combustion technologies and toward high levels of electrification".3

EPA projects roughly 87 percent of the 2026 model year fleet will continue to be conventional gasoline powertrains. We are confused by EPA's statement that "the standards can be met largely with the kinds of advanced gasoline vehicle technologies already in place in vehicles within today's new vehicle fleet …". 4

This position is at odds with findings from the most recent evaluation of U.S. fleet performance conducted by IHS Markit using manufacturer-supplied data. This baseline study assessed the percentage of 2020 model year vehicles capable of meeting the proposed GHG standards. As Figure 1 illustrates, only electrified powertrains (HEV, PHEV, BEV and FCEV) can attain the proposed targets for the 2024 model year and later passenger cars and 2025 MY and later light trucks. Most gasoline engine technologies modeled by EPA are already being used in the 2020 model year fleet. A more widespread adoption of top-performing gasoline engine technologies through 2026 model year will not result in fleet compliance. [EPA-HQ-OAR-2021-0208-0531-A1, p. 4] [Figure 1 can be found on p. 4 of Docket number EPA-HQ-OAR-2021-0208-0531-A1]

Modeling Assumptions Are Critical

The performance discrepancy is due to overly optimistic technology effectiveness assumptions and a reliance on unproven technologies being added to an older baseline fleet. For example, HCR2 Atkinson engine technology has returned to EPA's compliance modeling. 5 EPA now defines HCR2 as "the addition of dynamic cylinder deactivation and cooled EGR within nonHEV Atkinson Cycle engine applications".6 However, the cost, technology effectiveness, and underlying engine map used for modeling HCR2 technology appears identical to that used for the SAFE 2 Final Rule which is represented by the simulated and experimental effectiveness of the 2014 2.0L SKYACTIV engine with the addition of cooled Exhaust Gas Recirculation (cEGR), 14:1 compression ratio (CR), and cylinder deactivation. 7,8 There is still no U.S. production vehicle that incorporates this definition of HCR2 technology because the 14:1 CR requires higher octane than currently available in U.S. regular grade gasoline. Further, there are more cost-effective pathways than combining cylinder deactivation with Atkinson cycle engines which have inherently low pumping loss characteristics.

EPA compliance modeling applies HCR2 engine technology to over 40 percent of Toyota's fleet by 2026 model year. For example, Camry receives HCR2 along with engine friction reduction (EFR) in 2024 model year. The resulting 51.7 mpg fuel economy is about a 9% improvement over Toyota's current generation Camry powered by a 2.5L Atkinson engine which has a worldbest 40% thermal efficiency.9 The modeled CO2 and fuel economy are closer to hybrid Camry performance and are unreasonably large for the technologies involved. First, cylinder deactivation is the only practical distinction between HCR2 and Toyota's 2.5L Dynamic Force Atkinson engine. NHTSA's evaluation has determined applying only cylinder deactivation to Atkinson cycle engines (HCR1) nets an incremental improvement of roughly 2 percent. 10 Second, the 2.5L Dynamic Force engine already encompasses EFR as explained in past comments under CBI. 11 Finally, IACC and EFR benefits appear to be double counted on top of ERF already being included in the Camry 2.5L Atkinson engine. This is because IACC and EFR are both fully included in the simulated HCR2 engine map, yet both technologies are added again in the CAFE Model runs.

EPA modeling sequentially adds enhanced technology to a 2017 baseline fleet until compliance with the proposed standards is achieved. The 2017 model year fleet is outdated because it fails to capture more recent state-of-the-art technologies in the U.S. fleet and requires the CO2 reduction effectiveness of those technologies to be assumed or simulated. An example is Toyota's 2.5L Atkinson engine technology which has been in the market since 2018 model year. The Camry example above could largely be avoided using a more recent baseline. A 2020 model year baseline fleet is more appropriate and provides a more accurate performance assessment, and with fewer product redesign cycles available, there is less chance for technology effectiveness errors to propagate through the fleet. The 2017 baseline has resulted in more Atkinson technology being assumed in the 2018 through 2021 model year fleets than really exists in the market. 12 The Focus is on Successful Outcomes Pointing out these ICE limitations in no way diminishes Toyota's general support for the proposed standards, but rather is intended to stress that compliance will require a more substantive shift to electrified powertrains, including conventional hybrids. We need to begin working together now to chart a path for near-term market readiness and growth of electrified powertrains. [EPA-HQ-OAR-2021-0208-0531-A1, p. 5-7]

Commenter: Union of Concerned Scientists (UCS)

Modeling future compliance with limited lead-time

Modeling assumptions

It is likely that manufacturers have product plans in motion that are built largely around achieving the standards set in 2012. In that case, lead-time is not an issue at all—industry will have been preparing for compliance with standards already that are stronger than the agency's proposal. And in fact, this may be exactly what market analysis of those product plans indicates (§ I.a.).

However, a more conservative assumption is to assume that manufacturers have responded to the weakened rules. One subset of manufacturers entered a voluntary framework with the state of California in order to provide more long-term certainty so they could plan investments accordingly ('Framework OEMs'), while another subset of manufacturers responded to the short-term incentives of the severely weakened rule and would have put planned investments on hold ('SAFE OEMs'). A conservative assessment of manufacturer flexibility would be to assume the same 18-month lead-time requirement from NHTSA's CAFE regulation.18 This is conservative because if manufacturers have already responded in MY2021 to a rule finalized in March 2020, that is a much faster timeline and would suggest that manufacturers could respond to a rule finalized in December 2021 by MY2023 at the latest. However, by adopting the conservative 18-month assessment of lead-time, we assume that if EPA's rule is finalized by the end of the year, manufacturers' product plans for MY2023 would not be able to be affected, while MY2024 could be.

The modeling behind the scenarios below is described in greater detail in Appendix A [Appendix A can be found at docket number EPA-HQ-OAR-2021-0208-0277-A1, pp. 41-57] One key factor in our modeling is that, unlike the Volpe model used by EPA, the algorithm underpinning manufacturer compliance in our modeling prefers for manufacturers to utilize banked credits before adding any additional technology, and manufacturers can purchase credits from any manufacturer with a lower marginal cost of compliance. For this set of runs assessing the question of lead-time, we simulated manufacturer compliance beyond MY2020 starting from finalized data on credits through MY2019 and used mid-model year data to represent the MY2020 fleet, correcting for actual fleetwide sales volumes. Compliance was then projected forward under the assumption that Framework OEMs had planned to comply with the voluntary agreements through MY2023, while SAFE OEMs had planned to comply with the SAFE rule through MY2023. Then, in MY2024 (as in all Volpe modeling), new technologies may only be applied to the portion of the fleet that is designated by Volpe for a refresh or redesign cycle in that Model Year. Notably the redesign cycles identified in the Volpe model inputs are generally slower than the rate anticipated in Murphy 2021.

Owing to the large credit banks manufacturers would seek to maximize the utilization of in any scenario, which can only be applied towards fleet debits, OEMs generally have greater debits than credits until MY2024-2026 timeframe, at which point they are in approximately annual compliance (i.e. net-positive credit generation). Industrywide for MY2020-2026, this tracks with approximately a 4.5 percent annual reduction in credited CO_2 improvements for Framework OEMs (i.e. including any relevant credit provisions such as EV multipliers or increased off-cycle credits) and 2.4 percent annual improvement for SAFE OEMs. These are slightly higher than the respective rates of stringency increase in the respective annual curves in order for manufacturers to shift from annual debits to annual compliance.

As noted above, our modeling allows manufacturers to deviate from this baseline compliance pathway beginning in MY2024. Because of the periodic refresh and redesign cycles faced by a manufacturer, it is unlikely that a manufacturer can fully redesign its entire fleet in a given year in response to a change in regulations. By matching the fleet to the compliance trajectory projected through MY2023, we best reflect the steps which are feasible for a manufacturer in the years afterwards, even limited by any such potential product cycle constraints. There are a number of additional strategies for compliance that cannot be mimicked by our modeling (see § I.d. for details), so we consider limiting improvements in this way a conservative constraint on how manufacturers could respond to a rule finalized for MY2023-2026.

For our modeling, we have considered the use of credit flexibilities with slight modification from those proposed by EPA, to be more consistent with our arguments on those flexibilities below. For the EV multipliers, we have only considered OEMs use of these credits in the MY2023-2025 timeframe—because the EV share prior to the rule going into effect is small, we assume that manufacturers will utilize the cap in later years when their EV share is greater. This is a conservative assumption, particularly with regards to lead-time, since a manufacturer selling EVs in MY2023 may wish to take full advantage of the cap in that year because of the large change in stringency. Additionally, we have not modeled the use of hybrid pick-up credits at all, and manufacturers in our model do not exceed the 10 g/mi off-cycle cap until MY2023. [EPA-HQ-OAR-2021-0208-0277-A1, pp.6-8]

18 The 18-month lead-time underpinning the rule’s ability to affect MY2021 stems from the National Highway Traffic Safety Administration’s fuel economy program under the Energy Policy and Conservation Act. It should be emphasized that EPA has no such requirement under the Clean Air Act, and this 18-month lead-time acts as a surrogate for action for manufacturers, since if manufacturers respond to the regulation on a slower timescale, they will not have been able to significantly alter their product plans in response to the SAFE rule, and thus there would be no lead-time issue, as already noted.

Commenter: Zero Emission Transportation Association (ZETA) and EVHybridNoire (EVHN)

ZETA members, including Rivian, Tesla, and Lucid, among others in the EV industry, have created over 250,000 American jobs and are scheduled to produce and accelerate the delivery of a variety of EVs during the implementation of the new rule.4 Some of these automakers and models are debuting in the next two years, so the EPA’s MY 2017 baseline used in the impact analysis of the proposed standards neither accounts for these new entrants nor the large deployment of EVs post-MY 2017 like the Tesla Model 3. Because of this, electric vehicles and trucks will make up a larger portion of the new vehicle market in MY 2023-2026 than projected. [EPA-HQ-OAR-2021-0208-0275-A1, pp.2-3]

EPA Response

In response to comments about modeling inputs from the Alliance For Automotive Innovation, Honda, Rivian, and others, EPA notes that we have updated inputs used in the FRM analysis. We are using a MY 2020 based fleet and have updated the banked credits information based on the most recent data. These and other modeling updates for the final rule are discussed in Preamble III and in RIA 4.

EPA disagrees with comments that we should use the most recent version of CCEMS and believes that the version we have used is appropriate for analyzing the costs and benefits in this rulemaking, including for our final program. We discuss this in Preamble III and in RIA 4.

In response to the off-cycle costs used in the NPRM, EPA notes that we have updated the costs of off-cycle credits using more recent data in the modeling inputs. This is discussed in RIA 4.1.1.1. Further, we have updated our approach to modeling off-cycle credits in the FRM analysis as detailed in RIA 4.1.1.1.

In response to comments on modeling of HCR2 technology, its use and its effectiveness value in the NPRM analysis, we have removed HCR2 from compliance pathways in our primary analysis model runs. Instead, we include a sensitivity that allows HCR2 to play a role in compliance pathways for MY 2025 and later, with the updated modeling results showing very little use of HCR2 technology in the MY 2023 through 2026 timeframe. See RIA 4.1.5.1 and Table 4-38. We discuss HCR2 technology in more detail in RIA 2.3.2 and 4.1.1.3.

In response to comments on battery costs, EPA has updated our battery costs for the final analysis. We discuss battery costs in Preamble III.A with more detail in RIA 2.3.4 and 4.1.1.2. Preamble III.A also includes specific responses to the Alliance's comments regarding intellectual property and proprietary production processes, total industry volumes of battery electric vehicles as a battery production volume assumption, and including BEV400 and BEV500 as technology options. We also address comments on battery cost in section 12.1 of this document. In response to comments on EPA relying on BEVs with short range (BEV200), EPA agrees in part and has limited the penetration of BEV200 technology in the final analysis to a level we believe is more realistic by setting the phase-in at 0.13% per year and beginning that low phase-in in MY 2020. As a result, very few of the BEVs in our final analysis are BEV200 (<2% in MY 2026).

In response to comments from the Alliance citing the uncertainty of future electricity rates and suggesting that electricity rates may become more expensive as renewable generation is added, please see our response in Section 12.1.

In response to comments on miles driven by BEVs versus ICE vehicles, EPA agrees that this is an important issue to consider. Based on the data and studies available to us (no new data was provided by the commenter), we have not reached any conclusions about systematic differences in use between these vehicles. We have also not reached a conclusion regarding the extent to which any differences that may exist today might persist in the future. We do not believe it is appropriate to make any analytical changes at this time regarding the VMT assumptions for BEVs and ICE vehicles for standards through MY2026 addressed in this rulemaking, but we intend to continue to study this issue.

Regarding comments on future fuel prices compared to today's prices and today's projections of future prices, EPA will continue to track such trends and to rely, as we have historically done for light-duty GHG rules, on experts at the Department of Energy’s Energy Information Administration to project future energy prices. Importantly, we have included in our sensitivity analysis, an assessment of the impacts of the standards with both lower oil prices (i.e., lower gasoline prices) and with higher oil prices (i.e., higher gasoline prices). See RIA 4.1.5.1, Tables 4-37 and 4-38.

Regarding comments on modeling of all federal and state programs simultaneously, rather than our approach to model our GHG program in isolation, see earlier statements in this Section 13 where we noted that EPA follows applicable guidance and best practices when conducting its benefit-cost analyses, including OMB Circular A-4, EPA’s Guidelines for Preparing Economic Analyses, and the Interagency Working Group (IWG) on Social Cost of Greenhouse Gases Technical Support Document: Social Cost of Carbon, Methane, and Nitrous Oxide Interim Estimates under Executive Order 13990. We therefore consider our analysis methodologically rigorous, performed in accordance with OMB guidelines, and a best estimate of the projected benefits and costs associated with the final rule. Further, EPA has included in its no action scenario both the GHG standards set in the SAFE 2 final rule and the voluntary agreements for national GHG emissions targets between California and five automakers (the California Framework Agreements). In each of the action scenarios analyzed, EPA considered the GHG program in isolation since EPA is only setting LD GHG standards in this rulemaking.

The Alliance for Auto Innovators comments claim a possibility that vehicle manufacturers may de-content conventional vehicle emission aftertreatment systems to save costs as the result of increasing stringency of GHG standards and reduced fuel consumption, and note that it would be inappropriate to claim benefits from reduced engine-out emissions. The EPA analysis does not assume tailpipe emissions of criteria pollutants will decrease with decreasing fuel consumption, and we believe that benefit-cost analysis conducted for this FRM appropriately reflects the emissions resulting from the final standards.

Regarding comments from the Alliance for Vehicle Efficiency suggesting that EPA use projected sales data from IHS Markit and pointing out shortcomings of past EPA projections, the commenter states that "Real-world modeling in the Proposed Rule will assist manufacturers with future planning to reflect consumer’s vehicle choices." CCEMS projects a future fleet based on data from EIA about the future fleet and on algorithms within the model that influence future fleet mix based on fuel consumption projections and costs. EPA acknowledges the commenter’s statement that manufacturers make use of its models or modeling results in their future planning with respect to consumer's vehicle choices.

Regarding comments that EPA should set standards that encourage as many solutions as possible, and that a single technology solution will not accomplish our goals, EPA agrees and has set performance-based, fuel-neutral standards directed at resulting insignificant GHG emissions reductions rather than mandating specific technologies.

The American Enterprise Institute claims that EPA failed, in the NPRM analysis, to consider the time-related costs of electric vehicle charging. This is not true. While we inadvertently did not mention that fact in the description of our analysis inputs in the proposal, we have corrected that oversight in the final preamble at Section VII.C. The CCEMS model input files used by EPA in support of the NPRM included all relevant factors used in the modeling (see any parameters input file at EPA_CCEMS_PostProcessingTool, Docket ID EPA-HQ-OAR-2021-0208-0133). The fact that EPA does include those impacts in the analysis is clear by the greater magnitude of the "Refueling Time Savings" in the FRM analysis relative to the NPRM analysis as shown in Preamble Table 45 (the negative time savings constitute a cost and since the magnitude is greater in the FRM analysis than it was in the NPRM analysis, then costs are greater for the FRM's final standards due to the higher BEV penetration in the FRM than in the NPRM).

Regarding comments from the Consumer Federation of America, Drs. Michalek and Whitefoot, and Mr. Peterson regarding our benefit-cost analysis, we note that our benefit-cost analysis follows the practices of OMB Circular A-4 and the Guidelines for Preparing Economic Analyses. EPA has been developing tools to examine the macroeconomic impacts of rulemakings but these tools are still in development; see https://www.epa.gov/environmental-economics/cge-modeling-regulatory-analysis).

The California Air Resources Board suggested that ZEV-only manufacturers be fully considered in credit modeling. EPA agrees with this comment and has conducted a sensitivity analysis which reflects this recommendation. CCEMS does not allow for credit trading across manufacturers. Instead, any credits earned and/or banked by a manufacturer are usable by that manufacturer only. Therefore, in the CCEMS modeling a pure BEV manufacturer (e.g., Tesla) that earns many credits each year, retains all of the earned credits since those credits cannot be traded or sold to another manufacturer within the modeling constraints. While that does not impact Tesla's average cost per vehicle calculated within the model, it can impact costs per vehicle of other manufacturers since, rather than purchasing credits from Tesla, the model simulates that they must add technology to achieve compliance. While we recognize there is uncertainty in the credit trading market in any given model year, EPA's annual manufacturer Trends reports indicates that there is a robust credit market and we believe it is more likely that most credits will not go unused. For that reason, for both the proposed and final rules we assessed a sensitivity case that allows for such trading -- our "perfect trading" sensitivity -- where we remove all manufacturer identifying data from the input files and treat the entire fleet as produced by a single manufacturer. That way, Tesla's credit sales, and the sales and purchases of other manufacturers, can be better reflected. We present our sensitivity results in several places: RIA 4.1.5.1 for cost per vehicle and technology penetration rates, and RIA 10.4 for benefit-cost analysis results.

In response to a request for comment, CARB suggested that if EPA's SAFE1 waiver action were reversed prior to this final rule, then it would be reasonable for EPA to include the California GHG and ZEV programs in the No Action case. EPA has not included the California GHG or ZEV programs in the No Action case for this final rule, as described in Preamble III.A and RIA 4.1. EPA applied the California Framework Agreement nationwide targets to the five participating manufacturers as part of the No-Action case in its compliance modeling.

Other commenters questioned why EPA had not included certain consumer-related costs and benefits as was done in the SAFE 2 final rule. As noted earlier, EPA follows applicable guidance and best practices when conducting its benefit-cost analyses, including OMB Circular A-4, EPA's Guidelines for Preparing Economic Analyses. EPA does not believe it is necessary to characterize certain costs and benefits as private (consumer) and others as societal (social) costs and benefits. In the past, EPA has considered financing costs, taxes, insurance, etc., when calculating consumer-oriented impacts such as payback periods and lifetime costs/savings, but has never included those costs in its final benefit-cost analyses.

In response to comments from Consumer Reports on the fuel economy gap, we discuss these issues in detail in Section 17 of this document and in Preamble VII.A. and RIA 8.1. We agree with the comment that our off-cycle credit modeling approach was not optimal in the NPRM. We have updated our approach as discussed in RIA 4.1.1.1. This commenter also suggests that we update our battery costs, which we have done as discussed in Preamble III.A with more detail in RIA 2.3.4 and 4.1.1.2. This commenter also states that EPA generally does not include repair and maintenance costs in GHG rules. In fact, EPA included maintenance cost impacts in the 2012 final rule and the analyses we conducted during the midterm evaluation, but maintenance costs were not included in the SAFE rulemaking and, likewise, were not included in the NPRM for this rulemaking. We also did not attempt to include those costs in our final analysis because we do not have a good method to incorporate recent studies into CCEMS. That said, we intend to study this issue for future analyses and appreciate the studies the commenter has referenced in their comments. As for fuel prices and the AEO report used, we have chosen to continue with the AEO 2021 report as it remains the most recent report. We have conducted sensitivities that include the high oil and low oil prices and present those results in RIA 4.1.5.1.

Regarding the DENSO comment that we update our modeling with the updated IMAC-GHG-LCCP (Improved Mobile Air-Conditioning Greenhouse Gas Life Cycle Climate Performance software). We considered the comment but decided it was not necessary to do so for the final rule analysis since EPA did not propose and is not finalizing any changes to the air conditioning credit elements of the GHG program. We address Life-cycle Analysis comments in section 16 of this document.

Regarding comments from Walter Kreucher, many of the comments are difficult to understand and many do not appear specifically directed at this rulemaking or the EPA GHG program, but as far as EPA can determine pertain to the CAFE program. Mr. Kreucher may be implying that EPA based its "CO2 Tailpipe standards on market penetration of ZEVs" and that our RIA stated that there will be a de minimis impact on climate as a result of the proposal. Neither of these statements is true of EPA's NPRM. We did not conduct climate modeling for this rulemaking and did not make such claims on climate impacts. However, we have estimated climate benefits and present those estimates in Preamble VII.I and RIA 10. Mr. Kreucher also claims "average cost premium (including fuel cost and the social benefits) of an electric vehicle was $22,400 above the cost of its gasoline counterpart." The commenter did not provide an explanation for how this value was determined, but even if were true with respect to price, we note that the highest selling EVs tend to have performance and utility features which are not available in any ICE vehicles of the same class. It is therefore difficult to compare BEV vs. ICE prices on an equivalent basis. Any apparent price premium could imply higher costs to manufacturers, but it could also imply that electric vehicles are more desirable to consumers and that supply and demand is driving up their prices, or that EVs are sold in more expensive market segments than most new vehicles. The latter would say nothing of their costs. In addition, there are often federal and state tax incentives for consumers in purchasing zero emissions vehicles that can directionally reduce the prices paid by consumers. We believe, as discussed in Section 12 of this document, Preamble III.A and in RIA 2.3.4 and 4.1.1.2, that we have estimated electric vehicle costs, including our updated analysis of battery costs, as accurately as possible. With respect to comments on advanced technology multipliers suggesting that EPA does not think the proposed standards are feasible, EPA disagrees with this comment. The multipliers are meant to promote earlier introduction of BEV and PHEV vehicles in MYs 2023 and 2024 and to provide flexibility in light of lead time. We believe the standards could be achieved at a reasonable cost even in the absence of the multipliers, although the multipliers serve as an incentive for EVs.

In response to the Michalek and Whitefoot comments, we note that EPA is not obligated under the Clean Air Act to set standards based on maximizing net benefits. With respect to the scrappage modeling, we address this issue in more detail in Preamble III.A where we state that EPA is maintaining the assumption of constant non-rebound total fleet VMT for this FRM and will continue to review these and other modeling approaches for future analyses. Further, we have generally characterized the flexibilities available to manufacturers in our benefit-cost analysis where appropriate (see Preamble III and RIA 4).

NCAT commented that they believed our battery costs in the proposal were too high. EPA has updated those costs based on public comments and the most recent data, which has resulted in a lowering of battery costs for the final rule as discussed in Section 12 of this document, Preamble III.A and in RIA 2.3.4 and 4.1.1.2.

Toyota commented on our use of HCR2 technology and that the technology was inappropriately modeled. As we discuss in RIA 2.3.2 and 4.1.1.3., we have revised our approach to modeling the HCR2 technology and for the final rule we do not allow the technology within the modeling for our primary analysis. HCR2 is now modeled as part of a sensitivity analysis for model years 2025 and later (see RIA Chapter 4.1.5). The comment that HCR2 assumes use of a compression ratio of 14:1 is incorrect. The effectiveness of HCR2 is based upon a geometric compression ratio of 13:1, use of cooled EGR, and addition of dynamic cylinder deactivation (see RIA 2.3.2), and thus the incremental CO_2 effectiveness would be comparable to the incremental effectiveness of Toyota's current production A25A-FKS engine except with the addition of dynamic cylinder deactivation.[57]

13.2. Projected Technology Packages and Manufacturer Compliance Costs

Commenters Included in this Section

Alliance For Automotive Innovation
American Honda Motor Company (Honda)
California Attorney General Office, et al.
Consumer Federation of America
E2 - Environmental Entrepreneurs
Institute for Policy Integrity
International Council on Clean Transportation
Tesla
Union of Concerned Scientists (UCS)

Commenter: Alliance For Automotive Innovation

Auto Innovators provides the following comments on EPA's modeling of potential manufacturer compliance pathways, including technology benefits and costs, in the spirit of ensuring a robust assessment of the actions manufacturers may take for compliance, their associated costs, and other considerations. Given the limited time provided for comments, we have necessarily abbreviated our review. Auto Innovators may submit additional supplemental technical comments in response to EPA's analysis and to that of other stakeholder submissions.

In the GHG NPRM, EPA states that:

In our design and analyses of the proposed program and our overall updated assessment of feasibility, EPA also took into account the decade-long light-duty vehicle GHG emission reduction program in which the auto industry has introduced a wide lineup of ever more fuel efficient, GHG-reducing technologies. The technological achievements already developed and applied to vehicles within the current new vehicle fleet will enable the industry to achieve the proposed standards even without the development of new technologies beyond those already widely available. Furthermore, in light of the design cycle timing for vehicles, EPA has basis to expect that the vehicles that automakers will be selling during the first years of the proposed MY 2023-26 program were already designed before the less stringent SAFE standards were recently

[57] Kargul, J., Stuhldreher, M., Barba, D., Schenk, C., Bohac, S., McDonald, J., & Dekraker, P. (2019). Benchmarking a 2018 Toyota camry 2.5-liter atkinson cycle engine with cooled-EGR. SAE International journal of advances and current practices in mobility, 1(2), 601.

adopted. Further support that the technologies needed to meet the proposed standards do not need to be developed, but are already widely available and in use on vehicles…140

Auto Innovators encourages EPA to rethink the assumption that the compliance modeling is reasonable in the context of policy analysis and projected response to major regulatory reform and considering significant events since 2017.141

While it is true that manufacturers and suppliers have invested hundreds of billions of dollars in research and development and in production facilities to bring fuel-saving technologies with impressive efficiencies to market over the last decade, scaling up the production of these technologies will take additional time and investment. Manufacturers and suppliers are working hard to grow automotivegrade battery production and other production capacities for fuel-saving technologies. Compliance with portions of this proposal require breaking new ground. Many elements of the supply chain are at capacity (consider the semiconductor shortage, for instance). Even if technologies are currently in production on some vehicles, future, unforeseen innovations are still required to meet the projected technology costs assumed in the EPA analyses (consider, for example, how quickly the Agencies assume battery costs are reduced through learning), and these cost-saving innovations are not guaranteed. The EPA analyses also include technologies that have not yet been produced (with projected effectiveness estimates that may not be technologically feasible), and these are assumed to be adopted quickly, and broadly in the EPA compliance pathways.142 [EPA-HQ-OAR-2021-0208-0571-A1, p. 46-47]

Commenter: American Honda Motor Company (Honda)

Modeling Technology Pathways

Over the past decade, Honda has expressed concern that regulatory methodologies for assessing costs and benefits under vehicle GHG and fuel economy programs result in an underestimation of actual compliance costs. While we understand an agency’s need to define regulatory boundaries, we believe this issue is increasingly important given the pace of transformation facing the automobile industry in the coming years. We believe that modeling technology pathways that are substantially different from actual plans will result in a policy discussion unnecessarily disconnected from key business decisions.

Pursuit of a pathway consistent with lowest-cost technology walks could, in theory, result in a fleet capable of meeting MY2026 standards. However, because coming regulatory regimes dictate broader strategic decisions, manufacturers today cannot simply plan to achieve 2026 targets. The Biden administration has publicly declared a desire to, in the near future, go well beyond stringencies considered in the MY2023-2026 rule. Meanwhile, California is in the process of setting its own ambitious GHG and electrification requirements as part of its Advanced Clean Car II regulations. Manufacturers and suppliers must plan for these transformations.

Pursuit of a lowest-cost technology path (capable of meeting MY2026 standards, and no further) would likely necessitate abandoning technology in the face of more stringent future requirements, stranding assets before their costs could be meaningfully recouped. More succinctly put, the cheapest path to 2026 could be the most expensive path to 2035.

Today, modeled lowest-cost pathways for bringing a fleet into compliance (such as those conducted in regulatory modeling exercises) are, for all intents and purposes, not viable options to manufacturers that must set their sights further into the future. As such, it is our view that actual compliance costs are, on the whole, typically higher than those estimated by the agency – a challenge exacerbated by the pace and magnitude of investment over a relatively brief window of time. Honda raises this point not as rationale for relaxing proposed standards, but rather to underscore the continued importance of regulatory flexibilities and complementary measures necessary to drive the transition to a cleaner fleet. [EPA-HQ-OAR-2021-0208-0565-A1, p. 11]

Agency Modeling Data

Honda has observed inconsistencies between computer model data files associated with this proposal, and data published in EPA’s Trends Report.21 Honda has not attempted to assess the breadth of this issue, but flags it as an item for further examination by the agency prior to final rule publication.

Two examples are given. First, EPA’s modeling assumes that use of off-cycle credits will be fully maximized by automobile manufacturers in MY2020 and later. By contrast, Trends Report data indicate that off-cycle credits delivered 5.4 g/mi in MY2017, climbing to just 7.5 g/mi in MY2019, an increase of roughly 1 g/mi per year. Given this pace, we believe it is unlikely that industry as a whole will adopt at a quadrupled-rate pace to reach the off-cycle cap in MY2020, as appears to be assumed in the agency’s modeling.

On a separate but related note, Honda noticed that while the 'postproc_model_runs' tool includes some aggregate off-cycle technology cost information, technology-specific costs could not be located. Honda welcomes further discussion with the agency on this topic. The agency may also wish to consider constraining off-cycle technology application to product refresh and redesign years, consistent with how it approaches application of other technologies.

Second, the total volume of banked GHG credits assumed by the agency in its CCEMS Market Data input file do not match publicly available data on EPA’s website.22 Differences between these files is, in some cases, quite significant, especially for model years 2015 and 2016. It is unclear how credit volumes included in the CCEMS Market Data input file were derived, so we simply flag the issue here for further agency examination. [EPA-HQ-OAR-2021-0208-0565-A1, pp. 11-12]

Commenter: California Attorney General Office, et al.

However, two key threshold points are relevant to all model years. First, the cost of compliance for all of the standards included in EPA’s Proposal—including the most stringent ones—is modest and very reasonable. EPA projects average, per-vehicle costs of its preferred alternative to be approximately $500 in MY2023 and $1,000 in MY2026, Draft Regulatory Impact Analysis

(‘DRIA’) 4-14 (Table 4-16), and those costs are similar for the more stringent Alternative 2, id. at 4-16 (Table 4-20). These per-vehicle costs for MY2026 are similar to the per-vehicle costs EPA estimated for the MY2025 standards it promulgated in 2012 and to the costs EPA determined remained appropriate in 2017. DRIA 1-10 (Figure 1-4). Indeed, the projected pervehicle costs are now similar to, and even lower than, they were in 2012. Compare id. (2012 estimate for MY2025) with id. at 4-16 (more stringent MY2026). The per-vehicle costs EPA estimates here for the outer model years are also in line with EPA’s earlier (2010) projections for its MY2016 GHG standards. 75 Fed. Reg. at 25,348. EPA’s 2010 actions were challenged by numerous parties in the D.C. Circuit, but none of those challengers alleged the standards were too costly or required more lead time to address compliance costs.121 Put simply, EPA correctly concluded, in 2010, 2012 and 2017, that per-vehicle compliance costs like these are reasonable and would not cause undue disruption, and there is no basis for any other conclusion here.122 No additional lead time, for any model year, can be justified on the basis of compliance costs. [EPA-HQ-OAR-2021-0208-0245-A1, pp.24-25]

Fourth, and finally, automakers can reduce fleetwide emissions by marketing and incentivizing the purchase of certain vehicles they already produce. For example, even in their current (MY2021) fleets, automakers offer a range of packages for many models.134 GHG emissions can vary, for a single model, by as much as 30% (and sometimes more) across these packages, even where, in most applications, the differently packaged vehicles will perform similarly.135 For example, in MY2021, Ford offers six versions of its popular Explorer sport utility vehicle (SUV), and the lowest-emitting Explorer has GHG emissions 27.2% below the highest-emitting one.136 And Ford’s range of Escape SUVs varies even more—by 35.7% from the highest- to lowest-emitting.137 Ford can, thus, reduce its fleetwide average emissions by leveraging its marketing, pricing, and other incentives to encourage consumers looking to buy an Explorer or an Escape to buy a lower-emitting one. And it (and other automakers) can do that with next-tono lead time, since all of these packages are already being manufactured. [EPA-HQ-OAR-2021-0208-0245-A1, p, 28]

Commenter: Consumer Federation of America

Fortunately, the agency has continued with the approach to regulation that we call 'command-but-not-control,' which was very much at the core of EISA. One challenge here is that the agency must accelerate a transition in technology to an all-electric fleet, a transformation to which many of the automakers have already committed. Therefore, the agency is not 'mandating' a technology; it is seeking to smooth and accelerate its adoption. [EPA-HQ-OAR-2021-0208-0297-A1, p. 24]

Commenter: E2 - Environmental Entrepreneurs

Costs: EPA’s cost analysis of Alternative 2 shows that compliance with the stronger rule would cost automakers less per vehicle. In 2026, the fleet average cost per vehicle is $1,044 under the Proposal and $1,030 for Alternative 2. DRIA, Tables 4-16, 4-20. It goes on to show that any higher costs of Alternative 2 are more than offset by Alternative 2’s higher benefits. EPA projects that through 2050, the Proposal has a net benefit of $140 billion, compared with Alternative 2's net benefit of $180 billion. [EPA-HQ-OAR-2021-0208-0604-A1, p. 3]

Commenter: Institute for Policy Integrity

IV. EPA Has Begun to Make Appropriate Changes to Its Modeling Approach; Further Adjustments in the Future Would More Fully Capture the Benefits of Strong Standards

In this rulemaking, EPA has chosen to rely on the same CCEMS model used by EPA and NHTSA to develop the SAFE 2 standards. Policy Integrity previously provided comments on the SAFE proposal and issued public reports on the final SAFE 2 Rule analyzing technical and economic flaws that cause this model to overestimate the costs and undervalue the benefits of strong standards.130 While EPA has begun to make appropriate adjustments to address some of these flaws, Policy Integrity recommends EPA make further changes to its model for the final rule, to work closely with NHTSA to maintain consistency in analysis with the companion fuel economy standards where appropriate, and to continue to develop its new OMEGA2 model for future rulemakings. In general, the below suggestions would not change the direction of EPA's cost-benefit analysis (i.e., the proposal and alternatives would continue to have net benefits), but rather could significantly increase the magnitude of estimated net benefits of these and future standards by more properly estimating the effects of stronger standards.

Policy Integrity provides the following comments to support EPA's proposed changes in input choices for the CCEMS model, as well as to encourage EPA to consider further changes for the final rule and in future rulemakings.131 [EPA-HQ-OAR-2021-0208-0299-A1, pp. 18-19]

Commenter: International Council on Clean Transportation

As detailed in the technology sections of ICCT's comments, above, there are many technology efficiency improvements and cost reductions that have not been incorporated into EPA's modeling, plus how the model handles off-cycle credits artificially increases the total cost of compliance. Given the very modest increases in conventional technology penetration from the SAFE rule to the proposed rule, it is clear that additional technology can easily be added to the fleet by 2026 that is more effective and lower cost than modelled in the proposed rule. [EPA-HQ-OAR-2021-0208-0522-A1, p. 18]

Commenter: Tesla

Tesla notes in supporting the proposal EPA errantly asserts that Tesla can make use of all on-menu off-cycle credits and then assigns a cost to Tesla vehicle manufacturing for utilizing off-cycle technologies that are not applicable to EVs. See, EPA, Revised 2023 and Later Model Year Light Duty Vehicle GHG Emissions Standards, Regulatory Impact Analysis (Aug 2021) at 134. ('As shown in Table 4-14, Tesla incurs nearly $400 per vehicle despite being a pure electric vehicle maker (0 grams/mile) and despite there being no upstream emissions accounting under the proposal. The costs shown for Tesla represent the costs of 15 grams/mile of off-cycle credit that we estimate Tesla would incur to generate additional GHG credits which it could sell to other manufacturers.'). EPA's modeling needs to correct this error. 185 See 77 Fed. Reg. at 62650. 186 See ICCT, How Will Off-Cycle Credits Impact U.S. 2025 Efficiency Standards? (March 2018).

Commenter: Union of Concerned Scientists (UCS)

Results – Preferred Alternative

Results for the modeled compliance scenario for the Preferred Alternative are shown in Figure 1. As can be seen in the figure, manufacturers are projected to continue to run net deficits on an annual basis until at least 2024 and as late as 2026. The crediting provisions of the greenhouse gas program allow for such deficit running, and it would be disadvantageous for a manufacturer not to take advantage of such flexibilities if they had sufficient banked credits to do so. [EPA-HQ-OAR-2021-0208-0277-A1, p.8] [[Figure 1 can be found on p. 9 of EPA-HQ-OAR-2021-0208-0277-A1]]

Both Framework OEMs and SAFE OEMs can meet the MY2023 standards without any increase in technology adoption above that in the projected baseline. For the Framework OEMs, there is not a substantial increase in technology adoption in MY2024, owing to the sufficient availability of credits and relatively small deviation between the California agreements and the NPRM in this timeframe. Already by MY2025 a small adjustment in technology can be made, and the Framework OEMs adjust then to annual compliance with the regulation. [EPA-HQ-OAR-2021-0208-0277-A1, pp.8-9]

For the SAFE OEMs, who potentially had planned for a far less stringent standard to be in place in MY2024, there is a substantial change in technology from the baseline scenario (and the previous model year). In this case, this reduction in emissions is largely the result of a modeled increase in deployment of electric vehicles (EVs) between MY2023 and MY2024, from 3.7 percent to 7.7 percent of the fleet. This is consistent with the large number of new EV models expected to be made available in this timeframe.19 Moreover, this year-over-year increase is much less than the 8 percent increase seen in the European market between 2019 and 2020, when manufacturers were similarly responding to new regulatory incentives.20 Finally, while the model determined this was the most cost-effective pathway, it is simply one technology available to manufacturers in this timeframe—there are significant available internal combustion engine technologies for most of the manufacturers at the level of certification required in MY2024 in these scenarios such that there are pathways with lower EV penetration which would still comply with the regulation, and the model was simply selecting for the most efficient within its algorithmic framework. [EPA-HQ-OAR-2021-0208-0277-A1, pp.9-10]

Because credits are a critical part of the compliance strategy, we've paid special attention to ensuring that the model replicates the credit banks in a reasonable manner.21 Figure 2 compares two different possible credit strategies considered in our modeling, one in which manufacturers are preferential toward the use of credits not ready to expire (left), and one in which industry as a whole utilizes available credits perfectly in order of vintage (right). Even with suboptimal credit usage, Figure 2 shows clearly that manufacturers can choose not to deviate at all from their compliance plans for MY2023 and comply with the NPRM with modifications to their plans consistent with technology adoption available to all manufacturers in MY2024 and later. In fact, in these modeling runs, industry runs a net deficit in MY2023, MY2024, and MY2026 and yet has sufficient credits to comply largely through carryforward of its banked credits, even in our suboptimal trading run.[EPA-HQ-OAR-2021-0208-0277-A1, pp.10-11] [[Figure 2 can be found on p. 10 of EPA-HQ-OAR-2021-0208-0277-A1]]

Results – Alternative 2

In the preamble to the proposed rule, EPA noted that lead-time was part of its consideration in rejecting Alternative 2.22 Our modeling does not support this assessment. Rather, even in our conservative assumptions on manufacturer product plans for MY2023, there is sufficient credit availability for manufacturers to comply, even without resorting to additional technology deployment or credit carryback from improvements made post-MY2024. As such, we believe there is sufficient lead-time argument for industry to comply with Alternative 2 in MY2023 and beyond [EPA-HQ-OAR-2021-0208-0277-A1,p.11]

Figure 3 illustrates manufacturers' response to Alternative 2. SAFE OEMs again respond to the rule primarily through additional electrification, this time with an increase of 7.3 percent, from 3.7 to 11.0 percent.23 Because Alternative 2 is more stringent than the California framework in MY2023 and MY2024, even the Framework OEMs choose to deviate from their baseline production plans with additional technology adoption. Though a small change, this helps the industry overall comply through the modeled timeframe. [EPA-HQ-OAR-2021-0208-0277-A1, p.11] [[Figure 3 can be found on p. 12 of EPA-HQ-OAR-2021-0208-0277-A1]]

Figure 4 illustrates the credit bank for industrywide compliance with Alternative 2. Because manufacturers make more adjustments to their fleet in MY2024, the credit bank overall is not that different entering MY2027 than it was under the compliance modeled for the Preferred Alternative. The fact that further adjustment in MY2024 is possible also further illustrates the ease with which manufacturers can comply with the Preferred Alternative, even with limited lead-time.[EPA-HQ-OAR-2021-0208-0277-A1, p.11] [[Figure 4 can be found on p. 14 of EPA-HQ-OAR-2021-0208-0277-A1]]

Additional strategies by manufacturers to handle lead-time

The Volpe model is limited in its ability to consider all of the possible paths to compliance accessible to manufacturers. Below we highlight a couple of those strategies which can and have been used by manufacturers previously, indicating that our modeling is, again, a conservative picture of how the industry could respond in a short timeframe to increases in standards with relatively little lead-time. [EPA-HQ-OAR-2021-0208-0277-A1, p.13]

One obviously potential strategy is the use of pricing changes to shift the sales mix of a manufacturer's fleet. There is extensive literature on this subject, and in fact General Motors themselves published its own internal economic model for pricing with regards to compliance with CAFE standards.24 There continues to be recent anecdotal evidence in support of this as well, such as pricing of the Fiat 500e to ensure Stellantis sold the prescribed volume of electric vehicles required under state ZEV regulations.25 Because EVs are so much more efficient than either the Preferred Alternative or Alternative 2 require, small shifts in fleetshare for those vehicles result in dramatic shifts in a manufacturer's average fleet performance. Given the large number of new EV models offered in the MY2023-2025 timeframe, it is highly likely that manufacturers concerned about short-term compliance with the newly finalized standards could make last-minute adjustments to pricing in order to compensate for any unforeseen shortfalls. Smaller pricing decisions such as the relative costs between a given model's more efficient base powertrain offering and the high-performance package could also help a manufacturer alter its average performance without making any adjustments to the technology offered in its fleet. [EPA-HQ-OAR-2021-0208-0277-A1,pp.13-14]

Another tool at manufacturers' disposal is the use of "carryback" credits. The Volpe model only looks at carrying forward credits for compliance, but manufacturers can use overcompliance credits earned from as many as three years after a deficit is generated to offset it.26 While the Volpe model does not consider this as a compliance possibility, EPA allows it, automakers' trade associations have acknowledged its use,27 and the National Automobile Dealers Association and Volkswagen both commented that credit carryback supports annual compliance with the greenhouse gas program.28 Manufacturers like Volvo and Jaguar-Land Rover have carried forward deficits under this provision for purposes of complying with the current greenhouse gas program.29 While this may not be an option preferred by manufacturers, shifts in the market and/or adjustments to the standards themselves are precisely the reason for such credit flexibilities, and it should be a viable option for compliance considered by EPA in its consideration of lead-time requirements. [EPA-HQ-OAR-2021-0208-0277-A1,p.14]

Support for setting stronger greenhouse gas emissions standards in 2026

EPA has requested comment on strengthening the standards beyond the Preferred Alternative or Alternative 2 in 2026, noting the significant amount of lead-time and information on manufacturers' plans that suggests industry is more than capable of meeting increasing stringency in this timeframe.30 Not only is such an increase feasible, but it is critical in order to rapidly confront the issue of climate change and limit warming. [EPA-HQ-OAR-2021-0208-0277-A1, p.14]

EPA's own modeling shows how much more can be done in this timeframe, not just through electrification but through improvements to gasoline-powered vehicles. Our modeling supports this and indicates the significant additional benefits increasing stringency provides. [EPA-HQ-OAR-2021-0208-0277-A1,p.14]

Building on the modeling effort detailed in § I., we examine three standards more stringent than the proposal: Alternative 2, and Alternative 2 with targets 5 and 10 g/mi lower in 2026. In all cases, manufacturers are able to comply, through both an increase in electrification and further penetration of internal combustion engine technologies, leading to significant benefits. [EPA-HQ-OAR-2021-0208-0277-A1,p.14]

Achieved fleetwide greenhouse gas emissions levels

Figure 5 shows the respective fleet average standards and the levels achieved in the scenarios examined by UCS. Even the strongest of these alternatives does not achieve an emissions level below what the initial 2012 standards were supposed to achieve in 2025 until 2026.31 While these rules are, by design, flexible to fleet mix, the dramatic shift towards crossover- and sport-utility vehicles has significantly eroded much of the emissions reductions which were initially anticipated—setting a strong standard for MY2023-2026 is the only way to put us back on that trajectory. However, EPA will need to accelerate the rate of improvement beyond even the strongest alternative modeled by UCS in order to meet our estimate for a 2030 target consistent with what is needed to address climate change (Figure 6).32 [EPA-HQ-OAR-2021-0208-0277-A1, p.15] [[Figure 5 can be found on p. 15 of EPA-HQ-OAR-2021-0208-0277-A1]] [[Figure 6 can be found on p. 16 of EPA-HQ-OAR-2021-0208-0277-A1]]

Electric vehicle penetration for different regulatory scenarios

EV marketshare for our modeling is shown in Figure 7.33 Here we also include an alternative scenario matching the proposal but excluding EV multipliers, to illustrate the adverse impacts of EV multipliers (§ III.a.). [EPA-HQ-OAR-2021-0208-0277-A1,p .16] [[Figure 7 can be found on p. 17 of EPA-HQ-OAR-2021-0208-0277-A1]]

The results are clear and systematic—the more stringent the rule, the more EVs which are projected to penetrate the fleet. While the three variants of Alternative 2 match in the early years, the increase in stringency in 2026 has a significant impact on EV penetration in the MY2025-2026 timeframe. There is nearly a 50 percent increase in MY2026 EV sales between the proposal and the most stringent scenario examined, from 10.8 percent up to 15.5 percent. These figures are more than double and triple, respectively, the 4.8 percent EV marketshare achieved in MY2026 in the baseline compliance scenario. [EPA-HQ-OAR-2021-0208-0277-A1, p.16]

While the proposal would result in more than 5.5 million EVs sold according to our analysis, more than doubling the total sold in the baseline, our strongest alternative would result in an additional 1.3 million EVs on the road. For context, 1.9 million EVs have been sold in the United States since 2010.34 However, it is further worth noting that our modeling runs do not consider compliance with state ZEV standards—this will likely impact the assumed baseline level of EV adoption, particularly by MY2026. [EPA-HQ-OAR-2021-0208-0277-A1,p.17]

California's Air Resources Board is developing the Advanced Clean Car II rule, which will include revisions to the Zero Emissions Vehicle (ZEV) regulations. The Air Resources Board initial draft of the ZEV regulation targets would require approximately 25 percent of new vehicles in California to be EVs.35 New vehicle sales in California over the previous 5 years (calendar years 2016-2020) averaged 2.06 million vehicles, and the ZEV regulation would likely require over 500,000 EVs in California alone.36 [EPA-HQ-OAR-2021-0208-0277-A1,pp.17-18]

It is clear from our modeling that EV adoption is at the heart of any discussion of stringency. Setting the strongest rule possible in the near-term sends a stronger signal to industry and will better enable industry to respond to a post-MY2026 regulation consistent with EO 14037. For example, this could be the difference in requiring a five-fold increase in EV sales in a four-year span, compared to just a three-fold increase. While the transition to electrification will happen rapidly as vehicles not just reach cost parity but convenience parity, prodding manufacturers to pull forward the front edge of that transition will help solidify investments in the United States in support of this transition that will enable EPA to set as robust a rule as possible in order to address climate change. [EPA-HQ-OAR-2021-0208-0277-A1,p.18]

Internal combustion engine vehicle technology under different regulatory scenarios

While manufacturers' EV plans will be a key piece to addressing the increase in stringency beginning in MY2023, internal combustion engine vehicles will continue to improve in this timeframe and show no sign of exhausting their potential. While our modeling suggests that manufacturers will deploy EVs due to the significant improvement they can make in a fleet's performance, this is by no means the only path available, as indicated by the relatively low levels of vehicle technology modeled as being deployed in the remaining gasoline-powered fleet, which leave many other options open (Figure 8). [EPA-HQ-OAR-2021-0208-0277-A1,p.18] [[Figure 8 can be found on p. 19 of EPA-HQ-OAR-2021-0208-0277-A1]]

The strongest gains come in the adoption of high compression ratio (HCR) engines, and especially an advanced HCR engine with a cooled exhaust gas recirculation and dynamic cylinder deactivation (HCR2). As has been highlighted previously by EPA, HCR2 remains a cost-effective technology.37 However, our modeling also shows an increase in advanced cylinder deactivation, as well as an increasing use of cylinder deactivation with turbocharged engines. [EPA-HQ-OAR-2021-0208-0277-A1,p.18]

While not shown, we saw across all scenarios a significant shift to more advanced transmissions, both for continuously variable transmissions (CVTs) moving to more advanced variants, and for a marked shift to more 10-speed automatic transmissions. Both of these are consistent with ongoing trends in the industry.38 [EPA-HQ-OAR-2021-0208-0277-A1,p.18]

Interestingly, apart from the differences in plug-in electric vehicles, there is little difference between the four modeled scenarios when it comes to hybridization of conventional vehicles. Shares of stop-start/mild hybrids, as well as strong hybrids, only see marginal changes in all scenarios (Figure 9). [EPA-HQ-OAR-2021-0208-0277-A1, p.19] [[Figure 9 can be found on p. 20 of EPA-HQ-OAR-2021-0208-0277-A1]]

The relatively small changes in marketshare across different compliance scenarios illustrates one of the challenges with a model like the Volpe model—it can get stuck in particular pathways that act as a local minimum and may not necessarily fully reflect all of the compliance pathways utilized by manufacturers. There will always be examples of a model such as Volpe not quite accurately reflecting reality—for example, Figure 9 shows little change in strong hybridization, and our modeling observed no strong hybrid pick-up trucks, yet both Ford and Toyota are moving forward with full-size hybrid pick-up trucks (§ III.d.). EPA's own modeling exhibits a similar level of stability in overall technology deployment across all regulatory scenarios and sensitivity cases.39 [EPA-HQ-OAR-2021-0208-0277-A1, pp.20-21]

At the same time, while our model may not perfectly replicate the industry's eventual path forward, it indicates that there are many viable pathways for compliance, since large numbers of vehicles remaining in relatively low-technology configurations like a lack of start-stop or large remaining share of 18-bar BMEP turbocharged engines (Turbo1). [EPA-HQ-OAR-2021-0208-0277-A1, p.21]

EPA Response

The comments by the Alliance for Automotive Innovation encouraged EPA to rethink whether the compliance modeling is reasonable considering significant events since 2017. The Alliance also commented on EPA's battery cost estimates and statement that all technologies included in the analysis are already in production. Although the comment is unclear, we believe this latter claim is directed at the HCR2 technology that was projected for wide application in the NPRM analysis. However, the FRM analysis does not include that technology in our primary analysis as we discuss in RIA 2.3.2 and 4.1.1.3. Further, we discuss our updated battery costs in Preamble III.A with more detail in RIA 2.3.4 and 4.1.1.2 where we note that our updated battery costs are in-line with Department of Energy and third-party estimates and projections.

In response to comments by Honda with respect to EPA's modeling of off-cycle credits in the NPRM, we agree that our approach in the NPRM could be improved, and we have updated our approach for the final analysis. We discuss our updated approach in RIA 4.1.1.1. Honda also commented that the banked credits that were used for modeling in our NPRM appeared to be out-of-date. We agree with the commenter and have updated our banked credits for the final analysis based on the most recent manufacturer compliance data submitted to EPA. We appreciate Honda's comment that flexibilities in the program are important because automakers may want to adopt a compliance strategy for model year 2026 with an eye towards developing products that could meet future standards that may be more stringent. We agree that the flexibilities built into the program mean that compliance costs for a given time period are often in effect spread over a wider time period, depending on a manufacturer's choice of strategy. Our modeling is intended to be a reasonable illustration of potential costs for automakers to comply with the standards under consideration in the proposal, and those adopted in this final rule. Although the flexibilities in the program offer manufacturers different options for technology paths to compliance over different time periods, which may make it more difficult, or uncertain, to accurately predict costs for a specific manufacturer in a specific year, we believe the modeling represents a reasonable estimation of costs to meet the standards, and the flexibilities adopted overall reduce costs.

EPA agrees with the comment from the Consumer Federation of America that we are not mandating a technology with these final standards. We are establishing performance-based standards which are technology neutral.

Regarding the comment from Environmental Entrepreneurs, we note that we do not set standards to maximize net benefits under the Clean Air Act, but rather EPA considers many factors including technology feasibility, lead time considerations, and costs.

Tesla commented that we erroneously show them earning off-cycle credits in our NPRM analysis. We have corrected this issue in our final analysis.

In response to comments from the Institute for Policy Integrity recommending that EPA make further changes to its model for the final rule and to work closely with NHTSA to maintain consistency in analysis with the companion fuel economy standards where appropriate, and to continue to develop its updated OMEGA2 model for future rulemakings, EPA did coordinate with NTHSA for this rulemaking. We also plan on the continued development of our OMEGA2 model and plan to make the final model available to all stakeholders in the future.

14. GHG Emissions and Climate Science, Including Estimated GHG Health and Environmental Impacts

<u>Commenters Included in this Section</u>

Agortsas, George
Allergy & Asthma Network, et al.
Alliance of Nurses for Health Environments
American Council for an Energy-Efficient Economy (ACEEE)
American Enterprise Institute (AEI)
American Honda Motor Company (Honda)
American Lung Association
American Lung Association (Sacramento, CA)
Anderson, Laurie
Asthma and Allergy Foundation of America (AAFA)
Bay Area Air Quality Management District
Bednar, Valencia
Begley, Amanda
Beitzel Snow, Stephanie
Bjork, Deb
Brandt, Dorothy
Brandt, Elizabeth
Buzzelli, Melanie
California Air Resources Board (CARB)
California Attorney General Office, et al.
Cantley, Jennifer
Caudill, Gregory
Center for Biological Diversity
Center for Biological Diversity, et al.
Center for Climate and Energy Solutions (C2ES)
CERES
Collins, Molly
Connecticut Department of Energy and Environmental Protection
Cooper, Almeta
Davidson, William
Davis, Darien
Dream Corp Green for All
Dream Corps Green for All et al.
E2 - Environmental Entrepreneurs
Elders Climate Action (ECA)
Energy Innovation Policy and Technology LLC
Energy Strategy Coalition
Environment America
Environmental Defense Fund (EDF)
Environmental Law & Policy Center (ELPC), et al.

Environmental Law and Policy Center (ELPC)
Environmental Protection Network (EPN)
Exxon Mobil
Filippelli, Garbirel
Gallagher, James A.
Gersten, Dana
Haines, Meredith
Hauptman, Elizabeth
Hewes, Celerah
Hill, Pablo
Interfaith Power & Light (IPL)
International Council on Clean Transportation
Kimmel, Julie
Klein, Stephanie
Kuntz, Laurie
Levison, Laura
Lish, Christopher
Lynch, Vanessa
Maine Department of Environmental Protection
Maryland Department of Environment
Mass Comment Campaign sponsored by American Lung Association (121)
Mass Comment Campaign sponsored by Center for Biological Diversity (77,692)
Mass Comment Campaign sponsored by Environment America (11,080)
Mass Comment Campaign sponsored by Interfaith Power & Light (1,093)
Mass Comment Campaign sponsored by Interfaith Power and Light et al. (1,599)
Mass Comment Campaign sponsoring organization unknown-1 (7,010)
Mass Comment Campaign sponsoring organization unknown-11 (1,667)
Mass Comment Campaign sponsoring organization unknown-6 (39)
Mass Comment Campaign sponsoring organization unknown-7 (37)
Mass Comment Campaign sponsoring organization unknown-8 (25)
Mass Comment Campaign sponsoring organization unknown-9 (3,219)
Mathews, Mary
Melton, Karen
Metropolitan Mayors Caucus
Metropolitan Washington Air Quality Committee (MWAQC)
MI Air MI Health
Mid-America Regional Council (MARC)
Minault, Kent
Minnesota Pollution Control Agency (MPCA) and Minnesota Department of Transportation (MnDOT)
Moore, Cinthia
Moore, Kenneth
Mothers and Others for Clean Air
National Association of Clean Air Agencies (NACAA)
National Coalition for Advanced Transportation (NCAT)

National Parks Conservation Association (NPCA)
Natural Resources Defence Council (NRDC)
New Mexico Environment Department
New York State Department of Environmental Conservation
Northeast States for Coordinated Air Use Management (NESCAUM)
Oliver, Shaina
Pennoyer, Marguerite
Pruitt, Katherine
Rauch, Molly
Remilien, Sandra
Sainz, Columba
Shevelew, Jonathan
Sierra Club
Smith, Rita L.
Southern Environmental Law Center
Spencer, Sam
Spirit of the Sun
Stein, Karen
Stout, Linda
Sturza, Taisia
Taxpayers Protection Alliance
Tesla
Trombetta, Nick
Uberuaga, Michelle
United Methodist Women
Valentine, Lucia
Verdin, Langston
Whyte, Yolanda
Wisconsin Department of Natural Resources
Wiste, Leah
Zewadski-Bricker, Edith

Please Note: *Some of the comments listed in this section also pertain to topics covered in Section 14.1 and Section 15.*

Commenter: Agortsas, George

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, p. 189.]

I believe it's difficult to thrive when you're dealing with health issues related to air pollution. It's difficult to thrive when the extremes in weather create dangerous environment. It's difficult to thrive when economically we're burdened with the aftereffects, including increased medical costs, increased costs to address more and more disasters, and costs to address displaced families due to climate change, and other disasters.

That's my main motivation. I really, really want to leave a better planet for our children and grandchildren and those that follow

Commenter: Allergy & Asthma Network, et al.

The Biden Administration action to review and revise existing GHG standards for light-duty vehicles for model years 2023-2026 represents a crucial public health and equity opportunity. This rule must be finalized in 2021 so the rules will be implemented Model Year 2023. The American Lung Association's State of the Air 2021 report made clear that more than 40 percent of all Americans - 135 million people - live in communities impacted by unhealthy air quality. 1 Exposures to poor air quality can result in a wide range of negative health outcomes including asthma attacks, worsening COPD, heart attacks and strokes, lung cancer and premature death. Children, seniors, people of color and low-income communities are at far greater risk of harm from unhealthy air. [EPA-HQ-OAR-2021-0208-0296-A1, pp. 1-2]

Transportation is the number one source of climate pollution in the United States and a leading source of our air quality challenges. Climate change driven by fossil fuel combustion is threatening decades of clean air progress made through US EPA, state, and local actions to reduce harmful emissions. Climate change is a health emergency, amplifying many present-day threats to public health, including extreme heat impacts, degraded air and water quality, and increased destruction and displacement due to wildfires, flooding and other extreme events, among many other tolls taken on Americans' physical and mental health. US EPA acknowledges the significant public health burdens posed by climate change, and that 'scientific assessments continue to be released that further advance our understanding of the climate system and the impacts that GHGs have on public health and welfare both for current and future generations.'2 The revised standards must meet the climate challenge head-on and set the stage for future standards that transition the fleet to zero-emissions as rapidly as possible. [EPA-HQ-OAR-2021-0208-0296-A1, p. 2]

Commenter: Alliance of Nurses for Health Environments

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, pp. 21-22.]

If we do not make significant cuts in greenhouse gas emissions as soon as possible, the worst impacts of climate change will be unavoidable.

As nurses serving on the front lines of communities and caring for impacted populations, we are already seeing the very real effects of climate change on health.

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

Transportation is now the largest source of greenhouse gas emissions in the United States and the light-duty sector makes up 58% of those emissions (EPA 2020b). Reducing carbon emissions is critical to tackling climate change but increasing light-duty vehicle efficiency will also have significant benefits to air quality and reduce driver fueling costs. Vehicles are a significant contributor to local air pollution and the associated health impacts, such as increased rates of asthma, increased risk of heart attacks or strokes, and lung cancer (Doyle 2021). [EPA-HQ-OAR-2021-0208-0251-A1, p.2]

Commenter: American Honda Motor Company (Honda)

Meaningful GHG Reductions

Standards developed in the 2012 Final Rule (covering MY2017-2025 vehicles) were designed to deliver significant environmental benefits. That program called for roughly 4.5% year-over-year improvement to help avoid the worst consequences of climate change. Honda supported the goals of the MY2017-2025 rule and remains convinced of the importance of further action. Due to a variety of reasons, including changing regulatory winds and shifts in consumer preference, industry as a whole did not progress at that pace. According to the latest EPA Trends Report, the combined (car/truck) fleet improved approximately 4.2% in total between model years 2016 and 2020 (the most recent year of data available), well below levels targeted in 2012.8

Societal inaction is not an option. Impacts of climate change can be seen with increased frequency, and scientists continue to warn of even more adverse consequences.9 While the burden of responsibility lies well beyond the automobile sector alone, transportation is a critical part of the solution set. According to recent statistics, light duty transportation is responsible for roughly 22% of all U.S. GHG emissions.10 It is only appropriate that our industry shoulder its portion of responsibility to lower our nation’s contribution to global climate change. [EPA-HQ-OAR-2021-0208-0565-A1, p.4]

Commenter: American Lung Association

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, pp.18-19]

First, climate change is a health emergency. The Intergovernmental Panel on Climate Change found that the planet is on a path towards catastrophic destruction if we do not make serious cuts to greenhouse gas emissions as soon as possible.

From deadly floods in Tennessee to wildfires in the West destroying communities and blanket the continent with unhealthy particle pollution, no one can escape the lethal consequences and the urgent need to act.

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, pp.87-88]

The need for action on climate change could not be more urgent. Earlier this month a report from the UN Intergovernmental Panel on Climate Change found that there is an extremely narrow window of time to act on climate change after which point the worst impacts will be unavoidable.

Climate change is a public health emergency and the sooner we act the more lives we will save. Strong standards for cars are a critical step needed to slash greenhouse gas emissions.

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, p.89]

The bottom line: Americans across the political spectrum support specific policies to achieve a pollution-free transportation future. We must take action at every level to address climate change and reduce greenhouse gas emissions in order to protect health and save lives and that includes cleaning up transportation pollution using the strongest possible standards.

Climate change poses unprecedented threats to the health of every American now and for every future generation. There is no time to delay.

The Biden Administration must use all available tools to promote the climate pollution reductions we so desperately need. Please make this propose as beneficial for health as possible and finalize it quickly and then move forward with bold future greenhouse gas standards for light- and heavy-duty vehicles that accelerate the critical transition to zero emission vehicles.

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, pp. 167-168.]

Pollution from cars is helping to drive climate change which can lead to more excessive heat like what we've seen across the country and the globe in recent months and the rise in intensity of extreme weather events and wildfires.

Setting strong greenhouse gas standards for cars and light trucks is only part of the solution towards a healthier future.

A report released by the American Lung Association in September of 2020 found that transitioning the nation to electric light- and heavy-duty vehicles powered by non-combustion renewable energy would lead to a $113 million in climate benefits annually by 2050.

Greenhouse gases are not the only pollutant released by tailpipes. Air pollutants released from cars contribute to ozone and particulate matter pollution which both have direct health impacts, particularly for vulnerable populations, like those with existing lung disease.

Our Road to Clean Air Report also found that a transition to electric vehicles would yield $72 billion in health benefits annually by 2050.

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, pp. 170-173.]

Climate change is a health emergency. I imagine many of you on the line today are personally experiencing some of those impacts right now, just like millions of Americans across the country.

We know that these impacts will get dramatically worse without strong federal action. In fact, we often hear from physicians and nurses that they are seeing the impacts of climate change on their patients right now.

We hear about direct lung health concerns with student athletes who are exposed too often to wildfire smoke or parents who have to choose to keep their kids from playing outside at all on hazardous air days, and we hear about a whole array of other impacts affecting everything from cardiovascular health to mental health.

That's why health and medical organizations have been spending years rallying support for cleaner cars. In 2017, the Lung Association wrote a letter to EPA and NHTSA signed by more than 700 medical and health professionals from across the nation urging both agencies to implement strong state and federal advanced clean car regulations to protect public health.

In 2018, we joined more than 90 national, state, and local health and medical organizations in commenting against the SAFE Rule Act.

Earlier this year, the Lung Association and 13 national health and medical organizations, including the American Public Health Association, the National Association of County and City Health Professionals, the Medical Society, Consortium on Health, and the American Psychological Association all sent a letter to President Biden calling on him to set the strongest possible emissions standards to protect public health.

We asked the Administration to act urgently to ensure the same or better greenhouse gas emissions reductions scheduled to be achieved under the Obama-era standards and then set stronger standards through at least Model Year 2030.

And just last month, a robust contingent of the health community submitted commented to EPA in support of state authority to set stronger cleaner car standards, including 28 national, state, and local health and medical organizations and dozens of health professionals. In fact, some of the organizations represented are testifying today and tomorrow.

Climate change is a health emergency but it's also a health opportunity. That's why the health community supports cleaning up our nation's vehicles because it not only addresses climate change but also provides immediate benefits to health by eliminating dangerous tailpipe pollution.

The nation urgently needs to reduce greenhouse gases from transportation to avoid the worst health impacts of climate change. A nationwide transition to zero emission vehicles has the potential to provide immediate benefits to health and to equity.

Commenter: American Lung Association (Sacramento, CA)

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, pp. 253-254.]

We believe this provision is a vital response to the alarming public health risks posed by climate change in every corner of our nation and especially in communities already most at risk due to poor air quality.

The climate crisis is on full display today. Like many Americans, Californians have faced extreme heat warnings, air quality alerts, and red flag warnings for wildfire risk.

As I speak to you today, EPA's Air Now website shows very unhealthy and even hazardous air quality impacting residents of multiple states due to Western wildfires. Lives have been lost, homes have been lost, entire communities have been lost.

With each extreme event, we become more acutely aware of and concerned by the many connections between climate change and public health.

We call on you as EPA to use all the tools available to respond to this crisis and these standards really represent one of the most powerful levers available.

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, p. 255.]

These actions support cleaner air, healthier climate, and relief for communities most burdened by both on-road transportation sources and fossil fuel infrastructure that threatens health on a daily basis.

Commenter: Anderson, Laurie

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, p. 104-105.]

The transportation sector is the largest sector of carbon pollution in the U.S. Cleaning up vehicle pollution is one of the most important things we can do to fight climate change.

I am also concerned about the impacts of climate change. Last year Colorado experienced the three worst wildfires in our state's history which impacted air quality across the state and Colorado remains in severe drought on the Western Slope and that is where our water supply comes from.

We are also facing abnormal weather patterns, such as two tornadoes over the past couple months have touched down in this area, and this is an area where we rarely even have a tornado watch.

Additionally, Colorado relies on our winter snowpack for our water supply and it is down substantially from years prior. These impacts are serious and we must reduce our pollution now.

Commenter: Asthma and Allergy Foundation of America (AAFA)

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, pp. 214-216.]

25 million Americans have asthma, including over six million children, and over 3,600 people die each year from asthma. That's about 10 people a day. It's a chronic disease that causes your airways to become inflamed, making it hard to breathe, and there is no cure for asthma.

In the United States the burden of asthma falls disproportionately on the black, Hispanic, American Indian, and Alaska Native populations, and especially on children. These groups have disproportionately high rates of poor asthma outcomes, including hospitalizations and deaths.

In fact, as documented in our 2020 Asthma Disparities Report, black Americans are three times more likely to die from asthma than white Americans and five times more likely to be treated in an emergency room, and black women have the highest death rates from asthma versus any other group.

Poor air quality and exposure to air pollution is a very significant risk factor, both for developing asthma and for those who already have an asthma diagnosis.

That's why clean air and addressing the climate crisis are particularly important to the asthma and allergy community and especially those in racial and ethnic minorities.

As the leading contributor to air pollution and the largest source of climate pollution in the U.S., cleaning up the transportation sector represents immense opportunity for public health benefits.

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, p. 217.]

We must make haste to finalize the rule this year and we must make haste to set up even more health protective standards beyond that. Climate change is a public health emergency and we cannot afford to delay action.

Commenter: Bay Area Air Quality Management District

Government regulation that encourages innovative air pollution control is critical for combatting the current climate crisis. California experiences compelling and extraordinary conditions due to air pollution, climate change, wildfires, and extreme heat. We need strong greenhouse gas standards to serve as a key tool to help prevent and address these challenges. As noted earlier, the light duty sector is a significant source of greenhouse gas emissions. Cultivating innovation in passenger car and light duty vehicle technologies is an opportunity for great impact.[EPA-HQ-OAR-2021-0208-0283-A1, p.3]

Commenter: Bednar, Valencia

[The following comments were submitted as testimony at the virtual public hearing on August 26, 2021. See Hearing Testimony – 26Aug2021, p. 209.]

I am wanting today to have a healthy climate and not have pollution from cars.

[The following comments were submitted as testimony at the virtual public hearing on August 26, 2021. See Hearing Testimony – 26Aug2021, p. 210.]

We live close to busy roads and car pollution isn't good for us. We are trying to do our part. We want to ride our bikes but cars make it harder. Cars create a lot of pollution and are a big part of the climate change problem. We need EPA to help cars pollute less.

Commenter: Begley, Amanda

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, pp. 246-248.]

I'm here because I'm concerned about climate change. The latest IPCC report, the Intergovernmental Panel on Climate Change, the first part of the sixth assessment was recently released, and the assessment details in stark and clear language that climate change is widespread, rapid, and intensifying. It is here, it is now, it is us.

The assessment detailed that warming will increase over the next three decades because nations have delayed curbing fossil fuel emissions for so long. In almost all emissions scenarios contained in the latest assessment, global warming is expected to hit 1.5 degrees C in the early 2030s. That is so soon.

The global temperature average has already risen one degree C or about two degrees Fahrenheit since the Industrial Revolution, and with that two degrees of additional warming we've had record breaking heat waves, California's ever-increasing and intense wildfire season, Australia fires, China flooding. I could go on and on.

We have a window of opportunity to avoid things getting worse. The slower we act, the worse the consequences will be, and the faster we act, the less severe the consequences will be.

Transportation is the largest source of carbon emissions in the United States and it is critical that we both make our gasoline-powered cars and trucks more efficient and we must shift rapidly to electric vehicles.

Commenter: Beitzel Snow, Stephanie

[The following comments were submitted as testimony at the virtual public hearing on August 26, 2021. See Hearing Testimony – 26Aug2021, pp. 239-240.]

Without immediate action to address the root causes of climate change, carbon pollution from burning fossil fuels, our communities are facing increasingly frequent and severe weather events causing the kind of destruction, death, and damage that swept across our lands last year.

[The following comments were submitted as testimony at the virtual public hearing on August 26, 2021. See Hearing Testimony – 26Aug2021, p. 240.]

Transportation sector is the largest source of carbon pollution in the United States and cleaning up vehicle pollution is one of the most important things that we can do to fight climate change.

Commenter: Bjork, Deb

[The following comments were submitted as testimony at the virtual public hearing on August 26, 2021. See Hearing Testimony – 26Aug2021, pp. 36-37]

The sobering and terrifying Sixth Intergovernmental Panel on Climate Change Report released two weeks ago clearly describes our hellish future unless we take immediate and bold action to curb fossil fuel emissions.

We must mitigate the worst of climate change. We need the EPA to enact strong standards. I have a Ph.D. in clinical psychology. Research shows that the effects of climate change place children at risk of mental health consequences, including PTSD, depression, anxiety, phobias, sleep disorders, attachment disorders, and substance abuse. These in turn can lead to problems with emotional regulation, cognition, learning, behavior, language development, and academic performance. Together, these predispose adverse mental health outcomes.

Climate change also affects adults with mental health impacts and significant stress. Two recommended coping strategies that reduce psychological impacts of climate change are staying informed and taking positive action towards change.

Of note, one suggested action is to buy an energy-efficient or electric car. Because the transportation sector is the largest source of carbon pollution in the U.S., reducing vehicle pollution is essential for the fight for climate change and clean air. Reducing pollution from cars and light-duty trucks is crucial to improving air quality.

Commenter: Brandt, Dorothy

[The following comments were submitted as testimony at the virtual public hearing on August 26, 2021. See Hearing Testimony – 26Aug2021, pp. 207-208]

We all know pollution from cars causes breathing problems. California's air is so much better today than it was in the past because the government recognized the auto emissions problem and worked to improve clean air.

California is still leading the way to limit dangerous auto emissions. Federal leadership is needed. Please help us by minimizing dangerous greenhouse gas emissions for passenger cars and light trucks for the Model Years 2023 through 2026. This is a necessary short-term first step in addressing climate pollution from the transportation sector. If we do, our future could be much brighter with cleaner air to breathe and to my knowledge smog pollution is getting worse in America.

This is because of climate change and auto emissions. We are already experiencing rising temperatures and more intense heat waves because of climate change. High heat creates the perfect conditions for ozone to form.

As climate change continues to erode the progress we've made on cleaning up air pollution, we need strong standards to follow the science and protect our health.

Commenter: Brandt, Elizabeth

[The following comments were submitted as testimony at the virtual public hearing on August 26, 2021. See Hearing Testimony – 26Aug2021, pp. 196-197.]

Pollution from the transportation sector is the nation's leading source of climate warming carbon pollution. Tackling pollution from cars and trucks is one of the most important ways we can fight climate change.

[The following comments were submitted as testimony at the virtual public hearing on August 26, 2021. See Hearing Testimony – 26Aug2021, p. 199.]

In order to prevent our worse case climate scenario, we must take strong action now to reduce pollution from cars. Climate change is disrupting our livse. So we need to disrupt our approach to reducing climate pollution. Bold action is needed.

Commenter: Buzzelli, Melanie

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, pp. 122-124.]

Recently, the professor asked us to look at the concentration of carbon dioxide in the atmosphere when we entered the program and compare it to the concentration now. In June of 2019 the concentration level was approximately 414.1 parts per million, and in June of 2021 the concentration level was approximately 418.94 parts per million.

The professor then asked us to compare these numbers to the point of no return, generally recognized as 450 parts per million, and reflect on how we felt. I had a hard time attempting to describe my myriad of emotions at the time and I don't think I've become any more articulate since then, but I think the word I ultimately ended up landing on to suffice for now which was terrified.

I know these numbers aren't a surprise for you and they weren't necessarily a surprise to me either, but I think it is nonetheless important to constantly remind ourselves of what we face.

Working in policy myself, I know how easy it is for politics and bureaucracy to chip away at big change, but on the issue of climate change we simply cannot afford for that to happen.

We need to be doing as much as we can at every opportunity we have and in that vein, while this proposal is a step in the right direction, much more is needed.

The transportation sector is the largest source of greenhouse gas emissions in the United States. Gasoline and diesel-powered cars, SUVs, trucks, buses, vans, and more pollute the air we breathe and drive climate change.

Climate change is terrifying. It's truly an existential crisis and I hope it's one that we're willing to meet.

Commenter: California Air Resources Board (CARB)

We strongly support urgent action to protect public health and stabilize the climate. The wildfires, drought, declining air quality, and extreme heat we face due to the climate crisis are becoming increasingly extreme and frequent. They confirm the assessments of climate scientists that we must act quickly to stave off the worst effects of climate change. Indeed, America's most vulnerable communities – and communities in California in particular – face very serious public health and economic threats without swift action. [EPA-HQ-OAR-2021-0208-0643-A6, p.1]

The mandate to protect the environment, climate, and public health has never been stronger. We must not delay any further reducing the pollution of greenhouse gases to maintain a stable climate. The imperatives to meet the health-based National Ambient Air Quality Standards, reduce toxic emissions, and alleviate the disparate impacts of pollution on certain communities are likewise urgent and overdue. Wildfire, drought, harmful air quality, and extreme heat are more extreme and frequent because of a changing climate. The leading climate scientists continue to stress that we must act quickly to avoid the worst effects of climate change. [EPA-HQ-OAR-2021-0208-0643-A6, p.6]

The Proposal is Urgently Needed to Mitigate a Deteriorating Climate and Protect Public Health - Especially Those Most Exposed to Pollution

Transportation is one of the main causes of air pollution that threatens our health and our climate. Climate change brought on by continued emissions of greenhouse gases is an existential threat. As CARB's Chair testified on this proposal, these emission standards are sorely needed. California's skies are darkened by wildfire ash and smoke and our reservoirs are alarmingly low.6 The recent report from the Intergovernmental Panel on Climate Change on the physical science basis for human-caused climate change underscores the urgency.7 The extensive drought striking California and other parts of the West, and the resulting wildfires, are likely exacerbated by greenhouse gas emissions from human activities. As U.S. EPA recognized in its proposal, these standards would avoid the release of billions of tons of greenhouse gases.8 [EPA-HQ-OAR-2021-0208-0643-A6, p.8]

Commenter: California Attorney General Office, et al.

Strong standards are necessary now to stave off the worst effects of human-induced climate change and to confront inequitably distributed threats to public health and the environment from climate change as well as other pollution. From droughts to floods and from wildfires to hurricanes, our States and Cities are already experiencing the devastating impacts of climate change, which will continue to mount and compound with rising concentrations of GHGs in the atmosphere. [EPA-HQ-OAR-2021-0208-0245-A1, p.1]

Our States and Cities are currently experiencing the devastating effects of climate change. Just this summer, multiple deadly2 heatwaves with record-breaking high temperatures ravaged the western United States. The West is also experiencing extreme drought conditions that threaten water security and fuel wildfires that have displaced thousands.3 Meanwhile hurricanes of historic force swept across the southern and eastern United States—testing energy resilience and producing record-breaking rainfall and fatal flash floods.4 These types of impacts have been linked to climate change caused by anthropogenic emissions of GHGs,5 and they are projected to worsen.6 As average surface temperatures rise and the intensity and frequency of these types of extreme weather events increases,7 our States and Cities face direct and compounding challenges to protect the health and welfare of our residents, our economies, and our natural resources. [EPA-HQ-OAR-2021-0208-0245-A1, pp.2-3]

'The past six years, including 2020, have been the six warmest years on record,' 8 an already concerning statement only amplified by the Intergovernmental Panel on Climate Change's (IPCC) warning that '[g]lobal warming of 1.5°C and 2°C [above pre-industrial averages] will be exceeded during the 21st century unless deep reductions in CO2 and other greenhouse gas emissions occur in the coming decades.'9 See Figure 1 [Figure 1 can be found on p. 3 of Docket number EPA-HQ-OAR-2021-0208-0245-A1].

The IPCC has found that GHG emissions from human activities are already responsible for about 1.1°C of warming since 1850-190010 and that '[h]uman influence has warmed the climate at a rate that is unprecedented in at least the last 2000 years.'11 In other words, the world is getting hotter due to increased concentrations of GHGs in the atmosphere that are 'unequivocally caused by human activities.'12 As temperatures rise, threats to public health and the environment in our States and Cities continue to mount. For example, '[w]ith higher temperatures, [hospital] admissions for acute renal failure, appendicitis, dehydration, ischemic stroke, mental health, noninfectious enteritis, and primary diabetes were significantly increased.'13 And '[m]ortality effects are observed even for small differences from seasonal average temperatures.'14 These types of heat-related health and mortality risks are not equally distributed.[EPA-HQ-OAR-2021-0208-0245-A1, pp. 3-4]

'Warmer temperatures [also] contribute to the severity of drought conditions by leading to more precipitation falling as rain rather than snow, faster melting of winter snowpack, greater rates of evaporation, and drier soils.'17 This can result in, among other impacts, the degradation of water security18 and ecological vulnerabilities.19 As shown in Figure 2 [Figure 1 can be found on p. 6 of Docket number EPA-HQ-OAR-2021-0208-0245-A1], a significant portion of the western U.S. is currently experiencing extreme or exceptional drought. Drought conditions are particularly severe in California, where nearly 90% of the State is facing at least extreme drought and about 45% of the State is experiencing exceptional drought.20 The 2021 year-to-date statewide average temperature in California is almost the warmest on record,21 and precipitation and snowpack levels in the State are well below average.22 These conditions are impacting the State's water supply at major reservoirs, nearly all of which have far less water than the historical average as of September 2021.23 Moreover, '[f]orests are especially vulnerable to drought in a warming world.'24 For example, California's 2012-2015 drought killed more than 100 million trees, mainly in the Sierra Nevada forest.25 The forest density and warmer temperatures 'compound[ed] die-off by an estimated 55%,' and 'climate change is expected to . . . increas[e] Sierran tree death during drought by 15-20%' for each additional degree of warming.26 And '[w]hen a drought drives changes within ecosystems, there can be a ripple effect through human communities that depend on those ecosystems for critical goods and services.'27 [EPA-HQ-OAR-2021-0208-0245-A1, pp.4-5]

Rising temperatures combined with drier conditions are also increasing the risk of wildfires.28 '[T]he number of hot days is climbing; forests and grasslands are dried out by increased evaporation; the growing season is lengthening (providing available fuel for longer periods); and snowpack is melting earlier.'29 These conditions have significantly enhanced the size of wildfires and length of the wildfire season. '[S]ince 1984, human-induced climate change is responsible for doubling the cumulative area of forest fires across the western United States.'30 'Since the 1970s, the annual average wildfire season in the Western United States has expanded from five months to 8.5 months long.'31 'It now burns six times as many acres and consists of three times as many large fires—those defined as more than 1,000 acres.' 32 And '[c]limate models project a continued increase in the frequency and intensity of wildfires with rising temperatures.'33

Consistent with this projection, the 2020 wildfire season was unprecedented. For example, wildfires in Colorado burned more than 665,000 acres—more than in any previous year—and the State's record for largest wildfire was broken twice.34 Historic wildfires also burned 10.2 million acres across California, Oregon, and Washington.35 With 4.1 million acres blazed, California more than doubled its previous annual record for area burned.36 The State also experienced five of the top six largest wildfires on record in 202037—a record already broken in 2021.38

These massive wildfires have broad impacts across our States and Cities. The 2020 wildfires—which conservatively cost an estimated $16.5 billion39—put 500,000 Oregonians (more than 10% of the state's population) under evacuation warnings or orders,40 led to the displacement of about 100,000 people in California,41 and killed 46 people in California, Oregon, and Washington.42 In the Pacific Northwest, more than 17 million people experienced air quality deemed 'very unhealthy' or 'hazardous' for an average of 4 days,43 a worrisome statistic given that 'wildfire-specific PM2.5 is up to 10 times more harmful on human health than PM2.5 from other sources.'44,45 This public health concern grows as the frequency and intensity of wildfires increase and is not limited to States where the wildfires are burning. The rising heat from the wildfires takes particulate matter and toxic gases in the smoke into the jet stream, which can carry those hazardous substances thousands of miles and cause harmful air pollution across the country. This happened during the 2020 wildfire season and again in July of 2021, when smoke from wildfires burning on the West Coast caused New York City to experience some of the worst air quality in the world.46 [EPA-HQ-OAR-2021-0208-0245-A1, pp.6-8]

Extreme weather events pose innumerable threats to our States and Cities—from increased health risks and death, damage to infrastructure, and water scarcity,47 to economic damage and impacts to the energy system that 'threaten[] more frequent and longer-lasting power outages and fuel shortages.'48 And '[w]ith every additional increment of global warming, changes in extremes continue to become larger.'49 'For example, every additional 0.5°C of global warming causes clearly discernible increases in the intensity and frequency of hot extremes, including heat waves (very likely), and heavy precipitation (high confidence), as well as agricultural and ecological droughts in some regions (high confidence).'50 'The proportion of intense tropical cyclones (categories 4-5) and peak wind speeds of the most intense tropical cyclones are projected to increase at the global scale with increasing global warming (high confidence).'51 [EPA-HQ-OAR-2021-0208-0245-A1, p.8]

These costs, which are partially borne by our affected States and Cities, reflect the breadth of impacts and rippling effects of extreme weather events. For example, in 2020, Hurricane Isaias made landfall in North Carolina, producing storm surge inundation levels of 3 to 6 feet above ground level along the southern coast of North Carolina57 before accelerating up the East Coast. After unleashing 5-8 inches of rainfall across Virginia, Maryland, Delaware, and western New Jersey, causing flooding across those states,58 the storm's winds cut power to nearly 3.5 million customers—affecting roughly 1.4 million customers in New Jersey, 512,000 in New York, 380,000 in Pennsylvania, 264,000 in Connecticut, 218,000 in Virginia, 134,000 in North Carolina, 76,000 in Maryland, 51,000 in Delaware, 12,000 in Massachusetts, 6,000 in Vermont, and 4,000 in Rhode Island.59 Hurricane Isaias also spawned 39 confirmed tornadoes from North Carolina to New Jersey60 and killed a total of 9 people.61 More recently, in June 2021, a heat dome described as 'virtually impossible without human-caused climate change'62 descended upon the Pacific Northwest and brought record-shattering temperatures as high as 108°F in Seattle, Washington, 116°F in Portland, Oregon, and 118°F in Dallesport, Washington—the highest temperature ever recorded in Washington.63 The extreme heat not only killed billions of intertidal species along the Pacific Northwest coast,64 but it also resulted in the confirmed deaths of at least 96 people in Oregon65 and 112 people in Washington.66 'Extreme heat is already a leading cause of mortality in the United States, but without adaptation, deaths could increase more than sixfold.'67 [EPA-HQ-OAR-2021-0208-0245-A1, pp.9-10]

Our States and Cities face mounting threats from a climate crisis that is primarily caused by anthropogenic emissions of GHGs. As the transportation sector accounts for about 29% of the GHG emissions in the United States,70 that sector must be rigorously addressed. [EPA-HQ-OAR-2021-0208-0245-A1, p.10]

GHG Reductions from Light Duty Vehicles are Particularly Necessary Now. It is critically important to reduce GHGs from light-duty vehicles and to do so now. Transportation is the single leading source of GHG emissions in the country, accounting for approximately 29% of total GHG emissions. 86 Fed. Reg. at 43,746 (citing U.S. GHG Emissions Inventory), 43,779 (same). Light-duty vehicles account for nearly 60% of those transportation sector emissions, or approximately 17% of total U.S. GHG emissions. Id. Reductions of these emissions from light-duty vehicles are crucial for the United States to take meaningful steps to keep the rise in global mean temperatures below 1.5°C to 2°C.99

Immediate emissions reductions are necessary because GHGs can remain in the atmosphere for long time periods. Carbon dioxide in particular remains in the atmosphere longer than the other major GHGs emitted as a result of human activities: once emitted, 40% will remain in the atmosphere after 100 years and 20% will reside after 1000 years; only after about 10,000 years will the remainder break down.100 As explained in the Fourth National Climate Assessment, '[w]aiting to begin reducing emissions is likely to increase the damages from climate-related extreme events (such as heat waves, droughts, wildfires, flash floods, and stronger storm surges due to higher sea levels and more powerful hurricanes).'101

One of the ways in which scientists calculate and express what it will take to hold the increase in temperatures to a certain level is by using a 'carbon budget.' The carbon budget calculates the amount of cumulative GHG emissions from human activity (starting in late 1800s) that models show will result in a specified likelihood of not exceeding a particular increase in global mean temperatures. The budget is expressed either in billions of tons or 'gigatons' of carbon (GtCO2).102 Between 1850 and 2019, a total of approximately 2,390 GtCO2 of anthropogenic CO2 was emitted, resulting in a global surface temperature increase of approximately 1.1°C.103 The IPCC recently calculated that only 400 GtCO2 of the world's carbon budget remains, if we are to retain a two-thirds chance of limiting the global average temperature increase to 1.5°C.104 The IPCC further estimated that the carbon budget is being depleted by approximately 42 GtCO2 per year.105 Thus, if global emissions continue at the current pace, the carbon budget will be exhausted in less than 10 years. And that timeframe could be optimistic because, as cumulative emissions increase, the portion of those emissions in the atmosphere also increases due to ocean and land carbon sinks becoming less effective at absorbing carbon dioxide.106

There may be 'tipping points' in the climate system such that even a small incremental change in temperature could push Earth's climate into catastrophic runaway global warming.107 Indeed, a recent commentary in the journal Nature warned that nine major climate tipping points (including the accelerating ice loss from the West Antarctic ice sheet) are 'dangerously close' to being triggered.108 Therefore, serious efforts to reduce GHG emissions are needed now to avoid scenarios where steeper (and vastly more expensive) emission reductions are needed later. Delaying efforts to mitigate carbon dioxide emissions will have negative—and potentially irreversible—consequences for global warming and its impacts, including more extreme wildfires, rising sea levels, greater ocean acidification, and increased risks to food security and public health. Moreover, the uneven distribution of these impacts demands urgent action to protect our most vulnerable populations from additional climate harms and to prevent the exacerbation of existing climate injustices.109

The States and Cities agree that, in light of the 'increased urgency of the climate crisis,' the United States needs 'to achieve far deeper GHG reductions from the light-duty sector in future years.' 86 Fed. Reg. at 43,785. EPA's proposal is an important step toward those deeper reductions. By incentivizing production and deployment of lower-emitting and zero-emission vehicles, EPA's proposal will promote longer-term deeper emissions reductions critical to avoiding catastrophic impacts of climate change. [EPA-HQ-OAR-2021-0208-0245-A1, pp.20-21]

2 Sergio Olmos and Shawn Hubler, Heat-Related Deaths Increase as Temperatures Rise in the West, New York Times (July 9, 2021, updated July 28, 2021), https://www.nytimes.com/2021/07/09/us/heat-wave-deaths.html; Thomas Frank, Heat Wave Death Toll Will rise with Thorough Count, E&E News (July 23, 2021), https://www.scientificamerican.com/article/heat-wave-death-toll-will-rise-with-thorough-count/; Victoria Bekiempis, Record-breaking US Pacific north-west heatwave killed almost 200 people, The Guardian (July 8, 2021), https://www.theguardian.com/us-news/2021/jul/08/pacific-northwest-heatwave-deaths.

45 Smoke from wildfires has also been found to exacerbate risks associated with the COVID-19 virus, and one study found that '[t]housands of COVID-19 cases and deaths in California, Oregon, and Washington between March and December 2020 may be attributable to increases in fine particulate air pollution (PM2.5) from wildfire smoke.' Karen Feldscher, Link Between Wildfires and COVID cases established, The Harvard Gazette (Aug. 13, 2021), https://news.harvard.edu/gazette/story/2021/08/wildfire-smoke-linked-to-increase-in-covid-19-cases-and-deaths/.

Commenter: Cantley, Jennifer

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, p. 274.]

We need your support. Now in Nevada, heat and wildfire smoke are becoming a yearly occasion. It's no longer from June to September. The vehicle pollution has always been a Number 1 part of our air pollution.

Commenter: Caudill, Gregory

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, p. 312.]

My grandchildren are inheriting a planet I barely recognize. Global warming has already produced hotter summers and warmer winters from 50 years ago.

The ice caps and glaciers are melting. Our freshwater supplies are threatened. Homes are coming apart in the Midwest because of excessive groundwater removal by commercial and farm interests.

Commenter: Center for Biological Diversity

The excess methane emissions are particularly alarming. Immediate, deep reductions in methane emissions are critical for lowering the rate of global warming in the near-term, preventing the crossing of irreversible planetary tipping points, and avoiding harms to species and ecosystems from methane's intensive near-term heating effects and ground-level ozone production.31 Methane is a super-pollutant 87 times more powerful than CO2 at warming the atmosphere over a 20-year period, 32 and is second only to CO2 in driving climate change during the industrial era.33 Methane also leads to the formation of ground-level ozone, a dangerous air pollutant, that harms ecosystems and species by suppressing plant growth and reducing plant productivity and carbon uptake.34 Because methane is so climate-damaging but also comparatively short-lived with an atmospheric lifetime of roughly a decade, cutting methane has a relatively immediate effect in slowing the rate of temperature rise in the near-term. Critically, deep cuts in methane emissions of ~45% by 2030 would avoid 0.3°C of warming by 2040 and are considered necessary to achieve the Paris Agreement's 1.5°C climate limit and prevent the worst damages from the climate crisis.35 Deep cuts in methane emissions that reduce near-term temperature rise are also critical for avoiding the crossing of planetary tipping points—abrupt and irreversible changes in Earth systems to states wholly outside human experience, resulting in severe physical, ecological and socioeconomic harms.36 [EPA-HQ-OAR-2021-0208-0726-A1, pp. 5-6]

EPA's decision to finalize its proposal will allow cars and light trucks to emit millions of metric tons of greenhouse gases and tens of thousands of tons of criteria pollutants—even though EPA has the discretion to reduce them. These emissions will affect climate change, air quality, and species and their habitats in ways that are direct and predictable. [EPA-HQ-OAR-2021-0208-0726-A1, p. 7]

An overwhelming international scientific consensus has established that human-caused climate change is already causing severe and widespread harms to life on Earth, and these threats are becoming more dangerous as greenhouse gas emissions continue unabated.

An overwhelming international scientific consensus has established that human-caused climate change is already causing severe and widespread harms and that climate change threats are becoming increasingly dangerous. The Intergovernmental Panel on Climate Change (IPCC), the international scientific body for the assessment of climate change, concluded in its Climate Change 2021: The Physical Science Basis report that: '[i]t is unequivocal that human influence has warmed the atmosphere, ocean and land. Widespread and rapid changes in the atmosphere, ocean, cryosphere and biosphere have occurred,' and further that '[t]he scale of recent changes across the climate system as a whole and the present state of many aspects of the climate system are unprecedented over many centuries to many thousands of years.'44 [EPA-HQ-OAR-2021-0208-0726-A1, pp. 7-8]

The U.S. federal government has repeatedly recognized that human-caused climate change is causing widespread and intensifying harms across the country in the authoritative National Climate Assessments, scientific syntheses prepared by hundreds of scientific experts and reviewed by the National Academy of Sciences and federal agencies. Most recently, the Fourth National Climate Assessment, comprised of the 2017 Climate Science Special Report (Volume I)45 and the 2018 Impacts, Risks, and Adaptation in the United States (Volume II),46 concluded that 'there is no convincing alternative explanation' for the observed warming of the climate over the last century other than human activities.47 It found that 'evidence of human-caused climate change is overwhelming and continues to strengthen, that the impacts of climate change are intensifying across the country, and that climate-related threats to Americans' physical, social, and economic well-being are rising.'48 The Fourth National Climate Assessment warns that 'climate change threatens many benefits that the natural environment provides to society,' and that 'extinctions and transformative impacts on some ecosystems' will occur 'without significant reductions in global greenhouse gas emissions.'49 [EPA-HQ-OAR-2021-0208-0726-A1, p.8]

As detailed in the National Climate Assessments, the widespread, intensifying, and often long-lived harms from climate change include soaring air and ocean temperatures; more frequent and intense heat waves, floods, and droughts; more destructive hurricanes and wildfires; coastal flooding from sea level rise and increasing storm surge; declining food and water security; accelerating species extinction risk; melting Arctic sea ice, glaciers, and ice sheets; the collapse of Antarctic ice shelves; ocean acidification; and the collapse of coral reefs. 50 [EPA-HQ-OAR-2021-0208-0726-A1, pp. 8-9]

Fossil fuels are the dominant driver of the climate crisis. The National Climate Assessments decisively recognize the dominant role of fossil fuels in driving climate change. As stated by the Third National Climate Assessment: 'observations unequivocally show that climate is changing and that the warming of the past 50 years is primarily due to human-induced emissions of heat-trapping gases. These emissions come mainly from burning coal, oil, and gas.'51 In parallel, the Fourth National Climate Assessment reported that 'fossil fuel combustion accounts for approximately 85 percent of total U.S. greenhouse gas emissions,'52 which is 'driving an increase in global surface temperatures and other widespread changes in Earth's climate that are unprecedented in the history of modern civilization.'53 [EPA-HQ-OAR-2021-0208-0726-A1, p. 9]

The choices made now on reducing greenhouse gas pollution will affect the severity of the climate change damages that will be suffered in the coming decades and centuries. The National Climate Assessments make clear that the harms of climate change are long-lived, and the choices we make now on reducing greenhouse gas pollution will affect the severity of the climate change damages that will be suffered in the coming decades and centuries: '[t]he impacts of global climate change are already being felt in the United States and are projected to intensify in the future—but the severity of future impacts will depend largely on actions taken to reduce greenhouse gas emissions and to adapt to the changes that will occur.'54 As the Fourth National Climate Assessment explains: '[m]any climate change impacts and associated economic damages in the United States can be substantially reduced over the course of the 21st century through global-scale reductions in greenhouse gas emissions, though the magnitude and timing of avoided risks vary by sector and region. The effect of near-term emissions mitigation on reducing risks is expected to become apparent by mid-century and grow substantially thereafter.'55 Similarly, a 2014 White House report found that the cost of delay on reducing emissions is not only extremely steep but also potentially irreversible, and the costs rise exponentially with continued delays. 56 As summarized by the National Research Council:

Emissions of carbon dioxide from the burning of fossil fuels have ushered in a new epoch where human activities will largely determine the evolution of Earth's climate. Because carbon dioxide in the atmosphere is long lived, it can effectively lock Earth and future generations into a range of impacts, some of which could become very severe. [E]mission reduction choices made today matter in determining impacts experienced not just over the next few decades, but in the coming centuries and millennia.57 [EPA-HQ-OAR-2021-0208-0726-A1, pp. 9-10]

The IPCC 2018 Special Report, as reinforced by the 2021 IPCC Sixth Assessment Report, make clear that global greenhouse gas emissions must be halved by 2030 to avoid catastrophic damages of climate change.

In 2018, the IPCC issued a Special Report on Global Warming of 1.5°C that quantified the devastating harms that would occur at 2°C warming, highlighting the necessity of limiting warming to 1.5°C to avoid catastrophic impacts to people and life on Earth.58 The IPCC 2018 Special Report provides overwhelming evidence that aggressive reductions in emissions within this decade are essential to avoiding catastrophic climate change harms. [EPA-HQ-OAR-2021-0208-0726-A1, p. 10]

The Special Report quantifies the harms that would occur at 2°C warming compared with 1.5°C, and the differences are stark. According to the IPCC's analysis, the damages that would occur at 2°C warming compared with 1.5°C include dramatically increased species extinction risk, including a doubling of the number of vertebrate and plant species losing more than half their range, and the virtual elimination of coral reefs; significantly more deadly heatwaves, drought and flooding; 10 centimeters of additional sea level rise within this century; a greater risk of triggering the collapse of the Greenland and Antarctic ice sheets with resulting multi-meter sea level rise; 1.5 to 2.5 million more square kilometers of thawing permafrost area with the associated release of methane, a potent greenhouse gas; and a tenfold increase in the probability of ice-free Arctic summers.59 [EPA-HQ-OAR-2021-0208-0726-A1, p. 10]

The IPCC report concludes that pathways to limit warming to 1.5°C with little or no overshoot require 'a rapid phase out of CO_2 emissions and deep emissions reductions in other GHGs and climate forcers.' 60 In pathways consistent with limiting warming to 1.5°C, global net anthropogenic CO_2 emissions must decline by about 45 percent from 2010 levels by 2030, reaching net zero around 2050.61 [EPA-HQ-OAR-2021-0208-0726-A1, pp. 10-11]

Similarly, the IPCC Climate Change 2021 report concludes that global warming will exceed 1.5°C and 2°C by 2100 unless we make immediate, deep reductions in CO_2 and other greenhouse gas emissions.62 Only the most stringent emissions reduction scenario—SSP1-1.9 in which global emissions fall steeply in the near-term, reach net zero in 2050, and become net negative afterward—is consistent with a 1.5°C climate target. In this low emissions SSP1-1.9 scenario, global average surface temperature is projected to reach 1.5°C above pre-industrial in the near-term (2021-2040), overshoot and peak at 1.6°C in the mid-term (2041-2060), and drop down to 1.4°C in the long-term (2081-2100).63 [EPA-HQ-OAR-2021-0208-0726-A1, p. 11]

In short, the IPCC Assessment Reports, U.S. National Climate Assessments, and tens of thousands of studies make clear that fossil-fuel driven climate change is a 'code red for humanity,'64 and that every additional ton of CO_2 and fraction of a degree of temperature rise matters. As warned by the IPCC, 'every tonne of CO_2 emissions adds to global warming.'65 [EPA-HQ-OAR-2021-0208-0726-A1, p. 11]

Climate change has clear and documented adverse impacts on biodiversity. The best available science shows that anthropogenic climate change is causing widespread harm to life across the planet, disrupting species' distribution, timing of breeding and migration, physiology, vital rates, and genetics—in addition to increasing species extinction risk.66 Climate change is already affecting 82% of key ecological processes that underpin ecosystem function and support basic human needs.67 Climate change-related local extinctions are widespread and have occurred in hundreds of species, including almost half of the 976 species surveyed.68 Nearly half of terrestrial non-flying threatened mammals and nearly one-quarter of threatened birds are estimated to have been negatively impacted by climate change in at least part of their range. 69 Furthermore, across the globe, populations of terrestrial birds and mammals that are experiencing greater rates of climate warming are more likely to be declining at a faster rate.70 Genes are changing, species' physiology and physical features such as body size are changing, species are moving to try to keep pace with suitable climate space, species are shifting their timing of breeding and migration, and entire ecosystems are under stress.71 [EPA-HQ-OAR-2021-0208-0726-A1, pp. 11-12]

Species extinction risk will accelerate with continued greenhouse gas pollution. One million animal and plant species are now threatened with extinction, with climate change as a primary driver.72 At 2°C compared with 1.5°C of temperature rise, species' extinction risk will increase dramatically, leading to a doubling of the number of vertebrate and plant species losing more than half their range, and a tripling for invertebrate species.73 Numerous studies have projected catastrophic species losses during this century if climate change continues unabated: 15 to 37% of the world's plants and animals committed to extinction by 2050 under a mid-level emissions scenario74; the potential extinction of 10 to 14% of species by 210075; global extinction of 5% of species with 2°C of warming and 16% of species with business-as-usual warming76; the loss of more than half of the present climatic range for 58% of plants and 35% of animals by the 2080s under the current emissions pathway, in a sample of 48,786 species77; and the loss of a third or more of animals and plant species in the next 50 years.78 [EPA-HQ-OAR-2021-0208-0726-A1, p. 12]

As summarized by the Third National Climate Assessment, ‘landscapes and seascapes are changing rapidly, and species, including many iconic species, may disappear from regions where they have been prevalent or become extinct, altering some regions so much that their mix of plant and animal life will become almost unrecognizable.'79 [EPA-HQ-OAR-2021-0208-0726-A1, pp. 12-13]

The loss of sea ice is one of the clearest and most obvious consequences of global warming. As highlighted by the Fourth National Climate Assessment, Alaska and the Arctic have experienced some of the most severe and rapid warming associated with climate change, with temperatures rising at twice the rate of the rest of the globe on average.81 Arctic summer sea ice extent and thickness have decreased by 40% during the past several decades,82 with each metric ton of CO_2 emissions causing a sustained loss of three square meters of summer sea ice area.83 The Arctic lost 95% of its oldest and thickest sea ice during the past three decades, and the remaining thinner, younger ice is more vulnerable to melting.84 Sea ice loss has accelerated since 2000, with Alaska’s coast suffering some of the fastest losses.85 The length of the sea ice season is shortening as ice melts earlier in spring and forms later in autumn.86 Along Alaska’s northern and western coasts, the sea ice season has already shortened by more than 90 days.87 As summarized by the Fourth National Climate Assessment:

Since the early 1980s, annual average arctic sea ice has decreased in extent between 3.5% and 4.1% per decade, become thinner by between 4.3 and 7.5 feet, and began melting at least 15 more days each year. September sea ice extent has decreased between 10.7% and 15.9% per decade (very high confidence). Arctic-wide ice loss is expected to continue through the 21st century, very likely resulting in nearly sea ice-free late summers by the 2040s (very high confidence).’88 [EPA-HQ-OAR-2021-0208-0726-A1, p. 14]

It is precisely this sea ice loss, and the lack of adequate regulatory mechanisms addressing greenhouse gas pollution, that led FWS to list the polar bear (Ursus maritimus) as a threatened species in 2008.89 As a top Arctic predator, the polar bear relies on sea ice for all its essential activities, including hunting for prey, moving long distances, finding mates, and building dens to rear cubs. 90 Separately, recognizing the critical importance of sea ice for polar bear survival, FWS designated sea ice habitat off Alaska as critical habitat for the polar bear in 2010.91 [EPA-HQ-OAR-2021-0208-0726-A1, pp. 14-15]

Federal documents acknowledge that shrinkage and premature breakup of sea ice due to climate change is the primary threat to the species, leaving bears with vastly diminished hunting grounds, less time to hunt, and a shortage of sea ice for other essential activities such as finding mates and resting.92 As summarized in FWS’s 2017 5-year review, sea ice loss and a shorter sea ice season makes hunting calorie-rich seals more difficult for polar bears, leading to nutritional stress, reduced body mass, and declines of some populations.93 As the sea ice retreats, polar bears have been forced to swim longer distances,94 which is more energetically costly,95 and they are spending more time on land where they have reduced access to food.96 Females are denning more often on land than on ice, increasing the potential for conflicts with humans.97 Because polar bears have high metabolic rates, increases in movement resulting from loss and fragmentation of sea ice result in higher energy costs and are likely to lead to reduced body condition, recruitment and survival.98 [EPA-HQ-OAR-2021-0208-0726-A1, p. 15]

In the southern Beaufort Sea of Alaska, polar bears declined by 40 percent over a recent 10-year period,99 and this decrease has been attributed to sea ice loss that limited access to prey over multiple years. 100 For the bears in this population, research has linked sea ice loss to decreases in survival,101 lower success in rearing cubs,102 shrinking body size,103 and increases in fasting and nutritional stress.104 The loss of sea ice also jeopardizes the polar bear's sea-ice dependent prey species—the ringed seal and bearded seal—which were listed as threatened in 2012 due to sea ice loss from climate change.105 [EPA-HQ-OAR-2021-0208-0726-A1, pp. 15-16]

If current greenhouse gas emissions trends continue, scientists estimate that two-thirds of global polar bear populations will be lost by 2050, including the loss of both of Alaska's polar bear populations, while the remaining third will near extinction by the end of the century due to the disappearance of sea ice.106 However, aggressive emissions reductions will allow substantially more sea ice to persist and increase the chances that polar bears will survive in Alaska and across their range.107 Highlighting the importance of reducing greenhouse gas emissions to protect sea ice and sea-ice dependent species, one recent study estimated that each metric ton of CO_2 emission results in a sustained loss of 3 ± 0.3 m^2 of September Arctic sea ice area based on the robust linear relationship between monthly-mean September sea ice area and cumulative CO_2 emissions.108 Similar to other research,109 the study concluded that limiting warming to 2°C is not sufficient to allow Arctic summer sea ice to survive, but that a rapid reduction in emissions to achieve a 1.5°C global warming target gives Arctic summer sea ice 'a chance of long-term survival at least in some parts of the Arctic Ocean.'110 [EPA-HQ-OAR-2021-0208-0726-A1, p. 16]

As such, FWS's 2016 Final Polar Bear Conservation Management Plan clearly stated that the polar bear cannot be recovered without significant reductions in the greenhouse gas emissions driving Arctic warming and sea ice loss: 'It cannot be overstated that the single most important action for the recovery of polar bears is to significantly reduce the present levels of global greenhouse gas (GHG) emissions, which are the primary cause of warming in the Arctic.'111 [EPA-HQ-OAR-2021-0208-0726-A1, p. 17]

If the Rule is finalized as proposed, greenhouse gases emitted will exacerbate the loss of sea ice, causing the likelihood of survival and recovery of the polar bear to diminish appreciably. The EPA must consult on how the Rule would affect sea ice loss for a listed species like the polar bear. [EPA-HQ-OAR-2021-0208-0726-A1, p. 17]

Ocean warming and ocean acidification, two incontrovertible environmental impacts caused by greenhouse gas pollution, are wreaking havoc on marine ecosystems and causing a global collapse of coral reefs. The world's oceans have absorbed more than 90 percent of the excess heat caused by greenhouse gas warming, resulting in average sea surface warming of 1.3°F

(0.7°C) per century since 1900.117 Marine heat waves—periods of extreme warm surface temperature—have become longer-lasting and more frequent due to climate change, with the number of heat wave days doubling between 1982 and 2016 and projected to increase 23 times under 2°C warming. 118 At present, 87 percent of marine heat waves are attributable to human-induced warming.119 Global average sea surface temperature is projected to rise by 4.9°F (2.7°C) by the end of the century under a higher emissions scenario, with even greater warming in the coastal waters of the Northeastern U.S. and Alaska.120 Rapid ocean warming has widespread impacts on species and ecosystems, contributing to rising sea levels, declining ocean oxygen levels, increasing rainfall intensity, and ice loss from glaciers, ice sheets and polar sea ice, and is the primary driver of mass coral bleaching events that are devastating coral reef ecosystems.121 [EPA-HQ-OAR-2021-0208-0726-A1, pp. 17-18]

Exacerbating the harms from rising temperatures, the global oceans have absorbed more than a quarter of the CO2 emitted to the atmosphere by human activities, which has significantly increased the acidity of the surface ocean in a process called ocean acidification, and has reduced the availability of key chemicals—aragonite and calcite—that many marine species use to build their shells and skeletons.122 Ocean acidification caused by the ocean's absorption of anthropogenic CO2 has already resulted in more than a 30 percent increase in the acidity of ocean surface waters, at a rate likely faster than anything experienced in the past 300 million years.123 Ocean acidity could increase by 150 percent by the end of the century if CO2 emissions continue unabated.124 In the United States, the West Coast, Alaska, and the Gulf of Maine are experiencing the earliest, most severe changes due to ocean acidification,125 although regions of the East and Gulf Coasts are also vulnerable.126 [EPA-HQ-OAR-2021-0208-0726-A1, p. 18]

Ocean acidification negatively affects a wide range of marine species by hindering the ability of calcifying marine creatures like corals, oysters, and crabs to build protective shells and skeletons and by disrupting metabolism and critical biological functions.127 The adverse effects of ocean acidification are already being observed in wild populations, including reduced coral calcification rates in reefs worldwide, 128 severe shell damage to pteropods (marine snails at the base of the food web) along the U.S. west coast,129 and mass die-offs of larval Pacific oysters in the Pacific Northwest.130 A U.S. expert science panel concluded in 2016 that 'growth, survival and behavioral effects linked to OA [ocean acidification] extend throughout food webs, threatening coastal ecosystems, and marine-dependent industries and human communities.'131 As stated by the 2018 IPCC Special Report on Global Warming of 1.5°C, '[t]he level of ocean acidification due to increasing CO2 concentrations associated with global warming of 1.5°C is projected to amplify the adverse effects of warming, and even further at 2°C, impacting the growth, development, calcification, survival, and thus abundance of a broad range of species, e.g., from algae to fish (high confidence).'132 [EPA-HQ-OAR-2021-0208-0726-A1, pp. 18-19]

Rising ocean temperatures and ocean acidification driven by greenhouse gas pollution threaten the continued survival of corals and coral reef ecosystems due to the increasing frequency of mass bleaching events and the dissolution of corals due to ocean acidification.133 Scientific research has definitely linked anthropogenic ocean warming to the catastrophic, mass coral bleaching events that have been documented since 1980 and are increasing in frequency and intensity as atmospheric CO_2 increases.134 Severe bleaching events have increased five-fold in the past several decades and now occur every six years on average, which is too frequent to allow full recovery of coral reefs.135 The global coral bleaching event that lasted from 2014 to 2017 was the longest, most widespread, and almost certainly most destructive on record, affecting more reefs than any previous mass bleaching event and causing mass bleaching of reefs that had never bleached before, with U.S. reefs particularly hard-hit.136 For example, in Papah-naumoku-kea Marine National Monument in Northwestern Hawaiian Islands, a 2017 study concluded that 'heat stress in 2014 was unlike any previous event and that the exposure of corals to the bleaching-level heat stress has increased significantly in the northern PMNM since 1982, highlighting the increasing threat of climate change to reefs.' 137 In the Caribbean, many important reef-building corals have not recovered from repeated bleaching events due to climate change.138 According to a 2021 study that projected changes in coral reef growth (net carbonate production) under ocean warming and acidification across 183 reefs worldwide, 94% of coral reefs globally will be eroding by 2050 if greenhouse gas emissions continue unabated. In contrast, if emissions are immediately and drastically reduced (i.e., RCP 2.6 emissions scenario), coral reef growth will still decline dramatically, but 63% of reefs will still be able to grow at the end of the century.139 A 2017 scientific review concluded that 'unless rapid advances to the goals of the Paris Climate Change Agreement occur over the next decade' that 'coral reefs are likely to degrade rapidly over the next 20 years, presenting fundamental challenges for the 500 million people who derive food, income, coastal protection, and a range of other services from coral reefs.'140 [EPA-HQ-OAR-2021-0208-0726-A1, pp. 19-20]

Scientific research and federal documents conclude that greenhouse gas emissions must be immediately and rapidly reduced—with the target of keeping global average temperature rise below 1.5°C and returning atmospheric CO_2 levels below 350 ppm—to prevent catastrophic loss and degradation of corals. For example, a 2012 study concluded that protecting at least half of the world's coral reefs requires limiting global average temperature rise to 1.2°C, while preserving greater than 10 percent of the world's reefs would require limiting warming to below 1.5°C. 145 Similarly, a 2014 study projected that under the low emissions pathway (RCP 2.6) that limits temperature rise below 2°C, the vast majority (88%) of global reef locations would still experience severe bleaching events annually by the end of the century, indicating that 2°C of warming would be devastating for corals. 146 The 2018 IPCC Special Report on Global Warming of 1.5°C stated that coral reefs 'are projected to decline by a further 70–90% at 1.5°C (high confidence) with larger losses (>99%) at 2ºC (very high confidence).'147 As summarized by a 2018 study:

Even the aspirational Paris Agreement target of constraining global warming to 1.5°C above pre-industrial levels is unlikely to be sufficient to prevent drastic modifications and reconfigurations of the community structure and make-up of coral reefs. For the 100 reef locations examined here and given current rates of warming, the 1.5°C global warming target represents twice the thermal stress they experienced in 2016. The 2°C global target would result in 3 times the 2016 level of thermal stress and 3 °C, which is currently being tracked with the NDCs, would be over 6 times the 2016 level of stress.148 [EPA-HQ-OAR-2021-0208-0726-A1, pp. 21-22]

Based on this evidence, coral scientists have recommended returning the atmospheric CO2 concentration to less than 350 ppm to protect coral reefs, and have suggested a target of 320 ppm which is the level that pre-dates the onset of mass bleaching events.149 [EPA-HQ-OAR-2021-0208-0726-A1, p. 22]

NMFS' 2015 Final Recovery Plan for Elkhorn and Staghorn Corals states that ocean warming and acidification are 'among the greatest threats' to these corals, and recommends actions to reduce greenhouse gas emissions to reduce these threats: 'the combination of rising temperature and ocean acidification both resulting primarily from anthropogenic increases in atmospheric CO2, are likely to have synergistic effects and are among the greatest threats to elkhorn and staghorn coral recovery'150 and 'therefore, actions must be taken to address ocean warming and acidification impacts on these species.'151 NMFS's recovery plan includes a recovery criterion with specific targets for ocean surface temperatures and ocean acidification levels152 that are lower than today's levels and are consistent with a return to an atmospheric CO2 concentration of less than 350 ppm,153 as recommended by numerous scientific studies that have examined coral species viability in response to ocean warming and ocean acidification. 154 The Recovery Plan also recognizes that a primary threat to listed corals is the inadequacy of existing regulations to control greenhouse gas emissions. It specifies a recovery criterion calling for the adoption of 'adequate domestic and international regulations and agreements' to abate threats from increasing atmospheric CO2 concentrations,155 including a recovery action to 'develop and implement U.S. and international measures to reduce atmospheric CO2 concentrations to a level appropriate for coral recovery.'156 As acknowledged by the Recovery Plan:

The final listing rule (NMFS 2006) identified inadequacy of regulatory mechanisms as a threat contributing to the threatened status of elkhorn and staghorn corals. Additionally, the 2014 final rule maintaining the threatened status of elkhorn and staghorn corals (NMFS 2014) identifies the inadequacy of existing regulations to control greenhouse gas emissions, and thus the high importance threats linked to climate change, as contributing to the status and risk of extinction of these two species. Because existing regulatory mechanisms are insufficient to provide appropriate threat abatement for elkhorn and staghorn corals, they are impeding recovery of these species. The threat posed by inadequacy of existing regulatory mechanisms is high (4) throughout the region (see Table 1) because several of the major threats affecting these species are amenable to regulation, albeit with difficulty. National and international efforts are needed to address global climate change while additional international protections are needed to protect populations of elkhorn and staghorn corals throughout their ranges.157 [EPA-HQ-OAR-2021-0208-0726-A1, pp. 22-23]

Since the ocean has absorbed more than 90 percent of the excess heat caused by greenhouse gas warming and more than a quarter of the CO2 emitted by human activities,158 it is critical for the survival of the elkhorn and staghorn corals to prevent many additional millions of tons of CO2 from being released. At a minimum, EPA must assess how the increases in carbon dioxide emissions will affect these climate-sensitive ocean species. [EPA-HQ-OAR-2021-0208-0726-A1, p. 24]

Other Coastal Species and Sea Level Rise. Global average sea level rose by seven to eight inches (0.2 m) since 1901 as the oceans have gotten hotter and land-based ice has melted.159 Global average sea level has risen faster since 1900 than in any other century in at least the last 3,000 years.160 Sea level rise is accelerating in pace: the recent rate of sea level rise has nearly tripled compared with the rate between 1901-1971 (3.7 mm per year from 2006-2018 versus 1.3 mm per year from 1901-1971).161 The Fourth National Climate Assessment estimated that global sea level is very likely to rise by 1.0 to 4.3 feet by the end of the century relative to the year 2000, with sea level rise of 8.2 feet possible.162 Sea level rise will be much more extreme without strong action to reduce greenhouse gas pollution. By the end of the century, global mean sea level is projected to increase by 0.8 to 2.6 feet under a lower emissions RCP 2.6 scenario, compared with 1.6 to 6 feet under a high emissions RCP 8.5 scenario.163 [EPA-HQ-OAR-2021-0208-0726-A1, p. 24]

According to the IPCC's Climate Change 2021 report, even under a very low GHG emissions scenario, it is likely that global sea level rise by 2100 will be about one to two feet (0.28-0.55 m) compared to 1995-2014. Under an intermediate scenario, sea level rise is likely to be as high as 2.5 feet (0.44-0.76 m), and under a very high GHG emissions scenario it is likely to be close to three feet (0.37-0.86 m). Sea level rise above the likely range, approaching seven feet (2 m) by 2100 under a very high GHG emissions scenario cannot be ruled out due to uncertainty around the melting of ice sheets. Regardless, the impacts of sea level rise will be long-lived: under all emissions scenarios, sea levels will continue to rise for many centuries.164 [EPA-HQ-OAR-2021-0208-0726-A1, p. 24]

Research and federal documents have also highlighted sea-level rise as a primary threat to sea turtles by eroding nesting beaches and reducing nesting success.172 For example, most (87 percent) loggerhead sea turtle (Caretta caretta) nesting occurs on the east coast of Florida,173 where 43 percent of the turtle's nesting beaches are projected to disappear with just 1.5 feet of sea level rise.174 The listing rules for the green sea turtle175 and loggerhead sea turtle176 conclude that sea level rise is likely to have negative effects on these species through beach loss and reduced nesting success. [EPA-HQ-OAR-2021-0208-0726-A1, pp. 25]

Finalizing the Rule is likely to result in a significant increase of CO2 emissions and worsen sea level rise. The proposed Rule thus triggers the EPA's legal duty under the ESA to consult on how continued habitat loss due to sea level rise will adversely affect the loggerhead sea turtle and other listed species threatened by sea level rise. [EPA-HQ-OAR-2021-0208-0726-A1, p. 26]

Commenter: Center for Biological Diversity, et al.

Just this year, one out of three Americans from coast to coast experienced the disastrous effects of the escalating climate crisis firsthand. The U.S. was battered by a never-ending stream of extreme and disastrous weather events, from unrelenting heat waves and droughts to raging wildfires and extreme rainfall and flooding. Many of these events are now clearly attributable to the deteriorating climate. Also this year, the Intergovernmental Panel on Climate Change (IPCC) reached the shocking conclusion that some of the drastically changed conditions have already become irreversible – for centuries and millennia to come. It projects that by the end of the century, warming on the current trajectory would cost the U.S. economy hundreds of billions of dollars each year and up to 10% of U.S. gross domestic product.

These are the appalling circumstances under which EPA must comply with its mandate to reduce the harmful pollution at its root. Vehicle emissions are the primary contributor to this nation's greenhouse gases: their steep reduction and elimination must be EPA's top priority to prevent even more irreversible calamitous outcomes. Yet, the 2020 Final Rule set out to increase their emissions and double down on the consequences. EPA must replace that rule and rectify its fundamental mistakes. These comments discuss many of them in detail – including that the 2020 Final Rule's "balancing" of factors listed in Section 202(a) of the Clean Air Act was so vastly off the mark that it ascribed more importance to "up front" costs to consumers than to the catastrophic events playing out in front of our eyes. [EPA-HQ-OAR-2021-0208-0651-A1, p. 6]

As EPA Has Repeatedly Found, Vehicular Emissions of Greenhouse Gases Gravely Endanger Public Health and Welfare.

Emissions of greenhouse gases from the transportation sector pose mortal dangers to public health and the environment; EPA's exercise of its responsibilities under the Clean Air Act must take account of and mitigate these dangers.[1] Commenters here summarize the voluminous scientific evidence on climate change published since 2018, when many of the same organizations submitted comments in connection with the Safer Affordable Fuel-Efficient Vehicles Rule (the 2020 Final Rule), submitted to the docket at EPA-HQ-OAR-2018-0283 on October 26, 2018.[2] These comments incorporate by reference and supplement the earlier submission with an overview of peer-reviewed, climate change-related scientific studies released since then. These studies amplify EPA's conclusion that greenhouse gases (GHG) (including carbon dioxide (CO_2)) endanger public health and welfare by driving increasingly dangerous climate change. This year alone, devastating harm to people, property and the environment has been experienced from coast to coast. Indeed, the scientific record is clear that since the earlier comments, the climate has continued to deteriorate.

The full effects of climate change will depend on how much we limit warming. In 2018, the IPCC issued a Special Report on Global Warming of 1.5°C. It quantified the devastating harms that would occur at 2°C warming, highlighting the necessity of limiting warming to 1.5°C to avoid catastrophic impacts to people and life on Earth.[3] The IPCC 2018 Special Report provides overwhelming evidence that climate hazards are more urgent and more severe than previously thought, and that aggressive reductions in emissions within the next decade are essential to avoiding the most devastating climate change harms.

The IPCC Special Report concluded that pathways to limit warming to 1.5°C with little or no overshoot require "a rapid phase out of CO_2 emissions and deep emissions reductions in other GHGs and climate forcers."[4] In pathways consistent with limiting warming to 1.5°C, global anthropogenic CO_2 emissions must decline by about 45 percent below 2010 levels by 2030 and reach near zero around 2050.[5]

In the IPCC Climate Change 2021: The Physical Science Basis report, five scenarios are considered, ranging from a very low GHG emissions scenario to a very high GHG emissions scenario, and in all of them warming of at least 1.5°C has already become unavoidable. Between 2021 and 2040, 1.5°C temperature increase is very likely to be exceeded under the very high GHG emissions scenario (CO_2 emissions double by 2050), likely to be exceeded under the intermediate and high GHG emissions scenarios (CO_2 emissions stay current until 2050 and CO_2 emissions double by 2100, respectively), more likely than not to be exceeded under the low and very low GHG emissions scenarios (CO_2 emissions reach net zero around 2050). In all scenarios except for the very low and low GHG scenarios, global warming of 2°C is likely to occur.

In short, both the IPCC Climate Change 2021 report and the 2018 IPCC Special Report provide overwhelming scientific evidence for the necessity of immediate, deep greenhouse gas reductions across all sectors. The Climate Change 2021 report estimates that, for a 67% chance of limiting warming to 1.5°C, total global emissions from January 2020 onward must not exceed 400 $GtCO_2$. 6 Global emissions are currently about 40 $GtCO_2$ per year, so this emissions cutoff would be passed around 2030 without immediate and drastic action to reduce global emissions.

Greenhouse gas emissions have made the Earth's climate hotter and more extreme. According to the IPCC's Climate Change 2021 report, "[i]t is unequivocal that human influence has warmed the atmosphere, ocean and land. Widespread and rapid changes in the atmosphere, ocean, cryosphere and biosphere have occurred," and "[t]he scale of recent changes across the climate system as a whole and the present state of many aspects of the climate system are unprecedented over many centuries to many thousands of years."7

As human emissions continue to rise, the average global atmospheric CO_2 concentration in 2019 reached 410 parts per million (ppm), a level not seen for at least 2 million years.8 The last time CO_2 in Earth's atmosphere was at 400 ppm, global mean surface temperatures were 2 to 3°C warmer and the Greenland and West Antarctic ice sheets melted, leading to sea levels that were 10 to 20 meters higher than today.9 The current atmospheric CO_2 concentration is 47 percent larger than the pre-industrial level of 280 ppm, and much greater than levels during the past 800,000 years.10 The atmospheric concentrations of methane (CH_4) and nitrous oxide (N_2O), two other potent greenhouse gases, have increased by 156 percent and 23 percent respectively, relative to pre-industrial levels.11

As a result, it is now an irrefutable fact that humans are drastically changing Earth's climate with unprecedented increases in temperature. Globally, each of the last four decades has been successively warmer than any preceding decades since 1850, which is the first year with reliable temperature measurements. Average global surface temperature from 2001 to 2020 was 1.8°F (0.99°C) higher than in 1850 to 1900, with larger increases over land than over the ocean. The best estimate for the human-caused global surface temperature increase from 1850 to 2019 is 1.9°F (1.07°C). 12 Since 2012, global warming has been especially pronounced, with the past five years (2016-2020) being the hottest five-year period since 1850 (Figure 1).13 [EPA-HQ-OAR-2021-0208-0651-A1, p. 7-9] [Figure 1 can be found on p. 10 of Docket number EPA-HQ-OAR-2021-0208-0651-A1]

Extreme weather events are becoming the new normal. Human-induced climate change is now affecting weather and climate extremes observed around the globe. Many events such as heatwaves, heavy precipitation, droughts, and tropical cyclones are not only changing in severity but are also now clearly attributable to human actions.15 In a truly alarming conclusion, the IPCC states that many of the changes we are imposing on our climate “due to past and future greenhouse gas emissions are irreversible for centuries to millennia, especially changes in the ocean, ice sheets and global sea level.”16

Extreme weather events are striking with increasing frequency, most notably heat waves and heavy precipitation events.17 In the contiguous United States, extreme temperatures are expected to increase even more than average temperatures, with more intense heat waves and 20 to 30 more days per year above 90°F by mid-century for most regions under a higher emissions scenario.18 Heavy precipitation has become more frequent and intense in most regions of the U.S. since 1901.19 This is both because increasing temperatures cause more evaporation from soils, which places more water vapor in the atmosphere,20 and because warmer air holds more water vapor, resulting in more extreme rain and snowstorms.21 Climate warming also has exacerbated recent historic droughts by reducing soil moisture and contributing to earlier spring melt and reduced water storage in snowpack.22 As conditions become hotter and drier, climate change is contributing to an increase in area burned by wildfire and a lengthening of the wildfire season in recent decades.23 In addition to the toll on human lives from the fires themselves, airborne soot from wildfire smoke was linked to over 33,000 deaths a year globally between 2000 and 2016, causing 0.62% of all worldwide deaths yearly, according to a recent study.24

Climate change has contributed to increasing North Atlantic hurricane activity since the 1970s.25 Hurricane-generated storm surge events—the enormous walls of water pushed onto the coast—have also become more frequent and severe.26 One study found that the frequency of large storm surge events of Hurricane Katrina magnitude has already doubled in response to warming during the 20th century.27 Studies of Hurricane Harvey concluded that climate warming made the storm’s record rainfall more likely and intense.28

Global average sea level rose by seven to eight inches (0.2 m) between 1901 and 2018 as the oceans have warmed and land-based ice has melted.29 Global average sea level has risen faster since 1900 than any other preceding century in the last 3,000 years.30 Sea level rise is accelerating in pace, from an average rate of 1.3 mm yr-1 between 1901 and 1971 to 3.7 mm yr-1 between 2006 and 2018.31 The combination of intensifying storm surge and sea level rise is leading to increased flooding risks in coastal regions.32

These events are ubiquitous in present-day America, and Americans of all stripes suffer their consequences on a regular basis. As of July 9, 2021, there have been eight climate disasters this year with losses over $1 billion in the United States: one drought event, two floods, four severe storms, and one winter storm.33 There were 22 of these disasters in 2020, the most on record. Every single state has had at least one climate disaster with losses over $1 billion; Texas has had 124 since 1980.34 According to a Washington Post analysis of federal disaster declarations, nearly 1 in 3 Americans live in a county hit by a weather disaster between June and August

2021.35 On top of that, 64 percent live in places that experienced a multi-day heat wave. During the summer of 2021 alone, these disasters claimed the lives of at least 388 Americans.36

To cite just one recent example, last month Hurricane Ida became the second-most damaging hurricane to strike Louisiana, after Hurricane Katrina. It dumped record amounts of rain in several Mid-Atlantic and Northeast states for days after making landfall. Climate change exacerbated the damage from the storm in several compounding ways. Because background temperatures in parts of the Gulf of Mexico are 3-5°F warmer than at the end of the 20th century, the storm drew more energy from the ocean, which increased its wind speed.37 Further, because hotter air holds more moisture, the severity and volume of precipitation was far more deadly.38 When the storm hit land, it dragged a greater amount of water onto land with its storm surge, due in part to higher existing sea levels linked to global warming. This flooding can be the most destructive part of a major hurricane: one study found that 76 percent of fatalities from hurricanes between 1963 and 2021 were caused by storm surge or flooding.39 Finally, after the storm caused power outages for millions of people, which could last up to a month,40 residents who stayed faced heat indices of 105-107°F—without air conditioning.41 These intersecting dangers show just one example of how a changing climate can increase the intensity, damage, and human suffering from the same weather event.

The effects of climate change will be felt well into the future. Surface temperatures will continue to increase until at least mid-century. In a worstcase high-emissions scenario, the global average temperature in 2100 could end up 5.7°C (10.2°F) higher than in 1900.42 Even in a best-case low-emissions scenario, we are likely committed to slightly overshooting 1.5°C, but with a drop back below that threshold by the end of the century.43 Only a best-case scenario keeps warming to 1.5°C, demonstrating the need for stringent and immediate global reductions of greenhouse gas emissions. In a startling new report, the United Nations recently reported that the global average temperature will increase 2.7 °C by 2100 even if all countries meet their currently promised emission targets.44

Even under a very low GHG emissions scenario, it is likely that global sea level rise by 2100 will be about one to two feet (0.28-0.55 m) compared to 1995-2014. Under a very high GHG emissions scenario it is likely to be close to three feet (0.37-0.86 m). Sea level rise above the likely range, approaching seven feet (2 m) by 2100 under a very high GHG emissions scenario, cannot be ruled out due to deep uncertainty around the melting of ice sheets. Regardless, the impacts of sea level rise will be long-lived: sea levels will continue to rise for many centuries, in addition to the lasting effects of ocean warming and acidification.45

Heavy precipitation events are projected to continue to increase in frequency and intensity across the United States, with the number of extreme events rising by two to three times the historical average by the end of the century under a higher emissions scenario.46 Further, as the climate warms, Atlantic and eastern North Pacific hurricane rainfall and intensity are projected to increase, making hurricanes more destructive.47

The effects of climate change could be even worse than conservative predictions. The Fourth National Climate Assessment concluded with very high confidence that large-scale shifts in the climate system, known as tipping points, and the compound effects of simultaneous extreme climate events have the potential to create unanticipated and potentially abrupt and irreversible "surprises" that become more likely as warming increases.48 The IPCC Climate Change 2021 report similarly concluded that "abrupt changes and tipping points are not well understood, but the higher the warming level and the longer the duration of overshoot [beyond 1.5°C], the greater the risk of unexpected changes."49 The crossing of tipping points could result in climate states wholly outside human experience and result in severe physical and socioeconomic impacts.50

In short, these studies provide overwhelming scientific evidence for the necessity of immediate, deep greenhouse gas reductions across all sectors to avoid devastating climate change-driven damages, and underscore the high costs of inaction or delays. The enactment of strong emissions standards that require all light-duty vehicles to be electric by at least 2035, and all vehicles by at least 2050, is a non-negotiable necessity for averting the worst harms of climate change. [EPA-HQ-OAR-2021-0208-0651-A1, p. 10-15]

The effects of climate change are being felt economically. The climate crisis is exacting a heavy economic toll, already costing the U.S. economy more than $1 trillion dollars in damages, with economic losses worsening with each additional ton of carbon pollution.51 Each 1°C temperature rise is estimated to decrease U.S. gross domestic product (GDP) by 1.2%, with the poorest regions of the U.S. suffering most.52 A 2021 study of the health costs in the U.S. of air pollution from fossil fuel combustion and resulting climate change estimated the costs already exceed $800 billion per year and are expected to become even more expensive without rapid action to curb fossil fuel pollution.53 At the global scale, warming of 2°C versus 1.5°C is projected to decrease global GDP by an additional 1.5 to 2% and cause $7.7 to 11.1 trillion in damages by mid-century.54

The Fourth National Climate Assessment similarly concludes that human-caused climate change is already leading to substantial economic losses in the U.S. and that these losses will be much more severe under higher emissions scenarios, impeding economic growth:

In the absence of more significant global mitigation efforts, climate change is projected to impose substantial damages on the U.S. economy, human health, and the environment. Under scenarios with high emissions and limited or no adaptation, annual losses in some sectors are estimated to grow to hundreds of billions of dollars by the end of the century. It is very likely that some physical and ecological impacts will be irreversible for thousands of years, while others will be permanent.55

According to the Fourth National Climate Assessment, the number of extreme weather events per year costing more than one billion dollars per event has increased significantly since 1980, with total costs from those events exceeding $1.1 trillion.56 The 2017 Atlantic Hurricane season alone is estimated to have caused more than $250 billion in damages and hundreds of deaths throughout the U.S. Caribbean, Southeast, and Southern Great Plains.57

By the end of the century, the Fourth National Climate Assessment estimates that warming on our current trajectory would cost the U.S. economy hundreds of billions of dollars each year and up to 10% of U.S. gross domestic product due to damages including lost crop yields, lost labor, increased disease incidence, property loss from sea level rise, and extreme weather damage.58Ultimately, the magnitude of financial burdens imposed by climate change depends on how effectively we curb emissions. Across sectors and regions, significant reductions in emissions will substantially lower the costs resulting from climate change damages.59

Because vehicular emissions are the nation's leading source of emissions, these undisputed facts leave no doubt that steep reductions in vehicle emissions must occur now to avoid truly catastrophic outcomes. [EPA-HQ-OAR-2021-0208-0651-A1, p. 15-16]

1 The nongovernmental organizations submitted detailed comments on climate change in their comments in the rulemaking for the 2020 Final Rule. See Joint Comments of Center for Biological Diversity, Earthjustice, Environmental Defense Fund, Natural Resources Defense Council, Sierra Club, and Public Citizen, Inc., Regarding the Proposed Greenhouse Gas Emissions and Fuel Efficiency Standards for Light-Duty Vehicles, Model Years 2021- 2026 Comments Specific to Climate Change (Oct. 26, 2018) (Joint NGO Climate Change Comments). Attached as Exhibit 1.

Commenter: Center for Climate and Energy Solutions (C2ES)

Climate change caused by greenhouse gas emissions from the extraction and burning of fossil fuels poses a direct and intensifying threat to global ecosystems, human health, and the global economy. To avert the most catastrophic impacts of the climate crisis, the world must reach economy-wide net-zero emissions by 2050. Decarbonizing the U.S. transportation sector is an essential element required to reach net-zero goals, and the United States must make all light-duty vehicles on the roads zero-emissions by 2050. [EPA-HQ-OAR-2021-0208-0287-A1, p.2]

To avert increasingly severe impacts from climate change, the United States must reach economy-wide netzero emissions by 2050. Presently, transportation is the largest-emitting sector, accounting for 29 percent of U.S. greenhouse gas emissions; of that, light-duty vehicles are responsible for 58 percent of U.S. transportation emissions.1 To meet mid-century decarbonization goals, all on-road light-duty vehicles must be zero-emitting by 2050.2 Correspondingly, to reflect average lifespans and stock turnover, all new light-duty vehicle sales must be zero emission around 2035.

This target is consistent with goals already put into place by several states and companies in the private sector. In September 2020, California Governor Gavin Newsom issued an executive order requiring the end of new internal combustion engine sales by 2035, which other states including Massachusetts may follow if EPA reinstates its Advanced Clean Car waiver.3 In the private sector, General Motors announced a goal in January 2021 to be carbon neutral by 2040 including the elimination of tailpipe emissions from new light-duty vehicles by 2035, and Honda, Volvo, and Mercedes-Benz have similar goals to go all-electric in the next two decades.4 Other companies, including Ford, Stellantis, Toyota, and Volkswagen, expect low- or zero-emission vehicles to make up at least 40 percent of light-duty sales by 2030.5 The market is moving toward zeroemissions transportation. Greenhouse gas emissions regulations should reflect the real-world market and capitalize on the opportunity to provide regulatory certainty to accelerate this trend toward cleaner vehicles, with significant positive implications for the climate crisis, economic productivity, and public health. [EPA-HQ-OAR-2021-0208-0287-A1, p. 3]

Commenter: CERES

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, p. 83.]

Transportation emissions-related health care are also major cost centers for companies. Establishing higher standards for vehicle emissions will help to substantially lower emissions-related health care costs while simultaneously lowering their fuel costs.

Commenter: Collins, Molly

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, pp. 230-231.]

I'd also like to thank this Administration for acknowledging the importance of tackling climate pollution from transportation which, as others have mentioned today, is an important step in the right direction.

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, p. 232.]

Earlier this month, a report from the UN Intergovernmental Panel on Climate Change found that we are on the path towards catastrophic destruction if we do not make serious cuts in our greenhouse gas emissions as soon as possible.

We must act with the urgency our situation requires. We are seeing the effects of our indifference in the news every day as extreme storms, wildfires, earthquakes, etcetera, and I hate that I'm leaving our planet in this state to my children.

Commenter: Connecticut Department of Energy and Environmental Protection

Connecticut needs emission reductions from the transportation sector. Reducing GHG emissions from the transportation sector is required to achieve Connecticut's economy-wide GHG reduction targets of at least 45 percent below 2001 levels by 2030, and 80 percent below 2001 levels by 2050, as required by the 2008 Global Warming Solutions Act (GWSA) and the 2018 Act Concerning Climate Change Planning and Resiliency.[5] Connecticut's transportation sector is the largest source of statewide GHG emissions, responsible for 37.4 percent in 2018, the most recent year for which data is available.[6] Connecticut will not meet its GHG reduction targets without increasingly more protective national vehicle emission standards.[EPA-HQ-OAR-2021-0208-0264-A1, p.2]

[5] Public Act 18-82, An Act Concerning Climate Change Planning and Resiliency, sec. 7, codified at Conn. Gen.Stat. § 22a200a. Public Act 08-98, An Act Concerning Global Warming Solutions, sec. 2, codified at Conn. Gen. Stat. § 22a-200a.

Commenter: Cooper, Almeta

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, pp. 76-77.]

There is a direct connection between climate change, clean air, and health. In the last month United Nations Intergovernmental Panel on Climate Change reported out that climate change is widespread, rapid, and intensifying, painting a grim picture of our world's future unless swift and strong intervention is taken immediately to curb the pollution causing global climate change.

Protecting public health means keeping everyone's air clean and safe to breathe and cutting greenhouse gas pollution. Because climate change affects us all, whether we live and work in suburban, rural, or urban areas, we must unite in protecting clean air for our children.

Commenter: Davidson, William

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, p. 206.]

I am very concerned about climate change, forest fires, floods, storms, etcetera, are causing hundreds of billions of damage and devastating lives here and abroad. We need automakers to bring more electric cars and hybrids to market.

Commenter: Davis, Darien

[The following comments were submitted as testimony at the virtual public hearing on August 26, 2021. See Hearing Testimony – 26Aug2021, p. 161.]

There is, however, a practical way to begin tackling climate change: focusing on clean transportation. Since the transportation sector is the largest source of emissions, bold car standards to help accelerate the transmission from cars with internal combustion engines to pollution-free vehicles. Now the EPA has the opportunity to both reinstate and strengthen clean car standards.

Commenter: Dream Corp Green for All

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, p. 305.]

In a short time I'd like to focus on two main points. First, strong greenhouse gas emissions standards for passenger vehicles are essential to meet climate and racial equity goals,

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, pp. 306-307.]

We may be beyond the point of being able to truly fix the climate disaster that burning fossil fuels has reaped but every fraction of a degree matters. As the Number 1 contributor to the highest emitting sector in the United States, light-duty vehicles present an opportunity, indeed an obligation, to reduce emissions as quickly as feasible so that other human needs can be met.

For example, increasing extreme heat means that we will need to add air conditioning for people to avoid heat stroke which can cook people's organs without a place of reprieve. Transportation has the highest potential to reduce emissions and we can do this without losing mobility. We can still get where we need to go with lower emissions and can make these cuts in transportation emissions far easier than in other essential sectors.

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, p. 308.]

Given the risks of abrupt changes from global temperature rise identified in the 2021 IPCC Report, the benefits of reducing emission are very likely underestimated in the government's analysis.

Commenter: Dream Corps Green for All et al.

Strong GHG emission standards for passenger vehicles are essential to meet climate and racial equity goals.[EPA-HQ-OAR-2021-0208-0285-A1, p.1]

As the number one contributor to the highest emitting sector in the United States, light duty vehicles present an opportunity--indeed an obligation--to reduce emissions as quickly as feasible so that other human needs can be met that will continue to require GHG emissions for the near future. For example, increasing extreme heat means that we will need to add air conditioning in more places in order to provide reprieve from heat-related illness or death.[4] As the biggest emitter in the United States, the transportation sector has the highest potential to reduce emissions, and thanks to existing technology, passenger vehicles can do so without sacrificing the mobility and economic benefits that transportation provides. We can still get where we need to go with lower emissions and can do this far easier in passenger vehicles than in aviation or shipping and other essential sectors.[5] [EPA-HQ-OAR-2021-0208-0285-A1, p.2]

Commenter: E2 - Environmental Entrepreneurs

Furthermore, the costs and dangers of the climate crisis has never been more apparent. In 2020, climate-related disasters cost the U.S. economy $95 billion. That is double the cost from 2019 and more than any other country. This year one out of three Americans from coast to coast experienced the disastrous effects of climate change first hand. The U.S. was battered unrelenting heat waves and droughts to raging wildfires and extreme rainfall and flooding. These events are consistent with the harms that scientists predict will grow as we continue to emit carbon dioxide pollution. The IPCC predicts that the harms we see today are just a prelude to what will come if we do not cut emissions. The IPCC's scientists project that by the end of the century, warming on the current trajectory would cost the U.S. economy hundreds of billions of dollars each year and up to 10% of U.S. gross domestic product. Strong standards to reducing carbon emissions from transportation and other sources are essential to reduce the rising costs of climate change. [EPA-HQ-OAR-2021-0208-0604-A1, p. 2]

E2 business leaders see climate change as a business risk and a threat to our broader economy. From direct impacts of stores closing from climate driven extreme weather to major disruptions in supply chains, the impacts are real and they are costly. They will only grow if America does not dramatically reduce emissions. [EPA-HQ-OAR-2021-0208-0604-A1, p. 3]

[1] This and the following calculations in this section assumes a 3% discount rate, as calculated by EPA.

Commenter: Elders Climate Action (ECA)

The science is clear: stabilizing the climate before it becomes too hot to support human civilization and attaining the ozone NAAQS in all of America's 230 nonattainment counties requires that GHG emissions from on-road vehicles be reduced to zero as soon as possible. In his Climate Executive Order President Biden declared that the policy of the United States is to 'put the United States on a path to achieve net-zero emissions, economy-wide, by no later than 2050.'1 [EPA-HQ-OAR-2021-0208-0521-A1, p. 1]

The President's declared policy responds to and is supported by the science which makes clear that the climate will continue to heat up so long as humanity continues to increase GHG levels in the atmosphere. The global mean temperature reached 1.2 o C above the pre-industrial baseline in 20202 which has produced massive damage and destruction to property and natural systems, and caused hundreds of deaths, displacement, homelessness and loss of livelihoods for tens of thousands of Americans from extreme floods, drought, wildfires, hurricanes and tornadoes.

The latest report (AR6) from the Intergovernmental Panel on Climate Change (IPCC) now makes clear that exceeding 1.5o C before 2050 is 'more likely than not' even with implementation of the most aggressive GHG reduction scenario, but that the excursion above 1.5o C can be limited to a few decades if we reduce GHG emissions by half before 2030, and achieve net zero emissions by 2050. But if we fail to meet either of those targets, it is 'more likely than not' that global temperatures will reach 2.0 o C with dire consequences for humanity.

To achieve net-zero emissions economy wide by 2050, zero emission technologies currently available must be deployed as soon as possible to put GHG emissions from our largest source of emissions – transportation – on the path toward zero. [EPA-HQ-OAR-2021-0208-0521-A1, pp. 1-2]

The IPCC Findings. Since the Endangerment Finding, EPA's catalogue of risks have been augmented by much more comprehensive modeling of warming trends, the warming expected from a range of global emission scenarios, and a description of the emission limitations that must be implemented to avoid more catastrophic climate outcomes.

The IPCC's 2018 report reviews and analyzes the then-available scientific literature to provide the best information available to answer two critical questions posed by world leaders at the Paris Climate conference:

1) What are the differences between the consequences of allowing the planetary climate system to rise 1.5o C compared to 2o C above the pre-industrial background?

2) What limitations on CO2 and other GHG emissions must be achieved to avoid overshooting a 1.5o C or a 2o C rise in global temperature?

Consequences of 1.5o C and 2o C rise in global temperatures are both unacceptable, but 2o C is significantly worse.

The IPCC's 2018 report catalogues numerous expected adverse consequences of both a 1.5o C and a 2o C rise and in global mean temperature.6 Some of the effects of greatest concern are –

1) increases in mean summer temperatures and the frequency of hot days above the 99th%ile of the baseline temperature range, and the increased duration of the summer dry season that, together, will more quickly desiccate the coastal and Cascade forests each year, increase the ignitability of forest fuels, increase the frequency and intensity of wildfires, increase the production of hazardous concentrations of fine particle pollution (smoke), and increase the adverse health consequences of public exposure to multi-day extreme hazard pollution episodes;

2) diminished summer stream flows that force curtailment of water for agricultural operations dependent on irrigation water, and contribute to warmer surface water temperatures that interfere with the survival of cold water fish species (e.g., salmonids) and contribute to algal blooms that produce toxic contamination of municipal and agricultural water supplies and fishery habitats;

3) increasing ocean acidification and ocean temperatures that together prevent reproduction and survival of some marine species, cause some native local species to abandon Oregon waters in search of cooler waters, and diminish productivity of species remaining in the local water column which in turn will reduce the catch, make commercial fishing unprofitable, and further reduce the food supply for human populations dependent on marine sources of protein and resident coastal orca populations that are now starving because of diminished food supply;

4) the frequency and duration of extreme precipitation events that cause flooding, erosion, displacement of human populations in flood-prone areas, the destruction of freshwater and anadromous fish spawning habitat and contamination of municipal water supplies;

5) warmer winter temperatures that convert winter snow precipitation events to rainfall thereby reducing the high altitude storage of water which diminishes water resources available for agriculture and municipal uses during the spring and summer, and increases the severity of

drought by reducing stream flows, causing crop loss, loss of fishery habitat, and inadequate water supplies for residential and industrial users and fire fighting.

6) longer wildfire seasons and expanded burn zones that increase human exposure to hazardous levels of air pollution, including multi-week exposure to levels of fine particles (smoke) known to cause pre-mature death and other adverse health outcomes among vulnerable populations, and elevated concentrations of ground level ozone harmful to public health exacerbated by warmer summer temperature regimes that govern the chemistry of ozone formation in the atmosphere.[7]

All of these effects are occurring now, and are expected to increase in severity as the climate warming accelerates.

Expanding Wildfire Destruction and Smoke Mortality Correlates with Warming Climate.

The IPCC found that global mean temperature was about 1.0^{o} C above the pre-industrial baseline in 2010. By 2010, the climate regime had not yet triggered large increases in wildfire conditions compared to historical fire patterns in the American West. But as the global mean advanced from 1.1 ^{o} C to 1.2 ^{o} C, new records were being set. The World Meteorological Organization (WMO) concluded that '[i]n 2020 – one of the three warmest years on record – the global average temperature was 1.2 °C above the pre-industrial baseline.'[8]

As the global temperature approached 1.2 °C, the frequency, intensity, areal extent and duration of wildfires have increased significantly in the last five years. In 2020 burns set records across the American West. California's burn area grew to nearly 5 million acres, and the total area burned in the 11 Western states exceeded 10 million acres: 2020 Western United States wildfire season - Wikipedia. The increasing area burned by wildfire in the American West tracks the Australian experience where annual fire zones expanded rapidly in response to drought leading to a massive wildfire season burning 46 million acres (an area equal to the State of Washington) during their 2019-20 austral summer.[9]

During the 2017 fire season, wildfire in Oregon destroyed one-half million acres for the first time in the State's history. In 2018 wildfire consumed 660,000 acres of forest. In 2020 Oregon wildfires consumed 1.2 million acres,[10] forced 500,000 Oregonians to evacuate their homes ahead of the flames, incinerated 4,000 homes displacing 10,000 Oregonians, leaving many families homeless, and killed 11. The 2020 burn area doubles the 2017 burn area, and is an order of magnitude greater than the statewide average of 120,000 acres burned during the 1990-2010 period.

The 2018 IPCC report states that the global mean temperature is rising about 0.2^{o} C per decade,[11] twice the warming rate during the 20th Century. This accelerated warming rate suggested in 2018 that 1.5^{o} C rise would be reached about 2035 unless large reductions in GHG emissions were achieved before 2030. New modeling performed for the 2021 IPCC report, AR6, indicates that 1.5^{o} C above the pre-industrial baseline will be reached by 2030 if GHG emissions are held to current rates, and 2^{o} C rise reached by 2050.[12,13] WMO has since announced its estimate that the first annual 1.5^{o} C rise in global temperature will likely occur by 2026.[14]

Given that the frequency and ferocity of wildfire in the American West began to increase significantly after 2015 under the climate conditions associated with 1.1° C to 1.2° C rise above the 1850–1900 baseline, the march higher toward a 1.5o C rise between 2025 and 2030 can be expected to accelerate the frequency, severity and areal extent of damage caused by wildfire.

The Oregon Climate Assessment (OCAR5.pdf | Powered by Box, January 5, 2021) anticipates that the destruction of property, disruption of daily life, large costs to the economy, pollution of the atmosphere and water supplies, impairment of human health, and damage to wildlife, the environment and habitats will worsen in coming years as the climate continues to warm more rapidly. The Assessment cites studies predicting the effects of warming on seasonal heat causing a six-fold increase in hot days (>90o F) in Oregon counties west of the Cascades during future Oregon summers (pp. 12-13), and reductions in summer precipitation (Table 2). Summers will be hotter and drier, and summer heat will start earlier and persist longer.15 The Assessment concludes that these conditions are conducive to 'high-severity' wildfires:

High-severity fires dominate wet, cool forests, including remnant old growth forests, in Oregon's Coast Range and western Cascade Range. High-severity wildfires in wet, cool forests typically are … facilitated by extremely dry and warm springs and summers or high winds.

As these conditions become more extreme, the area incinerated by wild fires is expected to increase (pp. 48-54). A 2017 forest modeling analysis 'projected a 200% increase in median annual area burned in Oregon' during the 2010-2039 period compared to 1961-2004.16 Another 2017 study looking at fires across the American West estimates a 200-400% increase in the 'annual probability of very large fires.'17 Going forward, the Assessment makes clear that all 'empirical models … consistently project that the area burned in Oregon will increase.'18

The fire zone doubled between 2017 and 2020. As predicted by forest science modeling, another doubling of the acres burned annually by 2025-30 is highly plausible as global temperature approaches 1.5° C above the pre-industrial baseline.

If fire zones expand to predicted levels in the Pacific NW, 25% to 40% of Oregon (15 to 25 million acres) and Washington (11 to 20 million acres) will be incinerated during this decade, economic activity will collapse and hazardous air quality will make the Northwest inhospitable to human habitation for most residents during the fire season.

The data and modeling estimates presented in the Oregon Climate Assessment and other sources predict a future in which the destruction of Oregon's forest resources by wildfire will continue until either 1) the cool and wet conditions that sustained Cascadia's forests during the 8,000 years before 1980 are restored, or 2) most of the standing forests are reduced to shrub or grasslands.

Impacts of Climate Warming on Public Health are Significant and Widespread.

Fire smoke and unprecedented hot temperatures are having a significant impact on human health as an example of the regional impact of heat waves, drought and wildfires.

The heat dome that raised temperatures above 110 F for three days in the Pacific NW in June 2021 caused over 200 heat-related deaths in Oregon and Washington.

Recent research demonstrates that emissions from wildfire are the largest source of fine particle pollution in large regions of the U.S., and contributed to thousands of pre-mature deaths. Wildfire in the western U.S. now accounts for half of all fine particle pollution in some areas of the West, doubling the exposure to PM2.519 from non-fire sources including motor vehicles, power plants and industrial operations.20

A warming climate is responsible for roughly half of the increase in burned area in the United States (4), and future climate change could lead to up to an additional doubling of wildfire-related particulate emissions in fireprone areas (36) or a many-fold increase in burned area (37, 38). Costs from these increases include both the downstream economic and health costs of smoke exposure, as well as the cost of suppression activities, direct loss of life and property, and other adaptive measure (e.g., power shutoffs) that have widespread economic consequences.21

Using satellite measurements of smoke plumes integrated with ground level monitored PM2.5 (fine particle) concentration data, Burke et al. estimate that between 7,000 and 14,500 deaths per year (depending on the dose/response curve used to estimate mortality from observed exposures) are attributable to fire smoke in the contiguous U.S.

Mortality and other health impacts such as asthma attacks and exacerbating COPD will be experienced most severely by communities already burdened by the adverse health effects of daily exposure to fine particle pollution emitted from tailpipes, power plants and industrial sources. Exposure to fire smoke in the American West during the 2020 fire season was universal. No communities were spared. But fire smoke at least doubled the annual exposure routinely suffered by BIPOC and low income communities living near major highways and industrial sources.

In Oregon, mortality attributed to fire includes many hundreds more deaths than the lives lost directly to fires. Statewide smoke pollution during the 2020 fires threatened lives and well-being with extreme hazard concentrations of particles known to cause pre-mature death and cancer, exacerbate asthma, COPD and other respiratory conditions, and cardio-vascular diseases.

The Oregon Health Authority (OHA) reports that '[t]he most severe recent air quality events in Oregon are due to wildfire smoke…'22 OHA cited a study finding that fire smoke in 2012 'caused hundreds of premature deaths, nearly 2,000 emergency room visits and more than $2 billion in health costs.'23 OHA points to the longer fire season as increasing the harm from exposure to smoke. 'Fire seasons in Oregon are roughly 100 days longer than they were in the 1970s. Longer seasons mean more smoke in Oregon communities.'24 The greater density of smoke and longer duration of smoke exposure in 2020 likely at least doubled the mortality caused by smoke exposure compared to 2012.

In addition, low income families without air conditioning are much less able to escape smoke pollution by closing doors and windows during the summer heat to keep themselves safe. Workers cannot avoid exposure to smoke pollution if required to work outdoors.

Beyond the economic and environmental damage, social disruption, and harm to health that will result from a longer fire season and expanded fire zones, more deadly air quality will likely make parts of the American West uninhabitable during the fire season for the most vulnerable populations such as the elderly, children and those with existing respiratory and cardiovascular conditions.

These recent data and other sources published since 2009, including the data discussed at length in the Administrator's 2009 Endangerment Finding, 74 Fed. Reg. 66,496 (December 15, 2009), confirm the finding that EPA made 12 years ago: 'The Administrator finds that the elevated atmospheric concentrations of the well-mixed greenhouse gases may reasonably be anticipated to endanger the public health and welfare of current and future generations.' Id., at 66,523.

Net-Zero Emissions Must be Achieved as Soon as Possible to Protect Public Health and the Public Welfare.

The climate will need to be stabilized as soon as possible to –

• protect public health from the deadly effects of heat waves and wildfire smoke particles;

• preserve the health, safety and quality of life in the American West from the devastation caused by massive uncontrollable wildfires;

• preserve the health, safety and quality of life for millions of Americans living along the Gulf Coast from the devastation caused by super hurricanes, o preserve the health, safety and quality of life for hundreds of millions of Americans living in the Mid-West and Northeast from the deaths and devastation caused by massive flooding,

• to protect the health, safety and quality of life for millions living in Tornado Alley from the Great Plains to the upper South;

• to protect forests so that they may serve as a sink for CO2 rather than as an emission source;

• preserve habitat for wildlife and a resource for forest products and other industries dependent on them, and

• protect the vitality of the marine web of life from collapse as a result of acidification.

The IPCC provided clear guidance in its 2018 report that to stop the warming and stabilize the climate, the economy must transition to a zero carbon (CO2 and methane) emission energy system, and forests must be expanded to extract CO2 from the atmosphere. Climate stability can be achieved only by reducing GHG emissions to net-zero.

To stabilize global temperature at any level, ‘net’ CO2 emissions would need to be reduced to zero. This means the amount of CO2 entering the atmosphere must equal the amount that is removed. Achieving a balance between CO2 ‘sources’ and ‘sinks’ is often referred to as ‘net zero’ emissions or ‘carbon neutrality’.25

Limiting warming to 1.5°C implies reaching net zero CO2 emissions globally around 2050 and concurrent deep reductions in emissions of non-CO2 forcers, particularly methane26 (high confidence). Such mitigation pathways are characterized by energy-demand reductions, decarbonization of electricity and other fuels, electrification of energy end use, deep reductions in agricultural emissions, and some form of CDR [carbon dioxide reduction] with carbon storage on land or sequestration in geological reservoirs.27

Zero GHG emissions to stabilize the climate must be achieved sooner than later to minimize the losses and deaths associated with devastating warmer climate effects. Zero emissions cannot be achieved without transforming transportation which is the largest source of GHG emissions. For most transportation sources such as on-road vehicles, zero emissions can be cost-effectively achieved by electrification with batteries or fuel cells.

The latest IPCC report (2021) concludes based on the latest climate data and updated modeling that –

Under the five illustrative [GHG emissions] scenarios, in the near term (2021-2040), the 1.5°C global warming level is very likely to be exceeded under the very high GHG emissions scenario (SSP5-8.5), likely to be exceeded under the intermediate and high GHG emissions scenarios (SSP2-4.5 and SSP3-7.0), more likely than not to be exceeded under the low GHG emissions scenario (SSP1-2.6) and more likely than not to be reached under the very low GHG emissions scenario (SSP1-1.9).28

The opportunity to stay below 1.5°C and to prevent the additional devastation that such level of warming will cause, has been frittered away by inaction and delay. At the current global mean temperature, the climate has warmed enough to endanger public health, cause devastating destruction of homes and businesses, loss of life and the disruption of natural systems by extreme floods, drought, wildfires, hurricanes and tornadoes. The harm we will experience above 1.5°C will be orders of magnitude greater.

But the IPCC offers the hope that ‘for the very low GHG emissions scenario (SSP1-1.9), it is more likely than not that global surface temperature would decline back to below 1.5°C toward the end of the 21st century, with a temporary overshoot of no more than 0.1°C above 1.5°C global warming.’29

That hope turns on cutting global CO2 emissions in half by 2030, and to net-zero by 2050 along with large reductions in non-CO2 climate forcers such as methane. EPA has not set out a regulatory path for achieving those reductions. [EPA-HQ-OAR-2021-0208-0521-A1, pp. 4-11]

Petition for Finding --

Based on these data and other available evidence, we petition the Administrator to find that –

1) climate warming already caused by GHG emissions harms the public health and is causing unacceptable adverse impacts on public welfare and the human environment, and

2) the expected increase in the severity and frequency of harms to health and the public welfare that will be caused by more extreme events that will occur as the global mean temperature advances toward and above the 1.5°C level resulting from growing GHG concentrations in the atmosphere, establish the need for a zero GHG emissions standard for light duty vehicles pursuant to section 202(b)(1)(C) of the Clean Air Act. [EPA-HQ-OAR-2021-0208-0521-A1, p. 12.]

As a proximate cause of death, air pollution from fossil fuel combustion would rank as the third-leading cause of death in the U.S. contributing to eight of the top ten causes—heart disease; cancer; chronic lower respiratory diseases; stroke (cerebrovascular diseases); Alzheimer's disease; diabetes; influenza and pneumonia; and nephritis, nephrotic syndrome, and nephrosis.34 Shindell estimates that ending the combustion of carbon fuels will save 1.4 million American lives between now and 2040.

The EPA staff researchers estimated that roughly 20% of the mortality attributed to carbon combustion is caused by emissions from on-road vehicle emissions. Depending on the total mortality estimate used, eliminating carbon fuels to power motor vehicles could save 20,000 to 40,000 lives annually in the U.S.

In the last three decades the average incidence of asthma among children has increased from 1 in 15 to 1 in 10 children, with higher rates among children of color and in polluted neighborhoods near refineries, power plants or major highways. As of 2018, the U.S. Census estimates that 22.4% of the U.S. population are under 18 years of age: https://www.census.gov/quickfacts/fact/table/US/PST045218. [EPA-HQ-OAR-2021-0208-0521-A1, p. 14]

1 Executive Order to Tackle Climate Change (January 27, 2021). Sec. 201. Policy. Even as our Nation emerges from profound public health and economic crises borne of a pandemic, we face a climate crisis that threatens our people and communities, public health and economy, and, starkly, our ability to live on planet Earth. Despite the peril that is already evident, there is promise in the solutions — opportunities to create well-paying union jobs to build a modern and sustainable infrastructure, deliver an equitable, clean energy future, and put the United States on a path to achieve net-zero emissions, economy-wide, by no later than 2050.

We must listen to science — and act. We must strengthen our clean air and water protections. We must hold polluters accountable for their actions. We must deliver environmental justice in communities all across America. The Federal Government must drive assessment, disclosure, and mitigation of climate pollution and climate-related risks in every sector of our economy, marshaling the creativity, courage, and capital necessary to make our Nation resilient in the face of this threat. Together, we must combat the climate crisis with bold, progressive action that combines the full capacity of the Federal Government with efforts from every corner of our Nation, every level of government, and every sector of our economy. It is the policy of my Administration to organize and deploy the full capacity of its agencies to combat the climate crisis to implement a Government-wide approach that reduces climate pollution in every sector of the economy; increases resilience to the impacts of climate change; protects public health; conserves our lands, waters, and biodiversity; delivers environmental justice; and spurs well-paying union jobs and economic growth, especially through innovation, commercialization, and deployment of clean energy technologies and infrastructure. Successfully meeting these challenges will require the Federal Government to pursue such a coordinated approach from planning to implementation, coupled with substantive engagement by stakeholders, including State, local, and Tribal governments.

Commenter: Energy Innovation Policy and Technology LLC

The EPA is an integral federal agency that can help unlock substantial GHG and other pollution reductions in the transportation sector, which remains the largest contributor to U.S. GHG emissions (29 percent of total emissions).[ii] The imperative to reverse course on increasingly volatile and damaging climate change is well documented, including in the most recent Intergovernmental Panel on Climate Change report.[iii] [EPA-HQ-OAR-2021-0208-0605-A1, pp. 2]

Commenter: Energy Strategy Coalition

In conclusion, reducing emissions from the transportation sector will be critical to meeting our states' mid- and long-term criteria and GHG emissions reductions obligations. The Proposed Standards will help to create a process to cost-effectively make adjustments and investments to set states on this path. [EPA-HQ-OAR-2021-0208-0533-A1, p.3]

Commenter: Environment America

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, pp. 237-238.]

Transportation is now the Number 1 source of climate emissions in the U.S. and the majority of those emissions come from every-day cars and trucks.

These emissions also cut short an estimated 58,000 American lives every year. We've already seen the damage climate change can do this year. Where I live in Philadelphia, we've entered our sixth heat wave of the summer this week and experienced intense flash flooding and rainfall for the last few months.

Scientists are saying that these impacts are coming even faster than they previously expected. So it's imperative that we do everything we can to clean up how we get around to curb the progression of the climate crisis.

Commenter: Environmental Defense Fund (EDF)

Standards that eliminate tailpipe pollution from new passenger cars and light trucks by 2035 could reduce more than 11 billion tons of climate pollution by 2050, prevent nearly 100,000 premature deaths [EPA-HQ-OAR-2021-0208-0688-A1, p. 2]

Saving Americans $88 billion annually by 2040 in economic and pollution benefits and nearly $1.6 trillion cumulatively by 2050, almost 10% of current U.S. GDP. [EPA-HQ-OAR-2021-0208-0688-A1, p. 37]

Protective pollution standards for new vehicles are urgently needed to help address the climate crisis and protect public health. We must respond to the climate crisis with urgency. The latest climate assessments are dire. According to the most recent Intergovernmental Panel on Climate Change (IPCC) Report, human-induced climate change is already affecting weather and climate extremes in every region in the world and across the whole climate system.5 Each of the last four decades has been successively warmer than any decade that preceded it since 1850. And the report concludes that in the coming decades climate changes will increase in all regions, including increased heat waves, longer warm seasons and shorter cold seasons with significant changes to wetness and dryness, winds, snow and ice, coastal areas and oceans. We must respond to the climate crisis with urgency.

The transportation sector is the nation's single largest source of climate pollution, responsible for more than 1.9 billion tons of climate pollution every year – nearly a third of U.S. emissions. 6 Passenger cars and light trucks are the largest transportation-related source of emissions, contributing nearly 60 percent of emissions. We cannot meet the climate crisis without transitioning to ZEVs. America's clean car standards are among our most effective policies for reducing pollution exposure and cutting climate emissions. EPA's proposed rule would eliminate an estimated 2.2 billion tons of climate pollution from vehicles sold in MY 2023 to 2026 by 2050. And adding a pathway to secure an additional 10 g/mi in 2026 will further enhance those reductions. Standards that deliver ZEVs in the near term, combined with longer term standards consistent with eliminating tailpipe pollution from new motor vehicles by 2035, will save lives and put us on a path to averting the worst impacts of climate change. [EPA-HQ-OAR-2021-0208-0688-A1, p. 4]

• Avoiding more than 600 million metric tons of greenhouse gas (GHG) emissions in 2040 – roughly the annual climate emissions from Canada – and eliminating more than 11.5 billion tons cumulatively by 2050 – far more than the carbon emissions from China last year, which is responsible for more than a quarter of the world's climate pollution; [EPA-HQ-OAR-2021-0208-0688-A1, p. 37]

Commenter: Environmental Law & Policy Center (ELPC), et al.

Reducing emissions from America's cars and light trucks is critical to mitigating climate change and achieving President Biden's goals and commitment in rejoining the Paris Climate agreement.[3] The transportation sector is currently the leading source of U.S. climate-changing pollution, contributing 29% of total U.S. greenhouse gas emissions.[4] As a result of the prior administration's rollback, the United States has lost years of emissions reductions as the urgency for action on climate change mounts daily. EPA must act urgently now to achieve emissions reductions.

The climate crisis currently playing out across the country and the world demands urgent, strong action. [EPA-HQ-OAR-2021-0208-0567-A1, pp. 1-2]

The sixth assessment report recently issued by the United Nations' Intergovernmental Panel on Climate Change makes clear both climate change's human causes and its devastating impacts.6 The report notes that human influence has warmed the climate at a rate that is unprecedented in at least the last 2,000 years.[7] Climate change is already affecting every inhabited region across the globe, with central and eastern North America experiencing increased heavy precipitation and western North America experiencing increases in extreme heat and drought.[8]

The undersigned organizations are specifically concerned about the threat climate change poses to the Midwest and the Great Lakes. The region is home to 61 million people and to the auto industry; it is also a significant engine for agriculture. Temperatures in the Midwest are rising due to climate change. Warmer temperatures impact public health with increased frequency of deadly heat waves and worsening air quality.[9]

In 2019, ELPC sponsored a report by leading Midwest climate scientists that detailed the impacts of climate change on the Great Lakes region. [10] Climate change threatens the Great Lakes ecosystem, fresh water supplies, and the economies that depend on them.

The Great Lakes are an international gem with enormous ecological, cultural, and economic value. The Great Lakes are the largest freshwater ecosystem on earth, containing 21% of the world's freshwater supply and providing drinking water for over 42 million people.[11] The available water supply helps to drive the regional economy.[12] Commercial and recreational fishing, alone, in the Great Lakes injects over $5 billion into the economies of the surrounding states.[13]

The changing climate brings increased storm intensity, changes to water temperatures, flooding, runoff, and algal growth—all presenting a significant and increasing threat to the Great Lakes. Costly weather-related disasters, like the recent devastating flooding in Detroit, have been linked to climate change. [14]

EPA must do all it can to avert the worst impacts of the climate crisis. [EPA-HQ-OAR-2021-0208-0567-A1, pp.2-3]

Commenter: Environmental Law and Policy Center (ELPC)

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, pp. 287-289.]

First, we need to act with urgency. The Six IPCC Report makes clear both the human causes of climate change and its devastating impact.

EPA's reminder in the NPRM that greenhouse gases endanger public health and welfare is important, but EPA fails to capture the scope of the tragic impacts we are seeing almost daily across the U.S. and around the world and the absolute urgency of strong standards.

ELPC is specifically concerned about the threat climate change poses to the Midwest and the Great Lakes which contain 21 percent of the world's freshwater supply and provide drinking water for over 42 million people.

In 2019, ELPC sponsored a report by leading Midwest climate experts and scientists that detailed the harmful impacts of climate change on the Great Lakes and our region.

The change in climate brings increased storm intensity, changes in water temperatures, flooding, runoff, and algal growth, all presenting a significant increasing threat to the Great Lakes.

In the region, the boundary waters has been evacuated due to the threats of wildfire and costly weather-related disasters, like the recent devastating flooding in Detroit, have been linked to climate change.

Commenter: Environmental Protection Network (EPN)

Section II describes the compelling need for achieving this goal, given the current understanding of the increasing threats presented by emissions of GHGs and criteria pollutants from vehicles powered by fossil fuels. Achieving the GHG and criteria emissions reductions from this kind of transformation would achieve very substantial benefits to the public’s health and welfare, and especially for those segments of society at risk for the greatest harms from climate change and criteria air pollution. Section II also discusses the confluence of several critical trends that show this goal is both practical and achievable. Section III [EPA-HQ-OAR-2021-0208-0213-A1, p.1]

While the standards proposed for these MYs would promote a real increase in zero-emissions vehicles from current levels, it is at best modest progress towards 50% electric power by MY 2030 and near 100% electric power by MY 2035. As we will discuss in Section II, there is no time to lose given the dire need to reduce GHGs from the transportation sector as part of addressing climate change and the compelling need for large reductions in nitrogen oxides (NOx) and particulate matter (PM).[EPA-HQ-OAR-2021-0208-0213-A1, p.1]

The Climate Emergency Alarms are Deafening. The recent report by 234 of the world’s top climate scientists for the Intergovernmental Panel on Climate Change (IPCC)—declaring a 'Code Red for Humanity'—is the most recent and powerful declaration of our existential climate crisis.[3] As summarized by United Nations Secretary-General Antonio Guterres, 'the alarm bells are deafening, and the evidence is irrefutable.'[4] In every corner of our country—devastating hurricanes in the southeast, massive droughts and wildfires in the west, unthinkable temperature extremes in the northwest, and more intense storms and floods in the northeast and midwest—we are seeing clear consequences of the climate crisis far faster than predicted just a few years ago. If the global community fails to 'move fast and move big' to reduce GHG emissions, the tragic impacts from today's 1.1 degrees C average global temperature rise will be dwarfed by a future 2 or 3 degrees C average rise. Accordingly, the Paris Climate Agreement established a goal of keeping the average global temperature rise to well below 2 degrees C, while urging efforts to limit the increase to 1.5 degrees C.[5] [EPA-HQ-OAR-2021-0208-0213-A1, p. 2]

Transportation is the largest U.S. GHG-emitting sector. Cars and light trucks are responsible for well over half of overall domestic transportation GHG emissions, and it takes about 15 years to turn over the U.S. car and light-truck fleet to new vehicles. Accordingly, achieving the dual economy-wide Biden administration climate goals of a 50-52% GHG reduction from 2005 levels in 2030 and net zero GHG emissions by no later than 2050 requires a bold transformation of new-car and light-truck sales from fossil fuels to zero-emissions technologies by 2035, and in-use car and light-truck fleet to zero-emissions technologies by 2050. [EPA-HQ-OAR-2021-0208-0213-A1, p.3]

EDF projects that GHG emissions would be reduced by 600 million metric tons (MMT) in 2040 and nearly 900 MMT in 2050, with cumulative GHG savings through 2050 of 11.5 billion metric tons. [EPA-HQ-OAR-2021-0208-0213-A1, p. 8]

Two, fully half of the societal benefits described above are environmental and public health benefits derived from emissions reductions that are classic textbook examples of market externalities where the societal benefits can only be accounted for through governmental regulation. [EPA-HQ-OAR-2021-0208-0213-A1, p. 8]

Commenter: Exxon Mobil

In 2019, transportation accounted for 29% of total GHG emissions in the U.S., followed by the electricity power sector at 25%[3]. [EPA-HQ-OAR-2021-0208-0734-A1, p. 1]

Commenter: Filippelli, Garbirel

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, p. 42.]

So, of course, the IPCC report that landed last week was a shock to the world, but it was not a shock to scientists like myself. I've been studying climate change and climate change impacts for about 30 years, and I've not only read most of the studies summarized in that but produced many of them.

And so for us scientists, it's been very clear for quite some time that climate change is a critical global issue and we also know that transportation, of course, is a large contributor to climate change, but it is also a contributor to something that I study here even locally Indianapolis and that's air pollution.

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, pp. 43-44.]

Now wouldn't it be nice if we were intentional about that and that's exactly what some of these air quality standards have to be written for, written not to just look at climate change in a global sense but also to improve the air for our children in cities like mine in Indianapolis and across this country, and I think that that will require some significant sharpening of some of these standards perhaps even beyond what was stated initially as preferred solutions.

So I encourage you to do this. I encourage you to do this for global climate, but I encourage you to do this for kids' right here in Indianapolis.

Commenter: Gallagher, James A.

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, p. 263.]

I watched the escalating extreme climate events, such as wildfires, droughts, and extreme heat, in the Northwest where my brother Gary has had to evacuate his home from the fires and my brother Tom died July 15th of lung cancer. He never smoked.

Meanwhile, we have tornadoes, hurricanes, and extreme flooding throughout our country and throughout the world. We have to change our ways but there are rich and powerful industries that do not want to change the status quo.

Commenter: Gersten, Dana

[The following comments were submitted as testimony at the virtual public hearing on August 26, 2021. See Hearing Testimony – 26Aug2021, pp. 280-281.]

I see the effects of climate change on my patients almost daily as it directly causes some health emergencies and makes others worse. Many of my patients have lung conditions, like asthma or COPD, as well as heart conditions. We live in a large city with truck and air pollution. This year, like last year, large wildfires make air quality even worse, sending many to the hospital. They breathe unrelenting smoke this time of year, and the poor air quality exacerbates their health condition, sending many to the hospital for intensive care. I think because so many of my patients are living on the edge of making it and not making it, these health exacerbations can send them over the edge into poverty. For example, when I was doing training in Oregon, I had a patient who was a farm worker who worked with the grape harvest. Wildfires destroyed the harvest, and he was not able to make any money. His electricity bill went unpaid, and his electricity was turned off. He couldn't keep his insulin cold, and then he went into a dangerous hyperglycemia. He became acutely ill, and when he returned back, he was unable to work. So, I think the cycle of poverty and ill health just keeps on going, affecting people who take care of my patients and also the people they take care of, like their spouses and their children. Our health care system can't afford to keep covering the costs of weak auto pollution standards. Especially with COVID, our hospital is near capacity, and there simply isn't room to treat all of the incoming patients with respiratory issues.

Commenter: Haines, Meredith

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, pp. 112-114.] in Virginia, we recognize that addressing transportation's outsized contribution to greenhouse gas emissions is critical to climate policy. And in February, the state legislature passed clean car standards, joining other forward-looking states, such as our neighbor Maryland, and we need the action of this Administration to lead all states to swift and effective change

The vast capacity of the ocean has buffered out pollution's impact enormously, directly absorbing greenhouse effects and excess heat and tempering atmospheric warming and yet we have reached ecosystem limits largely within my lifetime. Now ocean life suffers stresses of marine heat waves on top of generally warmer and more acidic waters with less oxygen. However, it seems until the impacts show up on our coasts affecting real estate and impacting our summer beach trips, then it's a problem happening somewhere else. So I don't need to remind the panel that there is no Plan B at least for today.

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, pp. 114-115.]

And to briefly touch on where regulation meets policy, I note that the regulatory analysis does not appear to consider the impact of the carbon tax and given that a carbon price is considered by economists and scientists and I advocate for it, the best policy for rapid emissions reductions and is broadly implemented worldwide should be part of the conversation and consumers will use their climate action incentive payments or carbon cash back and the known schedule of carbon price increases and want to further benefit economically by making more fuel-efficient/less-carbon-intensive choices.

Commenter: Hauptman, Elizabeth

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, pp. 242-243.]

Air pollution from the transportation sector not only harms the health of our children but it also contributes to the climate crisis. Pollution harms all of us but disproportionately impacts children. Kids are smaller, living closer to the ground than the rest of us, standing just about tailpipe high where concentrations from pollution from cars, trucks, and buses is coming directly at them.

Children's still developing hearts and lungs are being exposed to the dirty exhaust from vehicles that spew carcinogenic poisons into the air. This tailpipe pollution causes poor air quality that can exacerbate asthma, causing more asthma attacks, resulting in millions of missed school days, games, and outdoor family activities for kids across the country.

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, pp. 244-245.]

Michigan has some of the worst asthma rates in the country, according to the American Lung Association. Childhood asthma rates are significantly higher for children of color. Latino children are twice as likely to die from asthma and black children are 10 times more likely to die from asthma than white non-Hispanic kids.

These statistics make it abundantly clear that strong clean standards or a shift to zero emission vehicles is an environmental and social justice issue. Our children deserve justice in every breath. Because my son and over 166,000 children in Michigan who suffer from asthma need tougher air quality standards to protect their children from the nation's largest source of carbon pollution, tailpipe pollution.

In addition, we need these strong EPA standards to address the urgent climate crisis now. This climate crisis is not something you'll see impacts some day in the future. We're seeing climate impacts right now, extreme weather events, like excessive rainfall, storms like we had last night, floods, heat waves.

Currently the strong clean standards are the best tool we have in our toolbox to fight climate change. Addressing pollution from the transportation sector will fight climate change cannot wait. Michiganders and kids deserve the strongest clean car standards EPA has proposed.

Commenter: Hewes, Celerah

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, p. 107.]

Climate change is impacting New Mexico and the Southwest with drought and longer more intense wildfire seasons as well as increased heat waves that threaten the health of New Mexico's families. We've seen rising heat and climate impacts, including wildfires, that are causing air pollution from places over 400 miles away. This summer the wildfires burning in Arizona put Albuquerque as public health alert of smoke and particulates traveled hundreds of miles.

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, p. 108.]

Over the past few weeks, we've had numerous days where air quality officials have told us the air outside is unhealthy to breathe due to smoke and ozone and our skies are so thick with particulate matter we cannot see the Sandia Mountains. We cannot address the climate crisis without moving decisively to zero pollution vehicles and this proposal is a step in the right direction.

The pollution from cars not only causes climate change but it degrades air quality and threatens our health.

Commenter: Interfaith Power & Light (IPL)

At this moment in time, we have a choice. The just-released IPCC report makes it startlingly clear: there is no time to waste in half-measures, or catering to the interests of industry and manufacturing. We have already locked our children and grandchildren in to a future on this planet that will have more heat waves, more drought, more extreme weather, and more fires than we are experiencing right now.

We have an actual opportunity here with vehicle standards that can make a difference in lowering the amount of air pollution that is impacting people's health, and in lowering greenhouse gas emissions that are driving the climate crisis. But we can't wait. We can't grant loopholes to auto manufacturers [EPA-HQ-OAR-2021-0208-0224-A1, pp. 1-2]

Commenter: International Council on Clean Transportation

Decarbonizing the transportation sector, which is the largest contributor to climate pollution in the United States, is of the utmost urgency. While other major economies (e.g., Europe, China) have been acting on that crucial realization by taking steps to facilitate a transition to electric vehicles, the United States has lagged. That represents not only a setback for the climate but also a looming crisis for the American manufacturing economy. [EPA-HQ-OAR-2021-0208-0522-A1, p. 4]

Commenter: Kimmel, Julie

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, pp. 98-101.]

In fact, the transportation sector is responsible for 48 percent of carbon pollution in Virginia. We clearly cannot address the climate crisis without moving decisively to zero pollution vehicles. In the last year the Virginia General Assembly passed some important legislation for reducing tailpipe pollution in the Commonwealth, establishing an advanced clean cars program and electric vehicle rebate program and a grant fund for electric school buses and heavy-duty vehicles, but Virginia can't do this work to cut climate pollution alone and neither can any other state.

Climate change is already affecting my community in Reston. Over the last decade we've had several severe wind storms, a phenomenon I don't recall from my childhood here. We've also seen multiple so-called 100-year rain storms, and the annual number of days when temperatures soar past 90 degrees is growing. Families across the country are losing so many valuable play and school days to extreme storms, extreme heat, and wildfires, thanks to climate change, and this on top of the education crisis we're facing because of COVID.

As a parent worried about the impacts of climate change on our children's education, health, and future, I want EPA to finalize the strongest possible national greenhouse gas emissions standards for passenger cars and light trucks. To stall the climate catastrophe threatening our kids, we must get ourselves on the path to 100 percent zero emissions new vehicle sales by 2035 and that means the near-term standards for climate pollution that we're talking about today not only should be as strong as possible but also should avoid loopholes and put automakers on track to hit that 100 percent zero emissions by 2035 target.

Commenter: Klein, Stephanie

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, pp. 280-281.]

We also know that cars are one of our major sources of greenhouse gases. Ground transportation accounts for 22 percent of our climate pollution here. Like communities across the country, Washington, D.C., is experiencing the effects of climate change today. We are living through record-breaking heat waves, snowstorms, and floods caused by rising sea levels and heavy rain events. Our famous cherry blossoms are even blooming earlier as the planet warms.

Commenter: Kuntz, Laurie

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, pp. 208-209.]

As a biology graduate, I've been learning about the dangers of climate change and ecological degradation since the 1990s. Now in the 2020s, we are close to losing an entire class of species, anthozoa, commonly known as coral, because of the acidification and warming of ocean water that occurs with higher amounts of carbon in the atmosphere.

If we lose coral, an entire class of marine invertebrates, that's the equivalent of losing all mammals on the planet since mammals are an equivalent class of land vertebrates. If we lost coral or any other class of species, I'm confident that we would see worldwide ecological collapse.

If ecosystems can't function properly, the web of life will be untangled and humans will suffer and die. In my own area in Idaho, I've seen extreme drought. I've seen a wildfire come within two miles of my home, and I've seen reductions in wildlife populations over the past five years. I've seen birds die of heat stroke this year. I haven't seen any rusty catch bumble bees for the past two years, and I've seen chipmunks and birds with tumors caused by a degraded environment.

Reducing greenhouse gas emissions is the only way to change this path and prevent ecological collapse.

Commenter: Levison, Laura

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, p. 234.]

Stronger clean car standards will give us greater reductions in climate pollution which we desperately need and will save us consumers money, as well.

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, p. 235.]

Thanks to Speaker Pelosi and the advocates for greater fuel efficiency inside and outside of Congress, you have the authority to make auto emissions cleaner. You should not squander this opportunity to tackle the climate crisis and save consumers money.

Commenter: Lish, Christopher

Our country faces deadly heatwaves, devastating drought, extreme storms, massive wildfires and unprecedented flooding caused by climate change. Transportation is the largest source of climate pollution in the U.S., accounting for nearly 30% of greenhouse gas emissions. Air pollution from cars and trucks harms people’s health—especially in low-income communities and communities of color. Vehicle emissions cause thousands of premature deaths and billions in health care costs every year. To fight climate catastrophe and protect public health, the United States must reduce the massive amount of pollution produced by passenger cars.

Climate change is also the single biggest threat to our national parks. Nearly all 423 units of America’s national park system are endangered by climate change-related impacts, including heat waves, drought, sea level rise, coastal flooding, and wildfires. Parks such as Glacier, Everglades, Sequoia, and Joshua Tree are even at risk of permanently losing their namesake features if we don’t act quickly. [EPA-HQ-OAR-2021-0208-0218-A1, p. 1]

Commenter: Lynch, Vanessa

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, pp. 192-193.]

The latest Intergovernmental Panel on Climate Change Report summarizes the State of the Science on Climate Change confirming climate change is widespread, rapid, and intensifying. The report paints a grim picture of our world's future unless swift and strong action is taken immediately to curb the pollution causing global climate change. The transportation sector is the largest source of carbon pollution in the U.S. We cannot address the climate crisis without moving decisively to zero pollution vehicles electrified by zero pollution electric power sources.

In Pennsylvania, climate change is clearly making an impact. The Pennsylvania Department of Environmental Protection reports the state has the highest number of Lyme disease cases in the nation, triple the number of cases from 10 years ago. If you talk to families in Southwest PA, it's not if you know someone who's been impacted but, rather, how severe were those impacts. From short-term antibiotic treatment to long-term joint pain and swelling, inflammation of the brain and spinal cord and nerve pain, my neighbors and friends have experienced them all.

In my local community, landslides and major rain events are becoming much more frequent. Our family was recently forced to install an interior French drain in our basement due to major flooding. Mold and mildew growth caused major home repair issues and health concerns as a result of the increase in rain to our region and these impacts are felt by each of us, regular American citizens across the country. From 2010 to 2020, Pennsylvania experienced 37 extreme weather events, costing the state up to $10 billion in damages, those creating the increasing financial burden climate change is becoming to Pennsylvania's families.

Commenter: Maine Department of Environmental Protection

Climate change poses a real and present danger to the to public health, the environment, and the economy. From increasing land and ocean temperatures, to rising sea levels, more frequent severe storms, shortened winters and disrupted agricultural seasons, and more prevalent public-health risks, scientists have cataloged, and continue to catalog, the current and expected harms of climate change. As greenhouse gas (GHG) emissions drive dramatic changes in Earth’s climate systems, the warming trends documented in Maine are even more prominent than those observed globally. Since 1895, Maine’s statewide annual temperatures have risen by 3.2°F (1.8°C), with coastal areas warming more than the interior of the state. Extreme weather conditions in Maine, such as drought and large rain events, are harming agriculture, shellfisheries, and freshwater and coastal ecosystems susceptible to climate change effects. Human and animal health are affected by climate change and will continue to be into the future as temperature extremes, extreme weather, tick- and mosquito-borne diseases, food- and water-borne infections, and pollen pose increasing risks to Mainers’ health. In Maine, as in much of the nation, the transportation sector is the largest source of climate-warming GHG emissions in Maine and across the nation. As we move forward to substantially reduce GHG emissions, strong standards for the transportation sector will be critical to the success of our efforts to reduce both GHG and criteria pollutants. [EPA-HQ-OAR-2021-0208-0225-A1, p.1]

Commenter: Maryland Department of Environment

This proposal has the potential to offer substantial benefits and emission reductions that are needed for Maryland to attain and/or maintain clean air, mitigate the effects of climate change, and continue to make progress reducing nitrogen deposition to the Chesapeake Bay. [EPA-HQ-OAR-2021-0208-0241-A1, p.1]

Commenter: Mass Comment Campaign sponsored by American Lung Association (121)

Climate change puts everyone at risk, including my family. To help protect our health from the impacts of air pollution and climate change, the nation needs to transition to zero-emission transportation. [EPA-HQ-OAR-2021-0208-0559-A1,p.1]

Commenter: Mass Comment Campaign sponsored by Center for Biological Diversity (77,692)

Our country faces deadly heatwaves, devastating climate change is real. drought, extreme storms, massive wildfires and unprecedented flooding caused by climate change. To fight climate catastrophe and protect public health, the United States must reduce the massive amount of pollution produced by passenger cars. [EPA-HQ-OAR-2021-0208-0560-A1, p.1]

Commenter: Mass Comment Campaign sponsored by Environment America (11,080)

Over five years ago, the Obama-Biden administration took the strongest federal action to reduce global warming pollution in history. Unfortunately, this progress was undone under the Trump-Pence administration. This is particularly concerning since the effects of climate change only continue to worsen. [EPA-HQ-OAR-2021-0208-0557-A1, p.1]

As pollution increased over the past half-decade, the wildfire season has lengthened and grown more intense, coastal communities have been torn apart by destructive hurricanes fueled by warmer oceans, and inland communities have seen more than their fair share of 100-year floods. We cannot turn back the clock five years, which makes it all the more urgent for us to zero out emissions from our cars and trucks to help solve this climate crisis. [EPA-HQ-OAR-2021-0208-0557-A1, p.1]

Commenter: Mass Comment Campaign sponsored by Interfaith Power & Light (1,093)

The window for meaningful action to address climate change is closing and we ask the EPA to do its part to address climate pollution starting with the largest sources like transportation. Stronger and more protective car standards can also reduce health care costs and protect our health, particularly the health of the most vulnerable in our communities. [EPA-HQ-OAR-2021-0208-0553-A1, p.2]

Commenter: Mass Comment Campaign sponsored by Interfaith Power and Light et al. (1,599)

As faith leaders from many diverse religious and spiritual traditions, we believe that humanity shares a responsibility to be stewards of Creation. All of us must work together to reduce pollution and implement just and equitable solutions to the climate crisis, and our national leaders have a sacred role in helping to achieve these goals. [EPA-HQ-OAR-2021-0208-0192-A1, p.1]

Commenter: Mass Comment Campaign sponsoring organization unknown-1 (7,010)

With so many of us are experiencing unhealthy wildfire smoke, deadly floods, and other effects of global warming, the time has come for us to move to more responsible transportation that also happens to be better. I have driven a plug-in for nearly a decade and am happy to report that the experience is far superior to gas-powered cars. Please help us be on the right side of history.[EPA-HQ-OAR-2021-0208-0545, p.1]

Commenter: Mass Comment Campaign sponsoring organization unknown-11 (1,667)

Climate change is the single biggest threat to our national parks, as well as to many local communities. Nearly all 423 units of America's national park system are endangered by climate change-related impacts, including heat waves, drought, sea level rise, coastal flooding, and wildfires. Parks such as Glacier, Everglades, Sequoia, and Joshua Tree are even at risk of permanently losing their namesake features if we don't act quickly. [EPA-HQ-OAR-2021-0208-0642-A1, p.1]

Enacting more stringent clean car standards will provide numerous co-benefits for people and parks — from saving American's billions at the pump, to preventing unhealthy vehicle air pollution that severely harms public health and the wellbeing of park ecosystems. [EPA-HQ-OAR-2021-0208-0642-A1, p.1]

Commenter: Mass Comment Campaign sponsoring organization unknown-6 (39)

Climate change is the single biggest threat to our national parks, as well as to many local communities. [EPA-HQ-OAR-2021-0208-0550, p.1]

Nearly all 423 units of Americas national park system are endangered by climate change-related impacts, including heat waves, drought, sea level rise, coastal flooding, and wildfires. Parks such as Glacier, Everglades, Sequoia, and Joshua Tree are even at risk of permanently losing their namesake features if we don't act quickly. [EPA-HQ-OAR-2021-0208-0550, p.1]

Commenter: Mass Comment Campaign sponsoring organization unknown-7 (37)

The transportation sector is the largest contributor to climate pollution in the US. Cleaner, more efficient vehicles reduce air pollution and combat climate change -- helping to prevent harmful health impacts like asthma attacks. We need the strongest possible clean car standards to protect health now and for future generations. [EPA-HQ-OAR-2021-0208-0551, p.1]

We experienced the better quality of air in 2020 when we had to minimize our travel including air travel. Low emission cars will create a healthier environment for all our future generations. [EPA-HQ-OAR-2021-0208-0551, p.1]

Commenter: Mass Comment Campaign sponsoring organization unknown-8 (25)

Dedicated to protecting life and a sustainable future, I join the majority of Americans who want bold federal action now to stop the climate crisis from destroying our children's and grandchildren's future. I'm old enough to remember bright blue skies, a clear view of distant mountains, plentiful water, a father who could earn a house, and a mother who could stay home to care for her children. A generation has changed dramatically, and the next will be far worse -- unless you act. [EPA-HQ-OAR-2021-0208-0552, p.1]

The climate crisis has brought death, injury and destruction to millions of Americans this summer. The CODE RED for humanity issued by the International Panel on Climate Change's (IPCC) 6th Assessment underscores the urgent need for strong action NOW. Reducing GHG emissions years from now will be too late. EPA must adopt emissions standards to move the nation to zero emission vehicles as soon as possible. [EPA-HQ-OAR-2021-0208-0552, p.1]

The IPCC report has told us unequivocally that we have exhausted the time in which we might have acted to avert catastrophic change, and yet we have a very small window of time remaining to reduce the severity of the coming consequences of our inaction. Half measures are unacceptable in this moment. [EPA-HQ-OAR-2021-0208-0552, p.1]

For the sake of our children and grandchildren, the time to act, and to act boldly, is now. [EPA-HQ-OAR-2021-0208-0552, p.1]

Commenter: Mass Comment Campaign sponsoring organization unknown-9 (3,219)

To date, the transportation sector has been the largest source of climate pollution in the U.S., accounting for nearly one third of our nation's greenhouse gas emissions. Cars and light trucks in particular, account for about 45 percent of all U.S. oil consumption and about 20 percent of all U.S. greenhouse gas emissions. [EPA-HQ-OAR-2021-0208-0640-A1,p.1]

Commenter: Mathews, Mary

[The following comments were submitted as testimony at the virtual public hearing on August 26, 2021. See Hearing Testimony – 26Aug2021, p. 256.]

As transportation is the largest source of carbon emissions, restricting the emission of heat-trapping gases will help mitigate climate change and combat deadly air pollution.

Air pollution caused by emissions has been proven to increase the risk of heart disease, lung cancer, and asthma. The requirement for transition to zero emission cars within a short time frame will greatly improve public health.

Commenter: Melton, Karen

[The following comments were submitted as testimony at the virtual public hearing on August 26, 2021. See Hearing Testimony – 26Aug2021, pp. 253-254.]

With transportation as the largest source of carbon emissions in the U.S., it's critical that we both make our gasoline=powered trucks and cars more efficient and that we shift rapidly to electric vehicles if we are to achieve a hundred percent zero emission vehicle sales by 2035 and net zero greenhouse gas emissions economy by 2050.

Commenter: Metropolitan Mayors Caucus

In July 2021, we released the first climate action plan for the region identifying equitable goals for climate mitigation and adaptation.https://mayorscaucus.org/climate-change/ Our plan calls for a 19% reduction in transportation emissions by 2030. This target is only achievable with the strongest possible standards from the US EPA. Our mitigation objective 'Decarbonize Transportation' specifically identifies, 'Support strong national fuel efficiency standards' as a strategy. [EPA-HQ-OAR-2021-0208-0504, p.1]

Commenter: Metropolitan Washington Air Quality Committee (MWAQC)

Strengthening the GHG emissions standards will also provide considerable support for metropolitan Washington and communities across the United States to meet their GHG emissions reduction goals. Unfortunately, our region is already experiencing the impacts of climate change. Observations in metropolitan Washington show that temperatures and the water surface level in the Potomac River are rising and will continue to rise. Extreme weather events and increases in the number of days with extreme heat or extreme cold will increase risks to health, energy usage patterns, plant and animal habitats, and infrastructure. These changes in our weather patterns are also affecting stormwater, drinking water, and wastewater. Broad-based climate change mitigation and adaptation strategies, such as national rules, are necessary to reduce the impacts of climate change and fight the adverse effects of climate change on our region and planet. [EPA-HQ-OAR-2021-0208-0208-A1] [p.2]

In 2008, the National Capital Region Climate Change Report established regional climate goals to reduce GHG emissions by 20% below 2005 levels by 2020, and 80% below 2005 levels by 2050. In October 2020, the COG Board of Directors adopted new 2030 climate goals to supplement the previous goals, including a goal to reduce GHG emissions by 50% below 2005 levels by 2030. [EPA-HQ-OAR-2021-0208-0208-A1][p.2]

The metropolitan Washington region has implemented emissions reduction measures across all sectors, including on-road transportation, which contributes approximately 34% and 38% of the region’s GHG and NOx emissions, respectively. The region relies heavily on federal control programs for a significant amount of additional GHG and NOx emissions reductions since these programs provide benefits across the marketplace. The federal government's leadership in delivering effective regulatory limits on GHG emissions from motor vehicles could also help reduce ozone and fine particle precursors and is a critical component of our ability to meet adopted environmental objectives and standards. [EPA-HQ-OAR-2021-0208-0208-A1] [p.3]

Commenter: MI Air MI Health

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, p. 195.]

We believe that everyone deserves to breathe clean and healthy air.

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, pp. 196-197.]

We are in the midst of a climate crisis and emissions contributing to climate change need to be eliminated as quickly as possible. The time to act was yesterday and we are already seeing these effects as evidenced by the floods in Detroit this summer, most recently in Tennessee over this past weekend, wildfires along the Western Coast, extreme heat events, severe drought. The list of examples goes on and on. Climate change poses very serious threats to public health and to the lives of all Americans, especially our most vulnerable, our kids, older adults, low-income communities, BIPOC communities, and people living with chronic diseases which is who I see in the hospital.

This is a public health emergency and we need to do everything we can to drive down these emissions from all sectors but especially the transportation sector. Research from Harvard University demonstrated this link between long-term exposure to air pollution and increased mortality from COVID-19.

Commenter: Mid-America Regional Council (MARC)

The Air Quality Forum commends the EPA for returning to a strong pathway towards emission reductions from light duty vehicles. With the transportation sector as the largest contributor of total greenhouse (GHG) emissions and light duty vehicles contributing to 58% of transportation sector GHG emissions in the United States, the proposed reductions are essential to curbing overall GHG emissions and are urgently needed. [EPA-HQ-OAR-2021-0208-0265-A1, p.1]

Commenter: Minault, Kent

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, p. 241.]

Here in Knoxville, the city is attempting to take some strong measures to deal with the climate crisis and I was privileged to sit in on the Mayor's Climate Council a year ago when they started meeting and we received some information, graphs showing the greenhouse gas reductions from building efficiency and especially dramatic greenhouse gas reductions that came from changing all the street lights to LED, but it was another slide that really shocked us all because it showed that a spike in transportation emissions was four times greater than all those other reductions. In other words, despite our city's best efforts to this point, we were actually going backwards and transportation was the reason.

Throughout the United States, utilities are making strides at greenhouse gas reductions and so are municipalities and counties and I sat in yesterday on a webinar hosted by the previous speaker about school bus adoption, as well, and we're starting to take steps on that in Tennessee.

Commenter: Minnesota Pollution Control Agency (MPCA) and Minnesota Department of Transportation (MnDOT)

The need for strong, immediate action to reduce transportation GHG emissions. Minnesota is already feeling the effects of climate change. Our state is getting warmer and wetter, including more frequent intense, damaging rainfalls. Our winters are getting warmer, including especially noticeable declines in the frequency of our coldest days.1 Wildfires are becoming larger and more frequent in the United States and Canada, in part due to the influence of climate change. Wildfires in Minnesota and across the region can impact Minnesota's air quality.2 Just this year, Minnesota experienced a record-breaking 17 air quality alert days due to wildfire smoke, including the state's first daily Air Quality Index reading above 200, which happened six times during July and August.3

These changes impact the health of Minnesotans, our economy, and our ways of life.4 [EPA-HQ-OAR-2021-0208-0211-A1, pp.1-2]

The recently published Intergovernmental Panel on Climate Change report, 'Climate Change 2021: The Physical Science Basis,' states 'it is unequivocal that human influence has warmed the atmosphere, ocean and land' and that 'global warming of 1.5°C and 2°C will be exceeded during the 21st century unless deep reductions in CO2 and other greenhouse gas emissions occur in the coming decades.'6 Immediate and aggressive action is needed to reduce emissions and develop resiliency to climate impacts. Transportation is the largest emitter of GHG emissions in Minnesota7 and nationally8. [EPA-HQ-OAR-2021-0208-0211-A1, p.2]

EPA's current proposal has the potential to offer substantial benefits in terms of emissions reductions, both of GHGs and criteria pollutants, as well as economic strength. [EPA-HQ-OAR-2021-0208-0211-A1, p.2]

Commenter: Moore, Cinthia

[The following comments were submitted as testimony at the virtual public hearing on August 26, 2021. See Hearing Testimony – 26Aug2021, pp. 116-117.]

Cleaning up vehicle pollution is one of the most important things we can do to fight climate change.

Commenter: Moore, Kenneth

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, pp. 321-322.]

The latest report by the IPCC has rightly called a Code Red for Humanity, but the climate scientists who prepared the report also offered the hopeful assessment that if the top emitting countries respond to the report's alarm bells with aggressive efforts to curb carbon pollution, the worst climate outcomes remain avoidable. This year's dreadful fire season has come about in part because of our use of fossil fuels has warmed the planet by one degree Celsius. The scientists predict that the intensity of extreme weather will be twice as bad compared to today's conditions if temperatures reach two degrees and quadruple as bad if global warming reaches three degrees.

AS Texas Climate Scientist Katherine Hague put it, "Again and again assessment after assessment, the IPCC has already made it clear climate change puts at risk every aspect of human life as we know it. We're already starting to experience those risks today, but we know what we need to do today to avoid the worst future impacts. The difference between a fossil fuel versus a clean energy future is nothing less than the future of civilization as we know it."

Commenter: Mothers and Others for Clean Air

Vehicle emissions cause health problems and death, and are a major source of greenhouse gases. The world is already experiencing dramatic effects of climate change, and lower emissions can prevent it from getting worse. [EPA-HQ-OAR-2021-0208-0491-A1, p. 1]

In addition, the most recent IPCC report declared that climate change is a Code Red for humanity. We need major action in reducing greenhouse gases, immediately. The U.S. is already seeing major effects of climate change, including heatwaves, intense hurricanes, wildfires, flooding, and more. There is no time to delay, it's a health emergency. Reducing vehicle emissions will have a rapid and sustained reduction in greenhouse gases, and will keep climate change from being so harmful. [EPA-HQ-OAR-2021-0208-0491-A1, p. 1]

Commenter: National Association of Clean Air Agencies (NACAA)

In its August 9, 2021, report, Climate Change 2021: The Physical Basis, a working group of the United Nations' Intergovernmental Panel on Climate Change (IPCC) concludes, 'It is unequivocal that human influence has warmed the atmosphere, ocean and land' and '[h]uman influence has warmed the climate at a rate that is unprecedented in at least the last 2000 years.' Further, it finds that '[g]lobal surface temperatures will continue to increase until at least the mid-century under all emission scenarios considered. Global warming of 1.5°C and 2°C will be exceeded during the 21st century unless deep reductions in CO2 and other greenhouse gas emissions occur in the coming decades.'3 Consistent with EPA's 2009 Endangerment Finding for GHGs, the authors of the IPCC report emphasize that the impacts of climate change go far beyond temperature increases, to include such things as extreme heat, marine heatwaves, heavy precipitation, droughts, tropical cyclones and reductions in Arctic sea ice, snow and permafrost – all of which will increase in frequency and intensity 'in direct relation' to intensifying global warming. They further report that under scenarios in which CO2 emissions increase, ocean and land carbon sinks are anticipated to be less effective at slowing the accumulation of CO2 in the atmosphere and, moreover, that many changes attributable to past and future GHG emissions 'are irreversible for centuries to millennia,' particularly those in the ocean, ice sheets and global sea level. No region of the world appears to be immune from the harmful effects of these future increases in climate change.

In NACAA's January 15, 2021 transition paper to the Biden-Harris Administration, the association wrote that 'state and local agencies in NACAA have implemented programs that made meaningful progress towards reducing GHGs, but a strong, comprehensive federal approach is essential for providing lasting nationwide reductions, regulatory certainty and a more protective baseline for all states to meet.' This proposed rule offers an opportunity for the federal government to take a step to advance this goal. [EPA-HQ-OAR-2021-0208-0255-A1, pp.2-3]

Commenter: National Coalition for Advanced Transportation (NCAT)

Air Quality and Climate Benefits of Federal Vehicle Standards and Electric Vehicles. Federal vehicle standards are central to addressing climate change as well as state, regional, and local air pollution problems, which in many cases are severe. It is clear that action is needed and, in the U.S., the transportation sector generates the largest share of GHG emissions (29 percent of 2019 GHG emissions).96 The transportation sector is also responsible for a significant share of criteria pollutant emissions, including over 55% of the nitrogen oxides (NOx) total emissions inventory in the U.S.,97 17.9 million tons per year of carbon monoxide, 133,000 tons per year of fine particulate matter (PM) PM2.5, 287,000 tons per year of PM10, and 1.8 million tons per year of volatile organic compounds (VOCs).98 These emissions have significant effects on communities around the country. In 2020, approximately 97 million people nationwide lived in counties with pollution levels above the primary National Ambient Air Quality Standards (NAAQS).99 In many areas of the country, pollution from vehicles is also the leading source of poor air quality. Further, PM2.5 and other transportation emissions are not evenly distributed and raise environmental justice concerns.100 Studies have shown that low-income and historically marginalized communities live disproportionately close high-traffic roads and highways, exposing these communities to greater levels of transportation emissions and associated impacts.101

Electric and other zero emission vehicles are a critically important, cost-effective strategy to reduce such air pollution, particularly in areas with severe air quality problems. All-electric vehicles produce zero direct emissions since these vehicles lack a tailpipe and thus have zero tailpipe emissions of GHGs or other pollutants. As a result, use of these vehicles in place of internal combustion engine vehicles can significantly improve air quality in urban areas. On average across the United States, annual life cycle emissions per vehicle are substantially lower for all electric vehicles as compared to gasoline vehicles. The emissions reductions are even greater in geographic areas that use relatively low-polluting energy sources for electricity generation.102 The share of electricity generated from renewable energy resources (e.g., wind, solar, geothermal, hydroelectric, and biomass) has dramatically increased in recent years to about 20% of total U.S. electricity generation in 2020.103 And the U.S. Energy Information Administration (EIA) predicts that this trend of significant increases in generation from renewable resources will continue.104 As the sources of electricity generation become cleaner, GHG and criteria pollutant emissions related to use of electric vehicles will further decline. Electric vehicles also emit less heat and produce less noise.105 Researchers from Harvard studied emissions from electric vehicles and conventional vehicles in large metropolitan statistical areas and concluded that in each area, air pollution mortality was significantly less from electric vehicles. 106 Others have found that, regardless of the electric vehicle adoption scenario they considered, ozone and PM2.5 concentrations declined with the adoption of electric vehicles. 107 A number of states are requiring that electric vehicle infrastructure be deployed in disadvantaged communities to ensure that those communities can reap the environmental and public health benefits of these technologies.108 [EPA-HQ-OAR-2021-0208-0239-A1, p. 15-16]

Commenter: National Parks Conservation Association (NPCA)

Nearly all 423 national park units are harmed by climate change impacts, including runaway heat waves, drought, sea level rise, coastal flooding, and wildfires. If we do not act quickly to mitigate emissions driving and exacerbating the climate crisis, we could very well lose many of our national park system's treasured namesake features, such as the glaciers in Glacier National Park, the Joshua trees in Joshua Trees National Park, the everglades in Everglades National Park, the saguaro cacti in Saguaro National Park, and the sequoias in Sequoia National Park. The myriad natural and cultural resources found within America's national parks system are priceless. We must do all we can to protect this heritage from climate change and pass on the legacy of our national parks unimpaired. [EPA-HQ-OAR-2021-0208-0291-A1, pp. 1-2]

To meet our national climate goals, protect our communities, and preserve our beloved public lands for generations to come, NPCA firmly believes we must move forward with standards that achieves a greater total tonnage GHG emission reduction than what would have been achieved under the previous Obama-era rules. Strong standards will help contribute to keeping global temperatures below a 1.5°C change from pre-industrial levels, which climate scientists believe is the key threshold necessary to prevent the worst climate impacts to our planet. [EPA-HQ-OAR-2021-0208-0291-A1, p. 2]

Commenter: Natural Resources Defence Council (NRDC)

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, pp. 24-25.]

This proposal comes at a critical moment. The recent Comprehensive Climate Assessment from IPCC shows that fossil fuel pollution, the burning of coal, oil, and gas, is driving a rapid and widespread destabilization of our planet. According to that science, levels of carbon dioxide in the atmosphere haven't been this high in two million years. We are in dangerous uncharted territory in terms of the human experience because of our continued reliance on dirty fossil fuels.

In this country the transportation sector is the top contributor to climate pollution and the window of time for us to slow further warming and limit the likelihood of dangerous tipping points is quickly closing. Maximizing those pollution reductions is critical and urgent because the climate crisis is here and now and it is fueling and a escalating public health emergency and endangering people all across the country.

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, pp. 25-27.]

It's contributing to more severe wildfires, exacerbating dangerous heat waves and drought, spiking levels of air pollution from ozone, smog, and wildfire smoke, and super-charging rainfall and flooding. If we continue down this path without cutting harmful emissions, climate hazards will only worsen in frequency, intensity, duration, and reach in the future, and the costs of those hazards, which broke a new record last year, according to federal data, will skyrocket out of control.

Climate hazards have profound consequences that are in vivid display right now, both in people's pain and suffering and in the costly need for medical care. These health costs are difficult to track and quantify and so they are largely absent from public accounting of climate damages. For that reason, the health-related costs savings of climate pollution reductions are not included in the accounting of benefits from the proposed rule being considered today. Because of these missing savings, the reality is that the net benefits of a strong cars plan are even higher than those currently estimated by EPA.

I led a peer-reviewed analysis that estimated the health costs of 10 climate-sensitive events across the U.S. that occurred during just one recent year and using public data and EPA's valuation methods, we found that just those 10 events inflicted huge health harms, about 900 deaths, 21,000 hospitalizations, and 18,000 ER visits, took a total financial toll of $10 billion in damage.

Commenter: New Mexico Environment Department

The more stringent standards will help improve the air quality in those areas of New Mexico where ambient ozone concentrations are climbing. Reducing ozone precursors by reducing emissions from mobile sources, such as automobiles, will improve public health and protect the most vulnerable populations in overburdened New Mexican communities, including children, the elderly, and those with respiratory conditions. The more stringent standards help New Mexico address global warming as swiftly as possible. New Mexico has already been experiencing the impacts of climate change. Over the past half-century New Mexico has experienced a 2.0-degree Fahrenheit average rise in temperature and a 15 percent reduction in Rio Grande surface water flows leading to heavier reliance on mined groundwater.6 Surface water flows in the Rio Grande are projected to decrease by an additional 30% by mid-century.7 Increased temperatures combined with altered precipitation amounts will create conditions for catastrophic, landscape-scale vegetation changes, including hotter droughts, woody plant dieback, increased forest fires, and intrusion of invasive plants.8 [EPA-HQ-OAR-2021-0208-0205-A1][p.2]

Commenter: New York State Department of Environmental Conservation

Combatting climate change is the preeminent environmental challenge of our time. In the last two decades, the impacts of climate change have become indisputable. We are witnessing rising average temperatures, recording-setting high temperatures, as well as increasing frequency and severity of extreme weather events. Across the western United States and globally we are experiencing record breaking wildfires in terms of number and size, driven by prolonged drought and intense heat waves resulting from climate change. The'wildfires in the West have affected the entire nation as the smoke is carried across the United States resulting in harmful levels of air quality. Last month, New York. State, like much of the eastern United States, experienced several high intensity rainfall events leading to flash flooding and significant destruction of property and infrastructure in several regions of the state. Given the profound impacts of climate change, it is essential that efforts to combat climate change and reduce emissions are supported by strict federal programs and standards. Recognizing the urgency of the climate crisis, New York enacted the. Climate Leadership and Community Protection Act (CLCPA) in 2019, which codified the most aggressive emissions targets in the country, including reducing statewide carbon emissions 40% from 1990 levels by 2030 and achieving a carbon neutral economy by 2050. [EPA-HQ-OAR-2021-0208-0238-A1, p.1]

The proposed rule would not only achieve substantial greenhouse gas reductions but, when fully implemented, will also reduce the pollution that causes harmful ozone levels across the country, providing substantial public health benefits, particularly to communities overburdened by air pollution. [EPA-HQ-OAR-2021-0208-0238-A1, p.3]

Commenter: Northeast States for Coordinated Air Use Management (NESCAUM)

The Earth's climate is changing faster than it has in thousands of years, driven primarily by GHG emissions from human activities. Atmospheric concentrations of carbon dioxide are at their highest levels in at least two million years. Every region across the globe is experiencing extreme weather and climate-related events and devastating economic impacts. In the United States, severe drought and wildfires plague the western states, while more intense precipitation events and Atlantic cyclones are wreaking havoc in the South and Northeast states. Across the country, heat waves, associated with increased illness and death, are more widespread and more intense. Snow and ice are retreating. Seas are rising at an increasing rate and becoming more acidic. Ecosystems are being irreparably altered at an unprecedented rate and scale. Entire communities are being displaced. According to the Intergovernmental Panel on Climate Change (IPCC), unless there are immediate, rapid, and large-scale reductions in GHG emissions from all sectors, limiting global warming to 1.5 degrees Celsius or even 2 degrees Celsius, consistent with the goals of the Paris Agreement, will be impossible.3

Transportation is the largest source of GHGs in the nation and in the Northeast. Light-duty cars and trucks are the largest contributor to those emissions. LDVs are also a major source of particulate matter, air toxics, and ozone-forming pollutants that harm public health. Significant portions of the Northeast are not in attainment with federal ozone standards, and climate change is expected to exacerbate tropospheric ozone levels. Low-income communities, communities of color, and indigenous populations in the Northeast are particularly vulnerable to the effects of climate change and are disproportionately impacted by air pollution. Mitigating the climate crisis will require deep reductions in GHG emissions from motor vehicles. [EPA-HQ-OAR-2021-0208-0259-A1, pp. 2-3]

Commenter: Oliver, Shaina

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, pp. 71-72.]

As a tribal member, I have seen the devastation of the degraded lands and the dwindling of birds, butterflies, bees. Our ancestral lands continue to be sacrificed for mining, drilling, and infrastructure of all sorts. Pollution from cars and trucks, including heavy-duty vehicles, degrades quality air and threatens our health.

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, pp. 73-74.]

I've been living with asthma since my infancy and worsening air quality due to heat and wildfires related to climate change have a direct impact on my ability to breath. Protective clean car standards will save lives in communities like mine because over 26 million people in the United States are burdened with asthma, including more than six million children.

With recent reports from the Intergovernment Panel on Climate Change confirms that climate change is widespread, rapid, and intensified, reconfirming the warnings Indigenous knowledge-keepers have been raising for years.

We must rethink of our next generation's future and livability standards and access to clean air, water, soil and health. President Biden has promised to address climate change and fight for environmental justice. By acting swiftly on clean cars, the Administration has taken an important step to tackling climate pollution from transportation.

Commenter: Pennoyer, Marguerite

[The following comments were submitted as testimony at the virtual public hearing on August 26, 2021. See Hearing Testimony – 26Aug2021, p. 29.]

The transportation sector is the largest source of greenhouse gas emissions in the United States. Gasoline- and diesel-powered cars, SUVs, and the increasingly-powerful pickup trucks pollute the air we breathe and drive climate change.

[The following comments were submitted as testimony at the virtual public hearing on August 26, 2021. See Hearing Testimony – 26Aug2021, p. 32.]

Stronger standards are desperately needed. According to the Lung Association's Road to Clean Air Report, a nationwide transition to zero emission vehicles, including passenger cars, buses, and heavy-duty vehicles, will provide $72 billion in health benefits and a $113 billion in climate benefits annually by 2050. It would reduce dangerous air pollution, especially for communities that live near major roads, and in June, the Lung Association released a poll showing that 70 percent of American voters are in support of the Federal Government advancing policies to encourage a nationwide transition to electric vehicles. So in conclusion, climate change is threatening the health of my patients and my family. The Biden Administration must use all available tools to reduce carbon pollution. We must take immediate action at every level to address climate change and reduce greenhouse gas emissions.

Commenter: Pruitt, Katherine

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, p. 156.]

As you know, earlier this month the world got some sobering news from the UN"s Intergovernmental Panel on Climate Change that affirmed in the starkest terms that we are in a deepening climate crisis. The UN Secretary General described the report as a Code Red for Humanity.

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, p. 157.]

The transportation sector is the largest source of greenhouse gas emissions in the United States. Gasoline and diesel-powered cars, SUVs, and pickup trucks pollute the air we breathe and drive climate change.

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, p. 158.]

Again, climate change is a health emergency and the Biden Administration must use all available tools to promote carbon pollution reductions. There is no time to delay.

Commenter: Rauch, Molly

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, p.34.]

The transportation sector is the largest source of climate pollution in the U.S. Cleaning up this pollution is one of the most important things we can do to fight climate change.

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, pp.35-36.]

The latest IPCC report, as you've heard, released earlier this month has affirmed that we are living in an unequivocal climate crisis, but we don't need a UN report to tell us what so many of us are experiencing in our own communities. Searing heat waves, staggering wildfires, terrible floods, unprecedented rainfall, choking drought, this affects us all. My teenage son is an athlete who trains outside in the summer. He's playing football here in D.C. where we live and his team started daily practices last week. We've had several heat emergency days and today is a Code Orange air day for ozone.

We have historical average of 11 dangerously hot days each year in D.C., but in the 2020s, in this decade, we're projected to have 18 every year and by the 2050s heat emergencies in D.C. are projected to increase to 30 to 45 days each and every year. This is hard on my son's body and it will harm the health of athletes like him in the future.

At Moms Clean Air Force, we appreciate that the Biden Administration is prioritizing climate action and has pledged a 50 percent reduction of climate pollution from 2005 levels by 2030. Now EPA must finalize the strongest possible standards to cut pollution from cars.

Commenter: Remilien, Sandra

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, p. 119.]

Transportation is the biggest source of greenhouse gas emissions and makes up 20 percent of emissions. (Audio glitch) makes up about 4.6 metric tons of carbon monoxide. (Audio glitch) creates about 8,887 rems of CO2.

Commenter: Sainz, Columba

[The following comments were submitted as testimony at the virtual public hearing on August 26, 2021. See Hearing Testimony – 26Aug2021, p. 226.]

It is a step in the right direction to address the climate emergency. Pollution from cars not only causes climate change, it harms my family's health and my community's. It threatens our health without mentioning families with no insurance, undocumented immigrants with no health access, low-wealth, and BIPOC communities experience disproportionate harm from dirty vehicle pollution, living through racial disparities in rates of asthma and other respiratory illnesses.

Commenter: Shevelew, Jonathan

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, p. 116.]

We need to recognize that we are faced with a climate crisis and therefore need to act as if this is a crisis and not a minor inconvenience that we can address gradually over a period of time. These initiatives should have been implemented 20 years ago. To now decide to accept the 20-year transition like GM is proposing is foolhardy and will have devastating results, especially when we already have manufacturers that have demonstrated that achieving a 100 percent reduction in GHG is possible today.

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, p. 118.]

There is also a political reality to consider. While currently the government is recognizing the climate crisis we are faced with, those positions can change with future administrations. In order to assure that we don't waver from this path, the EPA needs to put rules in place that are aggressive and which need to be acted on immediately.

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, p. 119.]

We will be held accountable and we'll be judged for our actions in this crisis by subsequent generations. What we do today will affect the quality of life for this planet for many years and it's time for us to be the adults in the room.

Commenter: Sierra Club

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, pp. 31-32.]

I want to go into the why behind these standards. This rule would be our nation's strongest climate tool if EPA gets it right. This summer has been devastating for our communities. Our friends, family and neighbors have been on the front lines of heat waves, of wildfires, flooding, and more, and many times, you know, people speak about climate action for future generation. While the well-being of children growing up in this decade is of big importance, the reality of that we're experiencing the impacts of climate crisis right now and while all generations are impacted, not all communities are impacted the same way. All too often the communities least responsible for our climate pollution are facing the burdens of the crisis and suffering from toxic air pollution, as well. So the latest IPCC report states in the strongest way ever that the climate crisis will continue to rapidly worsen unless the world slashes climate= disrupting pollution as quickly as possible in the next decade.

Transportation pollution is our nation's worst offender when it comes to the climate crisis and this rulemaking, if strengthened, can put us back on track and to have strong standards and offer protection for communities in New York and across the nation. As proposed, this rule would result in much less pollution reduction than the auto industry agreeing to in 2012, despite the enormous progress that's occurred on electric vehicles and the climate disasters we have seen since then.

Commenter: Smith, Rita L.

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, p. 103.]

My testimony is about my granddaughter Marnie born with asthma. Clean air is a good start by allowing the car industry to build more efficient cars. The transportation industry pollutes the air, causing my granddaughter to keep an asthma pump with her and one at school.

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, p. 104.]

The change I would like to address is for the automotive industry, the manufacturers of cars, trucks, military vehicles, farm machinery, actually all vehicles to eliminate gas emission from fossil fuel.

Commenter: Southern Environmental Law Center

The transportation sector is the largest source of climate change-driving GHG emissions in the U.S. and is causing tremendous harm. As noted in the Federal Register notice, "[t]he transportation sector is the largest U.S. source of GHG emissions, representing 29 percent of total GHG emissions. Within the transportation sector, light-duty vehicles are the largest contributor, at 58 percent, and thus comprise 17 percent of total U.S. GHG emissions."9 This is also true for most states in the South. The transportation sector is the largest source of carbon dioxide (CO2)—a significant component of GHGs10—in every state in SELC's region except for Alabama, where it is the second largest source.11

GHG emissions are a major driver of climate change, and the U.S. is already experiencing climate change impacts. Sea level rise is affecting coastal communities around the country, and the South is particularly vulnerable. For example, the Hampton Roads region in Virginia has one of the highest rates of sea level rise on the East Coast, with scientists predicting a rise of 1.5 to 2 feet by 2050.12 The frequency of extreme weather events, including heavy precipitation, high tides, storm surges, and heat waves, also continue to increase.13 These weather events can lead to public emergencies and infrastructure disruptions, stressing health services and communities. [EPA-HQ-OAR-2021-0208-0244-A1, pp. 2-3]

There is also an economic cost to climate change. Studies have found that climate change could cost the U.S. approximately 1.2 percent of the gross domestic product for every additional degree of warming, with the South expected to experience greater impacts than other parts of the country.[16] [EPA-HQ-OAR-2021-0208-0244-A1, p. 3]

In Virginia, for example, it has been estimated that the widespread adoption of zero-emission vehicles by 2050 would yield more than $1.3 billion in avoided annual health costs—including costs of 115 premature deaths, more than 1,780 asthma attacks, and nearly 8,190 lost work days.[38] Similar or better avoided annual health costs have been estimated for other states in South if zero-emission vehicles are widely adopted.[39] [EPA-HQ-OAR-2021-0208-0244-A1, p. 6]

[39] For example, Georgia could see almost $1.7 billion in avoided annual health costs by 2050, including costs of 147 premature deaths, 2,665 asthma attacks, and over 12,200 lost work days. Id. North Carolina could see over $1.6 billion in avoided annual health costs by 2050, including costs of 141 premature deaths, 2,384 asthma attacks, and over 10,000 lost work days. Id.

Commenter: Spencer, Sam

[The following comments were submitted as testimony at the virtual public hearing on August 26, 2021. See Hearing Testimony – 26Aug2021, p. 150.]

Charlotte's growth is generating over 25 million new car trips every year and that's only from rezoning, not by buy-right development. Conservatively, that's tens of millions of kilograms of new carbon dioxide emissions in the Charlotte region every year. It's a major equity issue for Charlotte.

[The following comments were submitted as testimony at the virtual public hearing on August 26, 2021. See Hearing Testimony – 26Aug2021, pp. 151-152.]

The Number 1 source of carbon emissions in Charlotte is vehicle trucks. We can't make significant progress on emissions reductions without a strong federal rule and, unfortunately, the EPA's proposed rule doesn't go far enough.

Commenter: Spirit of the Sun

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, p. 134.]

The transportation sector is the largest source of carbon pollution in the U.S. We need to clean up vehicle pollution. Honestly, it's one of the most important things we can do for climate change and the climate impacts that disproportionately impact the communities.

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, p. 135.]

We need to strengthen proposals from the EPA and we need clean car standards now. In all honesty, President Biden has promised to address climate change and fight for environmental justice, but that needs to have radical and revolutionary actions now.

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, p. 136.]

We need to address climate change by protecting our children's future and little lungs. In any way that you can have clean car standards, I advise you to do this now for future generations.

Commenter: Stein, Karen

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, pp. 276-277.]

Iowa has lost shade and wildlife habitat for decades to come. This year, we have endured an extremely hot summer. People's electric bills due to air conditioning usage are high and this is especially difficult for communities in low-wealth neighborhoods. Iowa's skies have been hazy most of the summer due to the wildfires in the Western United States and I am experiencing breathing difficulties for the very first time in my life.

I know children with asthma in the Latino communities in Iowa who have hardly been able to play outdoors this summer due to the haze and the heat and they badly needed to be able to play in the midst of this pandemic. I said that all of what I'm describing is due to the climate crisis which we're experiencing, which is made worse by vehicular pollution and many times Latino communities are not aware of the causes and don't have access to the tools that would allow them to take action while at the same time they are being among the most affected by climate change and pollution.

Commenter: Stout, Linda

[The following comments were submitted as testimony at the virtual public hearing on August 26, 2021. See Hearing Testimony – 26Aug2021, p. 119.]

Additional cars means more days with unhealthy air quality and more hazardous greenhouse gases and increased health problems.

Commenter: Sturza, Taisia

[The following comments were submitted as testimony at the virtual public hearing on August 26, 2021. See Hearing Testimony – 26Aug2021, p. 170.]

Transportation is the largest source of carbon emissions in the U.S. and it's critical that we both make our gasoline-powered cars and trucks more efficient and that shift rapidly to electric vehicles. If the vehicles themselves had stricter emissions standards and thus lower emissions, then the health impacts on the community would be much lower, as well.

Commenter: Trombetta, Nick

[The following comments were submitted as testimony at the virtual public hearing on August 26, 2021. See Hearing Testimony – 26Aug2021, pp. 216-217.]

In light of the recent report from IPCC, it is clear more than ever that climate change poses a significant threat to human existence on earth and must be addressed in the strongest way possible. This means that the EPA must take a strong stance on climate change, and clean cars standards is a great way to start. This will send a message to the rest of the world that America is ready to be a climate leader.

Commenter: Uberuaga, Michelle

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, p. 284.]

Montana's drought is killing farmers. Climate change is impacting every part of our lives, our economy, and our way of life, and our kids are counting on you to take action to protect their future.

Commenter: United Methodist Women

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, p. 131.]

The most recent IPCC report notes that human-caused climate change is fueling cataclysmic changes to our planet and warns that limiting global warming will be beyond reach in the next two decades without immediate, rapid, and large-scale reductions in greenhouse gas emissions. The U.S. has a moral responsibility to drastically reduce our own emissions. We must do our fair share. While we are only four percent of the world's population, the U.S. has contributed more than 25 percent of cumulative greenhouse gas emissions and is the biggest contributor.

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, p. 132.]

Because transportation is the largest climate-polluting sector in the U.S., by implementing the strongest possible fuel economy standards, EPA can ensure that automakers and bus and technology to make more efficient vehicles rapidly shift to electric vehicles significantly reduce greenhouse gas emissions and reduce co-pollutants that will protect the planet and our health.

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, p. 133.]

Passing the strongest standards to reduce tailpipe emissions will not only protect my father's life but the 103,000 people living with COPD and over 36,600 children living with pediatric asthma and the 1.6 million people of color in Queens County alone.

Commenter: Valentine, Lucia

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, p. 265.]

Growing up on the basic of the Potomac River, I experienced exacerbated climate disasters, such as flooding, due to the negative impacts that greenhouse gases have on our environment. This is in major part due to the lack of clean vehicle standards. The pollution from cars not only causes climate change but it also (audio glitch) the future of our children, families, and communities all across our beautiful state of West Virginia.

Commenter: Verdin, Langston

[The following comments were submitted as testimony at the virtual public hearing on August 26, 2021. See Hearing Testimony – 26Aug2021, pp. 265-266.]

The transportation sector is the largest source of greenhouse gas emissions in the state -- in the United States. Gasoline and diesel-powered cars, SUV, and pickup trucks pollute the air we breathe and drive climate change.

Commenter: Whyte, Yolanda

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, pp. 142-143.]

As you know, Atlanta is reported to have amongst the worst urban sprawl in the nation and we're known for our traffic congestion. We have so many highways around and through the city that it's hard to avoid traffic pollution. Right about now it's hot, humid, and it also has an odor particular to the more rural areas that I frequently visit. Many parts of the city are considered urban heat islands which are disproportionately affected by our changing climate. We are learning more about heat-related illnesses in which some, like heat stroke, are fatal, especially for babies and teen athletes, and some heat-related illnesses increase the risk of pregnancy complications and adverse birth outcomes, like prematurity, low birth weight, and stillbirths, thus worsening health disparities of maternal mortality and infant mortality.

This morning's Air Quality Index for the part of the city where I live was 108. This is in the orange range considered unhealthy for sensitive groups. Unfortunately, there are no public health warnings informing vulnerable residents, such as babies, seniors, those with heart or lung disease, of this risk or the need to stay indoors, close the windows, and take measures to improve indoor air quality.

Commenter: Wisconsin Department of Natural Resources

EPA’s rule would provide critical support to Wisconsin’s efforts to reduce GHG emissions and address climate change. Transportation emissions are responsible for a significant percentage (24%) of GHG emissions in Wisconsin. Through executive action, Governor Tony Evers has committed Wisconsin to fulfill the carbon reduction goals of the 2015 Paris Climate Accord,1 and the state’s December 2020 climate change report includes numerous actions that address the impacts of GHG emissions from transportation, such as development of a statewide electric transportation plan.2 However, state authority to address GHG emissions from vehicles and other mobile sources remains very limited. EPA’s action is therefore critical to ensure Wisconsin can achieve its climate-related goals. [EPA-HQ-OAR-2021-0208-0223-A1, p.1]

1 See Gov. Evers’ Executive Order 38 and Executive Order 52, available at: https://dnr.wisconsin.gov/climatechange/solutions.

2 Report is available at: https://climatechange.wi.gov/Pages/Home.aspx.

Commenter: Wiste, Leah

[The following comments were submitted as testimony at the virtual public hearing on August 26, 2021. See Hearing Testimony – 26Aug2021, pp. 85-86.]

This summer, the climate crisis brought another thousand-year flood to Detroit where I live, our second since 2014. In June, an overnight rainfall of seven inches, twice the amount of rain Detroit receives for the whole month. It shut down I-94 for days and flooded thousands of basements. $96 million in relief has been approved by FEMA as of July 15th. Beyond the immediate loss in damages, those whose homes were impacted are likely to experience health consequences from lingering mold and sewage which are especially dangerous for those already made vulnerable by asthma, COVID, and other diseases. Since transportation emissions are the largest source in U.S. climate pollution, clean car standards must be commensurate with the climate emergency we are experiencing right now.

Commenter: Zewadski-Bricker, Edith

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, pp. 228-230.]

As leaders, you have the grave responsibility to alleviate the climate crisis, to protect the poor here and around the world, to protect generations to come, to protect our nation's sovereignty, and ultimately to save the planet. The current Administration has recognized the urgent need for increased vehicle efficiency and limited vehicle planet-warming emissions is the very reason. The Environmental Protection Agency must do no less.

Please remember the climate crisis is the Number 1 issue facing the nation and the world. Unfortunately, only the policymakers, not individual citizens, can tackle these issues in a significant way. I am here because global warming is slated to flood the Florida Keys, my home. Here in South Florida, the Miami-Herald headline reads Sea Rise under Scrutiny in Condo Collapse. How many condos will collapse as the changing climate exacerbates the damage from hurricanes? How much will state and local governments spend uselessly fighting sea level rise?

I implore you to see past the politics, past the powerful, past the profits, and even past the present to the impact of your decisions on the future. As long as I'm here now, consider the poor and inner city Miami whose children are already dying from asthma and pneumonia and COVID-19 as a direct or indirect result of diesel fuel bus and gasoline vehicle emissions. Just today in our local paper, we read about the farmers in Homestead concerned with saltwater intrusion into South Florida's water supplies from sea level rise and an increase in pests and disease that thrives in warmer climates. In the Herald yesterday, we read about outdoor workers subject to increased temperatures.

EPA Response

The comments above in section 14 did not necessitate individual responses as they did not request changes to the proposed rule, nonetheless EPA acknowledges these comments expressing concern for health and climate impacts associated with GHG and non-GHG emissions from the transportation sector. Many of the commenters note studies linking harm to human health and the environment from these emissions.

EPA notes that this rule will result in significant reductions in air pollutants and substantial benefits for public health. As described in the preamble Section 1, the benefits include climate-related economic benefits from reducing emissions of GHGs that contribute to climate change, reductions in energy security externalities caused by U.S. petroleum consumption and imports, the value of certain particulate matter-related health benefits, the value of additional driving attributed to the rebound effect, and the value of reduced refueling time needed to fill a more fuel-efficient vehicle. Through 2050 the program will achieve more than 3.1 billion tons of GHG emission reductions.

Commenter: American Enterprise Institute (AEI)

Even under the assumptions and analytic/quantitative estimates provided in the Proposed Rule and the accompanying Regulatory Impact Analysis, the Proposed Rule cannot satisfy any plausible benefit/cost test, for two central reasons. First: The reduction in GHG emissions Asserted by EPA attendant upon implementation of the Proposed Rule would yield a global temperature reduction in 2100 of 0.0013 degrees C at most, applying the EPA climate model under a set of assumptions that exaggerates the effects of the Proposed Rule. Second: In economic terms, again under the explicit EPA analysis and assertions, the annual increase in global real GDP would be a maximum of 0.075 percent, a figure that cannot be statistically significant given the normal variation in global GDP growth. [EPA-HQ-OAR-2021-0208-0254-A1, p. 2]

The use of asserted global rather than domestic environmental benefits of the Proposed Rule is illegitimate, and would yield an obvious free-rider effect and important inefficiencies. [EPA-HQ-OAR-2021-0208-0254-A1, p. 2]

The Near-Zero Climate and Economic Benefits of the Proposed Rule

Table 2 in the draft Regulatory Impact Analysis2 asserts that the carbon dioxide (CO2) target in the Proposed Rule for MY 2026 is a reduction of 5.0 percent combined for cars and light trucks, as opposed to the 1.7 percent target in the SAFE rule to be replaced. Because the national fleet will evolve over time, in particular after MY 2026, let us quadruple the former parameter to 20 percent as the assumed long run reduction in GHG emissions attendant upon the Proposed Rule. The EPA reports that U.S. GHG emissions from the transportation sector overall are 29 percent of all U.S. GHG emissions.3 Let us assume for discussion purposes that all such emissions from the transportation sector are produced by cars and light trucks, ignoring heavy vehicles, airplanes, and sea transport. The notional 20 percent reduction in U.S. GHG emissions would represent a decline — other parameters held constant — of 5.8 percent in total U.S. GHG emissions. Because U.S. GHG emissions are 12.6 percent of global GHG emissions, the global emissions effect would be seven tenths of 1 percent.4

Let us apply the EPA climate model so as to derive an estimate of the global temperature impact of that reduction in GHG emissions, under a set of assumptions that exaggerate the future temperature/climate effects of reductions in GHG emissions.5 The predicted temperature effect in 2100 would be about 13 ten-thousandths of one degree C. For purposes of policy analysis, that number is effectively zero; and because the standard deviation of the surface temperature record is 0.11 degrees C, that notional effect would not be measurable.6 Nor can the Proposed Rule be justified as one component of a larger effort to reduce GHG emissions: The effect of a net-zero emissions policy implemented immediately by the U.S. would be 0.173 degrees C, under an identical set of assumptions. Accordingly, even if the assumption of a 20 percent long run reduction in U.S. GHG emissions proves to be understated by some large factor, the same benefit/cost analytic conclusion would be warranted. Nor would an international perspective change this conclusion: The national promises (‘Nationally Determined Contributions’) incorporated into the Paris agreement adopted at the 2016 21st Conference of the Parties, if taken seriously (they are not7), would yield a temperature reduction in 2100 of 0.178 degrees C. A GHG emissions reduction of 50 percent by China, under the same set of favorable assumptions, would yield a temperature reduction in 2100 of 0.184 degrees C. [EPA-HQ-OAR-2021-0208-0254-A1, pp. 3-4]

In the larger context, the claim of nontrivial climate benefits from reductions in GHG emissions must be based upon assertions of nontrivial climate effects — a climate ‘crisis’ either upon us or looming — from such emissions. But there is no evidence — none — of a climate ’crisis’ attendant upon increasing atmospheric concentrations of GHG, which can be expected to create effects both adverse and positive, the net effects of which are highly uncertain.

That anthropogenic climate change is ‘real’ — that increasing GHG concentrations are having detectable effects — is incontrovertible, but that does not tell us the magnitude of the observable impacts, which must be measured empirically. Temperatures are rising, but as the Little Ice Age ended no later than 1850, it is not easy to separate natural from anthropogenic effects on temperatures and other climate phenomena.19 The latest research in the peer-reviewed literature suggests that mankind is responsible for about half a degree of the global temperature increase of about 1.5-1.7 degrees C of global warming observed since 1850.20

The ‘crisis’ assertions are unsupported by the evidence reported in the peer-reviewed, official, or scientific literature. There is little trend in the number of ‘hot’ days for 1895–2017; 11 of the 12 years with the highest number of such days occurred before 1960.21 NOAA has maintained since 2005 the U.S. Climate Reference Network, comprising 114 meticulously maintained temperature stations spaced more or less uniformly across the lower 48 states, 21 stations in Alaska, and two stations in Hawaii.22 They are placed to avoid heat island effects and other such distortions as much as possible; the reported data show no trend over the available 2005–20 reporting period.23 A reconstruction of global temperatures over the past one million years, using data from ice sheet formations, shows that there is nothing unusual about the current warm period.24

Global mean sea level has been increasing at about 3.3 mm per year since satellite measurements began in 1992. The tidal-gauge data before then show annual increases of about 1.9 mm per year, but that comparison does not show an acceleration in sea-level rise because the two datasets are not comparable. The tidal gauges do not measure sea levels per se; they measure the difference between sea levels and ‘fixed’ points on land that in reality might not be fixed due to seismic activity, tectonic shifts, land settlement, etc. Accordingly, the data are unclear as to whether there is occurring an acceleration in sea level rise; it is reasonable to hypothesize that there has been such an acceleration simply because temperatures are rising due to both natural and anthropogenic influences, as noted above, and such increases should result in more melting ice and the thermal expansion of water. But because rising temperatures are the result of both natural and anthropogenic causes, we do not know the relative contributions of those causes to any such acceleration.25

The Northern and Southern Hemisphere sea ice changes tell different stories; the arctic sea ice has been declining, while the Antarctic sea ice has been stable or growing.26 U.S. tornado activity shows either no trend or a downward trend since 1954.27 Tropical storms, hurricanes, and accumulated cyclone energy show little trend since satellite measurements began in the early 1970s.28 The number of U.S. wildfires shows no trend since 1985, and global acreage burned has declined over past decades.29 The Palmer Drought Severity index shows no trend since 1895.30 U.S. flooding over the past century is uncorrelated with increasing GHG concentrations.31 The available data do not support the ubiquitous assertions about the dire impacts of declining pH levels in the oceans.32 Global food availability and production have increased more or less monotonically over the past two decades on a per capita basis.33 The IPCC itself in the Fifth Assessment Report was deeply dubious about the various severe effects often asserted to be looming as impacts of anthropogenic warming.34

Any rigorous analysis of the future effects of GHG emissions clearly should incorporate both adverse and beneficial impacts. The adverse effects of such emissions may prove serious, but there is a very large literature on the important benefits of slightly or moderately warmer temperatures. Examples are planetary greening, increased agricultural productivity, increased water use efficiency by plants, and reduced mortality from cold.35 [EPA-HQ-OAR-2021-0208-0254-A1, pp. 6-9]

EPA Response

EPA disagrees with many of the commenters’ contentions. EPA did not conduct climate modeling in support of this rulemaking and thus has no basis to evaluate the commenter’s estimate of temperature change. EPA notes that it is required to establish standards to reduce air pollution that endangers public health and welfare, taking into consideration the cost of compliance and lead time. As discussed in Section VI of the preamble, this is the approach EPA took in setting these standards. EPA did take note of the results of the benefit-cost analysis in the RIA, prepared under E.O. 12866, including the possibility that the net benefits could be higher or lower than presented, and finds that the estimated benefits exceeding costs reinforces the conclusion that the standards are appropriate. Thus, EPA disagrees that a change in the estimated benefits would have necessarily resulted in a meaningful change in how the impacts of the final standards compare to the alternatives, or in selection of different standards.

Commenter: Hill, Pablo

To Whom it may concern, my name is Pablo Hill and I would like to present my ideas and comments for EPA-HQ-OAR-2021-0208-0116. My goal today is to present peer-review confirmed data to better assist with the proposed rule for light duty vehicle with regards to GHG emissions. As the proposed rule relies on data with respect to weather, health, climate, etc. I will reference these topic and these topic only. And while the EPA uses the IPPC data to help draw its conclusion as to why it's position should be taken, policy and decision makers must make the best decision based on proven ideas that completes the stated goal(s) for the society while carefully considering the cost with those actions, not political ideology. I would recommend the readers please see the link provide:

https://www.zerohedge.com/markets/environmental-disaster-ev-battery-metals-crunch-horizon-industry-races-recycle,

https://www.realclearenergy.org/articles/2021/07/11/its_time_to_unplug_the_hype_over_electric_vehicles_785025.html?mc_cid=8f7a8c7594&mc_eid=891d8cfdc0,

http://blog.gorozen.com/blog/exploring-lithium-ion-electric-vehicles-carbon-footprint?utm_campaign=Weekly%20Blog%20Notification&utm_medium=email&_hsmi=131502455&_hsenc=p2ANqtz-_7qQPaoaOiPDaj3Oxq7U4viu0G8uQVtbzoIEWcpmAwkM5gB13hyS2NrdWrhOIE7TM7qUQWH4yTTPXm3qS6LRT4kAMd6Q&utm_content=131502455&utm_source=hs_email,

https://www.autonews.com/retail/study-evs-cost-more-service-ice-vehicles,

https://www.autonews.com/retail/study-evs-cost-more-service-ice-vehicles,

https://www.eia.gov/environment/emissions/carbon/,

https://www.eia.gov/todayinenergy/detail.php?id=47496,

https://www.cbsnews.com/news/climate-change-methane-natural-gas-oilemissions/#:~:text=Now%20for%20the%20good%20news,said%20in%20a%20recent%20report .,

https://www.visualcapitalist.com/how-much-oil-electric-vehicle/.

Each one of these links offer detail analysis necessary for all to make a proper comparison with respect to the EPA Proposed Rule and data. I will remind you all that while the EPA draws on IPPC and several other climate and weather agencies, institutions, think tanks, advice groups, etc. The issue at hand is not about climate change, climate science, or climate propaganda. The issue at hand is the stringiness of light duty emission rules for the future and the cost associated with implementation of the EPA rules to achieve a reduction in GHG. The links provided are use as reference for comparison and education purposes only and nothing more. Now I will state that I am not in favor of further regulations as defined by the EPA for GHG standards. The cost analysis are extremely optimistic. While the EPA does make references to health cost, which appears to be the main cost factor used to justify their proposed rule, the is no examples or real world analysis of this just inferences. Take from example Nox, Volkswagen emissions scandal of 2015 cost the shareholder and stakeholders over 9 billions dollars in fines, fees, and penalties, yet A peer reviewed study published in Environmental Research Letters estimated that approximately 59 premature deaths will be caused by the excess pollution produced between 2008 and 2015 by vehicles equipped with the defeat device in the United States, the majority due to particulate pollution (87 percent) with the remainder due to ozone (13 percent). The study also found that making these vehicles emissions compliant by the end of 2016 would avert an additional 130 early deaths. America has 330 million inhabitants, 59 deaths is not even a rounding error when compare with the benefits associated with Volkswagen companies and products they produce. [EPA-HQ-OAR-2021-0208-0515, p. 1]

EPA Response

While hard to follow, it appears that the commenter contends that the benefit-cost analysis has an inadequate benefit basis, however the commenter only cites the VW defeat device case to support that claim which is not relevant to our analysis. EPA notes that it determined what standards were appropriate in light of the need for emissions reductions, the cost of compliance and lead time, and found the results of the benefit-cost analysis in the RIA provide additional support for its conclusions. See Preamble Section VI.

Commenter: Taxpayers Protection Alliance

For those added expenses there would be little environmental benefit. American Action Forum regulatory policy director Dan Bosch notes, 'The EPA's analysis projects greenhouse gas emissions reductions of 2,200 million metric tons (MMT) if the proposed rule is finalized…According to the most recent calculation by the EPA, the United States emitted more than 6,500 MMT of greenhouse gases in 2019, with about 1,900 MMT from transportation sources. The projected reductions from the proposed rule, therefore, are about one-third of the annual nationwide total but spread over 28 years.'[EPA-HQ-OAR-2021-0208-0202-A1, p.1]

EPA Response

EPA disagrees with the commenter and believes there are substantial environmental benefits, as discussed in the Regulatory Impact Analysis and Preamble to the Final Rule. As described in those documents, this rule will result in significant reductions in air pollutants and substantial benefits for public health. The benefits include climate-related economic benefits from reducing emissions of GHGs that contribute to climate change (3.1 billion tons of GHG emissions through 2050), reductions in energy security externalities caused by U.S. petroleum consumption and imports, the value of certain particulate matter-related health benefits, the value of additional driving attributed to the rebound effect, and the value of reduced refueling time needed to fill a more fuel-efficient vehicle.

Commenter: Tesla

Protecting the Public Health and Welfare Requires 100% EV Sales By 2030. Recently, President Biden has acknowledged that we are at 'code red' because of the increasing impacts of climate change.34 He has further asserted:

Climate change has had a growing effect on the U.S. economy, with climate-related costs increasing over the last 4 years. Extreme weather events and other climate-related effects have harmed the health, safety, and security of the American people and have increased the urgency for combatting climate change and accelerating the transition toward a clean energy economy.35

And as the EPA confirms in its proposal, 'the transportation sector is the largest U.S. source of GHG emissions, making up 29 percent of all emissions. Within the transportation sector, light-duty vehicles are the largest contributor, 58 percent, to transportation GHG emissions in the U.S.'36 Indeed, there are compelling and extraordinary air pollution, climate change, and public health and welfare impacts to the country that result from these emissions, and they necessitate the rapid and complete electrification of the nation's transportation system.37 [EPA-HQ-OAR-2021-0208-0278-A1][pp.5-6]

Newer and Greater Urgency to Act in Addressing the Climate Crisis. As EPA notes, 'addressing the climate crisis will require substantial reductions in GHG emissions from the transportation sector.'75 In 2009, the EPA made its Endangerment Finding76 and subsequently established LDV standards at the requisite level of stringency to meet its statutory mandate to protect the public health and welfare demanded by the finding.77 The agency's failure to improve upon the stringency of a standard than what was proposed in 2012 is made more befuddling by the admission that the science about endangerment from climate change has significantly deepened and reveals more immediate and dire warning about the impact it will have on the nation.

As EPA recognizes 'major scientific assessments continue to be released that further advance our understanding of the climate system and the impacts that GHGs have on public health and welfare both for current and future generations.'78 Among the most recent of these studies is the new Intergovernmental Panel on Climate Change's (IPCC) peer reviewed science findings that, inter alia: '[h]uman influence has warmed the climate at a rate that is unprecedented in at least the last 2000 years;'79 'global warming of 1.5°C and 2°C will be exceeded during the 21st century unless deep reductions in CO2 and other greenhouse gas emissions occur in the coming decades;'80 and that 'every tonne of COâ‚‚ emissions adds to global warming.'81 Other recent reports have confirmed the imperative to act and reduce GHG emissions82 and include the agency's own analysis of the disproportionate vulnerability of racial and ethnic minority communities to the greatest impacts on underserved and pre-dominantly non-White communities.83 One recent study found that for each 4,434 metric tons of carbon dioxide emitted in 2020 one excess death will be caused globally between 2020 and 2100.84 Indeed, in early September, leading medical and public health professionals released an emergency call to action addressing the public health impacts of climate change.85

Embedded within these scientific findings is the heightened imperative to reduce GHG emissions and to 'dramatically reduce and electrify energy demand for transportation'86 and include 'the expansion of electric vehicles.'87 Indeed, as the UN has recently highlighted, '[i]n terms of specific technologies that Parties intend to use for achieving their adaptation and mitigation targets, the most frequently identified were energy efficient appliances and processes, renewable energy technologies, low- or zero-emission vehicles and hydrogentechnologies.'88 These findings only add to the overwhelming scientific consensus that the endangerment is accelerating and the U.S. and other countries need to set performance standards that utilize EV technology to mitigate the endangerment and GHG emissions rapidly.89[EPA-HQ-OAR-2021-0208-0278-A1][pp.10-11]

34 President Biden, Remarks by President Biden on the Administration's Response to Hurricane Ida (Sept. 7, 2021) ('They all tell us this is code red; the nation and the world are in peril. And that's not hyperbole. That is a fact. They've been warning us the extreme weather would get more extreme over the decade, and we're living it in real time now.'); Remarks by President Biden Before the 76th Session of the United Nations General Assembly (Sept. 21, 2021)('This year has also brought widespread death and devastation from the borderless climate crisis. The extreme weather events that we have seen in every part of the world — and you all know it and feel it — represent what the Secretary-General has rightly called 'code red for humanity.' And the scientists and experts are telling us that we're fast approaching a 'point of no return,' in the literal sense.').

EPA Response

EPA acknowledges these comments, and notes that this rule will result in significant reductions pollutants and substantial benefits for public health. Through 2050 the program will achieve more than 3.1 billion tons of GHG emission reductions. Regarding the comment about improving upon the 2012 standard, the final standards are more stringent than the 2012 standards in MY 2026 and beyond, as discussed in the preamble section I and in response to comments in section 2.2 of this response to comments document. In addition, EPA set the standards, as required under section 202, taking into account lead time.

14.1. Comments on Social Cost of Carbon Value (SCC)

Commenters Included in this Section

Alliance for Automotive Innovation
American Enterprise Institute (AEI)
Attorney General of Missouri et al.
California Attorney General Office, et al.

Center for Climate and Energy Solutions (C2ES)
Competitive Enterprise Institute et al.
Institute for Policy Integrity at NYU Law et al.
Kreucher, Walter
Ohio Attorney General Office, et al.

Commenter: Alliance for Automotive Innovation

GHG Emissions Benefits

The proposed rulemakings do not include recent advances in scientific analysis of the social cost of carbon ("SCC"). Before the Agencies consider any changes in the SCC, we urge the Administration to undertake a rigorous process that includes independent scientific peer review and ample opportunity for public comment. The Agencies should also use consistent discount rates for costs and benefits in any given calendar year.

From a societal perspective, Auto Innovators believes that GHG control is the most compelling benefit category that supports stricter CAFE and GHG standards.182 However, the proposed rulemakings do not include recent advances in scientific analysis of the social cost of carbon.183 We are aware that the Administration intends to update estimates of the social cost of carbon emissions based on new scientific developments. However, before the Agencies consider any changes in the SCC, and we urge the Administration to undertake a rigorous process that includes independent scientific peer review and ample opportunity for public comment.

In reviewing how the SCC was applied in the RIAs, Auto Innovators noticed an inconsistency in how SCC is applied to future benefits and costs. A basic principle of benefit- cost analysis is that the same rate of discount should be applied to any future benefit or cost that is experienced in the same calendar year. However, in some of the analyses reported, the discount rate for a climate-related benefit (in, for example, 2040) is discounted at a smaller rate (e.g., 2.5%) than the discount rates (3% or 7%) applied to local-air quality benefits and energy- security benefits in 2040. There may be a valid rationale for applying a smaller discount rate for long-term climate-related impacts, but coherence demands that the lower rate should be applied to all impacts that occur in those distant years. This discrepancy could be resolved by applying the 2.5% rate only in those years that transcend the analytic time horizon for the other benefit and cost streams (e.g., post-2050 or 2060). Alternatively, if a lower discount rate is applicable after a specific year (say) 2040, when multiple benefit and cost items are affected, then that lower discount rate should apply to all benefit and cost items that occur starting 2040.

One important step to clarifying the confusion is for both RIAs to provide a clear statement of the analytic time horizon for benefit and cost accounting. The RIAs state clearly that model years through 2050 are included in some of the modeling but the year 2050 is not the end of the analytic time horizon. The SCC estimates used by the Agencies presume that a ton of CO_2 emitted in 2020 can have welfare impacts far into the future, as IPCC estimates that most released CO_2 remains in the atmosphere between 5 and 200 years.184

Thus, the reader needs to know how long the analytic time horizon is, and what procedures for discounting are employed throughout the time horizon. Publishing the undiscounted time streams for each benefit and cost category as an appendix to the RIA would allow readers to perform their own sensitivity analyses with different rates. Whatever decision is made, benefit and cost impacts in the same calendar year should be subjected to the same discount factor. [EPA-HQ-OAR-2021-0208-0116]

EPA Response

EPA follows applicable guidance and best practices when conducting its benefit-cost analyses, including OMB Circular A-4 and EPA's Guidelines for Preparing Economic Analyses. We therefore consider our analysis methodologically rigorous and a best estimate of the projected benefits and costs associated with the final rule.

With respect to the social cost of greenhouse gases, EPA recognizes the limitations and uncertainties associated with the current interim IWG estimates and underlying methodology. EPA participated in the IWG and has carefully reconsidered for this rulemaking the February 2021 TSD,[58] the underlying studies discussed in the TSD and the issues raised by commenters. EPA concludes that, as noted in Section 3.3 of the RIA and elsewhere in this RTC, the discussions in the TSD represent appropriate consideration of the various issues (e.g., appropriate discount rate and scope) and the resulting estimates of the TSD represent appropriate, if conservative, estimates for purposes of this rulemaking.

With respect to the application of discount rates, EPA notes that it used the same discount rate as the rate used to discount the value of damages from future GHG emissions, for internal consistency. That approach to discounting follows the same approach that the February 2021 TSD recommends "to ensure internal consistency—i.e., future damages from climate change using the SC-GHG at 2.5 percent should be discounted to the base year of the analysis using the same 2.5 percent rate." EPA has also consulted the National Academies' 2017 recommendations on how SC-GHG estimates can "be combined in RIAs with other cost and benefits estimates that may use different discount rates." The National Academies reviewed "several options," including "presenting all discount rate combinations of other costs and benefits with [SC-GHG] estimates."

Commenter: American Enterprise Institute (AEI)

The EPA estimates of the climate benefit of the Proposed Rule obviously is based upon the interim estimates of the 'social cost of carbon,' which analytically are fundamentally flawed, combined with the asserted reduction in GHG emissions attendant upon the Proposed Rule. This methodology is illegitimate.

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[58] *Technical Support Document: Social Cost of Carbon, Methane, and Nitrous Oxide Interim Estimates under Executive Order 13990*

‘Fuel savings’ are asserted by the EPA to be roughly twice the purported environmental benefits of the Proposed Rule. But fuel savings, even if the asserted magnitudes are correct, are illegitimate as an economic benefit of the Proposed Rule, as the purported environmental benefits of reduced fuel use are reported separately, and thus there remains no further divergence between the market price and the social cost of petroleum fuels. Moreover, the EPA fails to consider the adverse consumer effects of a forced reduction in fuel consumption. Were the use of petroleum motor fuels to be proscribed entirely, the EPA methodology would yield a ‘benefit’ calculation of $357 billion annually, based upon data for 2019 reported by the Energy Information Administration. The EPA methodological approach is fundamentally unserious.

The discount rate analysis presented in the Proposed Rule and the RIA is not correct because the use of resources for future environmental improvement is an investment by definition; the historical evidence shows that the appropriate discount rate is a minimum of 7 percent. The use of different discount rates for the asserted benefit and cost streams engendered by the Proposed Rule is illegitimate. With respect to the ‘intergenerational equity’ question, the interests of future generations are served by a bequest of the most valuable possible capital stock, an outcome dependent upon the use of a correct and consistent discount rate by the current generation. [EPA-HQ-OAR-2021-0208-0254-A1, p. 2]

This reality — the ostensible effect of the Proposed Rule as a climate policy — alone demonstrates that the Proposed Rule cannot satisfy any plausible benefit/cost, and thus is not appropriate and should not be finalized in its present form or any alternative even remotely approximating it. That inescapable conclusion is demonstrated as well by the economic benefits asserted in the Proposed Rule, which are between $4.2 billion and $7.3 billion (in year 2018 dollars) annually through 2050. Global GDP in 2019 was about $97.5 trillion, also in year 2018 dollars.8 Accordingly, the EPA is asserting that this Proposed Rule will increase global GDP annually by an absolute maximum of about 0.075 percent, an effect that would decline over time as global GDP grows. Given the variation in global GDP growth rates over time, that effect cannot possibly be statistically significant. Accordingly, the EPA claim that ‘the total benefits far exceed the total costs of the program’ is not to be taken seriously.

Note also that the available independent analyses suggest that the prospective economic benefits of policies to reduce GHG emissions are much smaller than many assert. Consider the economic predictions from the integrated assessment models, the central one of which in this context is the Dynamic Integrated Climate and Economy Model, for which William D. Nordhaus won the Nobel Prize in Economics in 2018.9 Under DICE, global gross domestic product (GDP) in 2100 varies by about 3 percent across policy scenarios, including no climate policies at all, a figure that is both very small and almost certainly not statistically significant given the vagaries of economic forecasting and the number of years remaining before the end of this century. (I exclude here Nordhaus’ ‘Stern discounting’ policy scenario, as it assumes a discount rate effectively equal to zero, a fundamental analytic error.10) Per capita consumption varies only by about 1.3 percent across policy scenarios, also a very small number and almost certain not to be statistically significant.

The IPCC — even in its most alarmist analyses — arrives at a conclusion very close to that reported in the DICE analysis. In its 2018 report, it finds that the damage from anthropogenic climate change unmitigated by policy initiatives will reduce global GDP by 2.6 percent by 2100.11 By that year, IPCC projects that individual incomes on average will be at least 400 percent greater than is the case today.12 [EPA-HQ-OAR-2021-0208-0254-A1, pp. 4-5]

The discount rate analysis in the Proposed Rule is illegitimate. [EPA-HQ-OAR-2021-0208-0254-A1, p. 5]

Climate-related benefits. It is obvious that the EPA analysis in the Proposed Rule arrives at its calculation of the (global) benefits of reduced GHG emissions by multiplying its (interim) estimate of the social cost of carbon (SCC) by the asserted reductions in GHG emissions attendant upon implementation of the Proposed Rule.16 The interim estimates of the SCC are deeply problematic for a number of reasons,17 the most important of which is that they are divorced from the actual evidence and science of anthropogenic climate change. The mainstream estimates of the SCC, derived from three major integrated assessment models, ignore the actual evidence on the climate effects of increasing atmospheric concentrations of GHG, relying instead upon models that have overstated the historical record on global surface and tropospheric temperatures by a factor of over two, and upon a future scenario of increasing GHG concentrations that is almost impossible.18 (The IPCC in the Sixth Assessment Report describes RCP8.5 as ‘a low probability scenario.’) They ignore also the benefits of small or moderate warming. [EPA-HQ-OAR-2021-0208-0254-A1, p. 6]

Note also that the Interagency Working Group in its SCC analysis used the assumed global benefits of reductions in GHG emissions as the basis for the SCC analysis, while the CPP net benefits largely or wholly are created by assumed reductions in domestic pollutants, as just discussed. This is an inconsistency that has gone largely unnoticed in the Washington policy community.43 [EPA-HQ-OAR-2021-0208-0254-A1, p. 11]

The Inconsistent Use of Discount Rates and the Intergenerational Equity Question. By definition ‘climate policy’ is the allocation of resources away from current consumption and from productive activities that yield consumption goods during the current time period, in favor of a reduction in GHG emissions/concentrations that purportedly would increase the production of consumption goods during some series of future time periods. That is why EPA asserts that the Proposed Rule would increase the present value of the consumption stream increased. Accordingly, that use of resources during the current time period — again, by definition — is an investment, and it must be evaluated in comparison with the social return to alternative investments.

Therefore, it is the opportunity of cost of capital that is the appropriate discount rate to be applied to the evaluation of the Proposed Rule, because the allocation — the investment — of resources to such endeavors imposes an opportunity cost in the form of other forgone investments. Because the use of scarce resources for reductions in GHG emissions is an investment, whether promising returns low or high, the appropriate discount rate is the opportunity cost of capital for the economy as a whole. For the period 1928-2020, the average annual before-tax return to investment in the Standard and Poor 500, in real (inflation-adjusted) terms was 8.5 percent.53 For the period 1960-2020, the figure was 7.61 percent. Such long-run historical figures are consistent with the directive in OMB Circular A-4 that a discount rate of 7 percent be the baseline parameter applied to regulatory analysis by the federal government.54

The RIA proceeds to justify a ‘consumption rate of interest’ defined alternatively at 2.5 percent, 3 percent, or 5 percent, as follows.55

Second, the IWG found that the use of the social rate of return on capital (7 percent under current OMB Circular A-4 guidance) to discount the future benefits of reducing GHG emissions inappropriately underestimates the impacts of climate change for the purposes of estimating the SC-GHG. Consistent with the findings of the National Academies and the economic literature, the IWG continued to conclude that the consumption rate of interest is the theoretically appropriate discount rate in an intergenerational context… and recommended that discount rate uncertainty and relevant aspects of intergenerational ethical considerations be accounted for in selecting future discount rates. As a member of the IWG involved in the development of the February 2021 TSD, EPA agrees with this assessment and will continue to follow developments in the literature pertaining to this issue.

That analytic argument is fundamentally flawed. First: The ‘consumption rate of interest’ is not the correct conceptual discount rate for analysis of the Proposed Rule because the use of resources for purposes of reductions in GHG emissions is obviously an investment, the opportunity cost of which is the marginal social return to investment. Even if we assume that the ‘consumption rate of interest’ conceptually is the correct parameter for discounting purposes, the relevant metric is the real market rate of interest on intertemporal consumption shifts, one crude measure of which is the market rate of interest on unsecured consumer loans. Even given the recent years of low interest rates maintained by the Federal Reserve, that market rate appears to be over 7 percent in real terms.56 For secured loans (new autos), the real interest rate appears to be at least 3 percent,57 but that is not the correct parameter because there is no collateral insuring against the possibility that government policies mandating reductions in GHG emissions prove uneconomic. The discount rate argument presented in the RIA is fundamentally flawed analytically, and is inconsistent with the data for the U.S. credit market.

Note also that the use of a (low) ‘consumption rate of interest’ for the evaluation of climate policy only would introduce an important bias in the allocation of resources among government policies and between government and private-sector resource use. The RIA does not argue that the ‘consumption rate of interest’ should be applied to the benefit/cost analysis of all government investment and regulatory activity; only climate policies are to be so treated, on the grounds of ‘intergenerational equity,’ discussed below. Nor would the private sector choose to use an artificially-low discount rate for the evaluation of alternative resource uses. If it is only the climate dimension of investment and consumption choice dynamics that is to be shaped by the use of a low ‘consumption rate of interest,’ it is obvious that important distortions would be the central outcome, with a smaller capital stock resulting.

Second: The implicit premise in the EPA discussion of intergenerational analysis and the discount rate is straightforward: Future generations prefer to avoid the damages that they ostensibly will bear because of the climate effects of resource allocation decisions made by the current generation, and because future generations cannot vote during the current time period, it is equitable to force the current generation to bear the costs of anthropogenic climate change that otherwise would be inflicted upon future generations.

However seemingly straightforward, that argument is not correct. Future generations prefer to receive a bequest of an aggregate capital stock more- rather than less valuable, an objective very different from a maximization of the value of one dimension — climate phenomena — of that aggregate capital stock. This requires efficient resource allocation by the current generation, and therefore the application of the correct discount rate. Consider a homo sapiens baby borne in a cave some 50,000 years ago. Despite the fact that at birth that child would have enjoyed environmental quality effectively unaffected by mankind, and a fortiori climate phenomena determined by natural processes only, the baby at birth would have had a life expectancy of only about ten years.58

Accordingly it is obvious that given the opportunity to choose, that child would opt for less environmental quality and greater climate risk in exchange for a longer life expectancy engendered by a more valuable aggregate capital stock yielding improved shelter, expanded food supplies, a cleaner water supply, better medical care, ad infinitum. Greater wealth is the central objective of any generation, a reality shunted aside by the focus in the RIA upon only the climate dimension of the aggregate capital stock to be bequeathed to future generations.

There is the further matter that the application of differing discount rates to the benefit and cost streams asserted by EPA in defense of the Proposed Rule is deeply problematic. EPA discounts the purported benefit stream at 2.5, 3, and 5 percent discount rates — for presentational purposes, the 3 percent rate is used in the summary argument — but a 7 percent discount rate for the purported cost stream.59 Because the economic costs of the Proposed Rule would be borne almost immediately, while the asserted climate benefits would be obtained only after many decades at the earliest, it is not difficult to hypothesize that the use of inconsistent discount rates represents an effort to bias the analysis in favor of the Proposed Rule. Note that EPA in the RIA reports estimated global climate benefits through 2050 (year 2018 dollars) in present value terms of $140 billion, $91 billion, and $22 billion, at discount rates of 2.5 percent, 3 percent, and 2.5 percent, respectively.60 It is obvious that the application of a 7 percent discount rate would have yielded a climate benefit calculation close to zero. [EPA-HQ-OAR-2021-0208-0254-A1, pp. 14-16]

Inclusion of Global Rather Than Domestic Purported Benefits of GHG Emissions

OMB Circular A-4 directs federal agencies conducting benefit/cost analysis of regulatory measures as follows: 'Your analysis should focus on benefits and costs that accrue to citizens and residents of the United States. Where you choose to evaluate a regulation that is likely to have effects beyond the borders of the United States, these effects should be reported separately.'50 The Proposed Rule, however, incorporates explicitly in its benefit/cost calculation the purported global climate benefits from reductions in U.S. GHG emissions, presumably on the grounds that the assumed GHG externality is global in nature.

This argument is fundamentally flawed, in substantial part because the global climate effect of all U.S. GHG emissions is very close to zero, as discussed above in section I. Accordingly, the global 'benefit' of the Proposed Rule is effectively zero. EPA cannot dispute this because it is the EPA climate model used directly or indirectly through the IAMs applied to the analysis of the Proposed Rule. More generally, it is the EPA climate model that is used throughout the federal government for analysis of climate and energy policies.51

Furthermore, the inclusion of purported global benefits in the benefit/cost analysis of U.S. GHG policies would create a very large distortion in terms of an efficient international adoption of climate policies. An efficient promulgation of climate policies internationally would attempt to achieve both an equation of the global marginal benefits and costs of GHG emission reductions, and an allocation of emissions reductions that equates the marginal cost of such reductions across economies. If the U.S. is to promulgate domestic policies that equate domestic marginal costs with global marginal benefits, then other countries would have powerful incentives to obtain free rides on U.S. efforts. Given that the marginal cost function for reductions in GHG emissions almost certainly is upward sloping — the marginal cost of GHG reductions rises as such reductions increase — the outcome would be a global effort to reduce GHG emissions more costly than an international effort equating marginal costs across economies.52 That is the central implication of the imperative asserted in the Proposed Rule of including the purported global benefits of reductions in GHG emissions, rather than only the domestic ones. Under any assumption about the global benefits of reduced GHG emissions, that cannot be an efficient outcome unless the U.S. is the low-cost source of all reductions in GHG emissions, an assumption that simply is not plausible. [EPA-HQ-OAR-2021-0208-0254-A1, p. 13]19 On the surface (land/ocean) temperature record, see UK Met Office, Hadley Centre/University of East Anglia Climatic Research Unit, 'Tim Osborn: HadCRUT4 Global Temperature Graphs,' https://crudata.uea.ac.uk/~timo/diag/tempdiag.htm. On the Little Ice Age, see Michael E. Mann, 'Little Ice Age,' in Encyclopedia of Global Environmental Change, Volume 1: The Earth System: Physical and Chemical Dimensions of Global Environmental Change, ed. Michael C. MacCracken, John S. Perry and Ted Munn (Chichester, England: John Wiley & Sons, 2002), http://www.meteo.psu.edu/holocene/public_html/shared/articles/littleiceage.pdf.

52 This is true whether the marginal cost functions across economies are identical or differ.

EPA Response

EPA disagrees with many of the commenters' contentions. EPA follows applicable guidance and best practices when conducting its benefit-cost analyses, including OMB Circular A-4 and EPA's Guidelines for Preparing Economic Analyses. We therefore consider our analysis methodologically rigorous and a best estimate of the projected benefits and costs associated with the final rule. EPA has carefully reconsidered for this rulemaking the Technical Support Document, the underlying studies discussed in the TSD and the issues raised by commenters. EPA concludes that, as noted in Section 3.3 of the RIA and elsewhere in this RTC, the discussions in the TSD represent appropriate consideration of the various issues (e.g., appropriate discount rate and scope) and the resulting estimates of the TSD represent appropriate, if conservative, estimates for purposes of this rulemaking.

With respect to the use of consumption rate of interest for SC-GHG based estimates of climate benefits, the February 2021 IWG TSD discusses in detail why the social rate of return to capital is not appropriate for use in calculating the SC-GHG and climate benefits in general where benefits occur for decades or longer into the future. In this analysis, to calculate the present and annualized values of climate benefits, EPA uses the same discount rate as the rate used to discount the value of damages from future GHG emissions, for internal consistency. That approach to discounting follows the same approach that the February 2021 TSD recommends "to ensure internal consistency—i.e., future damages from climate change using the SC-GHG at 2.5 percent should be discounted to the base year of the analysis using the same 2.5 percent rate." EPA has also consulted the National Academies' 2017 recommendations on how SC-GHG estimates can "be combined in RIAs with other cost and benefits estimates that may use different discount rates." The National Academies reviewed "several options," including "presenting all discount rate combinations of other costs and benefits with [SC-GHG] estimates."

With respect to discount rates, EPA recognizes the limitations and uncertainties associated with the current interim IWG estimates and underlying methodology. The limitations were outlined in the February 2021 TSD and include that the current scientific and economic understanding of discounting approaches suggests discount rates appropriate for intergenerational analysis in the context of climate change are likely to be less than 3 percent, near 2 percent or lower. Additionally, the IAMs used to produce these estimates do not include all of the important physical, ecological, and economic impacts of climate change recognized in the climate change literature, and the science underlying their “damage functions” – i.e., the core parts of the IAMs that map global mean temperature changes and other physical impacts of climate change into economic (both market and nonmarket) damages – lags behind the most recent research.

The modeling limitations do not all work in the same direction in terms of their influence on the SC-GHG estimates. However, as discussed in the February 2021 TSD, the IWG has recommended that, taken together, the limitations suggest that the SC-GHG estimates likely underestimate the damages from GHG emissions. Therefore, as a member of the IWG involved in the development of the February 2021 TSD, EPA agrees that the interim SC-GHG estimates represent the most appropriate estimate of the SC-GHG until revised estimates have been developed reflecting the latest, peer reviewed science. The 2021 TSD previews some of the recent advances in the scientific and economic literature that the IWG is actively following and that could provide guidance on, or methodologies for, addressing some of the limitations with the interim SC-GHG estimates.

Regarding the distinction between global and domestic SC-GHG estimates, to correctly assess the total climate damages to U.S. citizens and residents, an analysis must account for impacts that occur within U.S. borders, climate impacts occurring outside U.S. borders that directly and indirectly affect the welfare of U.S. citizens and residents, and spillover effects from climate action elsewhere. The SC-GHG estimates used in regulatory analysis under revoked E.O. 13783 were an approximation of the climate damages occurring within U.S. borders only. EPA included the application of these domestic SC-GHG estimates to the reductions estimated in the analysis in Section 3.3 of the RIA. As discussed at length in the IWG's February 2021 TSD, estimates focusing on the climate impacts occurring solely within U.S. borders are an underestimate of the benefits of GHG mitigation accruing to U.S. citizens and residents, as well as being subject to a considerable degree of uncertainty due to the manner in which they are derived. EPA disagrees that using global estimates creates an incentive for foreign countries to "free ride" on U.S. GHG reduction efforts. As discussed in the February 2021 TSD, a wide range of scientific and economic experts have emphasized the issue of reciprocity as a reason for considering global damages of GHG emissions. Further, EPA agrees with commenter Institute for Policy Integrity's points on this issue (see comment in Section 14.1 of this document).

See Section 17 of this document for the response to AEI's comment on inclusion of the fuel savings in the benefit-cost analysis.

Commenter: Attorney General of Missouri et al.

Before addressing the EPA's request for public comment on the 'Revised 2023 and Later Model Year Light-Duty Vehicle Greenhouse Gas Emissions Standards,' it is important to reaffirm our objections to the process that has led us to this place. The Interagency Working Group on the Social Cost of Greenhouse Gases (IWG) and its actions violate the separation of powers by exercising quintessentially legislative authority without a valid delegation of authority from Congress, and violate the Administrative Procedure Act by failing to engage in ordinary rulemaking procedures.[1] They also violate federal statutes that delegate rulemaking authority to specific agencies, not the IWG. Separation-of-powers principles safeguard individual liberty, and the APA is Congress's blueprint to ensure reasoned decision-making by the Executive Branch. The IWG's failure to comply with these basic principles constitutes fundamentally lawless action that threatens the freedom of all Americans. [EPA-HQ-OAR-2021-0208-0288-A1, p.2]

The actions of the Interagency Working Group violate these fundamental principles. The adoption of specific, binding, numerical values for 'social costs ' of greenhouse gases is an inherently legislative function. Thus, the IWG purports to exercise quintessentially legislative authority without citing any delegation of authority whether valid or purported from Congress. The IWG reflects the Executive Branch's naked arrogation of legislative power to itself. 'Frequently,' a threat to the separation of powers 'will come ... clad, so to speak, in sheep's clothing .... But this wolf comes as a wolf.' Morrison u. Olson, 487 U.S. 654, 699 (1988) (Scalia,J .,dissenting). [EPA-HQ-OAR-2021-0208-0288-A1, p.3]

Moreover, the Interagency Working Group's 'request for comment ' earlier this year invoked the label for AP A procedures while purporting to deny Americans a critical benefit of notice and comment procedures: access to the judicial review to ensure that the Executive Branch meaningfully considers and addresses these concerns. We have previously objected to the Interagency Working Group dressing up substantive executive edicts in the parlance of good government. [EPA-HQ-OAR-2021-0208-0288-A1, pp.3-4]

On May 6, 2021, Deputy OIRA Administrator Mancini submitted a notice that the Co-Chairs requested comment on five issues impacting the SC-GHG. In addition to the legal and constitutional deficiencies in the IWG's formulation and process, we responded as follows to bullet points about 'general advances in science and economics included in' the 2021 TSD, approaches to implementing the recommendations of the National Academies of Science, Engineering, and Medicine (NASEM) published in its 2017 Valuing Climate Damages report, and using discount rates for intergenerational analysis. The Interagency Working Group's current approach to potential climate-related damages is deeply and irretrievably flawed, and yet more baseless modeling, speculative assumptions, and artificially manufactured numbers are not the solution. [EPA-HQ-OAR-2021-0208-0288-A1, p.4]

The 2021 TSD sets forth a substantive, legislative rule [3] because it is a final agency action imposing new rights or duties. Iowa League of Cities v. EPA, 711 F.3d 844, 873 (8th Cir. 2013); see 5 U.S.C. § 551(4). 'Expanding the footprint of a regulation' by imposing new requirements ... is the hallmark of legislative rules.' Id. As JudgeFriendly recognized, 'when an agency wants to state a principle 'in numerical terms,'terms that cannot be derived from a particular record, the agency is legislating and should act through rulemaking.' Catholic Health Initiatives v. Sebelius, 617 F.3d 490, 495 (D.C. Cir. 2010) (quoting Henry J. Friendly, Watchman, What of the Night?, in Benchmarks 144 45 (1967)). '[A]n agency performs a legislative function' when it promulgates 'a rule that turns on a number.' Id. In other words, rules that . promulgate specific numerical values for policy problems are quintessentially legislative in nature. The task of promulgating specific numerical values for 'social costs' of greenhouse gases is 'a legislative function.' Id. It can be exercised only by Congress, or through a valid delegation of authority from Congress (if a delegation of such enormous authority is even permissible, which is doubtful at best). [EPA-HQ-OAR-2021-0208-0288-A1, pp.4-5]

The IWG's promulgation of such rules for the 'social costs' of gases raises several problems. First, '[i]t is axiomatic that an administrative agency's power to promulgate legislative regulations is limited to the authority delegated by Congress.' Bowen v. Georgetown Univ. Hosp., 488 U.S. 204, 208 (1988). So when 'there is no statute conferring authority, a federal agency has none.' Michigan v. EPA, 268 F.3d 1075, 1081 (D.C. Cir. 2001). Neither the 2021 TSD nor the vehicle that created the Interagency Working Group, Executive Order 13990, cites any statutory authority authorizing them to promulgate such rules, and none exists. As a result, the Interagency Working Group lacks authority to issue rules in this area at all, and its attempts to do so violate both the separation of powers and the statutes that properly delegate such authority. See supra. [EPA-HQ-OAR-2021-0208-0288-A1, p.5]

Second, the IWG violated the APA in promulgating interim values for SCGHG because it failed to provide any opportunity to comment. 'Notice of a proposed rule must include sufficient detail on its content and basis in law and evidence to allow for meaningful and informed comment.' Am. Med. Ass'n v. Reno, 57 F.3d 1129, 1132 (D.C. Cir. 1995). 'The purpose of the comment period is to allow interested members of the public to communicate information, concerns, and criticisms to the agency during the rule-making process.' Connecticut Light & Power Co. v. Nuclear Regul. Comm'n, 673 F.2d 525, 530 (D.C. Cir. 1982). The Interagency Working Group, however, did not seek any public comment to before issuing the 2021 SCGHG estimates.

Instead, it formulated different SCGHG estimates for future use preventing the public from commenting on the 2021 SCGHG estimates that the rule at issue uses. [EPA-HQ-OAR-2021-0208-0288-A1, p.5]

These administrative procedures reflect important fairness principles and sound decision-making-and that is why Congress requires them. The Interagency Working Group effectively denied the American public the opportunity to meaningfully contribute to its decision-making process. Now, the IWG's unlawful process forms the foundation for the Revised Light Duty Vehicle Greenhouse Gas Emissions Standards, and EPA has used these interim estimates in this rule without determining whether the estimates comply with the statute or whether estimates are reasonable. [EPA-HQ-OAR-2021-0208-0288-A1, pp.5-6]

Basing the Revised Light-Duty Vehicle Greenhouse Gas Emissions Standards on Fla wed Social Costs of Greenhouse Gas Estimates while Failing to Account for Negative Externalities Would Be Arbitrary and Capricious.

To the extent that EPA relies on the IWG's SC-GHG analysis, the Revised 2023 and Later Model Year Light-Duty Vehicle Greenhouse Gas Emissions Standards result from a scientifically unreliable process that is unnecessarily experimental, non-scientific and harmful. As outlined above, the Eiden Administration's calculation of the 'social costs' of gases such as carbon dioxide and methane is arbitrary and capricious. This abstract and speculative policy-making causes substantial harms when applied to real-world industries that sustain thousands of American workers. [EPA-HQ-OAR-2021-0208-0288-A1, p.14]

This EPA proposed rule is the latest in what promises to be a series of evermore- stringent sweeping executive fiats intent on dramatically reshaping the automotive industry in the United States by a top-down conversion from the internal combustion engine to zero or near-zero emissions (i.e., all-electric) vehicles beginning in 2023. (86 FR 43728). Auto-manufacturing has formed an integral part of the national economy for generations, the economies of many states, and American life. The economic impact of vehicle manufacturing to the State of Missouri alone is estimated to be over $3.8 billion per year.[9] Furthermore, this economic activity employs over 20,000 Missourians. [10] [EPA-HQ-OAR-2021-0208-0288-A1, pp.14-15]

Failure to Adequately Consider Negative Impacts. This proposed rule compounds errors in the IWG's defective processes and is internally inconsistent. For example, the EPA fails to consider the negative environmental effects of its aggressive mandate which aims to convert a sizeable percentage of American auto manufacturing to electric vehicles on an expedited timeframe. Far from the panacea the EPA describes,[11] such heavy-handed meddling by federal bureaucrats in the functioning of the free market is bound to have negative upstream effects, which the SC-GHG analysis fails to consider. [EPA-HQ-OAR-2021-0208-0288-A1, p.15]

Inexorably linked to the move away from abundant, easy-to-reach fossil-fuels to electric light vehicles, are a host of technical, ecological, diplomatic and ethical issues. Phasing out internal combustion engines causes a dramatic increase in the demand for batteries. Significant challenges still remain before this technology can replace gasoline engines. [EPA-HQ-OAR-2021-0208-0288-A1, p.15]

The most common fuel cells to be used in electric vehicles rely on 'rare earth' metals such a lithium and cobalt. These important resources are often difficult to attain in adequate quantities for a number of reasons.[12] First, these metals are primarily located in regions of the world such as China, Chile, Bolivia, and Argentina, in the case of lithium. Extracting these resources have hidden costs such as extensive use of scarce water during the mining process in arid regions such as Chile. Such practices may have damaging effects on local agriculture.[13] Even more concerning is the supply of cobalt which is predominately located in the Democratic Republic of the Congo. Mining is conducted with little regard to human rights concerns, resulting in widespread exploitation. Child labor in these mining operations is estimated to impact up to 40,000 children who work in dangerous conditions.[14] [EPA-HQ-OAR-2021-0208-0288-A1, pp.15-16]

The rule is also internally inconsistent, and therefore arbitrary, because it only considers the 'global damages' from the emissions of new light duty vehicles, but not the global damages from upstream GHG emissions used to create and scale these new technologies. By only focusing on end-point GHG emissions, the rule increases perceived benefits in the lower emissions of these vehicles without considering, let alone measuring, whether upstream manufacturers emit more GHG, or in the case of rare earth metals, the other countries will emit more GHG emissions mining these materials. If the global damages from GHG must be considered, and EPA insists they must do so, failing to consider how adopting new technologies that require mining rare materials in other countries will produce GHG emissions is arbitrary. [EPA-HQ-OAR-2021-0208-0288-A1, p.16]

By offloading GHG emissions to other countries, the rule encourages 'carbon colonialism' that provides 'benefits' to first world countries at the expense of less developed ones. [EPA-HQ-OAR-2021-0208-0288-A1, p.16]

[3] A 'rule' is ' the whole or part of an agency statement of general or particular applicability and future effect designed to implement, interpret, or prescribe law or policy' 'includ[ing] the approval or prescription ... of valuations, costs, or accounting, or practices bearing on any of the foregoing.' 5 U.S.C. § 551(4). In its executive summary, the 2021 TSD makes clear that the 'SC-GHG is the monetary value of the net harm to society associated with adding a small amount of that GHG to the atmosphere in a given year.' Whether used in a cost-benefit analysis or for any other purpose, the 2021 TSD sets forth a value to be used in agency statements designed to implement law or policy, and as a result it is a rule.

EPA's use of the Biden Administration's Interagency Working Group's interim estimates for the 'social costs of greenhouse gases' (SC-GHG) to determine global damages of the present-day greenhouse emissions for light-duty vehicles is inappropriate. The interim estimates are the product of unreliable analysis, speculative projections, and naked policy judgements that have an outsize impact on perceived benefits from reducing GHG emissions. The selection of a discount rate, in particular, involves not science but a legislative judgement that Congress has not delegates to a regulatory agency like the EPA, And the IWG, by purporting to dictate binding values for such calculations that agencies like EPA must use in regulatory actions, is acting without any statutory authority and in violation of the fundamental separation of powers.

The federal government has previously and correctly recognized that this SC-GHG analysis is a fatally flawed concept when it refused ' to use social cost of carbon' analysis or a similar analytical tool to analyze the environmental impacts of greenhouse gas emissions from the construction and operation of the converted [natural gas] facilities.' EarthReports, Inc. v. Fed. Energy Regul. Comm'n, 828 F.3d 949, 956 (D.C. Cir. 2016). In that instance, the Federal Energy Regulatory Commission (FERC) did so because it concluded that the SCC would not be 'appropriate or informative' due to three factors: 'the lack of consensus on the appropriate discount rate leads to significant variation in output,' the SCC 'tool does not measure the actual incremental impacts of a project on the environment,' and 'there are no established criteria identifying the monetized values that are to be considered significant for NEPA purposes.' Id. (internal quotation marks omitted). The Commission further observed that 'there is no standard methodology to determine how a project's incremental contribution to [greenhouse gas emissions] would result in physical effects on the environment, either locally or globally.' Id. The D.C. Circuit upheld the Commission's reasoning and decision on this point. Id. All these concerns remain true today. The EPA should not rely on such a 'Social Cost of Carbon' metric for any rulemaking or other regulatory proceeding. [EPA-HQ-OAR-2021-0208-0288-A1, pp. 1-2]

Promulgating the Social Costs of Greenhouse Gases Violates the Separation of Powers and the APA, and Exceeds the Executive's Statutory Authority. Congress, not the President, controls the substance and sets the procedure for writing substantive rules. 5 U.S.C. § 553. The Interagency Working Group has violated those principles by issuing the 2021 TSD establishing the Social Costs of Greenhouse Gases (SCGHG) without engaging in notice and comment.[2] Id. at § 553(b). This deprives the American people of a meaningful opportunity to comment.[EPA-HQ-OAR-2021-0208-0288-A1, p.4]

The Current Social Costs of Greenhouse Gases Are Deeply Flawed and Cannot Be Fixed by Making More Wild Guesses. Beyond the fatal constitutional and legal deficiencies in these procedures, the IWG's approach to calculating ‘social costs’ of various gases is deeply flawed. The previous notice for comment expressly requested ways to implement the 2017 NASEM report's recommendations, recent advances in science and economics, and how to reflect the best understanding of discount rates for intergenerational analysis. The 2017 NASEM report, in turn, touches on most elements of the Interagency Working Group's process for developing a TSD, from the accounting of global versus domestic damages, the selection of the discount rate, and moving away from the incomplete and flawed averaging of the Integrated Assessment Models (IAMs). Though we agree with the 2017 NASEM report's general findings that the 2016 TSD[4] and Addendum are highly deficient, we disagree with the report's recommendations that more speculative modeling and more speculative probability distributions will right the ship. NASEM's findings confirm what MIT economist Robert Pindyck has found: ‘an IAM-based analysis suggests a level of knowledge and precision that is nonexistent, and allows the modeler to obtain almost any desired result because key inputs can be chosen arbitrarily.’ Robert S.

Pindyck, Climate Change Policy: What do the Models Tell Us?, National Bureau of Economic Research Working Paper 19244, at 16 (2013) (emphasis added). [5]

The 2021 TSD provides SCGHG estimates that are completely arbitrary for the reasons discussed below. As the Interagency Working Group's ! AM-based estimates fail to show a reasonable basis for the factual inputs and modeling assumptions, the estimates cannot survive arbitrary and capricious review. Sierra Club v. Castle, 657 F.2d 298, 333 (D.C. Cir. 1981).

2017 NASEM Report. NASEM's recommendations touch on virtually every aspect of the !AM-driven estimates promulgated by the Interagency Working Group. The NASEM report repeatedly criticizes the lack of transparency and consistency in the modeling processes, as well as the Interagency Working Group's failure to use more recent science. For example, in discussing the climate module, NASEM recommended that any ‘module should strive for transparency and simplicity so that the central tendency and range of uncertainty in its behavior are readily understood, reproducible, and amenable to improvement over time.’ Recommendation 4-1 at 13. NASEM concluded that averaging three IAMs fell short of achieving ‘transparency and consistency of key assumptions with the peer reviewed science' and aggravated 'the uncertainty representations, including structural uncertainty.' 2017 NASEM Report at 46 (Conclusion 2-1). It also found that the approach failed to provide an 'a transparent identification of the inputs, outputs, uncertainties, and linkages among the different steps of the SC-CO2 estimation process.' Id. (Conclusion 2-2).

NASEM also determined that estimated damages to the 'United States alone, beyond approximations done by the IWG ... is limited in practice by the existing SCIAM methodologies.' Id. at 9 (Conclusion 2-4). The report noted that the first Interagency Working Group made 'rough estimates of the proportion of global damages attributable to impacts within U.S. borders' even though it had departed from past agency practices by focusing on global damages. Id.[EPA-HQ-OAR-2021-0208 0288-A1, pp.6-7]

In various recommendations, NASEM stated that any new model should provide for more transparent reporting of individual sectors. E.g., Recommendations 3-2 at ll(‘Develop projections of sectoral and regional GDP and regional population’), 3-3 at 12 (socioeconomic module with ‘probabilistic regional and sectoral projections’), and 5-1 at 17 (damage functions).

The report and its recommendations identify other problems involving the time horizon, climate effects (ocean acidification, ice-sheet warming), the lack of reliable projections for population and GDP, the variability and non-comparability of the three different IAMs used by the Interagency Working Group, the need to account for feedback and adaptation, and the selection of discount rates. In nearly all cases, NASEM recommends more explicit modeling, more projections through expert elicitation and probability distributions, and improving the data sets for the modeling. And even NASEM doubts the viability of any socioeconomic module past the year 2100 an understatement to say the least. 2017 NASEM Report at 74 77. These significant issues and uncertainty counsel against relying on modeling to take government actions that impose pocketbook costs on the American people today. Unfortunately, the EPA with its currently proposed regulation on light duty vehicles is going down this very path.

IAM-based damages analyses are arbitrary. The IAM-based analyses provide a scientific veneer for the modeler's own policy preferences, instead of applying high quality data to measurable and reproducible phenomena. Because the DICE, PAGE, and FUND Models are all IAMs and the sole inputs for every estimate of social costs, averaging the results does nothing to make up for the lack of theoretical and empirical bases for the SCGHGs. See NERA, A Review of the Damage Functions Used in Estimating the Social Cost of Carbon (Feb. 20, 2014) (attached as Exhibit A).6 No matter how many times one guesses, the mean of three wild guesses is still a wild guess.

The IAMs ‘have crucial flaws that make them close to useless as tools for policy analysis’ and their ‘descriptions of the impact of climate change are completely ad hoc, with no theoretical or empirical foundation.’ Pindyck, Climate Change Policy (abstract). As one colleague put it, ‘I can make a model tie my shoe laces.’ Id. at 5 n.7. A 2014 NERA report, submitted to an earlier iteration of the Interagency Working Group, found the same thing. A Review of the Damage Functions, at 1. Specifically, it explained ‘that possible damage estimates at a given point in time can differ by a factor of 20 or more within the range of parameters and range of temperature changes found in the IAM literature.’ Id.

The NERA report explains that the IAMs' damages function predicts economic loss to show the change in GDP directly as a function of the projected change in temperature. Id. at 13. The FUND model projects monetary loss directly from the temperature change, the rate of temperature change, or carbon dioxide concentration. Id. at 14. This direct function from temperature change means that for all IAMs ‘global GDP is always reduced as global temperature increases.’ Id. at 15. Additionally, because of this relationship, all of the IAMs also have built in ad hoc ‘safety rails’ that prevent damages from exceeding 100% GDP. Id. at 16. In evaluating the theoretical basis for this damage function, the NERA team reviewed Weitzman's articles and ultimately credited his assessment that while he preferred one functional form over another, he could not ‘prove that my favored choice is the more reasonable of the two.’ Id. at 24.

The NERA report found that the IAMs had no empirical basis either. The team explained that the IAMs suffered from a lack of high quality data to properly calibrate their damage functions. Id. at 27 28. It also noted that these IAMs are set to one benchmark point that is a judgment each modeler makes, resulting in ‘damage functions [that] can differ dramatically from model to model, but each is ad hoc and with no well-defined empirical standards to resolve which might be more reliable than another.’ Id. at 26. As a result of these two issues, the report notes that the ‘modelers clearly recognize and readily concede the limitation in the empirical evidence’ with the creator of FUND noting that the lack of evidence ‘does not result in a climate change impact model that is adequate.’ Id. at 30.

All of this leads to the inevitable conclusion that the ‘model is unreliable and should not be used by lawmakers or regulators.’ Declaration of Kevin Dayaratna ,¶ 5 (Dayaratna Deel.) (attached as Exhibit B). As one economist noted, ‘[t]he bottom line here is that the damage functions used in most IAMs are completely made up.’ Pindyck, Climate Change Policy, at 13.[EPA-HQ-OAR-2021-0208-0288-A1, pp. 7-8]

Using an Improper Time Horizon. The Interagency Working Group's centuries-long time horizon further dilutes any perceptible causal chain and reflects an arbitrary decision that has an outsize impact on the SCGHGs. Purporting to predict global impacts 300 years into the future is an inherently speculative task- akin to an observer in the year 1721 predicting the invention of nuclear weapons and smart phones. And if the project had any non-speculative basis, the IAMs' time horizon was chosen arbitrarily and the Working Group injected their own assumptions into the models beyond their design.

The choice to run the IAMs to year 2300 originated in the first TSD and occurred because '[m]any consider 2200 too short a time horizon because it could miss a significant fraction of damages under certain assumptions about the growth of marginal damages and discounting.' 2010 TSD at 25 (emphasis added). In other words, without going to the year 2300, the Working Group reasoned, there was a risk costs would be lower. Notably, the Working Group made this decision even though one IAM and all of the EMF-22 climate scenarios ended before year 2300. To accomplish this task, the Working Group arbitrarily 'adjusted' the PAGE Model because it was designed to end in the year 2200. Id. The EMF-22 models (the five climate scenarios) also did not have projections for GDP, population, and greenhouse gas emission trajectories after the year 2100, so the Working Group also made those assumptions for the next 200 years that were used in all three IAMs. Id. In other words, it made up a model that would yield its pre-determined result.

The changes had the desired effect: the longer time horizon increased damages significantly. Dayaratna Deel. 30. This was a predictable change because '[t]he longer the horizon, the more years are summed into the damages and those years have greater and greater damages in a future that is difficult if not impossible to predict.' 34. To illustrate this effect, when the DICE Model (at a 3 percent discount rate) is only run until the year 2150 (roughly half the Working Group's time period) the damages are 13.43% to 20.28% less. 35-36. Although categorized as uncertainty, those additional damages assume what will happen centuries into the future and solely reflect the Interagency Working Group's assumptions for an additional 200 years. The Interagency Working Group did not submit these assumptions for peer review, expert elicitation, or public comment. It is virtually impossible to account for dynamic changes such as those caused by now commonplace technological innovations such as internet, smartphones, and GPS technology that were mere science fiction 300 years ago. 29. And the models provide no meaningful attempt to account for future technological changes that might mitigate the putative climate effects of gases, nor any other future mitigation attempts by the United States or any other country.

The SC-GHG estimates offer no justification why the IAMs were run to 2300 versus 2280 or an even 300 years to 2310. And if the reason is that damages were not fully accounted by the year 2100, the SC-GHG does not explain its arbitrary selection of a 300-year horizon for future damages. The Interagency Working Group also does not explain why the data it used is relevant to predicting GDP and population in the year 2300. All of these issues show that the selected end-dates are arbitrary and reflect a naked result-driven policy judgment. [EPA-HQ-OAR-2021-0208-0288-A1, pp.10-11]

Fails to Include 7% Discount Rate Baseline. The selection of the relevant discount rate is another consequential policy choice that the Interagency Working Group admits ‘has a large influence on the present value of future damages’ and ‘raises highly contested and exceedingly difficult questions of science, economics, ethics, and law.’ 2021 TSD at 17 (emphasis added). The 2021 TSD notably excludes the use of the 7 percent discount rate that the longstanding guidance in the peerreviewed 0MB Circular A-4 recommends for regulatory analysis. 0MB recognized that a 7 percent discount rate measures the cost of government regulation displacing investment (it is what a government project must ‘earn’ (pre-tax) to justify the cost, else it would have been better to invest in the market); and a 3 percent rate measures the opportunity cost of government regulation that displaces future consumption (for example, a person considers $1.03 tomorrow (post-tax) equal to a $1.00 today). See 0MB Circular A-4. The Interagency Working Group chose to use the consumption rate of return, alleging that it calculated the Social Cost of Carbon in terms of consumption. The Working Group, however, conceded that its analysis only works if it can convert ‘displaced investment . . . into a flow of consumption equivalents’ something it suggested it had yet to do fully. See 2021 TSD at 18; see also id. at 19 (needing ‘a more complete measure of costs, accounting for displacement of investment’). In other words, there is no rational explanation for the Working Group's transition from investment-based to consumption-based discounting.

To illustrate the influence of the selection of discount rate, the average social cost of carbon in the FUND Model for 2020 goes from a range of $21 to $39, 2016 TSD App. A Table A3, to negative 37 cents. Dayaratna Deel. 23. Adjusted for inflation, the FUND Model at a 7 percent discount rate equals negative 45 cents. This means that under the different (investment-based) discount rate, the social ‘cost’ of emitting an extra ton of carbon dioxide becomes a net benefit to society. The average social cost of carbon in the DICE Model for 2020 goes from a range of $28 to $48, 2016 TSD App. A Table A2, to $5.87 when the discount rate changes to 7 percent. Dayaratna Deel. 22. Adjusted for inflation, the social cost of carbon under the DICE Model at a 7 percent discount rate equals $7.21. Adjusted for inflation, the values for methane and nitrous oxide show similar sensitivity in the DICE Model for 2020 at the 7 percent rate are $331.76 (methane) and $2,312.44 (nitrous oxide). 25 26.

It is also noteworthy that in the Revised Light Duty Vehicle Rule's Summary of Costs and Benefits of the Proposed Program, EPA represents the present value of benefits under a 7 percent discount rate. Yet, Notes b & c to Table 4 explain that EPA has only used the IWG's estimates to discount the value of future GHG emissions, ‘while all other costs and benefits are discounted at either 3% or 7%.’ 86 FR 43735. EPA is not comparing benefits on an apples-to-apples basis, and does not comply with 0MB Circular A-4. EPA has failed to comply because it did not perform its own analysis, but blindly accepted the IWG's analysis as binding.

In short, the selection of a discount rate has an enormous impact on the actual projected costs generated by the SCGHG estimates. But this selection is not a scientific decision; even the 2021 Working Group admits that it ‘raises highly contested and exceedingly difficult questions of science, economics, ethics, and law.’ 2021 TSD at .17. Further, the 2021 Working Group admits that it has no clear scientific or economic justification for its abandonment of the investment mdisplacement discount rate provided in 0MB Circular A-4, and its adoption of the much lower consumption-based discount rates provided in the 2021 TSD-other than the naked policy preference for increased calculations of the ‘social costs’ of the relevant gases. Indeed, the 2021 Interagency Working Group's arbitrary selection of discount rates especially rates contrary to long-accepted pre-existing regulatory policy embodied in Circular A-4 constitutes a policy judgment that Congress did not delegate to any federal agency.[EPA-HQ-OAR-2021-0208-0288-A1p. 11-12]

2021 TSD Improperly Relies on Outdated Science. The SCGHG relies on assumptions and science used in the IAMs that do ‘not reflect the tremendous increase in the scientific and economic understanding of climate-related damages that has occurred in the past decade.’ 2021 TSD at 22; id. at 32. Contrary to the IWG's assumptions, however, such scientific advances reduce the calculations for SCGHGs; they do not inflate them. As a threshold issue, the NERA report notes that the IAMs are plagued by data availability issues for calibration. NERA Report at 28 30 (noting DICE 2013R and early 2000 FUND rely on studies from the 1990s). The report notes that even when new information is added, sometimes it makes relatively little difference if the IAM continues to use older studies. Id. There are at least three other considerations.

First, the Equilibrium Climate Sensitivity distribution (Roe and Baker (2006)) used in all the IAMs is out of date, and the Working Group does not explain why it has not considered newer ECSs. An ‘ECS is a distribution that probabilistically quantifies the earth's temperature response to a doubling of carbon dioxide concentrations.’ Dayaratna Deel. 39. For each IAM, the ECS shows the carbon dioxide impacts on climate, and the ‘[s]econdary effects, such as sea-level rise, all depend on a reliable ECS.’ The current ECS used is more than a decade old, and it vastly overstates the probability of high-end global warming compared to a more recent distribution.

A number of more recent ECS distributions suggest lower probabilities of extreme global warming in response to higher carbon dioxide concentrations.41. Failing to consider these alternatives has a big impact on the SC-GHG. Using newer ECS distributions, the average social cost of carbon (at the 3% discount rate in 2020 dollars) can be reduced by as much as 45% for the DICE Model and 80% for the FUND Model. Dayaratna Decl. 43 46. For example, the Lewis and Curry (2015) ECS that controls for observed ocean heat uptake efficiency causes the DICE Model’s value to go from $46.43 to $34.15 in 2020, $55.47 to $28.95 in 2030, $65.43 to $38.25 in 2040, and $75.83 to $39.94 in 2050. 43. The FUND Model’s values are affected even more : $23.75 to $4.09 in 2020, $26.76 to $4.79 in 2030, $29.93 to $5.52 in 2040, and $33.25 to $6.25 in 2050. 45. Instead of reviewing these alternatives, the 2016 and 2021 TSDs simply apply an ECS that is 15 years old and sorely outdated, without any adequate justification or explanation.

Second, four of the five EMF-22 scenarios ‘represent the modelers’ judgement of the most likely pathway absent mitigation policies to reduce greenhouse gas emissions, rather than the wider range of possible outcomes. ‘ 2010 TSD at 16 (emphasis added). These four scenarios continue to drive the outputs in the 2021 TSD and are hopelessly outdated. In addition to climate and emissions policies and rules in the last decade, President Biden announced ‘that America would aim to cut its greenhouse gas emissions 50 percent to 52 percent below 2005 levels by 2030.’ Brad Plumer and Nadja Popovich, The U.S. Has a New Climate Goal. How Does it Stack up Globally? N.Y. TIMES (Apr. 22, 2021). [8] Other nations similarly pledged to cut emissions compared to 2005 emissions: The EU nations by 51%, Britain by 63%, Canada by 45%, Japan by 44%, and Australia by 28%. All of these countries have pledged to achieve zero net emissions by 2050. And China , the world's largest emitter of greenhouse gases, has pledged that it will aim to get down to zero net emissions by 2060. To be sure, many nations such as China may not comply or fully comply with their pledges to reduce emissions. But it is implausible to assume as the IWG plainly does that no effective mitigation measures will occur over the upcoming decades. Even before these pledges, the United States and the EU nations had all been decreasing their emissions. The continued use of the four business-as-usual scenarios cannot be justified, and it has criticized as ' not just badly out of date, but reflecting a set of fictional worlds.'Roger Pielke Jr, The Biden Administration Just Failed its First Science Integrity Test, February 28, 2021 (available at https://rogerpielkejr.substack.com/p/thebidenadministraction-just-failed). And this process of implausibly adopting the worst-case scenario while refusing to give any weight to possible positive or mitigating effects pervades the IWG's entire analysis.

Third, the SCGHG analysis fails to fairly account for agricultural benefits caused by increased carbon dioxide concentrations, such as increasing plants' internal water use efficiency and raising the rate of net photosynthesis. Only one IAM, the FUND model, includes some quantification of these benefits. Indeed, the DICE model as utilized by the Working Group explicitly presumes that only damages will result from more CO2 in the atmosphere and there will be no benefits.Dayaratna Deel. 52. This limitation is arbitrary and only serves to overstate damages. For example, even using the outdated Roe Baker (2006) ECS distribution, the FUND Model (at a 3 percent discount rate) has a greater than 10 percent chance to generate a negative social cost of carbon each year through 2040. Dayaratna Deel. 49. Changing the discount rate to 7 percent raises that probability significantly. If an updated ECS distribution is used, there is a greater than 50 percent chance the social cost of carbon is negative through the year 2050. And there is good reason to believe that if the DICE Model was permitted to account for these benefits, then it would generate some negative values for the SCC as well. 52.

The Interagency Working Group, and by extension the EPA, should stop relying on data and projections that are not accurate and that only inflate the values for the SCGHGs. They should adhere to the best science showing that the IWG's analysis of future greenhouse gas emissions has no basis in sound science or reality. [EPA-HQ-OAR-2021-0208-0288-A1, pp.11-14]

Calculating Global Damages Is Inappropriate. The SC-GHGs allegedly monetize predicted global damages from the emission of an additional ton of carbon dioxide. The Interagency Working Group cited a number of reasons why it believes global damages are appropriate: 'GHG emissions contribute to damages around the world regardless of where they are emitted'; global impacts 'will have a direct impact on [overseas] U.S. citizens and the investment returns on those assets owned by U.S. citizens and residents'; global issues 'impact the welfare of individuals and firms that reside in the United States through their effect on international markets, trade, tourism, and other activities'; and 'allow[ing] the U.S. to continue to actively encourage other nations, including emerging major economies, to take significant steps to reduce emissions.' 2021 TSD, at 15 16. But these reasons have nothing to do with the CAA and whether Congress intended that costs (or benefits) include damages allegedly incurred in other countries in hundreds of years. [EPA-HQ-OAR-2021-0208-0288-A1, pp.8-9]

The Interagency Working Group's promulgation of purportedly binding numerical values for the ‘social costs’ of gases constitutes a quintessentially legislative activity, and its decision to do so without any valid delegation of authority from Congress violates the separation of powers and threatens the liberty of all Americans. Further, the 2021 TSD IAM-based methodology is deeply flawed, as highlighted by the 2017 NASEM report, and the resulting social costs estimates are arbitrary and capricious. [EPA-HQ-OAR-2021-0208-0288-A1, p.17]

EPA Response

EPA disagrees with many of the commenters’ contentions. EPA notes that it determined what standards were appropriate in light of the need for emissions reductions, the cost of compliance and lead time, and found the results of the benefit cost analysis in the RIA provide additional support for its conclusions. Under Section 202 of the CAA, EPA is required to establish standards to reduce air pollution that endangers public health and welfare, taking into consideration the cost of compliance and lead time. EPA is not required to conduct formal cost benefit analysis to determine the appropriate standard under Section 202. EPA weighed the relevant statutory factors to determine the appropriate standard and the analysis of monetized GHG benefits was not material to the choice of that standard. EO 12866 requires EPA to perform a cost-benefit analysis, including monetizing costs and benefits where practicable, and the EPA has conducted such an analysis. The monetized GHG benefits are included in the cost-benefit analysis. That cost-benefit analysis provides additional support for the EPA’s final standards. EPA notes that while it finds the results of the benefit-cost analysis supportive, it recognizes that some costs and benefits may be difficult to quantify. Indeed, the benefit -cost analysis for this rulemaking plainly omits certain benefits (as noted by several commenters and EPA’s responses in this document). After considering the February 2021 TSD, and the issues and studies discussed therein, EPA finds the SC-GHG estimates in the TSD, while likely an underestimate, are the best currently available SC-GHG estimates and appropriate for use in the RIA for this rulemaking. Note EPA has also assessed an estimate of benefits from climate impacts within U.S borders based on SC-GHG estimates used in regulatory analysis under revoked E.O. 13783, including in the RIA for the SAFE rule. As discussed at length in the February 2021 TSD and the RIA for this rule, estimates focusing on the climate impacts occurring solely within U.S. borders are an underestimate of the benefits of GHG mitigation accruing to U.S. citizens and residents, as well as being subject to a considerable degree of uncertainty due to the manner in which they are derived. However, regardless of the method used in quantifying the benefits of GHG reductions for purposes of this rulemaking, EPA would still adopt the standards of this final rule pursuant to its statutory obligation to set standards for pollutants that contribute to air pollution that endangers public health and welfare, taking into consideration the cost of compliance and lead time and other relevant factors as discussed in Preamble section VI. As a result, the decisions reached and standards put in place do not depend on the 2021 SC-GHG interim estimates

The commenter contends that the Interim SC-GHG values did not satisfy requirements of the Administrative Procedure Act (APA). First, Section 307(d) of the Clean Air Act generally specifies the procedural requirements applicable to this rulemaking and EPA has fully complied with those requirements. The question of whether the Interim SC-GHG values constitute a rule is beyond the scope of this action, but in any case, EPA does not view them to be or constitute a rule subject to the APA, or which the EPA is bound to follow in all cases. These estimates serve as one analytical input to EPA's evaluation of the overall economic effects of the rule. Nonetheless, EPA has independently evaluated (and indeed, contributed to) the development and methodology for these estimates and believes they reflect an appropriate valuation of the social benefits of GHG reduction based on currently available information. These estimates were used in the proposal, and commenters had the opportunity to comment on them (as they have).

With respect to the comment regarding consideration of negative impacts of requirements of the rule, EPA notes that the Final rule is fuel neutral and does not mandate a particular technology.

Please see the response to AEI in Section 14.1 in this document to similar comments on the distinction between global and domestic SC-GHG estimates, modeling uncertainties and the NASEM recommendations for the SC-GHG models and estimates, and the choice of discount rate and intergenerational discounting. With respect to the comments citing findings made by MIT economist Robert Pindyck on IAM-based analysis, as discussed by the commenter Institute for Policy Integrity, Professor Pindyck himself has noted that his writings on the subject have been taken out of context and that the damage functions in the IAMs are generally reflective of two to three degrees of warming (See comment from Institute for Policy Integrity in Section 14.1 of this document). With respect to the comments on the IAM modeling factors including time horizon, climate effects, projections for population and GDP, and variability of the three different IAMs used by the Interagency Working Group, EPA notes that the 2017 National Academies report makes near and longer-term updating recommendations regarding these issues. For example, the National Academies report provided methodological recommendations for addressing the challenges involved in developing the long run socioeconomic projections necessary for estimating the SC-GHG and recommended "In the context of the socioeconomic, damage, and discounting assumptions, the time horizon needs to be long enough to capture the vast majority of the present value of damages." Additionally, the 2021 TSD previews some of the recent advances in the scientific and economic literature that the IWG is actively following and that could provide guidance on, or methodologies for, addressing some of the limitations with the interim SC-GHG estimates. As noted above, taken together, the limitations suggest that the SC-GHG estimates likely underestimate the damages from GHG emissions and EPA agrees that the interim SC-GHG estimates represent the most appropriate estimate of the SC-GHG until revised estimates have been developed reflecting the latest, peer reviewed science.

With respect to the comment that the Clean Air Act does not provide authority to EPA to consider the global costs of climate change and the social cost of carbon, EPA disagrees with this comment. Even assuming it is possible to make a reasonable estimate of "domestic" costs of climate change, whether EPA considers global costs or domestic costs of climate change would not change anything about who is subject to these standards, and thus the canon against extraterritoriality does not resolve this question. Moreover, as the commenter notes, Congress has demonstrated its awareness in the Clean Air Act that air pollution can have effects beyond international borders so there is no reason to believe Congress expected EPA to ignore those effects, much less that it barred EPA from considering them, in making decisions under the Clean Air Act. In light of the well-recognized global nature of the climate problem, it would be odd if Congress did not intend EPA to consider the costs and benefits of addressing the problem at a global scale. This is particularly true when, in the agency's expert judgment, it is difficult and inappropriate to assess a "domestic" cost of climate change, both because of the nature of available modeling tools and the diverse ways in which U.S. interests, businesses, and residents may be impacted by climate change beyond U.S. borders. To the extent Congress was silent on this specific question, it is "eminently reasonable to conclude that [the statute's] silence is meant to convey nothing more than a refusal to tie the agency's hands." *Entergy Corp. v. Riverkeeper, Inc.*, 556 U.S. 208, 222 (2009).

Commenter: California Attorney General Office, et al.

Not only are the frequency and intensity of extreme weather events increasing, but so too are the costs. See Figure 3 [Figure 1 can be found on p. 9 of Docket number EPA-HQ-OAR-2021-0208-0245-A1]. On average, there were 7 billion-dollar extreme weather events per year in the United

States between 1980-2020 with an average annual cost of $45.7 billion; however, over the past 5 years, the average number of events per year increased to 16, with an average annual cost of $121 billion.52 In 2020—'a historic year of extremes'53—'[t]here were 22 separate billion-dollar weather and climate disasters across the United States, shattering the previous annual record of 16 events' and 'cost[ing] the nation a combined $95 billion in damages.'54 And these costs 'do not take into account losses to natural capital or assets, health care related losses, or values associated with loss of life,'55 meaning these estimates 'should be considered conservative.'56 [EPA-HQ-OAR-2021-0208-0245-A1, p.8]

As to the social cost of greenhouse gases ('SC-GHG') analysis in EPA's proposal, we: (1) applaud the use of a global rather than domestic analysis; (2) urge the use of a discount rate lower than 3%; and (3) recommend EPA explain that its analysis is based on its independent conclusions based on the best available science, including any additional updates that may further improve upon the interim SC-GHG values offered by the Interagency Working Group on Social Cost of Greenhouse Gases ('IWG').[EPA-HQ-OAR-2021-0208-0245-A1, p.33]

While we applaud improvement over SAFE 2, we strongly urge EPA to use a lower discount rate in its SC-GHG analysis than the 3% discount rate in EPA's proposed reference case. Recalculating social costs using a lower discount rate can be implemented immediately, especially given that EPA's proposal offers a sensitivity study that uses a 2.5% discount rate.159 As explained in both the SAFE 2 litigation and rulemaking,160 as well as multi-state comments161 regarding the interim SC-GHG values offered by the IWG, state experience and recent economic evidence shows a lower discount rate better accounts for the long-term, intergenerational impacts of climate change.

In addition, and to the extent possible, EPA should update its SC-GHG models to include any significant climate change-related impacts that have become quantifiable since EPA released its proposed standards.162 We also encourage EPA to identify some of the significant impacts it was unable to quantify in its SCC—including some impacts our States are experiencing this year, such as the combined effects of storm surges and rising sea levels and the human health costs of increased wildfires. While we recognize that EPA cannot quantify all climate impacts, and that EPA need not do so, we nonetheless believe it is important to acknowledge that the SCC figure used is almost certainly understated due to this constraint.

Finally, we urge EPA to explain that, while its SC-GHG analysis is consistent with the interim values offered by the IWG, EPA has reached its independent conclusions using the best available science, especially given that EPA's proposal uses SC-GHG analysis that reflects some updates from the IWG's analysis. Doing so would not diminish the SC-GHG analysis offered by the IWG, whose analysis is based on peer-reviewed literature and economic models.163 Rather, any updates by EPA based on agency expertise merely recognizes that federal agencies must use the best available science—which includes SC-GHG—when setting vehicle standards.164 [EPA-HQ-OAR-2021-0208-0245-A1, pp.33-34]

EPA Response

EPA acknowledges the commenter's input and notes that it determined what standards were appropriate in light of the need for emissions reductions, the cost of compliance and lead time, and found the results of the benefit-costs analysis in the RIA provide additional support for its conclusions.

With respect to the social cost of greenhouse gases, EPA recognizes the limitations and uncertainties associated with the current interim IWG estimates and underlying methodology. EPA participated in the IWG and has carefully reconsidered for this rulemaking the February 2021 TSD, the underlying studies discussed in the TSD and the issues raised by commenters. EPA concludes that, as noted in Section 3.3 of the RIA and elsewhere in this RTC, the discussions in the TSD represent appropriate consideration of the various issues (e.g., appropriate discount rate and scope) and the resulting estimates of the TSD represent appropriate, if conservative, estimates for purposes of this rulemaking. The 2021 TSD previews some of the recent advances in the scientific and economic literature that the IWG is actively following and that could provide guidance on, or methodologies for, addressing some of the limitations with the interim SC-GHG estimates.

Commenter: Center for Climate and Energy Solutions (C2ES)

Finally, with regards to the proposed input changes, C2ES supports the replacement of the domestic values for the social cost of greenhouse gases with global values. However, the interim values and discount rates used in the proposal are insufficient to capture the expected damages of climate change and should be adjusted to take into account the significant marginal costs of future emissions as the world approaches critical climate thresholds. [EPA-HQ-OAR-2021-0208-0287-A1, pp.2-3]

Input Changes – Global Social Cost of Carbon. C2ES supports the replacement of domestic values of the social cost of greenhouse gases with global values in the proposal but believes these values should be adjusted to more sufficiently capture the harms of marginal emissions now and in the future.

The social cost of carbon translates the future harm inflicted by the release of one additional ton of carbon dioxide into a present monetary value. The proposed rule uses the interim global estimates of the social cost of carbon published by the interagency working group (IWG) in February 2021. These values represent a significant improvement over the values EPA used in the analysis of the 2020 SAFE rule following the disbanding of the IWG, which considered only domestic climate-related damages and used a discount rate of 3 to 7 percent. The proposed rule considers global climate-related damages and uses average discount rates of 2.5 percent, 3 percent, and 5 percent, as well as the 95th-percentile of the 3 percent discount rate.

However, as EPA notes in the Draft Regulatory Impact Analysis (DRIA), these estimates are insufficient to capture the expected damages of climate change, particularly as the world approaches critical climate thresholds and each additional ton of greenhouse gases emitted represents significantly greater threats to the global climate. As the world warms, the value of avoiding future emissions becomes ever more important relative to avoiding present-day emissions and puts downward pressure on the discount rate. A discount rate of 2 percent or lower, based on the most up-to-date scientific and economic evidence, should be employed to reflect this.25

EPA recognizes the shortfalls of these interim values in the DRIA, including highlighting that a discount rate of 2 percent or lower would be more appropriate. However, as EPA plans to maintain the interim social cost of greenhouse gas emissions in its analysis and lists no plans to update the values once official ones are released by the IWG, the costs and benefits used to inform EPA's analysis of the proposal will significantly underestimate the actual marginal damages of greenhouse gas emissions.

The Intergovernmental Panel on Climate Change's (IPCC) Sixth Assessment Report highlights the extreme value of each marginal unit of warming avoided.26 It demonstrates that even if the global aspirational target of 1.5 degrees C of warming is exceeded, the relative severity of impacts of warming between 1.5 and 2.0 degrees C is significantly lower than that of the impacts of warming between 2 and 3 degrees C, and so on. The values used to determine the marginal cost of each ton of emissions should correspond to these marginal dangers of increased warming.

EPA and the IWG should adjust the values used for the social cost of greenhouse gases and lower the discount rates used in the analysis of this proposal to better reflect the increasing urgency of the climate crisis, and to more accurately capture the most recent scientific and economic evidence to analyze the damages of its present and future compounding impacts as emissions increase. [EPA-HQ-OAR-2021-0208-0287-A1, p.8]

EPA Response

EPA acknowledges the commenter's input and notes that the 2021 TSD previews some of the recent advances in the scientific and economic literature that the IWG is actively following and that could provide guidance on, or methodologies for, addressing some of the limitations with the interim SC-GHG estimates. For the reasons described in section 3.3 of the RIA and in the

February 2021 TSD, EPA believes that the estimates of the TSD are conservative (i.e., likely underestimates) but are nonetheless appropriate for use in this rulemaking.

Commenter: Competitive Enterprise Institute et al.

Our comments challenge the plausibility of the EPA's climate benefit estimates. The EPA estimates that, during calendar years 2023-2050, the proposal's GHG emission reductions will deliver $91 billion in climate change mitigation benefits.6 Those benefits are a mirage. Our comments may be summarized as follows.

The EPA's climate benefits estimate is based on the Biden administration Interagency Working Group's (IWG) social cost of carbon (SCC) estimates.7 Whatever its value as an academic pursuit, SCC estimation is too speculative and assumption-driven to inform policy decisions. The seeming objectivity and precision of official SCC estimates are illusory.

Indeed, SCC estimates are easily manipulated for political purposes. The IWG exercise is a case in point. All of the IWG's methodological decisions have the effect of increasing SCC values.

Those dubious decisions include the use of below-market discount rates, an analysis period extending far beyond the limits of reasonable speculation, outdated climate sensitivity assumptions, unscientific depreciation of carbon dioxide fertilization benefits, unjustified pessimism regarding human adaptive capabilities, implausible 'return to coal' baseline emission scenarios, and net-benefit calculations that misleadingly compare domestic costs to global benefits. Absent those biases, the IWG's SCC estimates could fall to zero dollars or below during 2023-2050 and beyond.

Even if the IWG's methodology were not biased in multiple ways, the EPA's $91 billion climate benefit estimate would still defy common sense. The proposed motor vehicle GHG standards are projected to avoid 0.001°C-0.002°C of global warming by 2050. That hypothetical change would be far too small for scientists to detect. It would make no discernible difference in weather patterns, crop yields, polar bear populations, or any other environmental condition people care about. Benefits no one can experience are 'benefits' in name only.

Section 1: Social Cost of Carbon Basics

The SCC is an estimate in dollars of the cumulative long-term damage caused by one ton of CO2 emitted in a specific year. That number also represents an estimate of the benefit of avoiding or reducing one ton of CO2 emissions.

The computer models used to project SCC values are called integrated assessment models (IAMs) because they combine aspects of a climate model, which estimates the physical impacts of CO2 emissions, with an economic model, which estimates the dollar value of climate change effects on agricultural productivity, property values, and other economic variables. The IWG uses three IAMs—abbreviated DICE, FUND, and PAGE—to estimate SCC values.8

In federal agency analyses, the cumulative damage of an incremental ton of CO_2 emissions is estimated from the year of the emission's release until 2300. SCC estimates are highly sensitive to:

• The discount rates chosen to calculate the present value of future emissions and reductions.

• The climate sensitivity assumptions chosen to estimate the warming impact of projected increases in atmospheric GHG concentration.

• The choice of socioeconomic pathways used to project future GHG emissions and concentrations.

• The timespan chosen to estimate cumulative damages from rising GHG concentration.

• The extent to which the SCC reflects empirical information about the agricultural and ecological benefits of carbon dioxide fertilization.

• The assumptions chosen regarding the potential for adaptation to decrease the cost of future climate change impacts.

In addition, from a political perspective, it matters a great deal whether the net benefits of climate policy proposals are calculated by comparing the domestic costs of GHG-reduction policies to the IAM-estimated global climate benefits or to the much smaller domestic benefits.

What this all means is that, if a modeler intends to make climate change look economically catastrophic and make GHG regulations appear essential, the modeler:

• Runs the IAMs with below-market discount rates.

• Uses IAMs that assume high climate sensitivity.

• Calculates cumulative damages over a 300-year period—i.e., well beyond the limits of informed speculation about how the global economy will evolve and how adaptative technologies will develop.

• Runs the models with implausible emission scenarios that assume the world repeatedly burns through all fossil fuel reserves absent aggressive climate policies.

• Minimizes the immense agricultural benefits of atmospheric CO_2 fertilization by, for example, averaging the results of three IAMs, two of which effectively assign a dollar value of zero to carbon dioxide's positive externalities.

• Includes at least one IAM that assumes adaptation cannot mitigate the cost of climate change impacts once 21st century global warming and sea-level rise exceed 2°C and 0.25 meters, respectively

• Calculates climate policy net benefits by comparing apples (domestic costs) to oranges (global benefits).

In other words, the modeler does exactly what the Obama IWG did in its 2010, 2013, and 2016 technical support documents (TSDs), and what the Biden IWG proposes to do in its 2021 interim TSD.9

Section 2: Artifactual Benefits No One Will Ever Experience

What will be the proposed regulation's measurable effects on global average surface temperature, compared to the existing SAFE Rule standards, and what benefits can be expected to accrue from the proposed changes?

In a word, the answer to both is simple: None.

It is a standard procedure for the EPA to assess the temperature effects of proposed or existing policies using the Model for the Assessment of Greenhouse-Gas Induced Climate Change. Developed at the National Center for Atmospheric Research, the model's official acronym is MAGICC.10

That subtle humor aside, one can use MAGICC to determine the effects of continuing the current vehicle standards versus those now proposed (which are roughly equivalent in stringency to the Obama-EPA standards rescinded by the SAFE Rule).

Using standard MAGICC assumptions, which include an equilibrium climate sensitivity of 3.0°C, MAGICC calculates the net 'savings' of global warming to be 0.003°C by the year 2100.11 That is roughly the average temperature difference between the air surrounding your knees and the air surrounding your midsection.

According to the National Oceanic and Atmospheric Administration, the inherent error in current calculations of annual global average surface air temperature is 0.08°C, which is nearly 27 times the calculated effect of the new standards.12

Yet when the EPA multiplies projected emission reductions by the IWG's SCC estimates, it comes up with climate benefits of $91 billion by 2050. Given that the MAGICC-calculated temperature change is a mere 0.003°C by 2100, the 2050 temperature 'savings' has to be far less than half of this value, rounding to some value between 0.001°C and 0.002°C.

It simply defies logic to calculate the benefits of a regulation that will have impossible-to-detect effects on surface temperature, because it is those same temperature changes that drive cost estimates.

In short, the proposed vehicle standards will have an undetectable effect on surface temperature, which means the standards will produce undetectable climate 'benefits.' In pursuit of such digital artifacts, the EPA will foist enormous costs on automakers, forcing some consumers to purchase vehicles they would otherwise not choose to buy while pricing others out of the market for new motor vehicles.

Qui bono? The only interest groups with tangible benefits are the administering agencies and the dominant automakers. Tightening GHG/fuel economy standards perpetuates and expands regulatory control over the auto industry. It also further cartelizes the industry. All automakers must comply or incur penalties. None is free to beat competitors on price, ride height, crashworthiness, or other vehicle attributes by producing fleets that fall short of the EPA's GHG reduction requirements.

Section 3: How the Discount Rate Affects the SCC13

Models used to estimate the SCC rely on the specification of a discount rate. Discounting is essential in benefit-cost analysis because compliance costs are best viewed as investments intended to yield benefits in the future. Applying discount rates enables agencies to compare the projected rate of return from CO2-reduction expenditures to the rates of return from other potential investments in the economy.

Office of Management and Budget (OMB) guidance in Circular A-4 specifically stipulates that agencies discount the future costs and benefits of regulations using both 3.0 percent and 7.0 percent discount rates.14 The IWG suggests that a 7 percent discount rate is an affront to intergenerational equity, apparently on the theory that discount rates higher than 1-2 percent imply that people living today are more valuable than people living decades or centuries from now.15

We respectfully disagree. The point of discounting is not to rank the worth of different generations but to have a consistent basis for comparing alternate investments. Only then can policymakers determine which investments are most likely to transmit the most valuable capital stock to future generations. In other words, discounting clarifies the opportunity cost of investing in climate mitigation, for example, rather than medical research, national defense, or trade liberalization.

Not only is it reasonable to include a 7 percent discount rate in SCC estimation, it is arguably the best option because 7 percent is the rate of return of the New York Stock Exchange over the last hundred and twenty-five years.16 Only by using a 7 percent discount rate can policymakers assess the wealth foregone when government invests in GHG reduction rather than other policy objectives or simply allows companies and households to invest more of their dollars as they see fit.

Institute for Energy Research economist David Kreutzer illustrates the point as follows. Suppose an emission-reduction investment produces $100 in benefits by 2171 (150 years from now). That is equivalent to investing $5.13 today with a 2 percent annual ROI. But if the same $5.13 is invested in stock that appreciates at 7 percent annually, the investment yields $131,081 in 2171. Clearly, that is a much larger bequest to future generations.

Kreutzer also notes that all baseline scenarios assume future generations are richer than current generations. He comments:

It is a terrible policy to make investments that return $100 instead of $131,081, but it is virtually brain-dead to argue the bad return is justified on equity grounds. Those alive centuries from now are almost certain to be much wealthier, healthier, and possessed of technology to better overcome any adversity—including climate change.17

It is hard to shake the suspicion that the IWG has never used a 7 percent discount rate, even as a sensitivity case analysis, because doing so would spotlight the comparatively low rates of return of GHG-reduction policies.

The IWG hints that its final TSD, to be published in 2022, may use discount rates as low as 1 percent.18 However, as in the IWG's 2010, 2013, and 2016 TSDs, the February 2021 interim TSD uses discount rates of 2.5 percent, 3.0 percent, and 5.0 percent. Accordingly, the remainder of this section examines how those rates affect SCC values.

At the Heritage Foundation, Dayaratna and colleagues ran DICE and FUND using a 7.0 percent discount rate to quantify how much the IWG's lower discount rates increases SCC estimates.

Below is the 2016 TSD's SCC estimates19 followed by the Heritage analysts' results published in the peer-reviewed journal Climate Change Economics:20 [Table ES-1, Table DICE Model Average SCC, and Table FUND Model Average can be found at docket number EPA-HQ-OAR-2021-0208-0292-A1, pp.7-8]

As the above tables illustrate, the SCC estimates are drastically reduced when the models are run with a 7.0 percent discount rate. In fact, under the FUND model, the estimates are negative. Using a 7.0 percent discount rate can cause the SCC to drop by as much as 80 percent or more.

The EPA should not use SCC analysis for policymaking, as it depends on too many unknowns. However, if the agency is going to use SCC analysis, it should include SCC discounted at 7 percent as part of its benefit-cost analysis, because only on that basis can the public compare climate policy 'investments' to other capital expenditures. And only through such comparisons can policymakers reasonably assess which investments will best position future generations to inherit the most productive capital stock.

Section 4: How the Time Horizon Affects the SCC

Human beings use technology to adapt to environmental conditions. Consequently, the loss functions in IAMs depend on assumptions about how adaptive technologies will be developed and deployed as the world warms. It is essentially impossible to forecast technological change decades, let alone centuries, into the future. Regardless, the IWG bases its SCC estimates on projections of climate change damages over a 300-year period (2000-2300). Dayaratna and his former Heritage Foundation colleague David Kreutzer ran the DICE model with a significantly shorter, albeit still unrealistic, time horizon of 150 years into the future.21

Here are the DICE-estimated SCC values with a baseline ending in 2300: [Tables 1 and 3 can be found at docket number EPA-HQ-OAR-2021-0208-0292-A1, p. 9]

The SCC estimates drop substantially—in some cases by more than 25 percent—as a result of ending the SCC estimation period in 2150. If the EPA is going to use the SCC in policymaking, it should underscore the highly-speculative nature of long-term economic and technology forecasting. In addition, the EPA should include sensitivity case analyses using timespans shorter than 300 years.

Section 5: How the Equilibrium Climate Sensitivity (ECS) Distribution Affects the SCC

The key climate specification used in estimating the SCC is the equilibrium climate sensitivity (ECS) distribution. Such distributions probabilistically quantify the earth's temperature response to a doubling of CO2 concentrations.

ECS distributions are derived from general circulation models (GCMs), which attempt to represent physical processes in the atmosphere, ocean, cryosphere and land surface. The IWG uses the ECS distribution from a study by Gerard Roe and Marcia Baker published 14 years ago in the journal Science.22 This non-empirical distribution, calibrated by the IWG based on assumptions it selected in conjunction with IPCC recommendations,23 is no longer scientifically defensible.24

Since 2011, a variety of newer and empirically-constrained distributions have been published in the peer-reviewed literature. Many of those distributions suggest lower probabilities of extreme global warming in response to CO2 concentrations. Below are three such distributions:25 [Figure (2007) can be found at docket number EPA-HQ-OAR-2021-0208-0292-A1, p.10]

The areas under the curves between two temperature points represent the probability that the earth's temperature will increase between those amounts in response to a doubling of CO2 concentration. For example, the area under the curve from 4°C onwards (known as right-hand 'tail probability') represents the probability that the earth's temperature will warm by more than 4°C in response to a doubling of CO2 concentrations. Note that the more up-to-date ECS distributions (Otto et al., 2013; Lewis, 2013; Lewis and Curry, 2015) have significantly lower tail probabilities than the outdated Roe-Baker (2007) distribution used by the IWG.

Here, again, is the IWG's 2016 SCC estimates for 2020-2050: [Table ES-1, Table DICE Model Average SCC, and Table FUND Model Average can be found at docket number EPA-HQ-OAR-2021-0208-0292-A1, pp.11-12]

In Climate Change Economics, Dayaratna and colleagues re-estimated the DICE and FUND models' SCC values using the more up-to-date ECS distributions and obtained the following results:26

Using the more up-to-date ECS distributions dramatically lowers SCC estimates. The IWG's outdated assumptions overstate the probabilities of extreme global warming, which artificially inflates their SCC estimates. The EPA should not to use SCC estimation for policymaking, as it is highly susceptible to user manipulation. However, if it must be used, the agency should utilize realistic estimates of climate sensitivity.

Lest the EPA assume we prefer the empirically-constrained ECS estimates just because they are lower, we would note that so-called state-of-the-art GCMs repeatedly overshoot observed warming—a clear indication the models overestimate climate sensitivity.

In its Fifth Assessment Report (AR5), the IPCC used the Coupled Model Intercomparison Project Phase 5 (CMIP5) models to project future warming and the associated climate impacts.27 The figure below compares predicted and observed average tropospheric temperature over the tropics.28 The observations come from satellites, weather balloons, and reanalyses.29

A careful look at the figure reveals that only one of the 102 model runs correctly simulates what has been observed. This is the Russian climate model INM-CM4, which also has the least prospective warming of all of them, with an ECS of 2.05°C, compared to the CMIP5 average of 3.2°C. [Figure 1. can be found at docket number EPA-HQ-OAR-2021-0208-0292-A1, p.13]

Best scientific practice uses models that work and does not seriously consider those that do not. This is standard when formulating the daily weather forecast, and should be standard with regard to climate forecasts.

The IPCC's recently released Sixth Assessment Report (AR6) uses a new suite of models, designated CMIP6. Is it an improvement?

No. As shown by McKitrick and Christy (2020), the CMIP6 models are even worse.31 Of the two models that work, the Russian INM-CM4.8, has even less warming than its predecessor, with an ECS of 1.8°C, compared to the CMIP6 community value of around four degrees.32 The other one is also a very low ECS model from the same, group, INM-CM5. The model mean warming rate exceeds observation by more than four times at altitude in the tropics. [Figure McKitrick and Christy (2020) can be found at docket number EPA-HQ-OAR-2021-0208-0292-A1, p.14]

Quoting from McKitrick and Christy's conclusion:

The literature drawing attention to an upward bias in climate model warming responses in the tropical troposphere extends back at least 15 years now (Karl et al., 2006). Rather than being resolved, the problem has become worse, since now every member of the CMIP6 generation of climate models exhibits an upward bias in the entire global troposphere as well as in the tropics.

Zeke Hausfather, hardly a climate skeptic, has noted that while the CMIP6 models are warmer than the previous generation, the warmer they are, the more they over-forecast warming in recent decades, confirming what McKitrick and Christy found.33

Zhu, Poulsen, and Otto-Bliesner (2020) used a CMIP6 model called CESM2 to project warming from an emission scenario that reaches 855 parts per million by 2100—roughly three times the pre-industrial concentration. Despite being tuned to match the behavior of 20th century climate, CESM2 produced a global mean temperature '5.5°C greater than the upper end of proxy temperature estimates for the Early Eocene Climate Optimum.' That was a period when CO2 concentrations of about 1,000 ppm persisted for millions of years.34 Moreover, the modeled tropical land temperature exceeded 55°C, 'which is much higher than the temperature tolerance of plant photosynthesis and is inconsistent with fossil evidence of an Eocene Neotropical rainforest.'35

The bottom line is that Row-Baker ECS distribution inflates the IWG's SCC estimates, which will become even more unrealistic if updated with CMIP6.

Section 6: Negative SCC Values

Policymakers and the media often assume carbon dioxide emissions have only harmful impacts on society. However, CO2 emissions have enormous direct agricultural36 and ecological benefits,37 global warming lengthens growing seasons,38 and warming potentially alleviates cold-related mortality, which may exceed heat-related mortality by 20 to 1.39

Of the three IAMs used by the IWG, only the FUND model estimates CO2 fertilization benefits. Dayaratna and colleagues investigated whether a model with CO2 fertilization benefits could produce negative SCC estimates. A negative SCC means that each incremental ton of CO2 emissions produces a net benefit.

The researchers calculated the probability of a negative SCC under a variety of assumptions. Below are some of the results published both at the Heritage Foundation as well as in the peer-reviewed journal Climate Change Economics:40 [Table FUND Model Probability, can be found at docket number EPA-HQ-OAR-2021-0208-0292-A1, pp.15-16]

As the above statistics illustrate, under a variety of reasonable assumptions, the SCC has a substantial probability of being negative. In fact, in some cases, the SCC is more likely to be negative than positive, which implies—if one adopts the perspective of a central planner—that the EPA should, in fact, subsidize (not limit) CO2 emissions. We, of course, oppose such interventionism.

Our purpose here is to illustrate the extreme sensitivity of these models to reasonable changes in assumptions. Although we advise the EPA not to use SCC analysis as a policymaking tool, if it does so, it should also present the probabilities of negative SCC values—i.e., the chance that the direct benefits of CO2 emissions will exceed climate-related damages.

Section 7: Updated Agricultural Benefits and Benefit-Cost Analysis

It is a well-established fact that increases in CO2 concentration enhance plant growth by increasing their internal water use efficiency as well as raising the rate of net photosynthesis.41

As discussed in the previous section, the FUND model attempts to incorporate those benefits; however, this aspect of the model is grounded on research that is one-to-two decades old. Even so, as discussed in the preceding section, Dayaratna et al. (2017) found substantial probabilities of negative SCC using the outdated assumptions in FUND. Dayaratna et al. (2020) summarized more recent CO2 fertilization research in a peer-reviewed study published in Environmental Economics and Policy Studies and re-estimated the FUND model's SCC values upon updating those assumptions.[42] To facilitate the EPA's review of that research, we excerpt several paragraphs from Dayaratna et al. (2020):

Three forms of evidence gained since then indicates that the CO2 fertilization effects in FUND may be too low. First, rice yields have been shown to exhibit strong positive responses to enhanced ambient CO2 levels. Kimball (2016) surveyed results from Free-Air CO2 Enrichment (FACE) experiments, and drew particular attention to the large yield responses (about 34 percent) of hybrid rice in CO2 doubling experiments, describing these as 'the most exciting and important advances' in the field. FACE experiments in both Japan and China showed that available cultivars respond very favorably to elevated ambient CO2. Furthermore, Challinor et al. (2014), Zhu et al. (2015) and Wu et al. (2018) all report evidence that hybrid rice varietals exist that are more heat-tolerant and therefore able to take advantage of CO2 enrichment even under warming conditions. Collectively, this research thus indicates that the rice parameterization in FUND is overly pessimistic.

Second, satellite-based studies have yielded compelling evidence of stronger general growth effects than were anticipated in the 1990s. Zhu et al. (2016) published a comprehensive study on greening and human activity from 1982 to 2009. The ratio of land areas that became greener, as opposed to browner, was approximately 9 to 1. The increase in atmospheric CO2 was just under 15 percent over the interval but was found to be responsible for approximately 70 percent of the observed greening, followed by the deposition of airborne nitrogen compounds (9 percent) from the combustion of coal and deflation of nitrate-containing agricultural fertilizers, lengthening growing seasons (8 percent) and land cover changes (4 percent), mainly reforestation of regions such as southeastern North America …

Munier et al. (2018) likewise found a remarkable increase in the yield of grasslands. In a 17-year (1999-2015) analysis of satellite-sensed LAI, during which time the atmospheric CO2 level rose by about 10 percent, there was an average LAI increase of 85 percent. A full 31 percent of earth's continental land outside of Antarctica is covered by grassland, the largest of the three agricultural land types they classified. Also, for summer crops, such as maize (corn) and soybeans, greening increased an average of 52 percent, while for winter crops, whose area is relatively small compared to those for summer, the increase was 31 percent. If 70 percent of the yield gain is attributable to increased CO2, the results from Zhu et al (2016) imply gains of 60 percent, 36 percent and 22 percent over the 17-year period for, respectively, grasslands, summer crops and winter crops, associated with only a 10 percent increase in CO2, compared to parameterized yield gains in the range of 20 to 30 percent for CO2 doubling in FUND.

Third, there has been an extensive amount of research since Tsingas et al. (1997) on adaptive agricultural practices under simultaneous warming and CO2 enrichment. Challinor et al. (2014)

surveyed a large number of studies that examined responses to combinations of increased temperature, CO2 and precipitation, with and without adaptation. In their metanalysis, average yield gains increased 0.06 percent per ppm increase in CO2 and 0.5 percent per percentage point increase in precipitation, and adaptation added a further 7.2 percent yield gain, but warming decreased it by 4.9 percent per degree C. In FUND, 3°C warming negates the yield gains due to CO2 enrichment. However, based on Challinor et al.'s (2014) regression analysis, doubling CO2 from 400 to 800 pm, while allowing temperatures to rise by 3°C and precipitation to increase by 2 percent, would imply an average percent yield increase ranging from 2.1 to 12.1 percent increase, indicating the productivity increase in FUND is likely too small.

Based on that literature, Dayaratna et al. (2020) updated the FUND model's coefficients to increase its agricultural benefits by 15 percent and 30 percent. In addition, the authors used an updated ECS distribution—that of Lewis and Curry (2018).43 In the charts below, the last three columns show the mean SCC as well as the associated probability of negative SCC values under different discount rates. [Table FUND Model Average SCC (2.5%), Table FUND Model Average SCC (3%), Table FUND Model Average SCC (5%), Table FUND Model Average SCC (7%) can be found at docket number EPA-HQ-OAR-2021-0208-0292-A1, pp.19-20]

As the results illustrate, under more realistic assumptions regarding agricultural productivity and climate sensitivity, the mean SCC essentially drops to zero and in many cases has a substantial probability of being negative. At a minimum, Dayaratna et al. (2020) further demonstrates that the SCC is highly sensitive to very reasonable changes in assumptions and is thus readily prone to user manipulation.

Indeed, we could not help noticing that the concepts of CO2 fertilization and global greening do not occur in the IWG's February 2021 interim TSD. Similarly, although Dayaratna et al. (2020) was published in January 2020, it is not included among the TSD's 115 references.44

Section 8: Unreasonable Pessimism Regarding Human Adaptive Capabilities

Other things being equal, the more pessimistic an IAM's view of human adaptive capabilities, the higher the SCC estimates it will produce. Climate impact assessments often ignore, assume away, or depreciate mankind's remarkable capacity for adaptation.45 Prominent examples include:

• The 2018 Fourth National Climate Assessment, which estimates that global warming could reach 8°C and reduce U.S. GDP by 10 percent in the 2090s.46 As revealed in the fine print, the estimate assumes no adaptive measures beyond those already deployed 'in the historical period,' i.e., during 1980-2010.47

• The Assessment's high-end estimate of $505 billion in climate damages in 2090. That estimate similarly assumes 'limited or no adaptation.'48

• The EPA's 2015 Benefits of Global Action report, which projects 12,000 annual heat-stress deaths and 57,000 annual air pollution deaths in 49 U.S. cities in 2100.49 As revealed in the fine print, the heat mortality estimate assumes no further progress in adaptation after 2015. As revealed in a key underlying study,50 the air pollution mortality estimate assumes no further reduction in air pollutant emissions after 2000, even though fine particle (PM2.5) emissions and precursors in 2015 were already significantly lower than in 2000.51

The 2021 TSD says little about adaptation other than to acknowledge the IAMs' 'incomplete treatment of adaptation and technological change' and 'uncertainty' about the adaptation costs.52 The 2016 TSD has a subsection on the PAGE model's treatment of adaptation. Here is the gist. In PAGE2002, 'Beyond 2°C, no adaptation is assumed to be available to mitigate the impacts of climate change.' And in PAGE09, 'adaptation is assumed to alleviate 25-50 percent of the damages from the first 0.20 to 0.25 meters of sea level rise but is assumed to be ineffective thereafter.'53

Those assumptions are not reasonable. Industrial civilization's virtuous circle of wealth creation and technological innovation endlessly updates mankind's adaptive capabilities, including our ability to make earth's naturally dangerous climate more livable.54 Since the 1920s, global CO2 concentrations increased from about 305 parts per million to more than 410 ppm, and average global temperatures increased by about 1°C.55 Yet, globally, the individual risk of dying from weather-related disasters such as hurricanes, floods, and drought decreased by 99 percent.56 If we are in a 'climate crisis' today, what words can adequately describe the climate regime of the 1920s?57 [Figure 8 can be found at docket number EPA-HQ-OAR-2021-0292-A1, P. 22]

It is not possible to discern a social cost of carbon in those data. Nor is an SCC detectable in several other trends of fundamental relevance to human survival and flourishing. The past 70 years have been marked by unprecedented improvements in global life expectancy,58 per capita income,59 food security,60 and various health-related metrics.61 Yields of all major food crops keep increasing,62 nearly 3 billion people gained access to improved water sources since 1990,63 and deaths from malaria (the most consequential climate-sensitive disease) declined by 52 percent during 2000-2015.64 [EPA-HQ-OAR-2021-0208-0292-A1, pp. 2-23]

Even in recent decades, the warmest in the instrumental record, mortality and economic loss data point to an increasingly sustainable civilization. A recent peer-reviewed study finds that climate-related hazards show a 'clear decreasing trend in both human and economic vulnerability, with global average mortality and economic loss rates that have dropped by 6.5 and nearly 5 times, respectively, from 1980–1989 to 2007–2016.'65 Similarly, data buried in the appendix of a 2019 study in the Lancet reveal that disaster losses as a percentage of GDP are declining, with the greatest declines occurring in low-income countries.66

It is thus fundamentally important to pursue policies that will make the United States and other countries wealthier, which will make humanity better able to handle whatever climate-related hazards occur in the future. SCC-based regulations, on the other hand, are likely to make nations less wealthy, while providing negligible climate change mitigation.67

A useful counterpoint to the PAGE model's pessimism about the futility of adaptation beyond 2°C of warming and 0.20-0.25 meters of sea-level rise is Hinkel et al. (2014), a study published in Proceedings of the National Academy of Sciences and reviewed by Bjorn Lomborg in his recent book False Alarm. The study includes an RCP8.5 warming scenario in which sea levels rise up to six feet and flood 350 million people every year by century's end, with costs reaching $100 trillion or 11 percent of global GDP annually.68 However, those extraordinary damages are projected to occur only if people do nothing more than maintain current sea walls.

If 'enhanced' adaptive measures are taken, annual flood costs increase from $11 billion in 2000 to $38 billion in 2100. Similarly, annual dike costs increase from $13 billion to $48 billion. However, Lomborg notes, 'the total cost to the economy will actually decline, from 0.05 percent of GDP to 0.008 percent.' Moreover, the number of people experiencing flood damages drops from 3.4 million in 2000 to 15,000 in 2100—a 99.6 percent reduction in flood victims! In other words, with reasonable adaptation, people are projected to be much safer, and the global economy much less affected by sea-level rise in 2100, despite high-end warming.69

If the EPA continues to use SCC estimates, it should eschew those produced by models that assume humanity is powerless to mitigate the costs of even modest levels of warming and sea-level rise. Visionaries have been predicting doomsday for millennia and none has ever been correct.

Section 9: Implausible Emission Baselines

We have discussed several ways modelers can inflate SCC estimates: run the models with below-market discount rates, project social costs far beyond the limits of informed speculation, assume climate sensitivities derived from general circulation models that repeatedly overshoot observed warming, use models that depreciate (or simply ignore) CO2 fertilization benefits, and use models that lowball human adaptive capabilities. Another way is to run the IAMs with implausibly high baseline emission scenarios. University of Colorado professor Roger Pielke, Jr. recently spotlighted this fatal flaw in the IWG exercise.70

To estimate the incremental impact of one ton of CO2 emissions, SCC modelers must first estimate how global emissions and concentrations will change over time. Such estimates are only as credible as the socio-economic development scenarios on which they are based. The IWG calculates SCC values with five emission trajectories. Four are no-climate-policy emission trajectories projected by four socio-economic models participating in a 2009 Stanford Energy Modeling Forum study known as EMF-22.71 The fifth, a climate policy scenario, is the average trajectory produced by the same four models run with a CO2 stabilization target of 550 parts per million. For more detail, see the Electric Power Research Institute's (EPRI) 2014 technical assessment report.72

Here is the gist. The EMF models estimated emissions growth through 2100. The IWG took those trajectories and extended them out to 2300. According to EPRI, 'the extensions lack a coherent, viable, and intuitive storyline (or set of storylines)' that could explain the emission pathways after 2100. That is not surprising. As noted above, nobody can foresee how the global economy will evolve centuries into the future. The IWG did not even try to guess how economies would develop after 2100, yet nonetheless plotted emissions growth over the next 200 years. Based on what assumptions? Apparently, the IWG assumed that, absent specific climate change mitigation policies, the global economy would burn through all fossil fuel reserves and do so repeatedly.

As EPRI put it, all four 'reference' (no-climate-policy) scenarios (USG1 – USG4) 'result in post-2100 cumulative CO2 emissions in excess of estimated fossil reserves.' [Table 4-6 can be found at docket number EPA-HQ-OAR-2021-0292-A1, p. 25]

For example, in the USG2 scenario, cumulative CO2 emissions reach 22,024 gigatons in 2200 and 33,023 gigatons in 2300—multiples of the estimated reserves (3,674 – 7,113 gigatons).

Thus, the IWG's SCC estimates 'envision cumulative carbon dioxide emissions that are far, far in excess of any plausible current expectation about the future,' Pielke, Jr. observes. 'In fact,' he continues, 'to even approach these massive amounts of cumulative emissions, the world would have to make it a policy goal to burn as much coal as possible over the coming centuries. That seems unlikely.'

The IWG's 300-year emission baselines are even more implausible than RCP8.5,73 the so-called business-as-usual (BAU) emission scenario used in the U.S. National Climate Assessment, IPCC AR5, AR6 (updated as SSP5-8.5), and literally thousands of other climate impact studies.74 For RCP8.5 to be a realistic projection of future CO2 emissions and concentrations, coal consumption would have to increase ten-fold during 2000-2100,75 achieving market shares not seen since the 1940s.76 [Figure 5 can be found at docket number EPA-HQ-OAR-2021-0292-A1, p. 26]

That is not happening, and emission trends increasingly diverge from those projected in RCP8.5. See the chart below by Zeke Hausfather and Glenn Peters. The chart shows that RCP8.5-projected CO2 emissions in 2050 are more than double those projected by the International Energy Agency in its baseline (current and pledged policies) emission scenarios.77 [Figure International Energy Agency can be found at docket number EPA-HQ-OAR-2021-0292-A1, p. 27]

One point that should leap out at attentive readers is that no-policy scenarios such as RCP8.5 are no longer 'reference case' or 'business-as-usual' baselines. Climate policies have been proliferating since the IWG's first SCC report in 2010. Yet the IWG continues to treat the obsolete EMF-22 'no policy' scenarios as BAU baselines.

More importantly, the EMF-22 no-policy scenarios would be unrealistic even if governments were not adopting climate policies. In 'The 1000 GtC coal question: Are cases of vastly expanded future coal combustion still plausible?'78 Justin Ritchie and Hadi Dowlatabadi show that all of the IPCC's five assessment reports 'use business-as-usual (BAU) scenarios that combust most or all coal reserves before the year 2100.' The basic idea is that coal is the inexpensive backstop energy source for the global economy, with reserve-to-production (R-P) ratios that increase over time as technological progress decreases extraction costs. Ritchie and Dowlatabadi further note that DICE, FUND, and PAGE 'adopt similar reference case assumptions for coal,' as do the EMF baseline scenarios underpinning the IWG's technical support documents.

Such scenarios are no longer plausible projections for the 21st century. The current coal R-P ratio is about 100 years—an order of magnitude lower than 1960s vintage assessments (>900 years) and two-thirds lower than the 300-year R-P ratio estimated in 1990. [Figure 1d can be found at docket number EPA-HQ-OAR-2021-0292-A1, p. 28]

Moreover, instead of real coal prices falling, as assumed in the IPCC, IAM, and EMF reference scenarios, prices in 2016 were about the same as in 1990, and have risen since 2000. In fact, coal prices today ($177 per metric ton) are more than double the average price in 2016.79 [Figure 1a can be found at docket number EPA-HQ-OAR-2021-0292-A1, p. 29]

Ritchie and Dowlatabadi comment: 'All else equal, conventional resource economists theorize that higher sustained commodity prices lead to a reclassification of marginal geologic deposits as economically recoverable reserves. Yet, since the doubling of coal prices and production in 2000, reserves declined by roughly 15 percent.' [Figure 1c can be found at docket number EPA-HQ-OAR-2021-0292-A1, p. 29]

In short, 'today's [coal] reserves are now more costly and less abundant than assumed 30 years ago.' That is due to several factors including constraints on extraction related to air and water quality regulations, declining social acceptance of mining operations near populated areas, the replacement of human labor with excavation machines too large to access smaller deposits, the absence (despite decades of R&D) of significant markets for coal-to-liquid motor fuel and coal syngas electricity fuel, and increased competition from unconventional oil and natural gas.

It is therefore no longer reasonable to view 'all geologic coal resources as eventual reserves' that sooner or later will be combusted. That is akin to assuming that 'all oceans should be on a supply curve for drinkable water' just because 'the total quantity of ocean water is vast and existing technology could theoretically convert all saltwater to replace fresh water.'

Ritchie and Dowlatabadi acknowledge that 'technological breakthroughs' may reverse the rise in coal prices and decline in coal R-P ratios. 'However, to assume [such breakthroughs] as constituting a plausible reference case is a tall ask.' To sum up, there is no evidence that, absent stringent new climate policies, coal will dominate global energy for centuries to come.80

Section 10: Comparing Apples and Oranges

In addition to stipulating that agencies should use both 3 percent and 7 percent discount rates in benefit-cost analysis, OMB Circular A-4 states:

The analysis should focus on benefits and costs that accrue to citizens and residents of the United States. Where the agency chooses to evaluate a regulation that is likely to have effects beyond the borders of the United States, these effects should be reported separately.81

Comparing domestic benefits to domestic costs makes obvious sense. It is Americans who chiefly bear the costs of domestic GHG regulations, so quantification of the associated U.S. climate benefits (to the extent that the SCC is quantifiable at all) is reasonable and appropriate.

Nonetheless, the IWG only estimates the global benefits of GHG emission reductions and suggests domestic benefit estimation is foolish or worse. We're admonished that GHG emissions are global externalities; that climate damages abroad have 'spillover' effects in the United States; that there are relatively few region- or country-specific SCC estimates in the literature; that IAMs were not calibrated to estimate domestic climate damages; and that presenting global SCC estimates facilitates U.S.-led international policy coordination.82

Whatever the merits of those points, they do not rebut the fact the agencies' current practice misleads the public by comparing apples to oranges. It encourages the public to mistakenly infer that it will reap most or all of the net benefits calculated by subtracting domestic regulatory costs from global climate change mitigation benefits. However valid it may be to present global SCC-based benefits, those should be reported separately, as Circular A-4 directs. There is no scientific or ethical justification for hiding U.S. domestic SCC estimates from the public.

The IWG discussed domestic SCC estimation in its 2010 TSD.83 The continuing dearth of country-specific SCC estimates and IAMs calibrated to estimate domestic SCC values strongly suggests agencies are not funding such research. Is that because domestic SCC estimates, even when inflated by all the methodological biases discussed above, are not large enough to support the 'climate crisis' narrative?

According to the 2010 TSD, the FUND model indicates the U.S. benefit of reducing CO2 emissions is about 7-10 percent of the global benefit.84 Based on such speculation (and, to repeat, all SCC estimation is speculation), the Trump administration estimated the domestic SCC in 2020 to be $7 per ton—about 86 percent lower than the IWG's 2016 estimate.85 [Table GAO-20-254 can be found at docket number EPA-HQ-OAR-2021-0292-A1, p. 31]

This much is clear. Failure to compare domestic climate policy costs and benefits injects a pro-regulatory bias into American politics. But then, so do all the IWG methodological decisions discussed above.

Section 11: Conclusion

The EPA's estimate of $91 billion in climate benefits from the proposed GHG motor vehicle standards does not withstand scrutiny. It depends on so many questionable and biased methodological choices there is no good reason to believe the projected emission reductions have any actual monetary value.

The studies by Dayaratna and colleagues reviewed above show that reasonable alternative assumptions substantially drive down SCC estimates, even pushing SCC values into negative territory. Replacing the obsolete EMF-22 baselines with realistic emission scenarios would further decrease SCC values during 2023-2050 and beyond.

However small (or negative) the global SCC would be after all reasonable adjustments are made to assumptions regarding discount rates, time horizons, climate sensitivity, CO2 fertilization, adaptive capabilities, and baseline emission trajectories, the SCC would be smaller still (or increasingly negative) if calculated on a domestic (U.S.-only) basis.

Finally, because the proposal's $91 billion climate benefits estimate is an inference from undetectably small hypothetical changes in global temperature with no discernible or verifiable environmental impacts, those benefits are not real enough to be netted against the tens of billions of dollars in annual costs the proposal would indisputably impose on automakers and consumers. [EPA-HQ-OAR-2021-0208-0292-A1, pp. 23-32]

EPA Response

EPA acknowledges the commenter's input and notes that it determined what standards were appropriate in light of the need for emissions reductions, the cost of compliance and lead time, and found the benefit-costs results of the RIA provide additional support for its conclusions. Under Section 202 of the CAA, EPA is required to establish standards to reduce air pollution that endangers public health and welfare, taking into consideration the cost of compliance and lead time. EPA is not required to conduct formal cost benefit analysis to determine the appropriate standard under Section 202. EPA weighed the relevant statutory factors to determine the appropriate standard and the analysis of monetized GHG benefits was not material to the choice of that standard. EO 12866 requires EPA to perform a cost-benefit analysis, including monetizing costs and benefits where practicable, and the EPA has conducted such an analysis. The monetized GHG benefits are included in the cost-benefit analysis. That cost-benefit analysis provides additional support for the EPA's final standards.

With respect to the social cost of greenhouse gases, EPA recognizes the limitations and uncertainties associated with the current interim IWG estimates and underlying methodology. EPA participated in the IWG and has carefully considered for this rulemaking the February 2021 TSD, the underlying studies discussed in the TSD and the issues raised by commenters. EPA concludes that, as noted in Section 3.3 of the RIA and elsewhere in this RTC, the discussions in the TSD represent appropriate consideration of the various issues (e.g., appropriate discount rate and scope) and the resulting estimates of the TSD represent appropriate, if conservative, estimates for purposes of this rulemaking.

Please see the response to AEI in Section 14.1 on modeling uncertainties and the NAESM recommendations for the SC-GHG models and estimates. Please see the response to AEI in Section 14.1 of this document on the choice of discount rate and intergenerational discounting.

Commenter: Institute for Policy Integrity at NYU Law et al.

EPA appropriately applies the social cost estimates developed by the Interagency Working Group on the Social Cost of Greenhouse Gases (Working Group') and rejects the faulty numbers that EPA applied from 2017 until early 2021. The Working Group developed its social cost estimates through a rigorous and transparent process incorporating the best available science. Those values though widely agreed to underestimate the full social costs of greenhouse gas emissions4 are appropriate to use as conservative estimates and have been applied in dozens of previous rulemakings 5 and upheld in federal court.6 In contrast, the estimates that EPA and other federal agencies applied during the Trump administration disregarded the best available science and were rejected by a federal court as arbitrary and capricious.7

EPA provides several compelling justifications for readopting the Working Group's estimates. But while the legal challenges that have already been brought against the Working Group's estimates are unfounded,8 EPA should anticipate similar legal challenges to its application of the social cost of greenhouse gases and so provide additional justifications for its policy choices on this consequential issue.9 In particular, EPA should expand upon its justifications for adopting a global damages valuation and for the range of discount rates it applies to climate effects. As detailed herein, there are many additional legal, economic, and policy justifications for such methodological decisions that can further bolster EPA's support for these choices. EPA should also strongly consider conducting supplemental sensitivity analyses to further confirm that strengthening the vehicle emissions standards will deliver significant net benefits to society under a range of analytical assumptions.

These comments are organized into five sections. First, as Section I recommends, EPA should both explicitly affirm that, in EPA's own expert judgment, those estimates are appropriate but conservative lower bounds that omit significant categories of climate damages. [EPA-HQ-OAR-2021-0208-0268-A1, pp. 1-2]

Section II recommends that EPA provide additional justification for adopting a global framework for valuing climate impacts. These include legal justifications based on the Clean Air Act, the National Environmental Policy Act's broad government-wide policy mandates, the Administrative Procedure Act's requirement to consider all important factors, and executive orders and international agreements. EPA can similarly strengthen its economic and policy justifications, such as by explicitly concluding that the theory and evidence for international reciprocity justify a focus on the full global values. Section II also recommends that EPA modify its discussion of domestic-only estimates. The RIA currently uses, in a footnote, the flawed domestic-only values developed under the now-revoked Executive Order 13,783.10 Though EPA correctly judges those values to be underestimates, they are actually fatally incomplete11 and should not be used. EPA should instead consider conducting sensitivity analysis using a sounder domestic-only estimate as a backstop to minimize legal risk. [EPA-HQ-OAR-2021-0208-0268-A1, pp.2-3]Section III recommends that EPA provide additional justification for adopting the range of discount rates endorsed by the Working Group and for appropriately deciding not to apply a 7% capital-based discount rate to climate impacts. In particular, EPA should provide additional justification for combining climate effects discounted at an appropriate consumption-based rate with other costs and benefits discounted at a capital-based rate. Besides climate effects presenting special legal, economic, and policy considerations for the discount rate, EPA should also argue that it is appropriate generally to focus its analysis of this rule on consumption-based rates given that most costs and benefits are projected to fall to consumption rather than to capital investments. We also urge EPA to consider providing additional sensitivity analysis using discount rates of 2% or lower for climate impacts, as recently suggested by the Working Group.

Section IV recommends that EPA bolster its justification for relying on the Working Group's other methodological choices, including the fact that the Working Group applied a transparent and rigorous process that relied upon the best-available and most widely-cited models for monetizing climate damages. This section also provides detailed rebuttals to common criticisms of the Working Group's methodology from opponents of climate regulation.

Finally, Section V encourages EPA to apply the social cost of greenhouse gases estimates that it developed through 2070, to coordinate with the Working Group (of which EPA is a member) to adopt social cost values through at least that time period, and more broadly to extend its analytical time frame to capture all significant benefits. [EPA-HQ-OAR-2021-0208-0268-A1, p.3]

EPA Should Affirm That, in Its Expert Judgment, the Working Group's Social Cost of Greenhouse Gas Estimates Are Appropriate But Conservative.

Both the Proposed Rule12 and the RIA13 cite and quote the Working Group's February 2021 Technical Support Document as support for the methodological choices underlying the social cost of greenhouse gas values that EPA applies in its analysis. In particular, EPA cites the Working Group's conclusion that the values likely underestimate' climate damages.14 Such references provide compelling justifications for applying the Working Group's estimates as appropriate lower bounds. However, EPA should take the additional steps of explicitly incorporating the Working Group's entire Technical Support Document by reference, and then affirming that in EPA's own judgment, the values it endorses are conservative underestimates.

These additional steps will serve two important goals. First, they will help shield EPA from any attacks that the agency's reliance on the Working Group's guidance or its justification for the values is in any way incomplete. Second, they will bolster the case that stronger vehicle emission standards will deliver significant net benefits to society. Notably, the Working Group's estimates do not currently reflect (due to data limitations) climate damages from many significant effects that EPA has a statutory responsibility to consider, including ocean acidification, wildfires, public health effects from methane emissions, abrupt ecosystem disruptions, and many potentially catastrophic outcomes, to name just some categories of omitted damages. 15 Because of such omitted damages and other limitations of the current estimates, the Working Group's central estimates of global damages calculated at a 3% discount rate are most likely severe underestimates of the full climate effects from greenhouse gas emissions. EPA should note in all its presentations of net benefits that its estimates of climate benefits are conservative underestimates that do not currently include many significant categories of climate damages.16 [EPA-HQ-OAR-2021-0208-0268-A1, pp. 3-4]

EPA Should Provide Additional Justification for Its Reliance on Global Climate Damage Valuations, While Considering Additional Analysis of Domestic Effects

In the Proposed Rule, EPA appropriately focuses on a global estimate of climate benefits, returning to its historical approach and correcting its recent, temporary, and arbitrary practice of disregarding all climate effects that occur outside the physical borders of the United States.

While EPA offers persuasive justifications for this decision,17 it should provide additional analysis on this front.18 In particular, EPA should emphasize the concern for the impacts of U.S. pollution on foreign welfare in the Clean Air Act and other sources of law, further highlight the significance of U.S. strategic interests and reciprocity, discuss the importance of extraterritorial impacts and spillovers, and highlight the inconsistency that would occur if the agency considered only domestic benefits while focusing on global costs. At the same time, since reliance solely on a global valuation carries some legal risk, EPA may wish to conduct additional sensitivity analysis around a domestic-only valuation.

Relevant Statutes and Executive Orders Compel, And Certainly Permit, a Global Perspective on Climate Damages.

The Clean Air Act, National Environmental Policy Act, Administrative Procedure Act, and other key sources of law not only permit, but in fact require EPA to consider international effects. EPA should highlight these legal requirements as justification for its focus on global climate impacts.

Section 202 of the Clean Air Act, under which EPA issues the Proposed Rule, charges EPA with regulating 'air pollutant[s] which may be reasonably anticipated to endanger public health or welfare,'19 where 'welfare' is defined to include 'effects on . . . weather . . . and climate.'20 When interpreting Section 202, the Supreme Court found 'there is nothing counterintuitive to the notion that EPA can curtail the emission of substances that are putting the global climate out of kilter.'21 And when industry challenged another EPA climate program by arguing that the Clean Air Act 'was concerned about local, not global effects,' the U.S. Court of Appeals for the D.C. Circuit had 'little trouble disposing of Industry Petitioners' argument that the [Clean Air Act's prevention of significant deterioration] program is specifically focused solely on localized air pollution,' finding instead that the statute was 'meant to address a much broader range of harms,' including 'precisely the types of harms caused by greenhouse gases.'22

Environmental and administrative law scholar Richard Revesz, who also directs the undersigned Institute for Policy Integrity, has exhaustively reviewed the legislative history of the Clean Air Act's definition of 'welfare' and has concluded that 'when Congress included the 'effects on . . . climate' language in the statute, it understood that adverse climate effects could occur on a global scale.'23 For instance, Senator Caleb Boggs, a Republican from Delaware and ranking minority member of the Public Works Subcommittee on Air and Water Pollution, which was considering the Clean Air Act in 1970, entered a report into the record stating that air pollution 'alters climate and may produce global changes in temperature.'24 Senator Jennings Randolph of West Virginia likewise submitted a statement into the record explaining that U.S. air pollution could 'produce unacceptable worldwide climate changes.'25 Congress's clear concern for the effects of domestic pollution on the global climate—many more examples of which are discussed in Professor Revesz's article—demonstrates that a global perspective is appropriate, if not required, when EPA regulates under the Clean Air Act. [EPA-HQ-OAR-2021-0208-0268-A1, pp. 4-5]

This interpretation is further compelled by the National Environmental Policy Act ('NEPA'). Though best known for requiring agencies to prepare environmental impact statements before taking certain actions (a requirement that does not apply to Clean Air Act actions),26 NEPA also much more broadly declares a national environmental policy and requires of all agencies that ‘to the fullest extent possible[,] the policies, regulations, and public laws of the United States shall be interpreted and administered in accordance with the policies set forth in this chapter,’ including the need to ‘recognize the worldwide and long-range character of environmental problems’ and to ‘lend appropriate support’ to help ‘maximize international cooperation.’28 In other words, especially because adopting a global perspective on climate damages will advance U.S. foreign policy goals (see the next subsection), NEPA requires EPA to interpret all of its laws, including the Clean Air Act, in ways that recognize the worldwide character of environmental problems. Using global social cost of greenhouse gas estimates helps fulfill that requirement.

Other key legal commitments compel this same conclusion. For instance, the United Nations Framework Convention on Climate Change—to which the United States is a party—declares that national ‘policies and measures to deal with climate change should be cost-effective so as to ensure global benefits at the lowest possible cost.’30 The Convention further commits parties to evaluating global climate effects in their policy decisions, by ‘employ[ing] appropriate methods, for example impact assessments . . . with a view to minimizing adverse effects on the economy, on public health and on the quality of the environment, of projects or measures undertaken by them to mitigate or adapt to climate change.’31 The unmistakable implication of the Convention is that parties—including the United States—must account for global economic, public health, and environmental effects in their impact assessments. In 2008, a group of U.S. senators—including then-Senator John Kerry, who helped ratify the framework convention on climate change—agreed with this interpretation of the treaty language, saying that ‘[u]pon signing this treaty, the United States committed itself to considering the global impacts of its greenhouse gas emissions.’

And under the Administrative Procedure Act, it is arbitrary and capricious for agencies to ‘entirely fail[] to consider an important aspect of the problem’—an obligation that a federal court held requires federal agencies to consider international climate impacts. Specifically, a recent ruling from the U.S. Court for the Northern District of California struck down as arbitrary the Bureau of Land Management’s (‘BLM’) rescission of the Waste Prevention Rule in part because the agency had abandoned the Working Group’s peer-reviewed, global estimates of the social cost of greenhouse gases in favor of flawed estimates (the same estimates that EPA applied under the Trump administration) that looked only at effects within the U.S. borders. The court found that the global values developed by the Working Group reflected ‘the best available science about monetizing the impacts of greenhouse gas emissions,’ whereas ‘focusing solely on domestic effects has been soundly rejected by economists as improper and unsupported by science.’ The court reminded BLM that relevant executive orders, including Executive Order 12,866, require consideration of ‘all’ costs and benefits, based on the ‘best reasonably obtainable scientific, technical, economic, and other information,’ and concluded that ‘no[] . . . regulatory rules or orders require exclusion of global impacts.’ More recently, Executive Order 13,990 instructed agencies to ‘tak[e] global damages into account,’ because ‘[d]oing so facilitates sound decision-making, recognizes the breadth of climate impacts, and support the international leadership of the United States on climate issues.’ This language again reinforces the instructions from NEPA that, whenever not precluded by statute from doing so, agencies should account for the environmental impacts of their actions on foreign nations.

EPA should draw upon these legal authorities in justifying its reliance on global climate-damage valuations. [EPA-HQ-OAR-2021-0208-0268-A1, pp.5-7]

26 While actions taken under the Clean Air Act 'shall [not] be deemed a major Federal action significantly affecting the quality of the human environment within the meaning of [42 U.S.C. § 4332(2)(C)],' 15 U.S.C. § 793(c)(1), the other provisions of NEPA—including those quoted and cited in this paragraph—continue to apply.

28 Id. § 4332(2)(F); see also EDF v. Massey, 986 F.2d 528, 536 (D.C. Cir. 1993) ('Section 102(2)(F) further supports the conclusion that Congress, when enacting NEPA, was concerned with worldwide as well as domestic problems facing the environment. . . . Compliance with one of the subsections can hardly be construed to relieve the agency from its duty to fulfill the obligations articulated in other subsections.'); NRDC v. NRC, 647 F.2d 1345, 1387 (D.C. Cir. 1981) (J. Robinson, concurring; J. Wilkey wrote for the Court, but there was no majority opinion) (concluding that even if a conflict with another statute prevents the agency from conducting an environmental impact statement, that 'does not imply that NRC may ignore its other NEPA obligations,' including the 'provision for multinational cooperation' and the 'policy of the United States with respect to the ecological well-being of this planet'; rather, the agency 'should remain cognizant of this responsibility'); Greene County Planning Bd. v. Federal Power Comm'n, 455 F.2d 412, 424 (2d Cir. 1972) ('The Commission's 'hands-off' attitude is even more startling in view of the explicit requirement in NEPA that the Commission 'recognize the worldwide and long-range character of environmental problems' and interpret its mandate under the Federal Power Act in accordance with the policies set forth in NEPA.').

30 U.N. Framework Convention on Climate Change art. 3(3), May 9, 1992, 1771 U.N.T.S. 107 (emphasis added); see also id. art. 3(1) ('The Parties should protect the climate system for the benefit of present and future generations of humankind, on the basis of equity and in accordance with their common but differentiated responsibilities and respective capabilities.') (emphasis added); id. art. 4(2)(a) (committing developed countries to adopt policies that account for 'the need for equitable and appropriate contributions by each of these Parties to the global effort').

Focusing on Global Climate Damages Furthers U.S. Strategic Interests by Facilitating Reciprocity, Mitigating International Spillover Effects, and Protecting U.S. Extraterritorial Interests.

EPA explains that the Working Group selected a global perspective because climate impacts occurring outside U.S. borders can directly and indirectly affect U.S. welfare through spillovers and foreign reciprocity, and that EPA is readopting that global perspective consistent with its approach from 2009 2016.39 EPA should expand on this justification. In particular, EPA should explicitly explain why the theory and evidence for reciprocity by itself justifies a focus on the full global values, and that additional strategic and practical justifications provide further support.

Use of the Global Values Facilitates International Reciprocity. Because the world's climate is a single interconnected system, the United States benefits greatly when foreign countries consider the global externalities of their greenhouse gas pollution and cut emissions accordingly. It therefore promotes the strategic interests of the United States to encourage all other countries to think globally in setting their climate policies. The United States can advance this objective by itself adopting the full global social cost of greenhouse gases as numerous leading climate economists and experts have explained.40 Indeed, basic economic principles demonstrate that the United States stands to benefit greatly if all countries apply global social cost of greenhouse gas values in their regulatory decisions and project reviews41 likely trillions of dollars in direct benefits from foreign action to combat climate change.42

The Biden Administration has clearly made such a strategic choice, to adopt a global valuation of climate damages as part of its diplomatic strategy. Executive Order 13,990 unequivocally states that [i]t is essential that agencies capture the full costs of greenhouse gas emissions as accurately as possible, including by taking global damages into account . . . [to] support the international leadership of the United States on climate issues.'43 The Order later elaborates: Our domestic efforts must go hand in hand with U.S. diplomatic engagement. Because most greenhouse gas emissions originate beyond our borders, such engagement is more necessary and urgent than ever. The United States must be in a position to exercise vigorous climate leadership in order to achieve a significant increase in global climate action and put the world on a sustainable climate pathway.'44

There is already evidence that the U.S. strategy of combining its domestic efforts including the global valuation of climate damages with its diplomatic engagement is spurring foreign reciprocity. During the April 2021 Leaders' Summit on Climate' hosted by the United States, following the announcement of a new U.S. commitment to reduce emissions to 50 52% below 2005 levels by 2030, multiple other countries reciprocally increased the ambition of their own climate targets. Notably, Japan accelerated its reduction goal from 26% to 46 50%; Canada strengthened its target from 30% to 40 45%; the European Union set a target of at least 55%; the United Kingdom set a new target for the year 2035; South Korea strengthened its target to achieve net zero emissions by 2050; China promised to peak coal use by 2025 and phase down coal consumption after that, and to join the Kigali Amendment to reduce hydrofluorocarbon emissions; Argentina pledged to strengthen its goal by 2.7% and make previously conditional' targets unconditional' instead; Brazil committed to a net zero target by 2050 (ten years earlier than its previous 2060 goal) and pledged to end illegal deforestation by 2030; South Africa shifted its emission peak ten years earlier, to 2025; and New Zealand, Bhutan, and Bangladesh all committed to submit more ambitious plans in the near future.45

This flurry of activity is just the latest evidence of reciprocity in international climate actions. Some past reciprocity has been explicit. The Kigali Amendment, for example, is the latest internationally negotiated climate treaty, with more than 120 parties so far committing to common but differentiated responsibilities to phase down hydrofluorocarbons. 46 Previously, under the Copenhagen Accord and the Paris Agreement, some parties, including the European Union and Mexico, have at times explicitly made conditional pledges, promising to ratchet up their efforts if other countries make comparable reductions.47 By contrast, when the United

States failed to take action to reduce greenhouse gas emissions during the George W. Bush Administration and during the Trump Administration,’ as economist Michael Greenstone has testified before the U.S. House of Representatives, both periods were characterized by little [international] progress, and indeed many instances of backsliding, in reducing emissions globally.’48 By failing to take international climate damages into account, in other words, EPA and other U.S. agencies would incentivize other countries to do the same, which in turn would cause greater greenhouse gas pollution originating in other countries that causes climate damage within the United States.

In January 2021, Trevor Houser and Kate Larsen published a conservative estimate of the number of tons of greenhouse gases that the rest of the world has committed to reduce for each ton that the United States has pledged to reduce: a figure they call the Climate Reciprocity Ratio.’49 Using only the quantifiable, unconditional pledges that 51 countries have made since 2014 to cut emissions through 2030, Houser and Larsen conservatively estimate that for every ton the United States pledged to reduce, these other countries have pledged 6.1 6.8 tons in return.50 While implementation of all these foreign policies is not guaranteed, Houser and Larsen cite evidence that several large emitters are on track to meet their goals, and that the ratio should grow over time as the U.S. share of global emissions falls.51

In short, both empirical evidence and economic theory strongly support a strategic choice for U.S. agencies to adopt the full global estimates of the social cost of greenhouse gases, as this facilitates international reductions in greenhouse gas pollution that directly benefits the United States. EPA should therefore explicitly make the case that current evidence of foreign reciprocity supports a focus on the full global valuations of the social cost of greenhouse gases. [EPA-HQ-OAR-2021-0208-0268-A1, pp.7-10]

Use of the Global Values Recognizes Spillover Impacts from Climate Change. Significant costs to trade, human health, and security will inevitably spill over’ to the United States as other regions of the planet experience climate change damages.52 Due to its unique place among countries both as the largest economy with trade- and investment-dependent links throughout the world, and as a military superpower the United States is particularly vulnerable to effects that will spill over from other regions of the world. Use of global damage values recognizes these spillover effects, which were ignored under the Trump administration’s domestic-only valuation.

These spillover effects take many forms. In terms of trade-related impacts, for one, as climate change disrupts the economies of other countries, decreased availability of imported inputs, intermediary goods, and consumption goods will cause supply shocks to the U.S. economy, causing particularly damaging disruptions in sectors such as agriculture and technology. Similarly, the U.S. economy will experience demand shocks as climate-affected countries decrease their demand for U.S. goods. U.S. trade and businesses that rely on foreign-owned infrastructure, services, and resources will suffer.53 Financial markets will also suffer as foreign countries become less able to loan money to the United States and as the value of U.S. firms declines with shrinking foreign profits. As seen historically, economic disruptions in one country can cause financial crises that reverberate globally at a breakneck pace.54

Climate change is also predicted to exacerbate existing security threats and possibly catalyze new security threats to the United States.55 Besides threats to U.S. military installations and operations at home and abroad from flooding, storms, extreme heat, and wildfires,56 climate change is also a source[] of conflict around the world'57 and a threat multiplier' that, as recognized by the Department of Defense, will aggravate stressors abroad such as poverty, environmental degradation, political instability, and social tensions conditions that can enable terrorist activity and other forms of violence.'58 Climate change will create and exacerbate new conflicts and humanitarian crises that will require a U.S. response, even as climate change also complicates the logistics of deploying forces and achieving missions.

Climate change will also very directly cause spillover damages across transboundary resources. The United States has already begun to experience increased smoke from Canadian wildfires and drought conditions that spread along the U.S.-Mexico border.59 The United States shares a maritime border with 21 other countries, shares water resources like the Columbia River with our neighbors, and shares ecosystems including the oceans through which migratory species with high economic and ecosystem-service values, like the Pacific hake, travel and live.60

All of these individual spillover effects can also interact and trigger feedback loops that will propagate additional spillover damages.61 Economic shocks around the world can make it more difficult for other countries to continue investing in mitigation and abatement, thus hastening the pace of climate change.62 Conflict and political instability caused by climate change can further reduce the willingness or ability of countries to engage in domestic climate policy or international cooperation.63 Spillover effects can chain together: if climate change accelerates migration, the attendant economic ripple effects and spread of health risks may cause political instability, which in turn can cause more migration and further economic ripple effects, thus starting the feedback loop again.64

Some experts on the social cost of greenhouse gases have therefore concluded that, because the integrated assessment models that underlie the Working Group's social cost valuations currently do not capture many of these key inter-regional costs, use of the global values can be further justified as a proxy for capturing all spillover effects.65 Though not all climate damages will spill back to affect the United States, many will, and together with other justifications, the likelihood of significant spillovers makes a global valuation the better, more transparent accounting of the full range of costs and benefits that matter to U.S. policymakers and the public. EPA can therefore highlight spillover impacts as further justification for relying on global social cost valuations. In addition to the spillover effects that EPA already mentions,66 EPA should argue that transboundary spillovers, feedback loops, information spillovers, and other effects justify a focus on the full global values, either independently or in combination with other strategic and ethical considerations.67 [EPA-HQ-OAR-2021-0208-0268-A1, pp.10-12]

Use of the Global Values Preserves Extraterritorial Interests. The RIA mentions direct and indirect impacts to U.S. citizens and assets located abroad as a justification for a global valuation,68 but U.S. extraterritorial interests are even more extensive and significant. A domestic-only estimate of the social cost of greenhouse gases based on some rigid conception of geographic borders or U.S. share of world GDP will fail to capture all the climate-related costs and benefits that matter to U.S. citizens, including impacts to significant U.S. ownership interests in foreign businesses, properties, and other assets, as well as U.S. consumption abroad including tourism,69 and even effects to the millions of Americans living abroad.70 The United States also has military personnel and assets located in almost every nation across the globe, and many if not all installations abroad including those with high replacement costs or irreplaceable strategic value face imminent climate risks.71 Because no methodology for estimating a domestic-only' value would capture these impacts to extra-territorial interests, focusing on the global values can be further justified in part as a proxy for these important considerations.

The Office of Management and Budget's Circular A-4 guidance on conducting regulatory impact analysis requires agencies to count all significant costs and benefits, including use' values as well as non-use' values like bequest and existence values.72 Circular A-4 cautions that ignoring these values' may cause analyses to significantly understate the benefits and/or costs' involved.73 Similarly, Circular A-4 recognizes that U.S. citizens may have altruism for the health and welfare of others,' and instructs agencies that when there is evidence of selective altruism, it needs to be considered specifically in both benefits and costs.'74 U.S. citizens will experience costs because of their use values, non-use values, and altruistic values attached to climate effects occurring outside the U.S. borders.

Such non-use and altruistic values take many forms. For one, the United States and its citizens have a willingness to pay as well as a legal obligation to protect the global commons of the oceans and Antarctica from climate damages. Furthermore, a quarter of the U.S. population consists of either foreign-born immigrants or second-generation residents,75 and subsequent generations of Americans retain significant familial, cultural, economic, and religious ties to their ancestors' home nations across the world.76 U.S. citizens and residents have a significant willingness to pay to protect their relatives, ancestral homes, and cultural and religious sites located abroad.77 Similarly, U.S. citizens value natural resources and plant and animal lives abroad even if they never see or use those resources and care about the health and welfare of unrelated foreign citizens78 and cultural and world heritage sites threatened by climate change.79 This altruism is selective altruism,' consistent with Circular A-4, because the United States is directly responsible for a huge amount of the historic emissions contributing to climate change.80

Both strategic considerations and the need to account for spillovers already provide independent justifications for focusing on the full global social cost of greenhouse gas estimates. But the global values can also be at least partly justified as a proxy for these extra-territorial interests that otherwise would be overlooked using a domestic-only damage estimate. EPA can therefore highlight U.S. extraterritorial interests as further justification for relying on global social cost valuations, and should specifically call attention to climate-vulnerable U.S. military instillations abroad with high replacement costs or irreplaceable strategic value, U.S. willingness to pay to protect relatives, ancestral homes, cultural and religious sites, and natural resources located abroad, and U.S. altruism toward the people, animals, and natural habitats across the globe. [EPA-HQ-OAR-2021-0208-0268-A1, pp.12-14]

Focusing on Global Climate Damages Is Consistent With EPA's Consideration of Global Costs. EPA can further justify its focus on global climate benefits as necessary for consistency with the rest of its analysis. To begin, EPA decided to treat monopsony impacts as an international transfer payment, rather than as potential benefits to U.S. consumers at the expense of foreign oil producers.81 As Circular A-4 suggests, an analysis adopts a global rather than U.S.-centered perspective when it treats such international flows as transfers rather than as costs or benefits.82 And while a global perspective on climate damages can be justified on strategic grounds that would not necessarily compel also treating monopsony effects as transfers rather than as U.S. benefits, adopting a global perspective on such monopsony effects is consistent with adopting a global perspective on climate effects.

More broadly, EPA's analysis implicitly takes a global perspective on technology costs, and so it would be arbitrary not to take a global perspective on climate effects as well. All industry compliance costs ultimately fall on the owners, employees, or customers of regulated and affected firms. Whether the Proposed Rule's technology costs are passed to consumers or investors, or some combination thereof, a significant portion of the Proposed Rule's alleged compliance costs will ultimately accrue to foreign customers or foreign investors. Regulated manufacturers include major corporations that are headquartered abroad or that are publicly traded with investors across the globe.83 Consumers similarly include corporate fleets of passenger vehicles and light-duty trucks owned by foreign entities or by public corporations with foreign shareholders.84 In general, about 29% of U.S. corporate debt and 14% of equities are foreign-owned,85 and adding foreign direct investment to portfolio stock ownership suggests that foreigners own about 40% of U.S. corporate equity.86 Thus, a significant share of technology costs may fall on foreign entities, but EPA never distinguishes between those costs that would accrue to foreign entities as opposed to U.S. citizens or U.S. entities, and so its calculations of cost implicitly include all global effects. Considering global climate benefits is consistent with that approach.

In a few recent analyses, agencies including EPA have admitted that some portion of the costs or cost savings calculated for publicly-traded corporations will accru[e] to entities outside U.S. borders' through foreign ownership, employment, or consumption.87 Yet much like in the Proposed Rule, these analyses do not attempt to separate out such effects to foreign interests, nor attempt to exclude such effects from consideration altogether. Indeed, splitting corporate effects into subparts based on ultimate ownership much like separating climate benefits geographically could be extremely complicated.88 Thus, as a practical matter, agencies typically count all costs or benefits to corporations, no matter how those effects may be passed through to foreign owners, foreign employees, or foreign customers.

Since EPA analyzes the Proposed Rule's costs globally without distinguishing between U.S. and foreign effects it would be inconsistent and arbitrary for the agency to attempt to separate out and disregard climate benefits that occur abroad, as doing so would put a thumb on the scale' by treating costs globally but benefits domestically.89 EPA can therefore highlight its consistent treatment of costs and benefits as further justification for relying on global social cost of greenhouse gas valuations. [EPA-HQ-OAR-2021-0208-0268-A1, pp.14-15]

EPA Should Replace Its References to the Interim' Domestic-Only Values Created Under Executive Order 13,783, and Instead Consider a Different Sensitivity Analysis as a Backstop to Minimize Legal Risks. While EPA correctly relies on global social cost of greenhouse gases values to assess the Proposed Rule's benefits, it should modify its limited discussion of the rule's domestic climate impacts. In a footnote, EPA applies the flawed domestic-only values developed under the now-revoked Executive Order 13,783. But those numbers are fatally incomplete and thus should not be used. Instead, EPA should consider conducting sensitivity analysis using a sounder domestic-only estimate as a backstop to minimize legal risk.

To begin, EPA should delete a stray reference in its RIA to social cost of greenhouse gas values created under the now-revoked Executive Order 13,783 that could be misinterpreted. In note j on page 3-29, the RIA writes: The values used in the SAFE rule RIA were interim values developed under E.O. 13783 for use in regulatory analyses. EPA followed E.O. 13783 by using SC-CO2 estimates reflecting impacts occurring within U.S. borders and 3% and 7% discount rates in our central analysis for the proposal RIA.'90 Though likely intended to refer only to the values EPA used in the proposed and final RIA for the SAFE Rule, the wording of the final phrase is ambiguous and could be misinterpreted as suggesting EPA is continuing to use such domestic-only values in its central analysis of this proposed RIA. To avoid such confusion, EPA should delete that unnecessary reference.

EPA does in fact use those domestic-only estimates in yet another footnote in the RIA. Specifically, note n on page 3-36 explains that those values were incomplete underestimates that ignored how climate impacts occurring outside U.S. borders can directly and indirectly affect U.S. welfare.91 Nevertheless, EPA presents what the Proposed Rule's climate benefit would be according to those values, highlighting climate benefits in the years 2023 and 2050. EPA perhaps intended to show that even under such misleadingly low valuations, the proposed standards will still achieve billions of dollars in climate benefits. However, the domestic-only values calculated under the now-revoked Executive Order 13,783 were not simply incomplete and misleading underestimates: they have been ruled by a federal court to be illegally arbitrary values inconsistent with the best available science and economics.92 EPA should make even clearer that these values are arbitrary and invalid and should not be relied upon.

At the same time, given past legal challenges to agencies' reliance on global valuations of the social cost of greenhouse gases, EPA should anticipate there may likely be litigation over its use of the global values in its main analysis here. For example, last year, a judge in the U.S. Court for the District of Wyoming faulted the Bureau of Land Management for not separately analyzing and reporting the United States' domestic share of [climate] benefits' resulting from a rule to reduce methane waste.93 Even after the agency had explained to the court that there was no suitable methodology for estimating domestic damages, the court opined that there is no reason to think that a domestic analysis cannot also be performed.'94 Thus, notwithstanding all the compelling legal, economic, and policy justifications for focusing on the global values, and despite previous caselaw favorable to the global valuation,95 some legal risk remains if EPA relies on global values without conducting a sensitivity analysis using domestically-oriented calculations. Additionally, because EPA included some domestic-only calculations of the social cost of greenhouse gases in its proposed RIA,96 erasing any domestic-only calculation from its final RIA could also raise legal challenges.

To further minimize legal risk, therefore, EPA should consider conducting a sensitivity analysis using a domestic-only valuation. The Working Group may in the future release guidance on an appropriate range for such a valuation, and considerable evidence suggests that after weighing strategic benefits, spillover effects, and extraterritorial interests any reasonable attempt to estimate the U.S. share of climate benefits would be quite a high proportion of global benefits.97 In the meantime, however, the best existing guidance available to EPA for a domestic-only estimate is not the arbitrary values calculated under the now-revoked Executive Order 13,783. Rather, EPA should look to the Working Group's past technical support documents for guidance.

In 2010, the Working Group provided an approximate, provisional, and highly speculative' range of up to 23% of the global value as a domestic-only estimate, but admitted even that was likely a significant underestimate. 98 Though an imprecise and gross underestimate, those values at least have the virtue of some regulatory precedent, as the Department of Energy has repeatedly used them for sensitivity analyses.99 EPA should therefore consider 23% of the global value to be the absolute minimum used for a domestic-only sensitivity analysis. EPA should emphasize that such values are still gross underestimates, as they disregard most of the domestic impacts discussed above including international reciprocity, spillover impacts, and extraterritorial interests. EPA should also note that the integrated assessment models used to estimate the social cost of greenhouse gases were not designed for such localized, non-global estimates. EPA should confirm that, while the Proposed Rule would be cost-benefit justified using such domestic-only values, the agency maintains that the global perspective is the correct focus for its main analysis. [EPA-HQ-OAR-2021-0208-0268-A1, pp.15-17]

EPA Should Provide Additional Justification for Its Discount Rates Choices and Conduct Sensitivity Analysis Using Lower Rates. EPA applies the social cost of greenhouse gas estimates calculated at discount rates of 2.5%, 3%, and 5%,100 consistent with the Working Group's current recommendations, and justifies its decision to return to its prior conclusion that a 7% capital-based discount rate is inappropriate for climate effects. While EPA's return to a reasonable range of discount rates to assess climate impacts is well supported, in anticipation of specious but inevitable legal challenges, EPA should provide additional justifications for its discounting choices.101 [EPA-HQ-OAR-2021-0208-0268-A1, p.17]

EPA should also work to promote consistent language on discounting with the National Highway Traffic Safety Administration's analysis of its now-proposed vehicle standards and, per the Working Group's recommendation, EPA should strongly consider providing additional sensitivity analysis around discount rates lower than 2.5% such as a 2% discount rate. [EPA-HQ-OAR-2021-0208-0268-A1, p.17]

EPA Should Provide Additional Justifications for Its Discount Rate Range. The RIA cites the Working Group's arguments that, for long-term policies with intergenerational effects, uncertainty and ethical considerations make a 7% capital-based discount rate inappropriate.102 Though these arguments provide sufficient reason for EPA's approach to discount rates, because the Working Group's approach to discount rates and in particular the reversal of the prior administration's irrational application of a 7% rate to climate effects has already been challenged in court, 103 EPA should provide additional justifications for its focus on consumption-based rates and its approach to discounting climate effects as compared to other costs and benefits. [EPA-HQ-OAR-2021-0208-0268-A1, pp. 17-18]

A 7% Discount Rate Is Inappropriate for Climate Effects, as Considerable Evidence Points to Substantially Lower Discount Rates in Intergenerational Settings. Although Circular A-4 provides discount rates of 3% and 7% as a default assumption, it also requires agency analysts to do more than rigidly apply default assumptions.104 As such, analysis must be based on the best reasonably obtainable scientific, technical, and economic information available,'105 and agencies must [u]se sound and defensible values or procedures to monetize benefits and costs, and ensure that key analytical assumptions are defensible.'106 Rather than assume that a 7% discount rate should be applied automatically to every analysis, Circular A-4 requires agencies to justify the choice of discount rates for each analysis.107 Based on Circular A-4's criteria, there are numerous reasons why applying a 7% discount rate to climate effects that occur over a 300-year time horizon would be unjustifiable and that discount rates of 3% or lower are appropriate.

First, basing the discount rate on the consumption rate of interest (which the 3% rate represents) is the correct framework for analysis of climate effects, whereas a discount rate based on the private return to capital (which the 7% rate represents) is inappropriate. While Circular A-4 suggests that 7% should be a default position' that reflects regulations that primarily displace capital investments, it also explains that [w]hen regulation primarily and directly affects private consumption . . . a lower discount rate is appropriate.'108 The 7% discount rate is based on a private sector rate of return on capital, as private market participants typically have short time horizons. By contrast, climate change concerns the public well-being broadly rather than market participants narrowly. Rather than evaluating an optimal outcome from the narrow perspective of investors alone, economic theory requires analysts to make the optimal choices based on societal preferences and social discount rates. Moreover, because climate change is expected to mostly affect large-scale consumption, as opposed to capital investment,109 a 7% rate is inappropriate. Crucially, as the Working Group recognizes, the social cost of greenhouse gas estimates present climate damages in consumption-equivalent units, and therefore, Circular A-4's guidance in fact dictates application of consumption-based discount rates.110 The National Academies of Sciences has agreed that a capital-based rate would be inappropriate for use with the social cost of greenhouse gases, given that climate damages are estimated in consumption-equivalent units.111 There is also strong consensus through the economic literature that a capital discount rate like 7% is inappropriate for climate change.112

Second, uncertainty over the long time horizon of climate effects should drive analysts to select a lower discount rate. As an example of when a 7% discount rate is appropriate, Circular A-4 identifies an EPA rule with a 30-year timeframe of costs and benefits.113 By contrast, greenhouse gas emissions generate effects stretching out across approximately 300 years. As Circular A-4 notes, [p]rivate market rates provide a reliable reference for determining how society values time within a generation, but for extremely long time periods no comparable private rates exist.'114 Circular A-4 discusses how uncertainty over long time horizons drives the discount rate lower.115 Circular A-4 cites the work of renowned economist Martin Weitzman and concludes that the certainty-equivalent discount factor . . . corresponds to the minimum discount rate having any substantial positive probability.'116 The National Academies of Sciences makes the same point about discount rates and uncertainty.117

Third, a 7% discount rate also ignores catastrophic risks and the welfare of future generations. As EPA showed in a recent cost-benefit analysis, the 7% rate truncates the long right-hand tail of social costs relative to the 3% rate's distribution. 118 The long right-hand tail represents the possibility of catastrophic damages. Thus, the 7% discount rate effectively assumes that present-day Americans are barely willing to pay anything at all to prevent medium- to long-term catastrophes. [EPA-HQ-OAR-2021-0208-0268-A1, pp.18-20]

Given that Congress expressed its overall goal for the Clean Air Act Amendments of 1977 to insure the protection of the public health and the environment, both of this and future generations, while at the same time considering the energy and economic needs of this Nation,' it would not be reasonable for EPA to discount climate impacts at such a high rate as to effectively ignore the welfare of future generations. .119 [EPA-HQ-OAR-2021-0208-0268-A1, p.20]

Fourth, long-term time horizons in general counsel strongly against application of a capital-based rate. The Working Group's latest guidance cites Li and Pizer's work on how the capital-based rate is generally inappropriate in many longer-term contexts.120 Specifically, Li and Pizer find that, given their best estimate of the shadow price of capital, the appropriate social discount rate collapses to the consumption-based rate relatively quickly, in the span of just several decades.121 Given the long time horizon that analysis of climate policies demands, the capital-based rate is simply inapplicable.

Fifth, several standard justifications for capital-based discount rates break down given the particular threats of climate change. For example, one argument for capital-based discount rates is that spending capital on climate abatement policies has opportunity costs and so, in policy analysis, future costs and benefits should be discounted at the rate of return to capital. However, the irreversible, uncertain, and catastrophic risks of climate change may disrupt this opportunity cost' rationale: while it may seem, for instance, that future, wealthier generations might have better opportunities to address climate change for themselves, irreversible or catastrophic damages could arise that make future mitigation efforts more expensive or impossible.122 Similarly, if climate damages are non-marginal,' such that climate change significantly affects the very natural resources needed to drive economic growth, growth could plummet or even turn negative.123

Sixth, a 7% discount rate is inappropriate because it is based on outdated data and diverges from the current economic consensus. Circular A-4 requires that assumptions including discount rate choices are based on the best reasonably obtainable scientific, technical, and economic information available.'124 Yet Circular A-4's own default assumption of a 7% discount rate was published 18 years ago and was based on data from even earlier.125 Circular A-4's guidance on discount rates is in need of an update, as the Council of Economic Advisers (CEA) detailed recently after reviewing the best available economic data and theory. 126 CEA gave two reasons to revise the 7% rate, both of which are generally applicable but may have particular force in the context of climate change. The first argument is that the market data clearly shows that the long-term interest rates used to derive the consumption-based discount rates have fallen, such that the 3% consumption-based rate instead should be at most 2 percent.'127 Because of the relationship between long-term, tax-free interest rates and rates of return on capital (i.e., the divergence between those rates is caused largely by taxation), a 1% drop in the consumption-based discount rate strongly suggests a corresponding drop in the capital-based rate.128 This may be especially true for longer-term context like climate change, because of the lack of reliable market data to measure expected rates of return on assets held inter-generationally.129 The second argument why the 7% rate is too high is that market rates of return are artificially increased by returns associated with unpriced externalities, rents associated with market power, and private (as opposed to social) risk premiums.130 For example, a market return on an oil and gas investment is increased because the oil and gas operation can externalize some of the costs of its pollution onto society. Yet especially when crafting long-term climate policies, it would be inappropriate to discount future welfare based on the fact that the current generation of investors prefers the high market returns that are now available partly because of such externalities.131 As such, the 7% capital-based rate is not only out of date and too high, but especially inappropriate for climate policy.

Finally, Circular A-4 recognizes that intergenerational contexts raise unique ethical issues that further counsel for lower discount rates. Specifically, it recognizes that [i]t may not be appropriate for society to demonstrate a similar preference when deciding between the well-being of current and future generations' as it does in the intragenerational setting.' 132 Circular A-4 thus recommends that agencies conduct additional analysis at using a lower [than 3%] but positive discount rate' for impacts with important intergenerational effects.133 Most market data reflects at best individual's current preferences for their own welfare over time and so simply does not capture society's preferences toward or ethical obligations to future generations. Basing a discount rate solely on market data ignores such important inter-generational considerations. Executive Order 13,990 instructs agencies to ensure that the social cost of greenhouse gas values adequately account for intergenerational equity.'134 A 7% rate ignores much of future generations' welfare and so would be inconsistent with that mandate. Notably, even in the SAFE rule, EPA and NHTSA explained that the 7% capital rate did not adequately account for tradeoffs between improving the welfare of current and future generations.' 135 [EPA-HQ-OAR-2021-0208-0268-A1, pp.20-22]

EPA Should Further Justify Its Distinct Approach to Discounting Climate Effects. As explained above, EPA's choice to use the social cost of greenhouse gas values calculated with consumption-based discount rates is fully justified. Two additional discounting choices then arise: how to discount back to present value the application of a future social cost of greenhouse gas value to monetize the climate benefits of future emissions reductions (e.g., bringing the $85 per ton of carbon dioxide in climate benefits generated by an emissions reduction in the year 2050 back to present value in 2021), and then how to compare those discounted climate effects to other costs and benefits.

EPA has chosen to ensure that all climate benefits are discounted in an internally consistent way, by applying the same discount rate used to estimate the underlying social cost values (e.g., 2.5%, 3%, or 5%) to calculate the present values of future climate benefits.136 That approach is consistent with the Working Group's guidance.137 But it also means EPA is calculating the present value of reduced greenhouse gas emissions differently than the present value of other costs and benefits (which, per Circular A-4's current default recommendations, are calculated at 3% and 7% discount rates).138

In the future, EPA should consider working with OMB and the Working Group to move toward a declining discount rate framework that can straightforwardly resolve all these issues of consistent discounting, by adopting a single schedule of applicable discount rates that steadily declines over time.139 In the meantime, EPA should expand on its justification to its current approach to discounting. EPA should consider two approaches: (1) explaining why a general focus on discounting all costs and benefits at consumption-based rates, rather than at a 7% capital-based rate, is appropriate in this particular rulemaking; and (2) explaining why special legal, economic, and policy considerations justify a different approach to discounting climate effects as distinct from other costs and benefits.

To begin, EPA can explain that given the nature of the Proposed Rule's costs and benefits, it is more appropriate to discount all effects using consumption-based rates, and so the present value calculations that include some costs and benefits discounted at a 7% rate can be viewed as lower-bound sensitivity analyses. The capital-based discount rate theoretically assesses whether the net benefits from government action will exceed the returns that society could earn by instead investing the same resources in the private sector. But this framework for discounting and comparing benefits and costs makes sense only under the extreme' assumption that all the costs of government action would fully displace' (i.e., crowd out) private investment. 140 In this way, the capital-based rate at best creat[es] a lower bound on the estimate of net benefits,' by applying a maximum discount rate that reflects an extreme case not likely to apply to many government actions.141

In general, there is less of a chance now that U.S. government actions will crowd out private investments than there was in 1992 when OMB first set its 7% capital-based discount rate, because the U.S. economy is relatively more open now.142 Additionally, the magnitude of the costs and benefits involved in many agency actions will be relatively small compared to the overall U.S. debt, again making it unlikely that agency actions will significantly crowd out private U.S. investment.143 Some agency actions may also induce more private investment than they displace.144 And if the costs of agency actions will be more borne through displaced consumption rather than displaced investment, the crowding-out theory for a capital-based discount rate further breaks down. In this rulemaking, the upfront technology costs and long-term fuel savings will be felt primarily by individual consumers, as will rebound value and refueling time savings; other effects, like health effects, climate benefits, energy security, and congestion, will be felt by society as a whole. In other words, because of the nature of the rule, the theory for a capital-based discount rate has a tenuous application at best. EPA therefore would be justified in arguing for a focus on cost-benefit comparisons using consumption-based rates, with the application of a 7% rate treated like a lower-bound sensitivity analysis.

Separately, EPA would also be justified in taking a distinct approach to discounting climate effects, and EPA should elaborate on the special legal, economic, and policy considerations. While effects like fuel savings and energy security will play out over the course of the next several decades, the climate effects of this rule are undeniably much longer term, affecting the welfare of future generations over centuries. Therefore, the arguments in favor of lower consumption-based discount rates based on long-term uncertainty, ethics, declining economic growth, inapplicable market data, and other considerations apply much more strongly to climate effects than to other costs and benefits. [EPA-HQ-OAR-2021-0208-0268-A1, pp.22-23]

And because a high capital-based rate, like 7%, will effectively ignore the welfare of future generations (e.g., over the course of just 80 years, a 7% rate discounts away 99.5% of a future effect's value145) legal requirements to consider the welfare of future generations caution much more strongly against the application of a 7% rate to long-term climate effects than to other costs and benefits. Notably, the Clean Air Act Amendments of 1977 expressed the congressional goal to insure the protection of the public health and the environment, both of this and future generations, 146 and NEPA broadly instructs147 all agencies to interpret all their laws to the fullest extent possible to advance the national environmental policies, 148 including to fulfill the responsibilities of each generation as trustee of the environment for succeeding generations.' 149 Multiple Executive Orders, including Executive Order 13,563 and 13,990, also call for agencies to appropriately and accurately weigh the interests of future generations. [EPA-HQ-OAR-2021-0208-0268-A1, pp.23-24]

Consequently, as the National Academies of Sciences has recognized, some differences in the application of discount rates may be warranted when only some categories [of costs and benefits] have an intergenerational component.'151 The National Academies has offered recommendations for how agencies can best apply different annualized discount rates to climate impacts versus other costs and benefits,152 and EPA can rely on the National Academies' guidance to support its approach to discounting here.

Case law on the social cost of greenhouse gases also offers support for EPA's discounting approach. Specifically, in Zero Zone v. Department of Energy, the plaintiffs argued that the Department of Energy had arbitrarily considered hundreds of years of climate benefits while limiting its assessment of employment impacts and other effects to just a thirty-year time horizon. The court upheld the regulatory analysis, concluding that the difference in time horizons was justified because the rule would have long-term effects on the environment but . . . would not have long-term effects on employment.'153 The choice of time horizons is related to the choice of discount rate: any cost or benefit occurring beyond the end of the analytical time horizon is effectively discounted at an infinitely high (or 100 percent) rate.154 Analogizing from this precedent, a court may similarly defer to an agency's finding that the long time horizon of climate change justifies a lower discount rate than the rate applied to shorter-term costs and benefits. EPA should explain the special economic, legal, and ethical considerations that justify selecting a different annual discount rate for climate effects than for other costs and benefits. [EPA-HQ-OAR-2021-0208-0268-A1, p.24]

EPA Should Conduct Additional Sensitivity Analysis Around Lower Discount Rates for Climate Impacts. In its regulatory impact analysis for the Proposed Rule, EPA assesses climate benefits using discount rates of 2.5, 3, and 5 percent for the social cost of greenhouse gases. In its most recent technical support document, however, the Working Group suggested that agencies conduct[] additional sensitivity analysis using discount rates below 2.5 percent.'155 And while EPA repeatedly references the fact that considering discount rates at 2 percent and lower' is warranted,'156 EPA's list of sensitivity analyses does not include a run using a 2% or lower discount rate for the social cost of greenhouse gases.157 Because of the considerable evidence that the most appropriate discount rate should be below 2%, and in anticipation of potential future updates to the Working Group's recommendations, EPA should conduct additional sensitivity analysis around lower discount rates for the social cost of greenhouse gases, including discount rates of 2% or lower.

As the Working Group explained in its recent technical support document, there is considerable evidence from market data that the default estimate of the consumption-based discount rate should be revised down from 3% to 2%. In the context of long-term, intergenerational effects like climate damages, the case for a lower discount rate is even stronger, in light of ethical considerations and other factors.158 Multiple expert elicitations show a growing consensus around a discount rate below 2%,159 and factors like uncertainty, negative economic growth correlations, risk aversion, and the scarcity and non-substitutability of environmental goods all point strongly toward even lower discount rates.160

For this reason, among others, the Working Group acknowledged in its latest technical support document that its social cost valuations presented at discount rates of 2.5%, 3%, and 5% 'likely underestimate societal damages from [greenhouse gas] emissions.'161 The Working Group will evaluate the discount rate (among other issues) as it performs a full assessment of its social cost valuations to reflect the latest scientific and economic research a task that it has been ordered to complete by January 2022.162 In the meantime, the Working Group has recommended that agencies apply additional sensitivity analysis around lower discount rates.163 To do so, EPA could look to the value of carbon' estimates from the New York State Department of Environmental Conservation (DEC'), which applied a 2% discount rate as its central value.164 Pursuant to DEC's estimates, at a discount rate of 2% social cost valuations for year 2020 emissions equal $125 per ton of carbon dioxide, $2,782 per ton of methane, and $44,727 per ton of nitrous oxide.165 DEC also recommended using a 1% discount rate for climate impacts, and provided annual social cost values for doing so.166 Because these valuations are based off of the Working Group's methodology, and differ only through the discount rate, EPA can apply these valuations if it applies additional sensitivity analysis around lower discount rates. [EPA-HQ-OAR-2021-0208-0268-A1, pp. 24-26]

EPA Should Ensure Analytical Consistency With the Treatment of Climate Benefits in NHTSA's Concurrent Fuel-Economy Rulemaking Though Consistent Approaches Need Not Be Identical Approaches. While EPA and NHTSA both assess global climate benefits using discount rates of 2.5%, 3%, and 5% in their recently proposed vehicle rules,167 there is a slight difference in the analyses between the two agencies. Many but not all of EPA's summary tables focus on the social cost of greenhouse gas values calculated at a 3% discount rate,168 though

EPA does caution against interpreting the 3% values as its central' estimates.169 By comparison, NHTSA tends to focus more on climate benefits calculated at a 2.5% discount rate in its summary tables, though again NHTSA does apply the Working Group's full range of values. These two approaches are consistent with each other and with the Working Group's guidance, which reminds agencies of their discretion to focus on lower discount rates.170 Nevertheless, because the approaches are not identical, they could be misinterpreted in ways that could wrongly cast doubt on the social cost of greenhouse gas values. To reduce legal risk, EPA and NHTSA should strive for analytical consistency in the treatment of climate benefits as they finalize their regulations.

Although there are few cases addressing an agency's discount rate in a cost-benefit analysis, courts have usually been reluctant to second-guess an agency's discounting choice in the instances where it has been challenged. In one case, for example, the U.S. Court of Appeals for the District of Columbia Circuit deferred to an agency's discount rate selection as first and foremost a policy choice,' and explained that the agency was free to revisit its discount rates in future rulemakings so long as it sets forth a reasonable justification for doing so.'171 This decision fits squarely within the judiciary's deferential approach to reviewing the more technical aspects of an agency's cost-benefit analysis.172

Given all of the evidence discussed above pointing to relatively low discount rates in intergenerational contexts, agency reliance on a 3% or 2.5% discount rate for the social cost of greenhouse gases or even a lower discount rate consistent with the latest evidence should easily meet the applicable standard of review. Agencies generally are given broad deference in selecting technical valuations, as noted above, and different agencies have sometimes used different inputs for key metrics such as the statistical value of life (i.e. the monetary value placed on mortality risks). 173 Consistent with this precedent, EPA and NHTSA should be able to rationally justify reliance on different discount rates for the social cost of greenhouse gases.

But such a strategy does not come without risk. Though deference to technical valuations is broad, a court may invalidate a regulation if a key analytical input is insufficiently explained or inconsistent with evidence and practice. Should EPA and NHTSA apply different discount rates in their analyses, critics could point to such an alleged inconsistency in an attempt to misleadingly argue that the social cost of greenhouse gases is indeterminate or arbitrary. More problematically, critics could point to statements made by each agency to justify its preferred discount rate to argue that the other agency's choice is irrational. To the extent that EPA and NHTSA can agree on more consistent presentations and discussions about the discount rate, it may help minimize the risk of such misinterpretations. EPA should especially be careful not to use any language that could be taken out of context to misleadingly criticize NHTSA's approach.

But ultimately, consistency does not require identical approaches. Both agencies have considered the full range of values recommended by the Working Group, and the choice to focus in some summary tables on the values calculated either at 3% or 2.5% or even at lower values, like 2% can be fully justified. [EPA-HQ-OAR-2021-0208-0268-A1, pp. 26-27]

EPA Should Defend Against Common Criticisms of the Working Group's Methodology. While the Working Group developed its social cost valuations through a rigorous process that incorporated the best scientific and economic modeling available at the time, its assumptions have sometimes been criticized by opponents of climate regulation. Such objections lack legal merit, and do not supply bases for EPA to reject the Working Group's expert valuations. Nonetheless, in order to minimize legal risk, EPA should provide additional defense of the Working Group's process and modeling assumptions, and be prepared to respond to common criticisms of its work. This section offers a defense of the Working Group's process and methodology, and offers responses to common criticisms that have been offered by opponents of strong climate policy. [EPA-HQ-OAR-2021-0208-0268-A1, p.27]

The Working Group's Methodology Is Rigorous, Transparent, and Based on a Range of Assumptions Reflecting the Best Available Data. Although the term social cost of greenhouse gases' is often used synonymously with the valuations developed by the federal Working Group, economic research and modeling on the social cost of greenhouse gases predate federal efforts to monetize incremental climate damages. Several of the most celebrated economic models of climate damages such as models by William Nordhaus174 and Chris Hope175 that have since been integrated into the federal government's damage valuations were first released in the early 1990s.

Owing to the availability of these damage models, the U.S. Court of Appeals for the Ninth Circuit held in 2008 that the federal government must monetize climate impacts when it conducts a cost-benefit analysis. In Center for Biological Diversity v. National Highway Traffic Safety Administration, the Ninth Circuit remanded a fuel economy rule to the Department of Transportation (DOT') for failing to monetize the benefits of carbon dioxide reductions in its regulatory analysis.176 The Court recognized the presence of uncertainty in the valuation of climate damages, but explained that the value of carbon emissions reduction is certainly not zero.'177 By failing to value the benefit of greenhouse gas emission reductions in its analysis, the Court continued, DOT effectively ignored the adverse impacts of greenhouse gas emissions and thus put a thumb on the scale by undervaluing the benefits and overvaluing the costs of more stringent standards.'178

Following this decision, federal agencies began applying different valuations of the social cost of greenhouse gases in their regulatory analyses.179 To harmonize those damage valuations across agencies, the Obama administration convened an interagency working group comprised of members of twelve federal agencies and departments, including EPA, the Council of Economic Advisors, Office of Management and Budget, the Department of Energy, and DOT.180 The Working Group also released damage estimates for two other greenhouse gases methane and nitrous oxide in 2016.186 These additional metrics used the same economic models, the same treatment of uncertainty, and the same methodological assumptions that the Working Group applied to the social cost of carbon, and underwent peer review.187 [EPA-HQ-OAR-2021-0208-0268-A1, pp.27-29]

EPA Is Required to Value Climate Damages, and Doing So Provides Balance to EPA's Cost-Benefit Analysis. One objection to agency usage of the Working Group's estimates is that

Congress, not the executive branch, should set policy with respect to climate change. But EPA has broad authority to assess climate impacts, and judicial precedent suggests that it must value climate-change impacts as part of its regulatory impact analysis. In fact, assessing climate damages as part of its regulatory impact analysis provides rationality and balance to EPA's approach and does not, as critics have suggested, inappropriately skew the analysis. [EPA-HQ-OAR-2021-0208-0268-A1, p. 29]

EPA Must Monetize Climate Impacts as Part of Its Analysis. It is widely established that federal agencies may and often must consider effects on climate change when those effects flow from the agency's actions. With EPA, this is especially well-established. Perhaps most relevant here, in Massachusetts v. EPA, the Supreme Court held that EPA may regulate greenhouse gas emissions from new motor vehicles.188 Because the purpose of the Proposed Rule is to limit greenhouse gas pollution from new motor vehicles directly in line with the Massachusetts precedent EPA should naturally and obviously consider impacts on climate when deciding upon the stringency of its regulation.

Since EPA must account climate impacts, therefore, the only relevant question is how it should account for those impacts. Monetizing climate impacts is the best available option. Indeed, it is well accepted in regulatory practice and precedent that agencies should monetize regulatory impacts to the extent feasible, in order to compare costs and benefits along a common metric and select the alternative that maximizes net benefits.189 In a decision that sparked the federal government to develop consensus valuations of climate damages in the first place the Center for Biological Diversity case discussed above the Ninth Circuit held that the Department of Transportation acted arbitrarily and capriciously by failing to monetize potential climate benefits when assessing the costs and benefits of various alternative fuel-economy standards for new automobiles.190 And EPA monetized climate damages both in the SAFE Rule and in the Section 202 emissions standards promulgated under the Obama administration. [EPA-HQ-OAR-2021-0208-0268-A1, pp. 29-30]

Monetizing Climate Benefits Does Not Skew the Analysis, but Rather Provides Balance Since EPA Also Monetizes Costs. Another objection to the use of the social cost of greenhouse gases from critics of climate action is that these valuations account only for the damages from climate change, but do not take account of the economic benefits from fossil-fuel production and usage, such as economic development and employment. But this argument is unpersuasive for two key reasons.

First, the economic benefits of fossil-fuel extraction are far more limited than its proponents suggest, since the broader benefits that society derives from power and electricity are attributable to energy production in general and are not unique to fossil fuels.191 Accordingly, controls on fossil fuels will hasten a transition to a greener economy, and so have limited net economic impacts.192 Second, while there are of course some economic impacts from reductions in fossil-fuel production and usage, including effects on revenues and jobs, those impacts should not be included in any calculation of climate damages, but rather considered separately by regulators on the costs side of the ledger in individual determinations.

In the Proposed Rule, EPA monetizes not only the expected benefits of the proposal including, but not limited to, climate benefits but also the expected compliance costs from industry as well as other costs of the rule such as expected fatalities, forgone consumer surplus, and even noise costs. EPA then compares quantified cost and benefit estimates in determining whether and how to regulate, as instructed by federal guidance and executive order.193 Capturing climate benefits is thus essential to ensuring a balanced analysis. As the Ninth Circuit has held, failure to monetize the most significant benefit of more stringent [vehicle-emission] standards: reduction in carbon emissions' while continuing to value estimated compliance costs would put a thumb on the scale by undervaluing the benefits and overvaluing the costs of more stringent standards.'194 [EPA-HQ-OAR-2021-0208-0268-A1, p. 30]

Common Criticisms of the Working Group's Methodology from Opponents of Climate Policy Lack Merit. EPA should also provide detailed responses to any objections lobbed against the Working Group's methodology and valuations during this comment period. The Working Group, of course, has already responded to criticisms of its methodology that were offered during the public comment period that it held in 2013,195 and EPA should draw from that document where relevant in responding to objections offered through this notice-and-comment process. But some objections are now being raised that were not offered during the 2013 comment period, while some of the responses that the Working Group provided can be supplemented with more recent information. Below, we provide brief responses to common objections that are now being presented by opponents of climate reforms. [EPA-HQ-OAR-2021-0208-0268-A1, p.31]

The Social Cost Valuations Are Not Too Uncertain to Apply. While critics argue that there it too much uncertainty to rely on the Working Group's social cost valuations, this argument is incorrect on multiple levels. As a legal matter, the presence of some uncertainty in the social cost valuations should not preclude agencies from using the best numbers available. And as a factual matter, the Working Group rigorously considered uncertainty and accounted for it in numerous ways. If anything, the presence of continued uncertainty suggests that the social cost valuations should be higher than presently valued not that climate damages should be ignored.

Federal courts have repeatedly recognized that agency analysis necessitates making predictive judgments under uncertain conditions, explaining that [r]egulators by nature work under conditions of serious uncertainty' 196 and are often called upon to confront difficult administrative problems armed with imperfect data.'197 As the Ninth Circuit has explained, the proper response' to the problem of uncertain information is not for the agency to ignore the issue but rather for the [agency] to do the best it can with the data it has.'198 Courts generally grant broad deference to agencies' analytical methodologies and predictive judgments so long as they are reasonable, and do not require agencies to act with complete certainty.199

Use of the Working Group's social cost estimates is precisely the type of reasonable analysis of uncertain information that courts endorse. The Working Group rigorously considered various sources of long-term uncertainty through a combination of a multi-model ensemble, probabilistic analysis, and scenario analysis.'200 As the Working Group explained, the three IAMs account for uncertainty themselves by spanning a range of economic and ecological outcomes.201 Additionally, the use of three separate models all developed by different experts spanning a range of views accounts for uncertainty by integrating a diversity of viewpoints and structural and analytical considerations.202

In addition to the use of three distinct damage models with differing inputs and assumptions, the Working Group integrated various sources of uncertainty into its damage valuations. For instance, the Working Group applied an equilibrium climate sensitivity that is, an estimate of how much an increase in atmospheric greenhouse gas concentrations affects global temperatures that reflects a broad distribution of possible outcomes.203 The Working Group also applied five different socioeconomic and emissions trajectories from the published literature reflecting a range of possible outcomes for future population growth, global gross domestic product, and greenhouse gas emission baselines all important inputs that affect long-term climate damage estimates.204 The Working Group ran each integrated assessment model 10,000 times per scenario (and per greenhouse gas) for a total of 150,000 draws per greenhouse gas, and then averaged across those results to develop its recommended estimates.205 In addition to reporting the average valuations, the Working Group published the results of each model run under each scenario.206

Moreover, experts broadly agree that the presence of uncertainty in the social cost valuations counsels for more stringent climate regulation, not less.207 This is due to various factors including risk aversion, the informational value of delaying climate change impacts, and the possibility of irreversible climate tipping points that cause catastrophic damage.208 In fact, as discussed above, uncertainty is a factor justifying lowering the discount rate, particularly in intergenerational settings.209 Furthermore, current omission of key features of the climate problem such as catastrophic damages and certain cross-regional spillover effects further suggests that the true social cost values are likely higher than the Working Group's current estimates.210 [EPA-HQ-OAR-2021-0208-0268-A1, pp. 31-32]

The Working Group Did Not Bias Its Estimates by Ignoring Positive Impacts of Climate Change. Critics further claim that the Working Group's social cost values ignore important positive impacts of a warming climate. Examples that have been offered to support this argument include alleged agricultural benefits from higher temperatures and decreased wintertime mortality. But these arguments are legally and factually dubious, and miss the forest for the trees.

Mere omission of some impacts does not counsel for abandoning the social cost estimates, particularly since independent experts widely agree that those estimates likely undervalue true climate damages because they omit far more negative effects than positive ones. For instance, the Working Group has explained that several of the underlying economic models omit certain major damage categories such as catastrophic damages and certain cross-regional spillover effects.211 These effects can be massive: One paper, for instance, finds that the inclusion of tipping points doubles the social cost estimates, 212 with another paper concluding that the effect is even greater and thus the Working Group's existing values may be significantly underestimating the needs for controlling climate change.'213 The current consensus of experts puts damages for a 3Â°C increase at roughly 5% to 10% of gross domestic product,214 which is substantially higher than the damages estimated by the IAMs.215 And as the Ninth Circuit has explained, the presence of some omitted damages does not provide a legal basis to ignore established methodologies to monetize climate damages, since while there is a range of [plausible] values, the value of carbon emissions reduction is certainly not zero.'216

In addition to its legal shortcomings, arguments about the impact of positive externalities are also factually suspect. For instance, while agricultural benefits have become a flashpoint in this debate, the IAMs in fact do account for the potential agricultural benefits of carbon dioxide fertilization from a warming planet.217 And evidence suggests that, if anything, these models overvalue agricultural benefits from a warming planet and thus undervalue the social cost of greenhouse gases.218 One paper, for instance, concludes that estimates of net agricultural impacts produced an undervaluation of the social cost of carbon by more than 50%, explaining that new damage functions reveal far more adverse agricultural impacts than currently represented' in the IAMs used by the Working Group.219 And a comprehensive investigation of the impacts of climate change on agriculture has rejected the hypothesis that agricultural damages over the next century will be minimal and indeed that a few degrees Celsius of global warming would be beneficial for world agriculture,' concluding that climate change will have at least a modest negative impact on global agriculture in the aggregate.'220

Other arguments focusing on omitted positive impacts are equally misguided. For example, while some critics of the Working Group's methodology misleadingly point out that one of the models, DICE, focuses on increased heat-related mortality and does not account for reductions in wintertime mortality, consideration of the many damages omitted from the IAMs (such as particulate matter from wildfires, deaths from flooding, Lyme and other tick-based diseases), including certain mortality effects, consistently point toward a higher social cost value.221 One recent study, in fact, concludes that the IAMs, on net, undervalue mortality from climate change.222 Focusing on the omission of reductions in wintertime mortality thus misses the forest for the trees, and does not supply a basis to disregard the Working Group's valuations. [EPA-HQ-OAR-2021-0208-0268-A1, pp. 33-34]

The Working Group Did Not Overstate the Pace of Climate Change. Critics further allege that the chosen Equilibrium Climate Sensitivity (ECS') distribution that is, the amount of warming that is expected to result from a doubling of the atmospheric carbon dioxide concentration is outdated and fails to account for recent evidence showing that sensitivity to be lower than previously believed. But these arguments rely on cherry-picked data and ignore the scientific consensus.

In 2016, the National Academies of Sciences dedicated an entire report to whether the Working Group should update the social cost metrics to reflect more recent science on the ECS. The National Academies decided that such an update was unnecessary, recommend[ing] against a near-term change in the distributional form of the ECS' and explaining that any reasonable revisions on this front would have a minimal impact on estimates of the [social cost of greenhouse gases].'223

On top of the National Academies' rejection of this argument, there is little support for the claim that the Working Group overstated the pace of climate change. The most recent estimate from the Intergovernmental Panel on Climate Change (IPCC') which reflects consensus estimates from the worldwide scientific community projects an ECS range from 2.5°C to 4°C, with 3°C as a best estimate.'224 This is consistent with the range applied by the Working Group based off of Roe & Baker which uses 3°C as its median and 3.5 °C as its mean ECS value.225 In evaluating the ECS, the Working Group assessed estimates from a wide range of experts and selected consensus values. In fact, as the Working Group acknowledged, some ECS estimate ranges go as high as 10º C, making its selected ECS distribution substantially lower than these high-end estimates and a reasonable middle range.226

Critics further argue that the ECS distribution applied by the Working Group inappropriately skews rightward, meaning that its mean ECS value exceeds the median value of 3º C that the IPCC has indicated. But that decision is a feature, not a bug. As the National Academies explained, the IPCC has found that there is a positively skewed distributional form for [the ECS] parameter' similar to the ECS distribution applied by the Working Group.227 In other words, the mean ECS value should be higher than the median ECS value, and the Working Group applied an appropriate distribution. Criticisms to the contrary are meritless. [EPA-HQ-OAR-2021-0208-0268-A1, pp. 34-35]

The Working Group Applied a Reasonable Range of Emission Baselines. Critics further argue that the Working Group's valuations are an overestimate because they apply outdated emission scenarios that exaggerate the baseline level of atmospheric greenhouse gas levels. Using a higher baseline level of emissions raises the social cost estimates because the harm from an additional unit of emissions increases with the baseline atmospheric emissions level. However, the Working Group used a reasonable emissions baseline that reflects different possible mitigation scenarios.

While the Working Group assumed a baseline emissions range of 13 118 gigatons of carbon dioxide emitted per year by 2100,228 recent projections from the Climate Action Tracker indicate that baseline emissions will reach between 14 175 gigatons of carbon dioxide by 2100 under a range of scenarios reflecting different levels of mitigation.229 Thus, the baselines used by the Working Group potentially understate baseline emissions rather than overvalue them as opponents argue. In fact, several of the Working Group's supposedly business-as-usual' scenarios are actually more consistent with baseline estimates reflecting policy projections.230 Accordingly, the criticism that the Working Group overestimated future greenhouse gas concentrations in the atmosphere falls flat.

Moreover, this choice does not particularly affect the social cost valuations. In comparison to the Working Group's central social cost of carbon estimate in 2020 of $51 per ton, the average social cost of carbon under the Working Group's supposed business-as-usual emissions scenarios is $53 per ton and $41 per ton under the emissions scenario that is consistent with sustained and widespread mitigatory action.231 While relying less on the Working Group's supposed business-as-usual scenarios would therefore modestly decrease the interim social cost valuations in a vacuum, more holistic updates to the metrics as recommended by the National Academies of Sciences would very likely increase the social cost valuations overall due to the omitted damages discussed above and recent evidence regarding intergenerational discount rates.232 At best, therefore, this argument makes a mountain out of a molehill. [EPA-HQ-OAR-2021-0208-0268-A1, pp. 35-36]

The Working Group Applied Scientifically-Based Damage Models. Critics further claim that the IAMs the damage functions for translating climate impacts into economic losses are flawed and arbitrary. In reality, however, the damage functions are based on reasonable assumptions made by a range of experts.233 They have also withstood scientific scrutiny, and while opponents of climate reform frequently highlight criticism of the damage functions by a notable economist, they take this criticism out of context.

The Working Group selected three models of climate damages that were the most widely used and cited models in the economics literature linking physical climate impacts to economic damages234: the DICE, FUND, and PAGE models.235 These models were developed by outside experts, published in peer-reviewed economic literature,236 and were the product of extensive scholarship and expertise. One of the models, DICE, was developed by William Nordhaus, an economics professor and former provost of Yale university who won a Nobel Memorial Prize in Economic Sciences for developing the model. And PAGE developer, Chris Hope, was a lead author and review editor for the Third and Fourth Assessment Reports of the IPCC, which shared the Nobel Peace Prize in 2007 with former U.S. Vice President Al Gore.237

The three models reflect a wide diversity of methodological assumptions about a range of key parameters and inputs.238 This reflects, in part, different judgments about the experts who developed the models. For instance, Richard Tol, who developed the FUND model, has stated that [t]he impact of climate change is relatively small,’ and dismissed much of the research behind climate change as scaremongering’ rather than sound science.’239 Unsurprisingly, his model produces the lowest damage estimates of the three models incorporated by the Working Group.240 William Nordhaus, who developed the DICE model, is widely credited with popularizing the goal that global temperatures increase no more than 2Â° Celsius (or 3.6Â° Fahrenheit) below pre-industrial levels241 a goal now considered conservative by the global community.242 His model produces higher damage estimates that are close to the Working Group’s average damage valuations.243

Opponents of climate mitigation policy frequently point to criticisms from Robert S. Pindyck, a noted climate economist who has been critical of the Working Group’s choice of damage functions. But as Professor Pindyck has himself stated, his writings continue to be taken out of context by some to unfairly attack the Interagency Working Group’s methodology and its interim estimates.’244 While Professor Pindyck has questioned the shape of the models’ damage functions,245 he has acknowledged that the damage functions reflect common beliefs’ about the effects of two or three degrees of warming.

And Pindyck states that uncertainty about the social cost estimates, including the damage functions, does not imply that [their] value should be set to zero until the uncertainty is resolved.’246 In fact, he actually advocates for an even higher social cost value than that produced by the Working Group,247 and has emphatically declared that the federal government should continue to use the [Working Group’s] interim estimates . . . as lower bound estimates.’248 In other words, the best critic of the Working Group’s methodology that opponents could find supports continued use of the Working Group’s estimates and considers them to be conservative underestimates of the true cost to society of greenhouse gas emissions. [EPA-HQ-OAR-2021-0208-0268-A1, pp. 36-38]

EPA Should Apply the Social Cost Estimates That It Has Developed Through 2070, and Coordinate With the Working Group to Adopt Climate-Damage Valuations Through at Least that Time Period

Although the Working Group's latest guidance presents calculations of the social cost of greenhouse gases only through year 2050, the marginal damages caused by an additional ton of emissions will continue to rise over time after 2050.249 EPA has used the Working Group's methodology to extend estimates of the social cost of greenhouse gases through year 2070.250 However, despite writing in the RIA that Table 3-14 through Table 3-16 shows the combined total climate benefits expected to occur over 2023-2070,'251 those tables' titles suggest they only cover the years 2023-2050,252 and all of EPA's cumulative cost-benefit comparison tables similarly end in 2050.253

EPA does not give a clear reason why it stops its analysis in year 2050. As early as its 2009 analysis of vehicle emission standards, EPA had already been projecting the net benefits for its proposed vehicle standards through the year 2050;254 yet now, twelve years later, EPA has not extended its time frame any further. Notably, NHTSA has suggested that some model year 2029 vehicles could still be in service as late as 2068.255 And while regulated vehicles' technology costs decline over the course of the analysis,256 many key benefits257 including climate benefits258 grow over the course of the analysis and may continue to grow after 2050. According to Circular A-4, EPA should select a time frame long enough to encompass all the important benefits and costs likely to result from the rule.'259

EPA should urge the Working Group to adopt social cost of greenhouse gas estimates through at least 2070, if not further into the future, for all agencies to use as appropriate. EPA should identify how far into the future it believes the Proposed Rule will continue to generate significant costs or benefits. If the rule will have significant effects after 2050, EPA should either extend its time frame or else state its reasons for not doing so. If EPA is trying to match the time frame from the SAFE Rule, it could still include a longer time frame as a sensitivity analysis. If EPA lacks sufficient data to fully project costs and benefits beyond 2050, it should explain the data limitations. But given that costs are likely to decrease over time while benefits may continue into the distant future, EPA should state whether it believes that the net effects of stronger vehicle standards after 2050 will increase total net benefits. If so, this fact further highlights that EPA's cost-benefit projections, especially around climate benefits, are conservative, and that stronger vehicle emissions standards will deliver significant net benefits to society. [EPA-HQ-OAR-2021-0208-0268-A1, pp.38-39]

For the foregoing reasons, it is appropriate for EPA to continue to rely on the Working Group's valuations of the social cost of greenhouse gases in the Proposed Rule as conservative estimates. To bolster the legal justification for that reliance as it finalizes its regulation, EPA should provide additional explanation for its methodological choices and conduct additional sensitivity analysis around different social cost values. [EPA-HQ-OAR-2021-0208-0268-A1, p. 39]

40 Most generally, it is individually rational for a country to fully internalize the global social cost of greenhouse gases ‘if a country expects a decrease in its own emissions to decrease that of all others in proportion to the ratio of its external cost of emissions to its internal costs.’ Matthew J. Kotchen, Which Social Cost of Carbon? A Theoretical Perspective, 5 J. ASSOC. ENV’T. & RES. ECON. 673, 683 (2017). Other economists have justified use of the global social cost estimates on more intuitive grounds. See, e.g., Tamma Carleton & Michael Greenstone, Updating the United States Government’s Social Cost of Carbon at 26-27 (Becker Friedman Institute Working Paper 2021-04, Jan. 2021), https://perma.cc/H9EU-XWBX (‘The global SCC . . . is an ingredient in efforts to procure the necessary international action. . . . Even if policymakers decide that the effects of regulations on U.S. citizens are what matter (in terms of both law and policy), it would make sense to use the global measure, as it would protect U.S. citizens against a range of adverse effects from unmitigated climate change.’); William Pizer et al., Using and Improving the Social Cost of Carbon, 346 SCIENCE 1189, 1190 (2014) (explaining that the ‘potential to leverage foreign mitigation,’ combined with moral, ethical, and security issues, provide ‘compelling reasons to focus on a global SCC but, more important, to make a strategic choice.’); Robert S. Pindyck, Comments on Proposed Rule and Regulatory Impact Analysis on the Delay and Suspension of Certain Requirements for Waste Prevention and Resource Conservation, Nov. 6, 2017, available at https://perma.cc/HG8Q-MT6H (‘[W]hat treatment of international damages is in the United States’ self-interest? . . . The simplest answer is to find the value of the [social cost of carbon] that maximizes global welfare. . . . I continue to think that the global value is the appropriate provisional value for use as research on this topic continues.’).

50 The estimate is conservative because it omits any conditional pledges, any pledges that are not readily quantified into specific reductions, any actions from countries that have not formally submitted Nationally Determined Contributions to the United Nations, any reductions occurring after 2030, and any foreign actions already achieved before 2014 that may have motivated U.S. pledges in the first place. Id.

52 Though some positive spillover effects are also possible, such as technology spillovers that reduce the cost of mitigation or adaptation, see S. Rao et al., Importance of Technological Change and Spillovers in Long-Term Climate Policy, 27 ENERGY J. 123–39 (2006), overall climate spillovers are likely strongly negative, see Jody Freeman & Andrew Guzman, Climate Change and U.S. Interests, 109 COLUM. L. REV. 1531 (2009).

72 A bequest value captures willingness to pay to preserve a resource for a future generation. Existence value captures willingness to pay to preserve a resource even with no intention to ever use or bequeath the resource. Off. of Mgmt. & Budget, Circular A-4: Regulatory Analysis 22 (2003).

76 Over $100 billion is sent from the United States to other countries in remittances every year. See Pew Res. Ctr., Remittance Flows Worldwide in 2017, Apr. 3, 2019, https://perma.cc/D684-7ZA8.

77 Many cultural sites are located near water because of how civilization developed, Yu Fang & James W. Jawitz, The evolution of human population distance to water in the USA from 1790 to 2010, 10 NATURE COMMUNICATIONS 1 (2019), and so such sites may be especially vulnerable to climate change, see Lee Bosher et al., Dealing with multiple hazards and threats on cultural heritage sites: an assessment of 80 case studies, 29 DISASTER PREVENTION AND MANAGEMENT: AN INTERNATIONAL JOURNAL 109 (2019). More broadly, there are clear cultural costs of climate change, W. Neil Adger et al., Cultural dimensions of climate change impacts and adaptation, 3 NATURE CLIMATE CHANGE 112 (2013), and a willingness to pay to protect culture, Ali Ardeshiri et al., Conservation or Deterioration in Heritage Sites? Estimating Willingness To Pay for Preservation (Working Paper, 2019).

83 Stellantis, which has been subject to the largest penalties in recent years for noncompliance, is based in the Netherlands. Volkswagen, Mercedes-Benz, and BMW are based in Germany. Mazda, Honda, Toyota, and Nissan are based in Japan. Yet in the Proposed Rule, EPA does not distinguish between compliance costs that would fall upon Japanese investors, German investors, Dutch investors, or American investors.

84 Agrium, for example, a subsidiary of Canadian-based Nutrien, operates one of the largest corporate fleets of pickup trucks operating in the United States, 6 FleetTrax, The Largest Fleets in America, https://fleettrax.net/largest-fleets-america/ ('Agrium also owns and operates a staggering 7,627 pickup trucks and cargo vans—a record number for this list.'; reporting on 'the largest private fleets operating in the United States'). Large fleets are also owned by public companies like Hertz. Norway's Government Pension Fund, for example, owns 1% of Hertz. https://www.nbim.no/en/the-fund/investments/#/2019/investments/equities/3799/Hertz%20Global%20Holdings%20Inc.

100 Note that just as there is growing evidence that the discount rate should be below 2%, there is growing evidence that 5% is much too high a discount rate. The values at 5% should be considered a very conservative lower bound.

167 NHTSA's proposed rule was published in the Federal Register earlier this month, with comments due October 26. Corporate Average Fuel Economy Standards for Model Years 2024–2026 Passenger Cars and Light Trucks, 86 Fed. Reg. 49,602 (Sept. 3, 2021).

174 The earliest versions of Nordhaus's DICE model were published starting in 1992. See William Nordhaus, An Optimal Transition Path for Controlling Greenhouse Gas Emissions, 258 SCIENCE 1315 (1992).

175 Chris Hope first released his PAGE model in 1991. See Memorandum by Dr Chris Hope, Judge Institute of Management, University of Cambridge, ¶1 (Jan. 14, 2005), https://publications.parliament.uk/pa/ld200506/ldselect/ldeconaf/12/5011805.htm (document describing the development and results of the PAGE model submitted to the Select Committee on Economic Affairs of the U.K. House of Lords).

191 Renewable energy, like fossil fuels, generates revenue, supports jobs, and vitalizes local economies. See, e.g., Katie Siegner et al., Rocky Mtn. Inst., Seeds of Opportunity: How Rural America Is Reaping Economic Development Benefits from the Growth of Renewables 6–16 (2021), available at https://perma.cc/DWH9-D4L7.

192 Environmental regulation typically has limited impacts on total employment or other macroeconomic indicators, but rather shifts production from one sector to another. See Inst. for Pol'y Integrity, Does Environmental Regulation Kill or Create Jobs (2017), available at https://policyintegrity.org/files/media/Jobs_and_Regulation_Factsheet.pdf. Meanwhile, the sharp decline in the cost renewable energy is already expected to crowd out the demand for gas-fuel electricity in the coming years and decades. See, e.g. Energy Info. Admin., Annual Energy Outlook 2021 Narrative 18 tbl. 11 (projecting doubling of renewables as a share of domestic energy consumption—from 21% to 42%—by 2050 under reference case, while share of coal and natural gas declines); Charles Teplin et al., ROCKY MTN. INST., The Growing Market for Clean Energy Portfolios 8 fig. ES-2 (2019), available at https://perma.cc/P5YJ-WARJ (showing precipitous decline in cost of clean energy to being cheaper than fossil fuels).

208 The undersigned organizations have filed comments in numerous regulatory proceedings highlighting the various forms of uncertainty that increase the social cost of greenhouse gases, and providing numerous references. See, e.g., Environmental Defense Fund et al., Improper Valuation of Climate Effects in the Proposed Revised Cross-State Air Pollution Rule Update for the 2008 Ozone NAAQS, Technical App'x: Uncertainty (Dec. 14, 2020), https://policyintegrity.org/documents/Joint_SCC_comments_EPA_revised_CSAPR_Ozone_NAAQS_2020.12.14.pdf.

242 For instance, the Paris Agreement calls for governments to 'hold[] the increase in the global average temperature to well below 2°C above pre-industrial levels and pursu[e] efforts to limit the temperature increase to 1.5°C above pre-industrial levels, recognizing that this would significantly reduce the risks and impacts of climate change.' Paris Agreement to the United Nations Framework Convention on Climate Change, Art. 2(1)(a), Dec. 12, 2015, T.I.A.S. No. 16-1104.

EPA Response

EPA acknowledges the comment and thanks the commenter for the detailed comments on the application of the SC-GHG estimates from the February 2021 TSD, *Technical Support Document: Social Cost of Carbon, Methane, and Nitrous Oxide Interim Estimates under Executive Order 13990*. For the reasons described in section 3.3. of the RIA and in the February 2021 TSD, EPA believes that the estimates of the TSD are conservative (i.e., likely underestimates) but are nonetheless appropriate for use in this rulemaking.

With respect to extending the analysis beyond 2050, EPA constrained the analysis to an out year of 2050 due to limitations in sales projections and other input assumptions beyond that year, though EPA expects impacts such as GHG emissions reductions will continue into the future.

Commenter: Kreucher, Walter

EVEN AFTER ALL THE COSTS AND DISRUPTIONS TO THE SUPPLY CHAIN, THERE WILL BE A DE MINIMIS EFFECT ON CLIMATE CHANGE

The Environmental Impact Statement 17 conducted in association with this rulemaking concludes that implementing the most stringent alternative (Alternative 3) would decrease global mean temperature by 0.003° C (0.006° F) over the next 100 years. Implementing the preferred alternative would decrease global mean temperature by 0.002° C (0.003° F). The predicted sea-level rise would decrease by 0.06 centimeters (0.03 inches) under the most stringent alternative. The global precipitation rate would be unaffected and the ocean ph level would change by about 0.0004 under the most stringent alternative. [EPA-HQ-OAR-2021-0208-0199-A1, p. 10]

EPA Response

The commenter appears to be citing the EIS for the NHTSA rulemaking, as EPA did not conduct climate modeling in support of this rulemaking. Rather, EPA estimated the climate benefits of the rule by using an estimate of the social cost of greenhouse gases, which resulted in an estimate of $31-$390 Billion in climate benefits. For more information regarding the estimated climate benefits see section 3.3 of the RIA. Moreover, as the Supreme Court recognized, "Agencies, like legislatures, do not generally resolve massive problems in one fell regulatory swoop. ... And reducing domestic automobile emissions is hardly a tentative step."[59] Thus, EPA disagrees that the estimates cited by the commenter provide a basis for not adopting these standards.

Commenter: Ohio Attorney General Office, et al.

The proposed rule is irrational, as it rests on a baseless benefit analysis. EPA describes that an 'essential' factor to the proposed rule is reducing carbon emissions, 'given the urgency of the climate crisis.' [49] According to the proposed rule, '[t]he monetized benefit of these GHG reductions is estimated at $22 billion to $280 billion across a range of discount rates and values for the social cost of carbon. '[50] That's a broad enough range to deduce that the monetized benefit is fantasy, not reality.

The proposed rule takes its estimate range from numbers produced by the Interagency Working Group on Social Costs of Greenhouse Gases in February 2021.[51] The February 2021 document is merely a recitation of estimates produced in 2016, using 2020 dollars. [52] And despite their importance to regulatory decisionmaking, the 2021 estimates were not subjected to notice-and-comment procedures. The 2016 estimates, [53] which include average estimates from three 'integrated assessment models' and one unlikely but doomsday scenario, do not provide a reasonable basis for decisionmaking.

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[59] *Massachusetts v. E.P.A.*, 549 U.S. 497, 524 (2007)

The 2016 estimates purport to predict the amount of warming that all greenhouse gases now and in the future will create, the effects that warming will have on society, and the costs of those effects. But in doing so, the 2016 estimates incorporate unreliable assumptions rather than data. As one economist described the integrated assessment models, they allow ‘the modeler to obtain almost any desired result because key inputs can be chosen arbitrarily. [54]

For example, the 2016 estimates result from the integrated assessment models being run through the year 2300, and calculate present day costs based on that speculative future harm. To put this absurdity into context, three hundred years ago, in the era of Sir Isaac Newton, social-cost evaluators may well have recommended the wholesale abolishment of cities, considering the costs of horse waste (unimaginably high, if today we all still rode horses) [55] and rampant disease (like smallpox and dysentery). But today we have automated transportation, running water, modern medicine, and advanced farming. There is simply no scientific way to fasten a 2021 rule around 2300 predictions. Nor do the 2016 estimates attempt to explain why a 300-year time horizon is scientifically appropriate. 56

The assumptions underlying EPA’s benefit guess are also badly out of date, and thus don’t reflect updated realities that conflict with inputs to the predictive models. [57] The predicted climate future scenarios (the amount of carbon that would otherwise be emitted) were established in 2010.[58] These assumptions incorporate four ‘business as usual’ scenarios and one that incorporates a ‘lower-than’ business as usual potential—and each scenario is weighted equally in estimating the social cost of carbon. Thus the trendline the EPA uses to calculate savings is based on an alternate reality where the world continues to burn immense amounts of coal and engage in other energy policies that are becoming obsolete. Reality since 2010 shows a different likelihood. Since 2007, for example, energy-related carbon emissions in the United States declined eight out of 12 years, [59] not counting 2020 where global energy-related carbon emissions declined by almost 6 percent.[60] [EPA-HQ-OAR-2021-0208-0258-A1, pp.7-8]

[56] This time horizon also conflicts with standard Executive Branch regulatory analyses, which generally do not consider effects beyond fifty years. See, e.g., Arden Rowell, Foreign Impacts and Climate Change, 39 HARV. ENVTL. L. REV. 371, 386 (2015).

[57] For example, the estimates incorporate the findings of the Fourth Assessment Report of the Intergovernmental Panel on Climate Change. But that Panel has since published a Fifth Assessment Report that increases the probabilities associated with a lower average temperature increase. See The Intergovernmental Panel on Climate Change, Climate Change 2014 Synthesis Report at 43, 62 (2015), https://perma.cc/C55X-EYP9.

[60] The Covid-19 pandemic resulted in the largest-ever decline in global emissions, International Energy Agency (Mar. 2, 2021), https://perma.cc/G5G4-UXNL.

EPA Response

EPA disagrees with many of the commenters’ contentions. EPA notes that it determined what standards were appropriate in light of the need for emissions reductions, the cost of compliance and lead time, and found the results of the cost-benefit analysis in the RIA provide additional support for its conclusions. Under Section 202 of the CAA, EPA is required to establish standards to reduce air pollution that endangers public health and welfare, taking into consideration the cost of compliance and lead time. EPA is not required to conduct formal cost benefit analysis to determine the appropriate standard under Section 202. EPA weighed the relevant statutory factors to determine the appropriate standard and the analysis of monetized GHG benefits was not material to the choice of that standard. EO 12866 requires EPA to perform a cost-benefit analysis, including monetizing costs and benefits where practicable, and the EPA has conducted such an analysis. The monetized GHG benefits are included in the cost-benefit analysis. That cost-benefit analysis provides additional support for the EPA's final standards. EPA follows applicable guidance and best practices when conducting its benefit-cost analyses, including OMB Circular A-4, EPA's Guidelines for Preparing Economic Analyses. We therefore consider our analysis methodologically rigorous and a best estimate of the projected benefits and costs associated with the final rule.

Please see the response to AEI in Section 14.1 of this document to similar comments on SC-GHG modeling uncertainties and limitations, and the use and application of the 2021 TSD SC-GHG estimates. Please see the response to the Missouri Attorney General in Section 14.1 to a similar comment on IWG notice and comment and the use of global estimates.

14.2. Comments on Impacts on Endangered Species

<u>Commenters Included in this Section:</u>

Center for Biological Diversity, Earthjustice, and Sierra Club
Center for Biological Diversity

Commenter: Center for Biological Diversity, Earthjustice, and Sierra Club

This rulemaking would benefit from consultation under the Endangered Species Act. Finally, EPA's rule would benefit from consultation under Section 7 of the Endangered Species Act. For every discretionary action, Section 7(a)(2) of the Endangered Species Act ('ESA') requires each federal agency, in consultation with the National Marine Fisheries Service and the U.S. Fish and Wildlife Service (collectively, the 'Services'), to 'insure that any action authorized, funded, or carried out by the agency is not likely to jeopardize the continued existence of any threatened or endangered species, or result in the destruction or adverse modification of the critical habitat of such species' using the best scientific data available.61 Undergoing consultation under the ESA assists EPA in making discretionary decisions—such as regarding stringency levels and uses of credits and other flexibilities—that mitigate harmful effects on species. Consultation is also consistent with President Biden's 'whole of government' approach to addressing the climate crisis, as well as Executive Order 13990, which states that all federal agencies 'must be guided by the best science and be protected by processes that ensure the integrity of Federal decision-making.' For these reasons, we encourage EPA to consult with the Services in rulemakings such as this and future ones that have vast potential effects on biodiversity. [EPA-HQ-OAR-2021-0208-0270-A1, p.10]

EPA Response

EPA acknowledges the comment. Please see the response to the following comment from Center for Biological Diversity.

Commenter: Center for Biological Diversity

Should EPA finalize the Rule, the Center urges you to undertake interagency consultation as required pursuant to Section 7 of the Endangered Species Act, 16 U.S.C. §§ 1531-44 ('ESA') ('Section 7 consultation'). Because the Rule will have an appreciable, cumulative impact on climate-threatened species as wells as species susceptible to criteria air pollution, EPA must consult with both the National Marine Fisheries Service and the U.S. Fish and Wildlife Service (collectively the 'Services').1 EPA's failure to undertake such consultation would violate both the procedural requirements of Section 7(a)(2) of the ESA as well as EPA's substantive duty to ensure against jeopardy of federally-listed species and the adverse modification of their habitats.

As explained below, while EPA's Rule reduces the total amount of greenhouse gas and other emissions that would have been emitted under the previous administration's Safer Affordable Fuel Efficient ('SAFE') Vehicles Rule, EPA's decision to finalize this Rule will nonetheless allow cars and light trucks to emit millions of metric tons of greenhouse gases and tens of thousands of tons of criteria pollutants. The impacts may be somewhat less harmful than those under the SAFE Rule, but they still exist. And by undergoing consultation under the ESA, EPA could make discretionary decisions—such as regarding stringency levels and uses of credits and other flexibilities—that mitigate these effects. Consultation is also consistent with President Biden's 'whole of government' approach to addressing the climate crisis, as well as Executive Order 13990, which states that all federal agencies 'must be guided by the best science and be protected by processes that ensure the integrity of Federal decision-making.' [EPA-HQ-OAR-2021-0208-0726-A1, pp. 1-2]

II. THE ENDANGERED SPECIES ACT REQUIRES INTERAGENCY CONSULTATION ON THE ADOPTION OF THE REVISED VEHICLES RULE

A. EPA's adoption of the Rule triggers its duty to consult under Section 7 of the ESA.

The proposed Rule triggers EPA's procedural duty to undergo Section 7 consultation. First, the Rule is a discretionary federal action. Section 7 consultation is required on an agency action 'so long as the agency has 'some discretion' to take action for the benefit of a protected species.'22 If 'an agency has any statutory discretion over the action in question, that agency has the authority, and thus the responsibility, to comply with the ESA.'23 Second, as explained above, 'action' is broadly defined to include 'all activities or programs of any kind authorized, funded, or carried out, in whole or in part' by federal agencies.24 The ESA's implementing regulations provide that actions triggering ESA consultation include those that ‘directly or indirectly caus[e] modifications to the land, water, or air.’25

Here, EPA’s adoption of the Rule is a discretionary government action that directly causes modifications to the air, and indirectly modify land and water, thus triggering the ESA Section 7 consultation requirement. For instance, EPA is making the discretionary decision to adopt the proposal rather than a more stringent alternative, and in doing so, is making the discretionary decision to allow millions of metric tons more greenhouse gases to be emitted than if it chose a different alternative. What is more, EPA is making the discretionary decision to include a number of different regulatory flexibilities and credits, which allow manufacturers to avoid or delay producing vehicles that would reduce their emissions.26 Each of these discretionary decisions affects the greenhouse gas and criteria emissions over the next several years, and thus ‘may affect’ endangered species or their habitat. [EPA-HQ-OAR-2021-0208-0726-A1, pp. 4-5]

According to the Rule’s Draft Regulatory Impact Analysis, while the proposal projects a reduction in greenhouse gas emissions compared to Trump’s SAFE Rule rollback, it would still allow millions of metric tons of greenhouse gases and other criteria pollutants to be emitted. This is especially stark when the proposal is compared to EPA’s suggested Alternative 2, which would save 293 million metric tons CO2 and 426,545 metric tons of methane compared with the proposal through 2050.27 Similarly, compared to the proposal, Alternative 2 would reduce emissions of NOx by approximately 30,000 tons and SO2 by over 100,000 tons through 2050.28 In other words, by making the decision to adopt the proposal instead of Alternative 2, EPA is, in its discretion, authorizing an addition 293 million metric tons of CO2 and 426,545 metric tons of methane, in addition to other greenhouse gases and increased criteria pollution. Of course, EPA could have analyzed other alternatives stronger than Alternative 2, which would have made these emissions savings even higher.

These numbers are not insignificant, and they can be directly tied to harm to species or critical habitat, such as to precise losses of sea ice and sea ice days in the Arctic. For instance, the greenhouse gas emissions can be tied to precise losses of sea ice and sea ice days in the Arctic;29 the excess 293 million metric tons of CO2 alone—not including the other greenhouse gases—that will be emitted if EPA decides to adopt the proposal instead of Alternative 2 will lead to a sustained loss of sea ice of 879 square kilometers,30 larger than the area of New York City. This loss will have devastating consequences for polar bears, as described below. [EPA-HQ-OAR-2021-0208-0726-A1, p. 5]

The excess methane emissions are particularly alarming. Immediate, deep reductions in methane emissions are critical for lowering the rate of global warming in the near-term, preventing the crossing of irreversible planetary tipping points, and avoiding harms to species and ecosystems from methane’s intensive near-term heating effects and ground-level ozone production.31 Methane is a super-pollutant 87 times more powerful than CO2 at warming the atmosphere over a 20-year period, 32 and is second only to CO2 in driving climate change during the industrial era.33 Methane also leads to the formation of ground-level ozone, a dangerous air pollutant, that harms ecosystems and species by suppressing plant growth and reducing plant productivity and carbon uptake.34 Because methane is so climate-damaging but also comparatively short-lived with an atmospheric lifetime of roughly a decade, cutting methane has a relatively immediate effect in slowing the rate of temperature rise in the near-term. Critically, deep cuts in methane emissions of ~45% by 2030 would avoid 0.3°C of warming by 2040 and are considered necessary to achieve the Paris Agreement's 1.5°C climate limit and prevent the worst damages from the climate crisis.35 Deep cuts in methane emissions that reduce near-term temperature rise are also critical for avoiding the crossing of planetary tipping points—abrupt and irreversible changes in Earth systems to states wholly outside human experience, resulting in severe physical, ecological and socioeconomic harms.36 [EPA-HQ-OAR-2021-0208-0726-A1, pp. 5-6]

Accordingly, EPA's discretionary actions meet the broad—and extremely low—'may affect' threshold under the ESA and its implementing regulations that trigger the EPA's Section 7 consultation duty.37 The 'may affect' standard includes '[a]ny possible effect, whether beneficial, benign, adverse or of an undetermined character.'38 As discussed below, the increases in greenhouse gas and criteria emissions—associated with the agency decisions described above—may impact the hundreds of federally protected species and their critical habitats that are imperiled due specifically to exacerbated climate change, nitrogen deposition, and greater levels of particular air pollutants from vehicle emissions. Courts have found that similar agency actions resulting in increases of criteria air pollutants may impact federally-listed species and result in environmental harms.39

In light of the Rule's effects, '[i]n no uncertain terms, the [ESA] mandates that [EPA] shall engage in consultation before taking any action that could jeopardize the continued existence of any endangered species or threatened species.' 40 Separately, the finalization of the proposed Rule also triggers EPA's substantive duty under Section 7(a)(2) of the ESA to 'insure' against a likelihood of jeopardizing federally-listed species which would be impacted by the Rule's adoption.41 Agencies are required to give the benefit of the doubt to federally-listed species, thus placing the ultimate burden of protecting species against risk and uncertainty on the agency itself.42 Accordingly, should EPA adopt the Rule without undergoing Section 7 consultation, EPA will have failed its substantive duty to insure that the Rule will not jeopardize listed species or adversely modify their critical habitat. [EPA-HQ-OAR-2021-0208-0726-A1, pp. 6-7]

EPA's decision to finalize its proposal will allow cars and light trucks to emit millions of metric tons of greenhouse gases and tens of thousands of tons of criteria pollutants—even though EPA has the discretion to reduce them. These emissions will affect climate change, air quality, and species and their habitats in ways that are direct and predictable. [EPA-HQ-OAR-2021-0208-0726-A1, p. 7]

i. Climate change has clear and documented adverse impacts on federally protected species.

This section describes the hundreds of federally-listed species—including the iconic polar bear43—whose very existence is jeopardized by increasing GHG emissions and exacerbated climate change—as legally determined by the Services in response to these species' listing petitions. The proposal, if finalized, would directly contribute to significantly higher GHG emissions and exacerbate climate change, and thus jeopardize the endangered and threatened species, as well as their critical habitats, that are specifically at risk due to exacerbated climate change. [EPA-HQ-OAR-2021-0208-0726-A1, p. 7]

a. An overwhelming international scientific consensus has established that human-caused climate change is already causing severe and widespread harms to life on Earth, and these threats are becoming more dangerous as greenhouse gas emissions continue unabated.

An overwhelming international scientific consensus has established that human-caused climate change is already causing severe and widespread harms and that climate change threats are becoming increasingly dangerous. The Intergovernmental Panel on Climate Change (IPCC), the international scientific body for the assessment of climate change, concluded in its Climate Change 2021: The Physical Science Basis report that: '[i]t is unequivocal that human influence has warmed the atmosphere, ocean and land. Widespread and rapid changes in the atmosphere, ocean, cryosphere and biosphere have occurred,' and further that '[t]he scale of recent changes across the climate system as a whole and the present state of many aspects of the climate system are unprecedented over many centuries to many thousands of years.'44 [EPA-HQ-OAR-2021-0208-0726-A1, pp. 7-8]

The U.S. federal government has repeatedly recognized that human-caused climate change is causing widespread and intensifying harms across the country in the authoritative National Climate Assessments, scientific syntheses prepared by hundreds of scientific experts and reviewed by the National Academy of Sciences and federal agencies. Most recently, the Fourth National Climate Assessment, comprised of the 2017 Climate Science Special Report (Volume I)45 and the 2018 Impacts, Risks, and Adaptation in the United States (Volume II),46 concluded that 'there is no convincing alternative explanation' for the observed warming of the climate over the last century other than human activities.47 It found that 'evidence of human-caused climate change is overwhelming and continues to strengthen, that the impacts of climate change are intensifying across the country, and that climate-related threats to Americans' physical, social, and economic well-being are rising.'48 The Fourth National Climate Assessment warns that 'climate change threatens many benefits that the natural environment provides to society,' and that 'extinctions and transformative impacts on some ecosystems' will occur 'without significant reductions in global greenhouse gas emissions.'49 [EPA-HQ-OAR-2021-0208-0726-A1, p.8]

As detailed in the National Climate Assessments, the widespread, intensifying, and often long-lived harms from climate change include soaring air and ocean temperatures; more frequent and intense heat waves, floods, and droughts; more destructive hurricanes and wildfires; coastal flooding from sea level rise and increasing storm surge; declining food and water security; accelerating species extinction risk; melting Arctic sea ice, glaciers, and ice sheets; the collapse of Antarctic ice shelves; ocean acidification; and the collapse of coral reefs. 50 [EPA-HQ-OAR-2021-0208-0726-A1, pp. 8-9]

b. Fossil fuels are the dominant driver of the climate crisis.

The National Climate Assessments decisively recognize the dominant role of fossil fuels in driving climate change. As stated by the Third National Climate Assessment: 'observations unequivocally show that climate is changing and that the warming of the past 50 years is primarily due to human-induced emissions of heat-trapping gases. These emissions come mainly from burning coal, oil, and gas.'51 In parallel, the Fourth National Climate Assessment reported that 'fossil fuel combustion accounts for approximately 85 percent of total U.S. greenhouse gas emissions,'52 which is 'driving an increase in global surface temperatures and other widespread changes in Earth's climate that are unprecedented in the history of modern civilization.'53 [EPA-HQ-OAR-2021-0208-0726-A1, p. 9]

c. The choices made now on reducing greenhouse gas pollution will affect the severity of the climate change damages that will be suffered in the coming decades and centuries.

The National Climate Assessments make clear that the harms of climate change are long-lived, and the choices we make now on reducing greenhouse gas pollution will affect the severity of the climate change damages that will be suffered in the coming decades and centuries: '[t]he impacts of global climate change are already being felt in the United States and are projected to intensify in the future—but the severity of future impacts will depend largely on actions taken to reduce greenhouse gas emissions and to adapt to the changes that will occur.'54 As the Fourth National Climate Assessment explains: '[m]any climate change impacts and associated economic damages in the United States can be substantially reduced over the course of the 21st century through global-scale reductions in greenhouse gas emissions, though the magnitude and timing of avoided risks vary by sector and region. The effect of near-term emissions mitigation on reducing risks is expected to become apparent by mid-century and grow substantially thereafter.'55 Similarly, a 2014 White House report found that the cost of delay on reducing emissions is not only extremely steep but also potentially irreversible, and the costs rise exponentially with continued delays. 56 As summarized by the National Research Council:

Emissions of carbon dioxide from the burning of fossil fuels have ushered in a new epoch where human activities will largely determine the evolution of Earth's climate. Because carbon dioxide in the atmosphere is long lived, it can effectively lock Earth and future generations into a range of impacts, some of which could become very severe. [E]mission reduction choices made today matter in determining impacts experienced not just over the next few decades, but in the coming centuries and millennia.57 [EPA-HQ-OAR-2021-0208-0726-A1, pp. 9-10]

d. The IPCC 2018 Special Report, as reinforced by the 2021 IPCC Sixth Assessment Report, make clear that global greenhouse gas emissions must be halved by 2030 to avoid catastrophic damages of climate change.

In 2018, the IPCC issued a Special Report on Global Warming of 1.5°C that quantified the devastating harms that would occur at 2°C warming, highlighting the necessity of limiting warming to 1.5°C to avoid catastrophic impacts to people and life on Earth.58 The IPCC 2018 Special Report provides overwhelming evidence that aggressive reductions in emissions within this decade are essential to avoiding catastrophic climate change harms. [EPA-HQ-OAR-2021-0208-0726-A1, p. 10]

The Special Report quantifies the harms that would occur at 2°C warming compared with 1.5°C, and the differences are stark. According to the IPCC's analysis, the damages that would occur at 2°C warming compared with 1.5°C include dramatically increased species extinction risk, including a doubling of the number of vertebrate and plant species losing more than half their range, and the virtual elimination of coral reefs; significantly more deadly heatwaves, drought and flooding; 10 centimeters of additional sea level rise within this century; a greater risk of triggering the collapse of the Greenland and Antarctic ice sheets with resulting multi-meter sea level rise; 1.5 to 2.5 million more square kilometers of thawing permafrost area with the associated release of methane, a potent greenhouse gas; and a tenfold increase in the probability of ice-free Arctic summers.59 [EPA-HQ-OAR-2021-0208-0726-A1, p. 10]

The IPCC report concludes that pathways to limit warming to 1.5°C with little or no overshoot require 'a rapid phase out of CO2 emissions and deep emissions reductions in other GHGs and climate forcers.' 60 In pathways consistent with limiting warming to 1.5°C, global net anthropogenic CO2 emissions must decline by about 45 percent from 2010 levels by 2030, reaching net zero around 2050.61 [EPA-HQ-OAR-2021-0208-0726-A1, pp. 10-11]

Similarly, the IPCC Climate Change 2021 report concludes that global warming will exceed 1.5°C and 2°C by 2100 unless we make immediate, deep reductions in CO2 and other greenhouse gas emissions.62 Only the most stringent emissions reduction scenario—SSP1-1.9 in which global emissions fall steeply in the near-term, reach net zero in 2050, and become net negative afterward—is consistent with a 1.5°C climate target. In this low emissions SSP1-1.9 scenario, global average surface temperature is projected to reach 1.5°C above pre-industrial in the near-term (2021-2040), overshoot and peak at 1.6°C in the mid-term (2041-2060), and drop down to 1.4°C in the long-term (2081-2100).63 [EPA-HQ-OAR-2021-0208-0726-A1, p. 11]

In short, the IPCC Assessment Reports, U.S. National Climate Assessments, and tens of thousands of studies make clear that fossil-fuel driven climate change is a 'code red for humanity,'64 and that every additional ton of CO2 and fraction of a degree of temperature rise matters. As warned by the IPCC, 'every tonne of CO2 emissions adds to global warming.'65 [EPA-HQ-OAR-2021-0208-0726-A1, p. 11]

e. Climate change has clear and documented adverse impacts on biodiversity.

The best available science shows that anthropogenic climate change is causing widespread harm to life across the planet, disrupting species' distribution, timing of breeding and migration, physiology, vital rates, and genetics—in addition to increasing species extinction risk.66 Climate change is already affecting 82% of key ecological processes that underpin ecosystem function and support basic human needs.67 Climate change-related local extinctions are widespread and have occurred in hundreds of species, including almost half of the 976 species surveyed.68 Nearly half of terrestrial non-flying threatened mammals and nearly one-quarter of threatened birds are estimated to have been negatively impacted by climate change in at least part of their range. 69 Furthermore, across the globe, populations of terrestrial birds and mammals that are experiencing greater rates of climate warming are more likely to be declining at a faster rate.70 Genes are changing, species' physiology and physical features such as body size are changing, species are moving to try to keep pace with suitable climate space, species are shifting their timing of breeding and migration, and entire ecosystems are under stress.71 [EPA-HQ-OAR-2021-0208-0726-A1, pp. 11-12]

Species extinction risk will accelerate with continued greenhouse gas pollution. One million animal and plant species are now threatened with extinction, with climate change as a primary driver.72 At 2°C compared with 1.5°C of temperature rise, species' extinction risk will increase dramatically, leading to a doubling of the number of vertebrate and plant species losing more than half their range, and a tripling for invertebrate species.73 Numerous studies have projected catastrophic species losses during this century if climate change continues unabated: 15 to 37% of the world's plants and animals committed to extinction by 2050 under a mid-level emissions scenario74; the potential extinction of 10 to 14% of species by 210075; global extinction of 5% of species with 2°C of warming and 16% of species with business-as-usual warming76; the loss of more than half of the present climatic range for 58% of plants and 35% of animals by the 2080s under the current emissions pathway, in a sample of 48,786 species77; and the loss of a third or more of animals and plant species in the next 50 years.78 [EPA-HQ-OAR-2021-0208-0726-A1, p. 12]

As summarized by the Third National Climate Assessment, 'landscapes and seascapes are changing rapidly, and species, including many iconic species, may disappear from regions where they have been prevalent or become extinct, altering some regions so much that their mix of plant and animal life will become almost unrecognizable.'79 [EPA-HQ-OAR-2021-0208-0726-A1, pp. 12-13]

f. Greenhouse gas pollution has clear and documented adverse impacts on federally protected species.

Greenhouse gas emissions harm endangered species in ways that are not only measurable but also causally understood. Climate change impacts such as sea ice loss, ocean heat stress and ocean acidification, sea level rise, the increasing frequency of extreme weather events, decreasing snowpack, and elevational and latitudinal shifts in habitat are several of the ways that greenhouse gas emissions harm hundreds of federally protected species--and has been recognized as such in federal listing determinations under the Endangeered Species Act. [EPA-HQ-OAR-2021-0208-0726-A1, p. 13]

The Polar Bear (Ursus maritimus) and Loss of Sea Ice. In 2008, the FWS listed the polar bear (Ursus maritimus) as a threatened species due to climate change and the loss of sea ice. 80 See also In re Polar Bear Endangered Species Act Listing, 709 F.3d 1 (D.D. Dir. 2013) (affirming FWS's decision to federally list the polar bear as threatened due to the effects of global climate change on polar bear habitat). [EPA-HQ-OAR-2021-0208-0726-A1, p. 13]

The loss of sea ice is one of the clearest and most obvious consequences of global warming. As highlighted by the Fourth National Climate Assessment, Alaska and the Arctic have experienced some of the most severe and rapid warming associated with climate change, with temperatures rising at twice the rate of the rest of the globe on average.81 Arctic summer sea ice extent and thickness have decreased by 40% during the past several decades,82 with each metric ton of CO2 emissions causing a sustained loss of three square meters of summer sea ice area.83 The Arctic lost 95% of its oldest and thickest sea ice during the past three decades, and the remaining thinner, younger ice is more vulnerable to melting.84 Sea ice loss has accelerated since 2000, with Alaska's coast suffering some of the fastest losses.85 The length of the sea ice season is shortening as ice melts earlier in spring and forms later in autumn.86 Along Alaska's northern and western coasts, the sea ice season has already shortened by more than 90 days.87 As summarized by the Fourth National Climate Assessment:

Since the early 1980s, annual average arctic sea ice has decreased in extent between 3.5% and 4.1% per decade, become thinner by between 4.3 and 7.5 feet, and began melting at least 15 more days each year. September sea ice extent has decreased between 10.7% and 15.9% per decade (very high confidence). Arctic-wide ice loss is expected to continue through the 21st century, very likely resulting in nearly sea ice-free late summers by the 2040s (very high confidence).'88 [EPA-HQ-OAR-2021-0208-0726-A1, p. 14]

It is precisely this sea ice loss, and the lack of adequate regulatory mechanisms addressing greenhouse gas pollution, that led FWS to list the polar bear (Ursus maritimus) as a threatened species in 2008.89 As a top Arctic predator, the polar bear relies on sea ice for all its essential activities, including hunting for prey, moving long distances, finding mates, and building dens to rear cubs. 90 Separately, recognizing the critical importance of sea ice for polar bear survival, FWS designated sea ice habitat off Alaska as critical habitat for the polar bear in 2010.91 [EPA-HQ-OAR-2021-0208-0726-A1, pp. 14-15]

Federal documents acknowledge that shrinkage and premature breakup of sea ice due to climate change is the primary threat to the species, leaving bears with vastly diminished hunting grounds, less time to hunt, and a shortage of sea ice for other essential activities such as finding mates and resting.92 As summarized in FWS's 2017 5-year review, sea ice loss and a shorter sea ice season makes hunting calorie-rich seals more difficult for polar bears, leading to nutritional stress, reduced body mass, and declines of some populations.93 As the sea ice retreats, polar bears have been forced to swim longer distances,94 which is more energetically costly,95 and they are spending more time on land where they have reduced access to food.96 Females are denning more often on land than on ice, increasing the potential for conflicts with humans.97 Because polar bears have high metabolic rates, increases in movement resulting from loss and fragmentation of sea ice result in higher energy costs and are likely to lead to reduced body condition, recruitment and survival.98 [EPA-HQ-OAR-2021-0208-0726-A1, p. 15]

In the southern Beaufort Sea of Alaska, polar bears declined by 40 percent over a recent 10-year period,99 and this decrease has been attributed to sea ice loss that limited access to prey over multiple years. 100 For the bears in this population, research has linked sea ice loss to decreases in survival,101 lower success in rearing cubs,102 shrinking body size,103 and increases in fasting and nutritional stress.104 The loss of sea ice also jeopardizes the polar bear's sea-ice dependent prey species—the ringed seal and bearded seal—which were listed as threatened in 2012 due to sea ice loss from climate change.105 [EPA-HQ-OAR-2021-0208-0726-A1, pp. 15-16]

If current greenhouse gas emissions trends continue, scientists estimate that two-thirds of global polar bear populations will be lost by 2050, including the loss of both of Alaska's polar bear populations, while the remaining third will near extinction by the end of the century due to the disappearance of sea ice.106 However, aggressive emissions reductions will allow substantially more sea ice to persist and increase the chances that polar bears will survive in Alaska and across their range.107 Highlighting the importance of reducing greenhouse gas emissions to protect sea ice and sea-ice dependent species, one recent study estimated that each metric ton of CO_2 emission results in a sustained loss of 3 ± 0.3 m^2 of September Arctic sea ice area based on the robust linear relationship between monthly-mean September sea ice area and cumulative CO_2 emissions.108 Similar to other research,109 the study concluded that limiting warming to 2°C is not sufficient to allow Arctic summer sea ice to survive, but that a rapid reduction in emissions to achieve a 1.5°C global warming target gives Arctic summer sea ice 'a chance of long-term survival at least in some parts of the Arctic Ocean.'110 [EPA-HQ-OAR-2021-0208-0726-A1, p. 16]

As such, FWS's 2016 Final Polar Bear Conservation Management Plan clearly stated that the polar bear cannot be recovered without significant reductions in the greenhouse gas emissions driving Arctic warming and sea ice loss: 'It cannot be overstated that the single most important action for the recovery of polar bears is to significantly reduce the present levels of global greenhouse gas (GHG) emissions, which are the primary cause of warming in the Arctic.'111 [EPA-HQ-OAR-2021-0208-0726-A1, p. 17]

If the Rule is finalized as proposed, greenhouse gases emitted will exacerbate the loss of sea ice, causing the likelihood of survival and recovery of the polar bear to diminish appreciably. The EPA must consult on how the Rule would affect sea ice loss for a listed species like the polar bear. [EPA-HQ-OAR-2021-0208-0726-A1, p. 17]

Elkhorn, Staghorn and other Coral Species & Ocean Heat Stress and Ocean Acidification. As of the date of this letter, 22 species of corals are listed under the Endangered Species Act due primarily to threats from ocean warming and ocean acidification, direct consequences of climate change. In 2006, NMFS listed elkhorn and staghorn corals (Acropora palmata and A. cervicornis) as threatened, citing ocean warming as a key threat to these species.112 In 2014 NMFS reaffirmed that ocean warming due to climate change and ocean acidification are primary threats to these species.113 In 2014 NMFS listed 20 additional corals as threatened, including five Caribbean coral species and fifteen Indo-Pacific coral species,114 determining that the most important threats contributing to extinction risk for these species are ocean warming, disease (as related to climate change), and ocean acidification.115 NMFS stated that 'these impacts are currently occurring, and are expected to worsen, posing increasingly severe effects on the species considered in this final rule.'116 [EPA-HQ-OAR-2021-0208-0726-A1, p. 17]

Ocean warming and ocean acidification, two incontrovertible environmental impacts caused by greenhouse gas pollution, are wreaking havoc on marine ecosystems and causing a global collapse of coral reefs. The world's oceans have absorbed more than 90 percent of the excess heat caused by greenhouse gas warming, resulting in average sea surface warming of 1.3°F (0.7°C) per century since 1900.117 Marine heat waves—periods of extreme warm surface temperature—have become longer-lasting and more frequent due to climate change, with the number of heat wave days doubling between 1982 and 2016 and projected to increase 23 times under 2°C warming. 118 At present, 87 percent of marine heat waves are attributable to human-induced warming.119 Global average sea surface temperature is projected to rise by 4.9°F (2.7°C) by the end of the century under a higher emissions scenario, with even greater warming in the coastal waters of the Northeastern U.S. and Alaska.120 Rapid ocean warming has widespread impacts on species and ecosystems, contributing to rising sea levels, declining ocean oxygen levels, increasing rainfall intensity, and ice loss from glaciers, ice sheets and polar sea ice, and is the primary driver of mass coral bleaching events that are devastating coral reef ecosystems.121 [EPA-HQ-OAR-2021-0208-0726-A1, pp. 17-18]

Exacerbating the harms from rising temperatures, the global oceans have absorbed more than a quarter of the CO2 emitted to the atmosphere by human activities, which has significantly increased the acidity of the surface ocean in a process called ocean acidification, and has reduced the availability of key chemicals—aragonite and calcite—that many marine species use to build their shells and skeletons.122 Ocean acidification caused by the ocean's absorption of anthropogenic CO2 has already resulted in more than a 30 percent increase in the acidity of ocean surface waters, at a rate likely faster than anything experienced in the past 300 million years.123 Ocean acidity could increase by 150 percent by the end of the century if CO2 emissions continue unabated.124 In the United States, the West Coast, Alaska, and the Gulf of Maine are experiencing the earliest, most severe changes due to ocean acidification,125 although regions of the East and Gulf Coasts are also vulnerable.126 [EPA-HQ-OAR-2021-0208-0726-A1, p. 18]

Ocean acidification negatively affects a wide range of marine species by hindering the ability of calcifying marine creatures like corals, oysters, and crabs to build protective shells and skeletons and by disrupting metabolism and critical biological functions.127 The adverse effects of ocean acidification are already being observed in wild populations, including reduced coral calcification rates in reefs worldwide, 128 severe shell damage to pteropods (marine snails at the base of the food web) along the U.S. west coast,129 and mass die-offs of larval Pacific oysters in the Pacific Northwest.130 A U.S. expert science panel concluded in 2016 that 'growth, survival and behavioral effects linked to OA [ocean acidification] extend throughout food webs, threatening coastal ecosystems, and marine-dependent industries and human communities.'131 As stated by the 2018 IPCC Special Report on Global Warming of 1.5°C, '[t]he level of ocean acidification due to increasing CO2 concentrations associated with global warming of 1.5°C is projected to amplify the adverse effects of warming, and even further at 2°C, impacting the growth, development, calcification, survival, and thus abundance of a broad range of species, e.g., from algae to fish (high confidence).'132 [EPA-HQ-OAR-2021-0208-0726-A1, pp. 18-19]

Rising ocean temperatures and ocean acidification driven by greenhouse gas pollution threaten the continued survival of corals and coral reef ecosystems due to the increasing frequency of mass bleaching events and the dissolution of corals due to ocean acidification.133 Scientific research has definitely linked anthropogenic ocean warming to the catastrophic, mass coral bleaching events that have been documented since 1980 and are increasing in frequency and intensity as atmospheric CO2 increases.134 Severe bleaching events have increased five-fold in the past several decades and now occur every six years on average, which is too frequent to allow full recovery of coral reefs.135 The global coral bleaching event that lasted from 2014 to 2017 was the longest, most widespread, and almost certainly most destructive on record, affecting more reefs than any previous mass bleaching event and causing mass bleaching of reefs that had never bleached before, with U.S. reefs particularly hard-hit.136 For example, in PapahÄ□naumokuÄ□kea Marine National Monument in Northwestern Hawaiian Islands, a 2017 study concluded that 'heat stress in 2014 was unlike any previous event and that the exposure of corals to the bleaching-level heat stress has increased significantly in the northern PMNM since 1982, highlighting the increasing threat of climate change to reefs.' 137 In the Caribbean, many important reef-building corals have not recovered from repeated bleaching events due to climate change.138 According to a 2021 study that projected changes in coral reef growth (net carbonate production) under ocean warming and acidification across 183 reefs worldwide, 94% of coral reefs globally will be eroding by 2050 if greenhouse gas emissions continue unabated. In contrast, if emissions are immediately and drastically reduced (i.e., RCP 2.6 emissions scenario), coral reef growth will still decline dramatically, but 63% of reefs will still be able to grow at the end of the century.139 A 2017 scientific review concluded that 'unless rapid advances to the goals of the Paris Climate Change Agreement occur over the next decade' that 'coral reefs are likely to degrade rapidly over the next 20 years, presenting fundamental challenges for the 500 million people who derive food, income, coastal protection, and a range of other services from coral reefs.'140 [EPA-HQ-OAR-2021-0208-0726-A1, pp. 19-20]

As discussed, 22 species of corals are listed under the Endangered Species Act due primarily to threats from ocean warming and ocean acidification. Specifically, listed elkhorn and staghorn corals—once abundant throughout the Caribbean Sea—precipitously declined by 92 to 97 percent, largely due to disease. Research indicates that the outbreaks of white-band disease that decimated these corals were driven by heat stress from rising ocean temperatures.141 Research has also documented that ocean warming increases the susceptibility to disease, fragmentation, and mortality of elkhorn and staghorn corals, while ocean acidification decreases their fertilization, settlement success, growth and calcification.142 For listed pillar corals (Dendrogyra cylindrus) which have suffered catastrophic declines in Florida in recent years, research indicates that black band disease first emerged following bleaching events in 2014 and 2015 spurred by abnormally high water temperatures. 143 The three listed star corals in the Caribbean—boulder star coral (Orbicella franksi), mountainous star coral (Orbicella faveolata), and lobed star coral (Orbicella annularis)—have experienced long-term declines in reproduction following bleaching events caused by high water temperatures, which scientists warned 'may be catastrophic for the long-term maintenance of the population.'144 [EPA-HQ-OAR-2021-0208-0726-A1, pp. 20-21]

Scientific research and federal documents conclude that greenhouse gas emissions must be immediately and rapidly reduced—with the target of keeping global average temperature rise below 1.5°C and returning atmospheric CO_2 levels below 350 ppm—to prevent catastrophic loss and degradation of corals. For example, a 2012 study concluded that protecting at least half of the world's coral reefs requires limiting global average temperature rise to 1.2°C, while preserving greater than 10 percent of the world's reefs would require limiting warming to below 1.5°C. 145 Similarly, a 2014 study projected that under the low emissions pathway (RCP 2.6) that limits temperature rise below 2°C, the vast majority (88%) of global reef locations would still experience severe bleaching events annually by the end of the century, indicating that 2°C of warming would be devastating for corals. 146 The 2018 IPCC Special Report on Global Warming of 1.5°C stated that coral reefs 'are projected to decline by a further 70–90% at 1.5°C (high confidence) with larger losses (>99%) at 2ºC (very high confidence).'147 As summarized by a 2018 study:

Even the aspirational Paris Agreement target of constraining global warming to 1.5°C above pre-industrial levels is unlikely to be sufficient to prevent drastic modifications and reconfigurations of the community structure and make-up of coral reefs. For the 100 reef locations examined here and given current rates of warming, the 1.5°C global warming target represents twice the thermal stress they experienced in 2016. The 2°C global target would result in 3 times the 2016 level of thermal stress and 3 °C, which is currently being tracked with the NDCs, would be over 6 times the 2016 level of stress.148 [EPA-HQ-OAR-2021-0208-0726-A1, pp. 21-22]

Based on this evidence, coral scientists have recommended returning the atmospheric CO2 concentration to less than 350 ppm to protect coral reefs, and have suggested a target of 320 ppm which is the level that pre-dates the onset of mass bleaching events.149 [EPA-HQ-OAR-2021-0208-0726-A1, p. 22]

NMFS' 2015 Final Recovery Plan for Elkhorn and Staghorn Corals states that ocean warming and acidification are 'among the greatest threats' to these corals, and recommends actions to reduce greenhouse gas emissions to reduce these threats: 'the combination of rising temperature and ocean acidification both resulting primarily from anthropogenic increases in atmospheric CO2, are likely to have synergistic effects and are among the greatest threats to elkhorn and staghorn coral recovery'150 and 'therefore, actions must be taken to address ocean warming and acidification impacts on these species.'151 NMFS's recovery plan includes a recovery criterion with specific targets for ocean surface temperatures and ocean acidification levels152 that are lower than today's levels and are consistent with a return to an atmospheric CO2 concentration of less than 350 ppm,153 as recommended by numerous scientific studies that have examined coral species viability in response to ocean warming and ocean acidification. 154 The Recovery Plan also recognizes that a primary threat to listed corals is the inadequacy of existing regulations to control greenhouse gas emissions. It specifies a recovery criterion calling for the adoption of 'adequate domestic and international regulations and agreements' to abate threats from increasing atmospheric CO2 concentrations,155 including a recovery action to 'develop and implement U.S. and international measures to reduce atmospheric CO2 concentrations to a level appropriate for coral recovery.'156 As acknowledged by the Recovery Plan:

The final listing rule (NMFS 2006) identified inadequacy of regulatory mechanisms as a threat contributing to the threatened status of elkhorn and staghorn corals. Additionally, the 2014 final rule maintaining the threatened status of elkhorn and staghorn corals (NMFS 2014) identifies the inadequacy of existing regulations to control greenhouse gas emissions, and thus the high importance threats linked to climate change, as contributing to the status and risk of extinction of these two species. Because existing regulatory mechanisms are insufficient to provide appropriate threat abatement for elkhorn and staghorn corals, they are impeding recovery of these species. The threat posed by inadequacy of existing regulatory mechanisms is high (4) throughout the region (see Table 1) because several of the major threats affecting these species are amenable to regulation, albeit with difficulty. National and international efforts are needed to address global climate change while additional international protections are needed to protect populations of elkhorn and staghorn corals throughout their ranges.157 [EPA-HQ-OAR-2021-0208-0726-A1, pp. 22-23]

Since the ocean has absorbed more than 90 percent of the excess heat caused by greenhouse gas warming and more than a quarter of the CO2 emitted by human activities,158 it is critical for the survival of the elkhorn and staghorn corals to prevent many additional millions of tons of CO2 from being released. At a minimum, EPA must assess how the increases in carbon dioxide emissions will affect these climate-sensitive ocean species. [EPA-HQ-OAR-2021-0208-0726-A1, p. 24]

Other Coastal Species and Sea Level Rise. Global average sea level rose by seven to eight inches (0.2 m) since 1901 as the oceans have gotten hotter and land-based ice has melted.159 Global average sea level has risen faster since 1900 than in any other century in at least the last 3,000 years.160 Sea level rise is accelerating in pace: the recent rate of sea level rise has nearly tripled compared with the rate between 1901-1971 (3.7 mm per year from 2006-2018 versus 1.3 mm per year from 1901-1971).161 The Fourth National Climate Assessment estimated that global sea level is very likely to rise by 1.0 to 4.3 feet by the end of the century relative to the year 2000, with sea level rise of 8.2 feet possible.162 Sea level rise will be much more extreme without strong action to reduce greenhouse gas pollution. By the end of the century, global mean sea level is projected to increase by 0.8 to 2.6 feet under a lower emissions RCP 2.6 scenario, compared with 1.6 to 6 feet under a high emissions RCP 8.5 scenario.163 [EPA-HQ-OAR-2021-0208-0726-A1, p. 24]

According to the IPCC’s Climate Change 2021 report, even under a very low GHG emissions scenario, it is likely that global sea level rise by 2100 will be about one to two feet (0.28-0.55 m) compared to 1995-2014. Under an intermediate scenario, sea level rise is likely to be as high as 2.5 feet (0.44-0.76 m), and under a very high GHG emissions scenario it is likely to be close to three feet (0.37-0.86 m). Sea level rise above the likely range, approaching seven feet (2 m) by 2100 under a very high GHG emissions scenario cannot be ruled out due to uncertainty around the melting of ice sheets. Regardless, the impacts of sea level rise will be long-lived: under all emissions scenarios, sea levels will continue to rise for many centuries.164 [EPA-HQ-OAR-2021-0208-0726-A1, p. 24]

Scientific research and federal documents recognize that many coastal listed species are threatened by sea level rise driven by climate change. According to a 2013 analysis, on the current emissions trajectory, rising seas driven by warming temperatures threaten at least 17 percent of our nation’s federally protected species, totaling 233 species in 23 coastal states.165 For example, more than half of Florida’s endangered species are threatened by rising sea levels and associated groundwater contamination.166 Recent FWS listing rules for Florida coastal species have determined that sea level rise resulting from climate change, and the inadequacy of existing regulatory mechanisms to address climate change, are primary threats endangering these species, including the Florida bonneted bat (Eumops floridanus), 167 Cape

Sable thoroughwort (Chromolaena frusrata),168 Florida semaphore cactus (Consolea corallicola),169 aboriginal prickly-apple (Harrisa aboriginum),170 and Florida bristle fern (Trichomanes punctatum ssp. floridanum).171 [EPA-HQ-OAR-2021-0208-0726-A1, pp. 24-25]

Research and federal documents have also highlighted sea-level rise as a primary threat to sea turtles by eroding nesting beaches and reducing nesting success.172 For example, most (87 percent) loggerhead sea turtle (Caretta caretta) nesting occurs on the east coast of Florida,173 where 43 percent of the turtle's nesting beaches are projected to disappear with just 1.5 feet of sea level rise.174 The listing rules for the green sea turtle175 and loggerhead sea turtle176 conclude that sea level rise is likely to have negative effects on these species through beach loss and reduced nesting success. [EPA-HQ-OAR-2021-0208-0726-A1, pp. 25]

Finalizing the Rule is likely to result in a significant increase of CO2 emissions and worsen sea level rise. The proposed Rule thus triggers the EPA's legal duty under the ESA to consult on how continued habitat loss due to sea level rise will adversely affect the loggerhead sea turtle and other listed species threatened by sea level rise. [EPA-HQ-OAR-2021-0208-0726-A1, p. 26]

Sample of Recent Species Listed Due to Climate Change. In addition, the Environmental Groups' analysis of federal listing rules found that FWS and/or NMFS determined that human-caused climate change was a current or potential threat for more than 70 percent of all species listed during 2012 to 2015. The table below includes examples of species listed during 2006 to 2015 for which climate change was a listing factor. Climate change is also a growing threat to many threatened and endangered species that were first listed for other reasons. [EPA-HQ-OAR-2021-0208-0726-A1, pp. 26; Table 1 can be found on pp. 26-31 of Docket number EPA-HQ-OAR-2021-0208-0726-A1]

In sum, the single most important action to avoid further jeopardizing climate-threatened species is achieving emissions reductions that keep warming below 1.5°C and meaningfully lessens carbon dioxide-induced ocean acidification. 177 Section 7 consultation under the ESA is the critical first step to preventing the worst impacts of climate change and ocean acidification on endangered species. As described above, the Rule, if finalized, would directly contribute to significantly higher emissions and their attendant climate change and ocean acidification effects, and thus triggers the duty to consult on those impacts to climate-threatened species—including polar bears and corals—to ensure that any final agency is not likely to jeopardize these and other species or result in the adverse modification of their critical habitat. Failure to conduct this consultation would render any final Rule unlawful. [EPA-HQ-OAR-2021-0208-0726-A1, pp. 31-32]

ii. Nitrogen pollution from vehicle exhaust has documented adverse impacts on federally protected species, and EPA's adoption of the proposed Rule will allow cars and light trucks to emit nitrogen pollution and impact these federally-listed species.

This section describes the numerous federally-listed species whose existence is jeopardized by increases in nitrogen oxide (NOx) emissions. The proposal would emit approximately 30,000 more tons of NOx than Alternative 2, and increasing stringency while reducing available credits could save even more NOx than Alternative 2 alone. Consequently, the Rule, if finalized, would directly contribute to NOx emissions from vehicle exhaust and increase nitrogen deposition in the areas where such vehicles are operating. Accordingly, increased levels of nitrogen deposition may impact critically imperiled species, including the bay and quino checkerspot butterflies and desert tortoise, whose populations are at heightened risk of extinction directly due to increased nitrogen pollution in their locations and critical habitats. [EPA-HQ-OAR-2021-0208-0726-A1, p.32]

Fossil fuel combustion from vehicles produces nitrogen oxide (NOx) air pollutants including nitrous oxide (N2O), as well as nitric acid (HNO3), nitrate (NO3-), and ammonia (NH3), which have contributed to the significant increase in nitrogen deposition globally and in many parts of the United States,178 resulting in widespread impacts to species and ecosystems.179 [EPA-HQ-OAR-2021-0208-0726-A1, p.32]

A recent study of the effects of nitrogen pollution on federally-listed species, based on analysis of USFWS and NMFS documents, found that this threat is ‘substantial’ and ‘geographically widespread.’180 The study found evidence for harm from nitrogen pollution for at least 78 federally protected taxa.181 This includes at least 50 invertebrates such as mollusks and anthropods, at least 18 vertebrate species of fish, amphibians, and reptiles, and at least 8 plants.182 Harms from nitrogen pollution fell into four main categories: (1) direct toxicity or lethal effects of nitrogen, (2) eutrophication lowering dissolved oxygen levels in water or causing algal blooms that alter habitat by covering up substrate, (3) nitrogen pollution increasing nonnative plant species that directly harm a plant species through competition, and (4) nitrogen pollution increasing nonnative plant species that indirectly harm animal species by excluding their food sources.183 [EPA-HQ-OAR-2021-0208-0726-A1, pp. 32-33]

Bay checkerspot butterfly (Euphydryas editha bayensis) Nitrogen deposition from vehicle exhaust is a well-documented threat to the bay checkerspot butterfly (Euphydryas editha bayensis), which is restricted to patches of low-nutrient serpentinite soil in the San Francisco Bay area.184 Nitrogen deposition has allowed exotic grasses to replace native forbs, including the bay checkerspot’s larval host plant, leading to butterfly population declines and local extirpations.185 USFWS in its most recent 5-year review for the bay checkerspot butterfly found that nitrogen deposition from smog created soil conditions that allowed for invasion of non-native plants, where the level of impact increased with proximity to a major interstate highway:

Weiss (1999, p. 1476) determined that while the initial cause of the butterfly declines were the result of rapid invasion by nonnative annual grasses that crowded out the butterfly’s larval host plants, the evidence indicated that dry nitrogen deposition from smog was responsible for creating soil conditions that allowed the observed grass invasion. Weiss (1999, p. 1482) estimated nitrogen deposition rates south of San Jose to be 10-15 kg of nitrogen per hectare per year (kg-N/ha/yr). Weiss (2002, p. 31) further demonstrated these effects by analyzing the pattern of non-native grass invasion resulting from nitrogen deposition at Edgewood Park, and observed that the cover of non-native Italian ryegrass (Lolium multiflorum) decreased with distance from Interstate Highway 280 (I-280), while Plantago erecta cover increased with distance. Plantago erecta cover was also higher upwind of I-280 than downwind. 186 [EPA-HQ-OAR-2021-0208-0726-A1, pp. 33-34]

In its 5-year review, USFWS concluded that ‘the butterfly is still at great risk from invasion of non-native vegetation, exacerbated by nitrogen deposition from air pollution.' 187 [EPA-HQ-OAR-2021-0208-0726-A1, p. 34]

Presidio clarkia (Clarkia franciscana) Endangered plant species such as the Presidio clarkia (Clarkia franciscana)--a beautiful flowering plant native to California serpentine grasslands--are also being harmed by nitrogen deposition from vehicle pollution which gives a competitive advantage to nonnative plants. 188 USFWS in its most recent 5-year review for the Presidio clarkia identified nitrogen deposition from air pollution as a principal threat, explaining that ‘elevated inputs of atmospheric nitrogen deposition from air pollution have further accelerated the encroachment of native shrubs and nonnative shrubs and nonnative grasses and forbs...into Clarkia franciscana habitat.' 189 The USFWS 5-year review specifically highlights vehicle pollution as a key contributor to the nitrogen deposition harming the Presidio clarkia:

Elevated atmosphere nitrogen deposition from air pollution is particularly harmful to the nutrient-poor serpentine grasslands where the Clarkia franciscana occurs because nitrogen is the primary limiting nutrient for plant growth on serpentine soils (Weiss 1999). The use of catalytic converters on vehicles has increased the availability of nitrogen in a form that is directly absorbed by plants (EBRPD 2009a). The excess nitrogen deposited leads to increases in nonnative annual grasses which outcompete the native flora (Fenn et al. 2003, Weiss 1999). [EPA-HQ-OAR-2021-0208-0726-A1, p. 34]

The displacement of Clarkia franciscana and native bunchgrasses from serpentine soils in the Oakland hills is attributed to the dry deposition of 10-15 kilograms nitrogen per hectare per year from smog allowing for the invasion of nonnative annual grasses, especially Italian ryegrass at Redwood Regional Park (EBRPD 2009a, Tonnesen et al. 2007). … Thus, Clarkia franciscana in the serpentine grasslands in the Oakland Hills continues to be threatened by elevated atmospheric nitrogen deposition from air pollution enabling the invasion of nonnative annual grasses into otherwise nutrient-poor soils.190 [EPA-HQ-OAR-2021-0208-0726-A1, pp. 34-35]

The USFWS 5-year review identifies other potential harms to the Presidio clarkia from nitrogen deposition such as decreased diversity of mycorrhizal communities and predisposing plants to environmental stresses such as elevated concentrations of ozone, drought, frost, or insect attacks.191 [EPA-HQ-OAR-2021-0208-0726-A1, p. 35]

Other Species Threatened by Nitrogen Pollution. Similarly, USFWS has determined that nitrogen pollution threatens the federally protected Quino checkerspot butterfly (Euphydryas editha quino) and the desert tortoise (Gopherus agassizii) by facilitating the spread of non-native species that displace the butterfly’s host plants192 and the tortoise’s forage plants, reducing the nutritional quality of available food for the desert tortoise.193 [EPA-HQ-OAR-2021-0208-0726-A1, p. 35]

A review on the effects of nitrogen deposition in the western United States highlighted the need for policy changes at the national level for reducing air pollution to protect endangered species from nitrogen deposition: 'local land management strategies to protect these endangered species may not succeed unless they are accompanied by policy changes at the regional or national level that reduce air pollution.'194 [EPA-HQ-OAR-2021-0208-0726-A1, p. 35]

i. Sulfur dioxide pollution has clear and documented adverse impacts on federally protected species, and EPA's adoption of the proposed Rule will allow cars and light trucks to emit sulfur dioxide pollution and impact these federally-listed species.

This section describes the myriad federally-listed species whose existence is jeopardized by increases in sulfur dioxide ('SO2') emissions. As with NOx, the proposal would emit over 100,000 more tons of SO2 than Alternative 2, and increasing stringency while reducing available credits could save even more SO2 than Alternative 2 alone. Consequentially, the Rule, if finalized as proposed, would directly contribute to SO2 emissions and jeopardize numerous critically imperiled bird species and plant species, whose populations are at heightened risk of extinction directly due to increased sulfur dioxide pollution in their locations and critical habitats. [EPA-HQ-OAR-2021-0208-0726-A1, pp. 34-36]

Strong evidence shows that SO2, as well as precursors such as sulfur oxides ('SOx'), harm endangered plant and animal species as well as aquatic and terrestrial ecosystems. As reviewed by EPA, the negative ecological effects of SO2 pollution include acidification of aquatic and terrestrial ecosystems, nutrient enrichment of aquatic and terrestrial ecosystems, and facilitation of mercury methylation in aquatic ecosystems.195 Acute and chronic exposure to SO2 also leads to phytotoxic effects on plants, including foliar injury, decreased photosynthesis, and decreased growth.196 [EPA-HQ-OAR-2021-0208-0726-A1, p. 36]

In its 2017 final Integrated Review Plan for Secondary Standards for Oxides of Sulfur, EPA acknowledged that there is 'sufficient evidence to infer causal relationships' between exposure to SO2 and SOx and (a) aquatic acidification and the loss of acid-sensitive species, where more species are lost with greater acidification;197 (b) changes in terrestrial biota due to acidifying sulfur deposition, such as decreased growth and increased susceptibility to disease and injury in sensitive tree species;198 (c) increased mercury methylation in aquatic environments;199 and (d) injury to vegetation, including decreased photosynthesis, decreased growth, and visible foliar injury.200 [EPA-HQ-OAR-2021-0208-0726-A1, p. 36]

In terms of harms to endangered species, EPA acknowledged that acidifying sulfur deposition in aquatic ecosystems can cause the loss of acid-sensitive species, such as salmonids (many of which are endangered), and that disruption of food web dynamics can cause changes to the diet, breeding distribution and reproduction of bird species.201 EPA further stated that current rates of acidifying SOx deposition are still well above pre-acidification conditions in areas such as the Adirondacks and Shenandoah, and that sulfur and nitrogen deposition loadings of many Adirondack lakes and streams are at levels that can harm aquatic biota (e.g., levels associated with loss of fitness in species such as the Blacknose Dace).202 EPA also acknowledged that there is a 'causal relationship between Sulfur deposition at current levels and increased Hg methylation in aquatic environments,'203 which is problematic because mercury is highly neurotoxic and, once methylated, can be taken up by zooplankton and macroinvertebrates, and bioaccumulate up the food web. 204 [EPA-HQ-OAR-2021-0208-0726-A1, pp. 36-37]

Indeed, EPA's Integrated Review Plan acknowledges that SO2 has the potential to negatively affect endangered species. The Risk and Exposure Assessment (REA) identified a range of ecosystem services that are affected by terrestrial acidification including 'decreased habitat for threatened and endangered species.,' 205 [EPA-HQ-OAR-2021-0208-0726-A1, p. 37]

At-risk Plant Species. Federal wildlife agencies, and in particular FWS, have identified numerous federally endangered and threatened species that are negatively affected by atmospheric pollution from SO2 and SOx. Federally protected plant species identified by FWS as threatened by or susceptible to acidification and atmospheric pollution include the Harperella (Ptilimnium nodosum), 206 Zuni Fleabane (Erigeron rhizomaxs), 207 Mancos Milkvetch (Astragalus humillimus), 208 Blue Ridge Goldenrod (Solidago spithamaea), 209 Heller's Blazing Star (Liatris helleri), 210 Rock Gnome Lichen (Gymnodema lineare), 211 and Roan Mountain Bluet (Hedyotis purpurea var. montana). 212 For example, Heller's Blazing Star is a rare plant endemic to a limited area in the Blue Ridge Mountains of North Carolina, with only a few populations currently known to exist. The recovery plan for this species names acid precipitation as a 'pervasive' threat. 213 The FWS recovery plan for the Rock Gnome Lichen, which is endemic to the Southern Appalachians, flags that 'there is a high likelihood that current and previous air pollution levels, especially from sulfates, may be contributing to the decline of this species.' 214 [EPA-HQ-OAR-2021-0208-0726-A1, p. 37]

At-risk Animal Species. FWS has also identified numerous animal species as being threatened by or susceptible to acidification and atmospheric pollution, including the Shenandoah Salamander (Plethodon shenandoah),215 Cheat Mountain Salamander (Plethodon neftiigi),216 Chiricahua Leopard Frog (Rana chiricahuensis),217 Whooping Crane (Grus americana),218 Roanoke Logperch (Percina rex),219 Dwarf Wedge Mussel (Alasmidonta heterodon),220 Mobile River Basin mussels,221 and seven species of Southeast mussels.222 For example, the recovery plan for the Chiricahua Leopard Frog states that acid rain has been found to adversely affect Chiricahua Leopard Frog populations,223 likely through reduced hatching of eggs and reduced growth rates.224 [EPA-HQ-OAR-2021-0208-0726-A1, p. 38]

Consultation under the ESA about impacts to species is essential. EPA's Proposal, if finalized, would directly contribute to higher emissions of SO2, and thus triggers the duty to consult on those impacts to species at risk from atmospheric pollution from SO2 and SOx. Failure to conduct this consultation would render any final repeal unlawful. [EPA-HQ-OAR-2021-0208-0726-A1. p.39]

The scientific evidence demonstrates that the Rule, if adopted as proposed, may affect hundreds of threatened and endangered species, and their critical habitats, due to the Rule's resulting increase in emissions of GHG, NOx, SO2 and other criteria air pollutants. [EPA-HQ-OAR-2021-0208-0726-A1. pp 39]

EPA Response

EPA notes that its rulemaking will result in emissions reductions that are expected to have beneficial effects on the environment with respect to global climate change, criteria pollutants, listed species, critical habitats, and associated impacts. EPA has reviewed the information submitted in comments noting the additional cumulative greenhouse gas and criteria pollutant emissions associated with the proposed standards as compared to Alternative 2, and attempting to quantify alleged impacts on certain threatened and endangered species from adopting the proposed standards in place of Alternative 2. EPA agrees that standards even more stringent than the proposal would provide additional reductions in emissions of greenhouse gases and criteria pollutants. As discussed in Section II of the Preamble, EPA has decided to finalize standards that are 10 g/mi more stringent than Alternative 2 in MY 2026 and beyond, resulting in a cumulative emissions reduction of 3.1 billion metric tons of CO_2 and, similarly, additional methane and criteria pollutant reductions. By comparison, in our NPRM, the proposed standards resulted in 2.2 billion metric tons of CO_2 reductions while Alternative 2 resulted in 2.5 billion metric tons of CO_2 reductions. This stringent path forward results in greater emissions reductions than either the proposal or Alternative 2 and beneficial climate effects on listed species and habitats.

15. Analysis of Impacts on Non-GHG Emissions Including Estimated Non-GHG Health and Environmental Impacts

Commenters Included in this Section

Alliance for Automotive Innovation
American Enterprise Institute (AEI)
American Lung Association
American Lung Association in the Mid-Atlantic
Anderson, Laurie
California Air Resources Board (CARB)
California Attorney General Office, et al.
Center for Biological Diversity
Center for Biological Diversity, et al.
Center for Climate and Energy Solutions (C2ES)
City of Albuquerque, NM
Collins, Molly
Competitive Enterprise Institute (CEI)
Connecticut Department of Energy and Environmental Protection
Cooper, Almeta
Elders Climate Action (ECA)
Energy Innovation Policy and Technology LLC
Environmental Defense Fund (EDF)
Environmental Protection Network (EPN)
Filippelli, Garbirel
Gillet, Victoria
Kansas Senator Marci Francisco
Klein, Stephanie
Mass Comment Campaign sponsored by Environment America
Mass Comment Campaign sponsored by Evangelical Environmental Network
Mass Comment Campaign sponsoring organization unknown-9 (3,219)
McQuire, Terry
Metropolitan Washington Air Quality Committee (MWAQC)
Mitchell, Milton
Mothers and Others for Clean Air
National Association of Clean Air Agencies (NACAA)
National Coalition for Advanced Transportation (NCAT)
National Parks Conservation Association (NPCA)
Oliver, Shaina
Program for Public Consultation
Remilien, Sandra
Sabetta, Tracy
San Joaquin Valley Air Pollution Control District
Southern Environmental Law Center
Spirit of the Sun

Tafoya, Ian
Tomcik, Patrice
Uberuaga, Michelle
Venner, Marie
Wisconsin Department of Natural Resources

15.1. Comments on Health and Environmental Impacts from Non-GHG Emissions

<u>Commenters Included in this Section</u>

American Lung Association
American Lung Association in the Mid-Atlantic
Anderson, LaurieBrandt, Dorothy
California Air Resources Board (CARB)
California Attorney General Office, et al.
Center for Climate and Energy Solutions (C2ES)
City of Albuquerque, NM
Collins, Molly
Connecticut Department of Energy and Environmental Protection
Cooper, Almeta
Elders Climate Action (ECA)
Environmental Defense Fund (EDF)
Environmental Protection Network (EPN)
Filippelli, Garbirel
Gillet, Victoria
Kansas Senator Marci Francisco
Klein, Stephanie
Mass Comment Campaign sponsored by Environment America
Mass Comment Campaign sponsored by Evangelical Environmental Network
Mass Comment Campaign sponsoring organization unknown-9
Mass Comment Campaign sponsoring organization unknown-11
McQuire, Terry
Metropolitan Washington Air Quality Committee (MWAQC)
Mitchell, Milton
Mothers and Others for Clean Air
National Coalition for Advanced Transportation (NCAT)
National Parks Conservation Association (NPCA)
Oliver, Shaina
Program for Public Consultation
Remilien, Sandra
Sabetta, Tracy
San Joaquin Valley Air Pollution Control District
Southern Environmental Law Center
Spirit of the Sun

Tafoya, Ian
Tomcik, Patrice
Uberuaga, Michelle
Venner, Marie
Wisconsin Department of Natural Resources

Commenter: American Lung Association

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, pp.17-18]

Air pollution causes tens of thousands of people to die each year in the United States and motor vehicles are a leading source of emissions that create ozone or smog and particle pollution. Transportation is also the nation's leading contributor to climate change.

The American Lung Association's most recent State of the Air Report found that more than a 135 million people in the United States, more than four in 10, live in counties with unhealthy levels of air pollution. Let me repeat this. Climate change is making air quality worse.

Commenter: American Lung Association in the Mid-Atlantic

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, pp. 110-112.]

According to the American Lung Association's most recent State of the Air Report in just this service area, not a mere handful but 20 counties, home to 13 million people, accounting for one-third of that region's population, earned failing grades for ozone smog, and a clear majority of these counties average at least five days a year when ozone levels were high enough to pose clear risks for people in sensitive groups, children and seniors as well as people with chronic lung and heart disease, risks severe enough to send people to emergency rooms and hospitals.

Despite many years of improvement in emissions and efficiency standards for vehicles and fuels, we in the Mid-Atlantic still face a serious problem. Transportation-related air pollution, including significant contributions from light-duty vehicles, continues to be a major source of both greenhouse gases and ambient air pollution. According to the most recent emission inventories, highway vehicles alone account for about 17 percent of the Mid-Atlantic's contributions to volatile organic compounds and for fully 39 percent, the largest share for any emissions tier, for nitrogen oxides, the primary driving precursor of ozone formation in the Mid-Atlantic.

Commenter: Anderson, Laurie

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, p. 104.]

Additionally, by reducing tailpipe pollution which includes NOX, a precursor to ozone, we thereby help reduce ground level ozone pollution and our hope of getting out of ozone non-attainment so we can breathe easier along Colorado's Front Range.

Commenter: Brandt, Dorothy

[The following comments were submitted as testimony at the virtual public hearing on August 26, 2021. See Hearing Testimony – 26Aug2021, p. 205-206.]

I call on the EPA to strengthen clean car standards. One of my daughters has asthma and I insist that our government protect her and the health of all Americans. No one should struggle to breathe due to preventable car pollution.

Commenter: California Air Resources Board (CARB)

U.S. EPA's proposed GHG emission standards will also decrease emissions of criteria pollutants, including particulate matter (PM) and the pollutants that form ground-level ozone: volatile organic compounds and oxides of nitrogen (NOx). Reducing particulate matter pollution and the constituents of smog are especially important in California. The interaction of population, geography, and climate present the most acute challenges in the nation to meeting the health-based standards for this pollution. CARB agrees with U.S. EPA that more stringent greenhouse gas emission standards will reduce criteria pollutants. [EPA-HQ-OAR-2021-0208-0643-A6, p.8]

Reducing this pollution will deliver a range of important public health benefits, especially for communities that have been disproportionately impacted by pollution. [EPA-HQ-OAR-2021-0208-0643-A6, pp. 8-9]

In addition, exposure to elevated pollution levels has been found to increase vulnerability to other types of illnesses. Studies in the U.S. and Europe have demonstrated associations between chronic elevated PM2.5 exposure and increased COVID-19-related premature death and illness. Wu et al., found long-term exposure to PM2.5 was associated with a significant increase in COVID-19 mortality in the U.S. Additionally, a study by Pozzer and colleagues found that PM2.5 air pollution contributed to COVID-19 mortality: approximately 15% worldwide, and 17% in North America. These results suggested that air pollution is an important cofactor increasing COVID-19 mortality risk. [EPA-HQ-OAR-2021-0208-0643-A6, pp. 13-14]

Commenter: California Attorney General Office, et al.

Reducing other forms of pollution—including criteria air pollution (such as fine particulate matter (PM2.5) and ozone) and emissions of toxic air pollutants—is also critical. Our States and Cities are committed to those reductions, but federal involvement is necessary to help States attain the National Ambient Air Quality Standards (NAAQS) and to reduce emissions that are outside our control. As EPA projects, more stringent standards will decrease criteria pollutant and air toxic emissions, as well as GHG emissions, and these reductions are critical to meeting our States' and Cities' public health and environmental justice goals and protecting our residents. [EPA-HQ-OAR-2021-0208-0245-A1, pp.10-11]

EPA projects overall reductions in PM2.5 and reductions in upstream nitrogen oxides (NOx) (an ozone precursor) beginning in 2023, and overall (net) reductions in NOx from 2028 on. 86 Fed. Reg. at 43,779–43,780. All of these reductions are crucial to avoid adverse health consequences, including premature mortalities. Short- and long-term PM2.5 exposures result in mortality risk, cardiovascular harms and adverse respiratory effects. In California alone, over 5,000 premature deaths and hundreds of illnesses and emergency room visits for respiratory and cardiovascular disease are linked to PM2.5 pollution. Even in areas presently attaining the NAAQS, two studies showed that long-term PM2.5 exposures are associated annually with up to 45,000 deaths, and 14,600 ischemic heart disease deaths, respectively, and thus, even a modest reduction of PM2.5 pollution will have beneficial impacts. For example, decreases in PM2.5 are significantly associated with lower asthma incidence. Recent studies also show that air pollution, including long-term PM2.5 exposure, may increase the vulnerability of individuals to contracting COVID-19 and may increase the severity and mortality risk from the virus. Ozone pollution leads to similar negative health effects, especially for respiratory health.

The mobile source sector is a major cause of these health impacts because it is one of the largest contributors of PM2.5 and ozone-forming emissions in the United States. In some urban areas, mobile sources account for 13 to 30% of the total primary PM2.5 emissions. In California, more than half of the PM2.5 pollution is produced by mobile sources. Mobile sources are also the number one contributor to high ozone levels in the Ozone Transport Region. The mobile source pollution concentrated near major roadways exposes nearby communities to additional health risks, including by contributing to and exacerbating asthma, impairing lung function, and increasing cardiovascular mortality. [EPA-HQ-OAR-2021-0208-0245-A1, pp.11-12]

EPA also projects that its proposed standards would result in the reduction of emissions of air toxics. 86 Fed. Reg. at 43,729, 43,781, 43,785. These reductions will benefit public health and welfare, in part because toxic air pollutants cause cancer and other serious health effects. Id. at 43,781; 72 Fed. Reg. 8,428, 8,430 (Feb. 26, 2007). Of all the outdoor air toxics, benzene contributes the most to nationwide cancer risk, and most of the nation's benzene emissions come from mobile sources. Id. at 8,432. In New Jersey, mobile sources are the largest contributors of air toxic emissions. In Allegheny County in Pennsylvania, mobile sources account for over 9% of the estimated cancer risk from hazardous air pollutants, mostly due to gasoline-powered cars. [EPA-HQ-OAR-2021-0208-0245-A1, p.13]

Reductions in Other Pollution Are Also Urgently Needed to Protect Public Health. EPA's proposal will also advance another important and urgent objective of our States and Cities and of Congress: reductions in criteria and toxic air pollution. See Background, Section B. It will do so by reducing GHG emissions, and laying the groundwork for deeper reductions to come, which is important for the reasons outlined above and because the effects of climate change will result in worse air quality even if criteria emissions remain the same. More stringent standards will also directly reduce criteria and toxic pollution, and even small reductions will have a significant impact, especially in nonattainment areas and communities living near refineries or near roadways. [EPA-HQ-OAR-2021-0208-0245-A1, pp.21-22]

More stringent standards will help protect public health and support NAAQS attainment. Various locations throughout our States and Cities have been unable to attain, or face difficulty maintaining, the NAAQS—designed to protect public health—for ozone and PM2.5. 42 U.S.C. § 7409(b). For example, multiple counties in California are registering severe, serious, or extreme nonattainment with the 8-Hour Ozone NAAQS. Reductions in ozone due to the proposed standards would provide critical clean air benefits to these locations. Nonattainment areas outside of California will experience similar benefits. For example, more stringent standards may result in a reduction of ozone precursors in Colorado's Denver Metro/North Front Range, which includes a major transportation corridor and a refinery. Based on 2018–2020 ozone monitoring data, this area is expected to shift from serious to severe nonattainment for the 2008 8-Hour Ozone NAAQS, and, thus, any and all reductions in ozone precursors are needed. Likewise, counties in Connecticut and New York are in serious nonattainment with the 2008 8- Hour Ozone NAAQS and are in moderate nonattainment with the 2015 8-Hour Ozone NAAQS, and their challenges in attaining the NAAQS are due in part to ozone-forming pollution from out-of-state upwind sources which EPA's standards could help reduce. 84 Fed. Reg. 44,223, 44,248, 44,251–44,252 (Aug. 23, 2019) ('EPA acknowledges the role interstate transport of precursors to ozone pollution plays in the efforts of downwind areas to attain and maintain the NAAQS.') New Jersey has taken action to reduce NOx and VOC emissions from mobile sources and from stationary sources, including power plants and refineries, in an attempt to attain the NAAQS. But New Jersey and other States cannot attain or maintain the NAAQS alone, and EPA's standards may provide important emissions reductions in upwind states and across the country.

In addition, PM2.5 exposure at any level is associated with adverse health impacts, so reductions in PM2.5 emissions will bring public health benefits to our States and Cities regardless of whether our regions have attained the NAAQS. Indeed, because PM2.5 exposure below the current NAAQS is clearly harmful, a multi-state coalition, which includes many of the signatories to this comment, petitioned EPA to reconsider its 2020 decision not to strengthen the current NAAQS for Particulate Matter. On June 10, 2021, EPA acknowledged that the current standards may not be adequate to protect public health and welfare, and announced its decision to reconsider its prior decision. [EPA-HQ-OAR-2021-0208-0245-A1, pp.22-23]

Commenter: Center for Climate and Energy Solutions (C2ES)

From a public health perspective, reduced vehicle emissions will contribute significantly to reducing urban smog and supporting healthier communities. In addition to the contribution of greenhouse gas emissions to global climate change, particulate pollution, ground-level ozone, and nitrous oxides are linked to asthma, heart disease, and premature death. Avoiding these health impacts will save the American economy billions in healthcare and lost productivity costs and will improve quality of life for many Americans. [EPA-HQ-OAR-2021-0208-0287-A1, p.3]

Commenter: City of Albuquerque, NM

As the largest metropolitan area and the major transportation hub in the State of New Mexico, the City and Bernalillo County are faced with the challenge of maintaining attainment status for the National Ambient Air Quality Standards ('NAAQS') for ground-level ozone. In Albuquerque/Bernalillo County ozone pollution is high and rising. Ground-level ozone can cause coughing, sore throats, inflame and damage the airways, and aggravate lung diseases such as asthma, emphysema, and chronic bronchitis. Local asthma rates are of particular concern to AQP as Albuquerque is listed as the 38th 'Most Challenging Places to Live with Asthma' in the United States according to the Asthma and Allergy Foundation of America.[EPA-HQ-OAR-2021-0208-0535-A1, p.2]

Although the Proposed Emission Standards are designed to reduce greenhouse gas emissions, if implemented, they will have co-benefits of also reducing criteria and ozone pre-cursor pollutants from mobile sources. [EPA-HQ-OAR-2021-0208-0535-A1, pp.2-3]

Commenter: Collins, Molly

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, pp. 231-232.]

Dylan has been pretty impacted by air quality and like a lot of people in our community here in Milwaukee, which is on the American Lung Association's list of the 25 Cities with the Worst Ozone Pollution, getting those air quality alerts on your phone can impact a lot about how you live your life that day and what you're able to do and as I'm sure you know, the increasing temperatures due to climate change make ozone more likely to form and that impacts a lot of people. People should have the freedom to move through their day not worrying about whether or not they're going to be able to breathe.

Commenter: Connecticut Department of Energy and Environmental Protection

The transportation sector was also responsible for 66 percent of the emissions of nitrogen oxides (NOx) in 2017, a key component of ground level ozone (smog). Connecticut fails to meet both the 2008 and 2015 National Ambient Air Quality Standards (NAAQS) for ozone. Poor air quality exposure exacerbates acute and chronic respiratory problems such as asthma, Chronic Obstructive Pulmonary Disease, and other lung diseases. Furthermore, the immediate health impacts of mobile source related air pollution (both direct and indirect) are felt in areas within and along transportation corridors that have borne a disproportionate impact from this pollution for decades. A recent national report, Asthma Capitals 2019, ranked New Haven (#11) and Hartford (#13) among the 100 largest U.S. cities where it is most challenging to live with asthma. [EPA-HQ-OAR-2021-0208-0264-A1, p.2]

Commenter: Cooper, Almeta

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, pp. 75-76.]

I'm speaking to you today from Downtown Atlanta where I have lived for seven years. Metro Atlanta is notoriously known for some of the worst traffic congestion in the nation. According to the U.S. Bureau of Transportation, from the outer edges of Fulton County commuters can average traveling as much as 80 miles each work day. Additionally, about 80 percent of the Fulton County's thousands of commuters travel by car daily and many are single occupants driving their vehicles.

Driving is the most harmful mode of transportation to the health of communities and is directly related to air quality. Therefore, it's no surprise that Fulton County was again flagged with a failing grade by the American Lung Association in its 2021 State of the Air Report. So you can easily understand why clean car standards are important to me. Cleaning up vehicle pollution is one of the most important actions we can take as citizens to improve air quality and to fight the adverse impact of climate change.

Commenter: Elders Climate Action (ECA)

In addition, the failure to attain the ozone NAAQS in 230 urban counties where 135 million Americans reside is a perpetual air pollution pandemic that has burdened millions of children with a lifetime of asthma and shortened millions of American lives over the last 50 years. This public health crises will continue to make our cities unhealthy places to raise our children and for elders to reside for decades to come.

In most nonattainment areas, the nitrogen oxides and reactive organic compounds emitted from internal combustion engines (ICEs) are the primary cause of ozone formation and a major contributor to PM2.5 nonattainment. Replacing ICEs as quickly as possible is the solution to urban smog and soot pollution that impairs the health and quality for life for millions of urban Americans. [EPA-HQ-OAR-2021-0208-0521-A1, p. 2-3]

Emissions from ICEs are a Primary Cause of Urban Smog and the Public Health Burden Imposed on Urban Dwellers by Air Pollution. The combustion of carbon fuels in ICEs produces, in addition to CO2, a complex array of hazardous pollutants that U.S. EPA has found cause deadly and debilitating effects on human health, including premature death, cardiovascular disease, chronic obstructive pulmonary disease, lung cancer, impaired fetal development, low birthweight babies, autism, childhood asthma, impaired lung development, and impaired cognitive function among children and adults.

The actions needed to stabilize the climate and prevent the accelerated worsening of the adverse effects on human health from a hotter climate will also provide other substantial public health benefits. The most important health benefits will flow from eliminating the exposures of over one hundred and thirty million Americans to life-shortening air pollutants by not burning carbon fuels. Other health benefits will be achieved by not poisoning the air with toxic pollutants emitted from oil and gas well fields, oil refineries and fuel transport terminals, by not poisoning water supplies now being contaminated by fracking fluids and ruptured oil pipelines, and by not risking the contamination of the oceans and the marine web of life with crude oil released from off-shore drilling and tanker wrecks.

LDVs vehicles are a primary source of nitrogen oxides (NOx) and organic compounds that contribute to the formation of ozone in more than 230 urban counties designated by U.S. EPA as nonattainment for the national ambient air quality standards (NAAQS) for ozone (also known as smog), or particulate matter smaller than 2.5 μm in diameter ("fine particles" regulated as PM2.5), or both.31

Health effects research estimates that air pollution from burning carbon was expected to take an estimated 242,000 lives in 2020 assuming normal economic activity not slowed by the COVID pandemic.32 Earlier work by EPA staff scientists using mortality risk factors derived from health effects research available in 2016 estimated 110,000 deaths annually.33 [EPA-HQ-OAR-2021-0208-0521-A1, p. 13]

Ozone-Caused Asthma Attacks Linked to Daily Exposures. For both ozone and PM2.5 EPA has established national ambient air quality standards (NAAQS) for short-term exposures (8 hours for ozone, and 24 hours for PM2.5) because the health effects research demonstrates that adverse health effects are associated with short-term exposure to these pollutants.

EPA's Clean Air Science Advisory Committee found that every day when ozone concentrations reach the level of the national ambient air quality standard (70 ppb), 8 to 20% of all children will experience a reduction in lung function deemed adverse to the health of an asthmatic child. 35 When ozone concentrations reach 75 ppb, only 5 ppb above the standard, from 11% to 22% of all school aged children will experience at least one such an event, and 1 to 6% of children will experience such adverse health events on 6 or more days.36 Both the percentage of children experiencing harmful effects and the number of days when exposures produce harmful effects continue to increase as ozone concentrations are elevated further above the level of the NAAQS. In most nonattainment cities, peak ozone levels routinely exceed 80 ppb. In Denver peak concentrations are at 90 ppb, and in the South Coast and San Joaquin air districts in California, peak 8 hour concentrations reach 110 ppb.

In its review of the health effects research, EPA found compelling evidence that populations exposed to elevated ozone will experience other adverse health effects in addition to the incidence of asthma attacks discussed in the CASAC letter, including both respiratory and cardiovascular disease outcomes. When the high frequency of asthma attacks is added to the expected frequency of other adverse health outcomes, the best estimates are that ozone pollution days exceeding the NAAQS will cause from 1% to 3% of the entire exposed population to experience an adverse health outcome that interferes with personal health to the degree that normal daily activity is disrupted and some medical intervention is required. As a pollutant formed in the atmosphere miles away from the primary sources of emissions, elevated ozone levels exceeding the NAAQS affect most of the residents of a metropolitan population.

For children, the proportion of the population adversely affected by ozone exposure is likely greater than for the entire population since children have been found to be more sensitive to pollution because of higher ventilation rates, greater air volume to body mass ratios, and higher activity levels when outdoors.

Both asthma attacks and these other adverse health outcomes often require resort to medications, and many require urgent or emergency medical care. Adults who require care suffer pain and impaired capacity to perform daily tasks, often miss work, lose income and incur medical costs. Children miss school. If they miss many days, their education is disrupted and students fall behind which contributes to high school dropout rates. Childhood asthma, autism and impaired cognitive development linked to pollutant exposures all contribute to failed educational achievement, which in turn is strongly correlated with lower lifetime income, poor health histories and shorter lifespans.

Daily NAAQS exceedances in these nonattainment counties create an air quality regime that is harmful to children born into it. Children raised in polluted air sheds develop lungs, bodies and nervous systems in an environment where the air is not safe to breathe. In some cities air is not safe to breathe for weeks out of the summer. In these nonattainment areas children who have no choice in where to live are exposed for the first two decades of their lives to an environment where venturing outdoors during the summer is often a high risk activity. The odds are high that children raised in this environment will develop childhood asthma, suffer impaired lung development, spend many days each year in urgent or emergency care, and experience lost school time that interferes with their education in ways that can result in poor achievement, delayed advancement, and ultimately in limited employment opportunities and diminished lifetime income.

Commenter: Environmental Defense Fund (EDF)

We must treat air pollution as the public health and equity crisis that it is. In addition to being the largest source of climate pollution in the U.S., the transportation sector is also one of the biggest sources of other harmful tailpipe pollutants. It generates over half of the nation's total nitrogen oxide (NOx) emissions, which form harmful ground-level ozone pollution and particle pollution. And our passenger cars and light trucks are responsible for more than half of the NOx and almost all of the volatile organic compound (VOC) pollution from all highway vehicles. Hundreds of studies over multiple decades have found that exposure to vehicle pollution causes adverse health impacts in utero, in infants and children, and in adults [EPA-HQ-OAR-2021-0208-0688-A1, p. 4 - 5]

More than 40 percent of all Americans live in counties with unhealthy levels of ozone or particle pollution. And more than 20,000 Americans die prematurely every year as a result of the motor vehicle pollution on our roads and highways. A recent study by researchers at George Washington University and the Environmental Defense Fund (EDF) found that, in the Bay Area alone, more than 2,500 lives are lost and 5,200 children develop asthma every year due to trafficrelated air pollution exposure. And researchers from the University of North Carolina and the Harvard T.H. Chan School of Public Health found that ozone and fine particulate matter from vehicle emissions in 2016 led to an estimated 7,100 deaths in eleven northeast states and the District of Columbia. Regionwide, light-duty trucks and SUVs were responsible for the largest number of premature deaths. [EPA-HQ-OAR-2021-0208-0688-A1, p. 5]

Significantly reducing ozone forming pollution and harmful particulate pollution that disproportionately burdens people of color, avoiding as many as 5,000 premature deaths and 281,000 lost workdays each year by 2040 and preventing as many as 98,000 premature deaths cumulatively by 2050; [EPA-HQ-OAR-2021-0208-0688-A1, p. 37]

Commenter: Environmental Protection Network (EPN)

Section II describes the compelling need for achieving this goal, given the current understanding of the increasing threats presented by emissions of GHGs and criteria pollutants from vehicles powered by fossil fuels. Achieving the GHG and criteria emissions reductions from this kind of transformation would achieve very substantial benefits to the public's health and welfare, and especially for those segments of society at risk for the greatest harms from climate change and criteria air pollution. Section II also discusses the confluence of several critical trends that show this goal is both practical and achievable. Section III [EPA-HQ-OAR-2021-0208-0213-A1, p.1]

135 million Americans Continue to Suffer from High Air Pollution Levels. Non-GHG air pollution continues to be a major problem in much of the country. The most intractable air pollutants are ground-level ozone and fine PM, both of which can cause a wide range of lung and heart conditions, such as asthma, bronchitis, and heart disease, which can contribute to premature death. Researchers estimate that fine particulate alone is responsible for nearly 48,000 premature deaths in the United States every year. Recent research shows that exposure to elevated levels of air pollution is linked to worse health outcomes from COVID-19, including higher death rates.

According to the American Lung Association's annual 'State of the Air' report, about 40% of Americans—more than 135 million people—live in the 217 counties across the nation with unhealthy levels of ozone, short-term particle pollution, or year-round particle pollution. Around 20.7 million people, or 6.3% of Americans, live in the 13 counties that have unhealthy levels for all three pollutants. [EPA-HQ-OAR-2021-0208-0213-A1, p.3]

Through 2050, the projected cumulative criteria emissions reductions are 5.5 million tons of NOx, 5.3 million tons of volatile organic compounds, and 390,000 tons of fine PM. Using EPA's own screening and mapping tool, EDF projects that the PM savings alone would avert between 43,000 and 99,000 cumulative premature deaths through 2050. [EPA-HQ-OAR-2021-0208-0213-A1, p. 8]

Commenter: Filippelli, Garbirel

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, pp. 42-43.]

Now I think COVID, the horrors of COVID also brought an important window for us to view some of these climate and air quality impacts through. The COVID shutdowns markedly cleared the air around the world, but it also cleared the air right here in the U.S. in cities and towns and we just published a study in the Journal Sustainability that shows how much that clearance was. In the two major months of COVID shutdowns, the concentration of NO2 dioxides, which is a severe lung irritant, the concentration in the atmosphere dropped by 20 to 40 percent in major cities across the country.

This drop wasn't because of a reduction in energy production. It was a reduction in transportation. This was the lockdown which kept people at home and those are people largely with the light vehicles and light-duty truck sectors. So what we saw was a very clear shutdown which inevitably resulted in a significant, although only temporary, improvement in public health in cities and towns around this country.

Commenter: Gillet, Victoria

[The following comments were submitted as testimony at the virtual public hearing on August 26, 2021. See Hearing Testimony – 26Aug2021, pp. 288-289.] Particle pollution, we know that there's no specific safe amount, right? Even a small amount of exposure to air pollution can cause health consequences across the life spectrum, from preterm birth to dementia and everything in between. And particularly, it's been shown to decrease COVID outcomes, in particular, for people who become infected. They're more likely to have severe outcomes and even death. So, it's important to me that my patients have access to clean air regardless of where they live, even if they happen to be near locations where there are larger vehicles going by.

Commenter: Kansas Senator Marci Francisco

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, pp. 293-294.]

As has been testified to today, vehicle emissions not only constitute one of the largest sources of greenhouse gas emissions in the United States but cars and trucks also emit deadly air pollutants, such as PM 2.5. By strengthening pollution standards for passenger vehicles and light-duty trucks as proposed, it would mean significant gains in both public health and our environment, all while providing consumers with opportunities for lower vehicle costs and economic savings.

Commenter: Klein, Stephanie

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, p. 280.]

Washington, D.C., has one of the highest ground level ozone pollution rates in the country. The American Lung Association grades our city at an F in its State of the Air Ozone Pollution Ratings. One in 10 kids in D.C. suffers from asthma which is exacerbated by ground level ozone pollution, and in some parts of the city, particularly our low-wealth and BIPOC communities, the childhood asthma rate is as high as one in three. Cars are one of the major sources of ground level ozone pollution and our kids are living with the impacts.

Commenter: Mass Comment Campaign sponsored by Environment America (11,080)

Not only do America's cars account for the majority of greenhouse gas emissions, but the pollution they emit also cuts short an estimated 58,000 American lives each year. Without stronger action, air pollution from our cars and trucks will continue to rise and threaten our health with more asthma attacks, cancer, and other negative health outcomes. [EPA-HQ-OAR-2021-0208-0557-A1, pp.1-2]

Commenter: Mass Comment Campaign sponsored by Evangelical Environmental Network (15,748)

After the release of the proposed rule, The Evangelical Environmental Network circulated the following petition among members of our community in support of the rule change:

As pro-life Christians, we want the air that we breathe to be safe for our children. But cars are spewing dangerous amounts of soot and smog into our air. These emissions put God's creation and our families—especially children, pregnant mothers, and the unborn—in harm's way. They cause premature birth, increase asthma, and are linked to serious brain diseases. We can fix this. And we can do it in a way that creates millions of new jobs and lowers Americans' monthly fuel bills. That's why we call upon The United States Environmental Protection Agency (EPA) to quickly complete the 2021, EPA's Revised 2023 and Later Model Year Light-Duty Vehicle Greenhouse Gas Emissions Standards (SAFE 2-Safer Affordable Fuel-Efficient (SAFE) Vehicles Rule). The sooner we can make the air safer for our children and the unborn, the better. [EPA-HQ-OAR-2021-0208-0561-A1, p.1]

We collected 15,748 signatures of support, and have included them with this letter. Pro-life Christians understand that reducing tailpipe emissions is a crucial part of defending the health of our kids—both born and unborn—from toxic pollution. Asthma, preterm labor, and other respiratory illnesses are all preventable epidemics that Americans have suffered under for far too long. Our children are in danger every day that vehicle pollution continues to choke their air. [EPA-HQ-OAR-2021-0208-0561-A1, p.1]

We are grateful that you also recognize the scale of the problem and are taking bold steps to address it. As you do, please know that tens of thousands of pro-life Christians stand with you. We are ready to use our voices to demand action for the health and life of all people—especially those made most vulnerable by air pollution. Our faith requires it. [EPA-HQ-OAR-2021-0208-0561-A1, p.1]

Commenter: Mass Comment Campaign sponsoring organization unknown-9 (3,219)

Beyond this, the transportation sector contributes significantly to health-harming particulates and smog-forming nitrogen oxides, exacerbating respiratory illnesses like asthma and resulting in premature deaths. These health impacts are felt disproportionately by low-income communities and communities of color. [EPA-HQ-OAR-2021-0208-0640-A1, p.1]

Commenter: Mass Comment Campaign sponsoring organization unknown-11 (1,667)

Enacting more stringent clean car standards will provide numerous co-benefits for people and parks — from saving American's billions at the pump, to preventing unhealthy vehicle air pollution that severely harms public health and the wellbeing of park ecosystems. [EPA-HQ-OAR-2021-0208-0642-A1, p.1]

Commenter: McQuire, Terry

[The following comments were submitted as testimony at the virtual public hearing on August 26, 2021. See Hearing Testimony – 26Aug2021, pp. 223-224.]

Studies make very clear that communities near major roadways are exposed to higher levels of dangerous air pollution. We know that this is true in my house because every six months or so we have to wash the front of the house off that's not covered by the porch roof. A layer of black soot builds up on the exterior of our home wherever the rain cannot reach it to be washed away. In more moderate months when we leave our windows open to get fresh air and avoid having to run the air conditioning, a layer of soot also develops on the window sills. So I know that we're breathing that in.

As a clean air advocate, I know how dangerous soot pollution is, especially for sensitive populations, like children and seniors. Directly across the street from my house is a small park, Argonne Circle, where groups of children play whenever the weather permits. I think about the pollution they are breathing and wonder if this will result in avoidable sickness or health harms.

Also across from the park is a senior rehabilitation and hospice center. I also think about those elderly residents and I wonder if our proximity to Intestate 581 shortens what little time they may have left with their loved ones.

Commenter: Metropolitan Washington Air Quality Committee (MWAQC)

Poor air quality affects the residents living and working in metropolitan Washington. The region is currently designated as being in nonattainment of federal National Ambient Air Quality Standards (NAAQS) for ozone. Nitrogen Oxides (NOx) are a precursor pollutant of ground-level ozone. In addition, NOx is a precursor to secondary particulate matter, such as particulate matter 2.5 micrometers in diameter and smaller (PM2.5). Exposure to PM2.5, along with ground-level ozone, is associated with premature death, increased hospitalizations, and emergency room visits due to exacerbation of chronic heart and lung diseases and other serious health impacts. Some communities in metropolitan Washington face higher rates of illnesses such as asthma than the national average, and these illnesses are aggravated by these pollutants. As such, reductions in NOx emissions will provide health benefits from both reduced ozone and PM2.5 pollution. [EPA-HQ-OAR-2021-0208-0208-A1] [p.2]

While significant progress has been made in metropolitan Washington to reduce NOx emissions, addressing sources of NOx, including those from on-road vehicles, is critical to continuing to deliver cleaner air for the residents of the region. Over the last five ozone seasons, the region recorded an annual average of seven unhealthy air days, which are in part caused by emissions transported into the region, making this not only a regional issue but a national one. In the short term, strengthening the national GHG emissions standards for passenger cars and light trucks will likely have minimal impact on our region's ability to realize the reductions in NOx emissions needed to comply with the 2015 Ozone NAAQS. However, in the long term, strengthening these standards will reduce NOx and PM2.5 emissions as shown by EPA's forecasts in Table 44 and Table 45 of the Federal Register Notice. [EPA-HQ-OAR-2021-0208-0208-A1] [p.2]

Commenter: Mitchell, Milton

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, p. 318.]

First, let me say that the air quality right now is tragically toxic and it's only getting worse.

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, p. 319.]

So what I ask today is that the EPA do everything it can within its power to do everything it can to reduce any pollution or toxicity because myself, along with millions, almost two to three percent of the population is immuno-compromised, transplant recipients. Some have transplanted hearts, some liver, whatever the case may be. It could be heart, could be liver, could be kidneys, and at this particular time what we're looking for is help and support and direction from the leadership.

Commenter: Mothers and Others for Clean Air

Studies show that PM2.5 from fossil fuels cause 13.1% of all deaths in the U.S. Nitrogen oxides cause 1.6% of all deaths in the U.S. Vehicle emissions are also a major source of substrates for ozone formation, which also causes many deaths in the U.S. Every death is preceded by illness and suffering, too many trips to medical offices, and too many admissions into a hospital. From lung disease, to heart conditions, strokes, cancer, dementia, and many other illnesses, air pollution is horrendous for human health. Significant reductions in vehicle emissions would save many lives and prevent much suffering. Air pollution also causes low birthweight, preterm birth, it affects children's performance in school, and causes increased needs for mental health care.

Here in the Southeast, air pollution has been shown to increase admissions for dementia, and in Atlanta we know that reducing air pollution prevented many episodes of asthma, congestive heart failure, and other heart and lung conditions.

Because air pollution has such a dire effect on health, the World Health Organization recently strengthened standards for all air pollutants, lowering the standard for annual PM2.5 from 35µg/m3 to 5µg/m3, and lowering the standard for nitrogen oxides from 40µg/m3 to 10µg/m3. Reducing vehicle emissions significantly would help meet these standards. Studies show that reducing air pollution will yield major health improvements within the first year. [EPA-HQ-OAR-2021-0208-0491-A1, p. 1]

Commenter: National Coalition for Advanced Transportation (NCAT)

Federal vehicle standards are central to addressing climate change as well as state, regional, and local air pollution problems, which in many cases are severe. It is clear that action is needed and, in the U.S., the transportation sector generates the largest share of GHG emissions (29 percent of 2019 GHG emissions). The transportation sector is also responsible for a significant share of criteria pollutant emissions, including over 55% of the nitrogen oxides (NOx) total emissions inventory in the U.S., 17.9 million tons per year of carbon monoxide, 133,000 tons per year of fine particulate matter (PM) PM2.5, 287,000 tons per year of PM10, and 1.8 million tons per year of volatile organic compounds (VOCs). These emissions have significant effects on communities around the country. In 2020, approximately 97 million people nationwide lived in counties with pollution levels above the primary National Ambient Air Quality Standards (NAAQS). In many areas of the country, pollution from vehicles is also the leading source of poor air quality.

Electric and other zero emission vehicles are a critically important, cost-effective strategy to reduce such air pollution, particularly in areas with severe air quality problems. All-electric vehicles produce zero direct emissions since these vehicles lack a tailpipe and thus have zero tailpipe emissions of GHGs or other pollutants. As a result, use of these vehicles in place of internal combustion engine vehicles can significantly improve air quality in urban areas. On average across the United States, annual life cycle emissions per vehicle are substantially lower for all electric vehicles as compared to gasoline vehicles. The emissions reductions are even greater in geographic areas that use relatively low-polluting energy sources for electricity generation. The share of electricity generated from renewable energy resources (e.g., wind, solar, geothermal, hydroelectric, and biomass) has dramatically increased in recent years to about 20% of total U.S. electricity generation in 2020. And the U.S. Energy Information Administration (EIA) predicts that this trend of significant increases in generation from renewable resources will continue. As the sources of electricity generation become cleaner, GHG and criteria pollutant emissions related to use of electric vehicles will further decline. Electric vehicles also emit less heat and produce less noise. Researchers from Harvard studied emissions from electric vehicles and conventional vehicles in large metropolitan statistical areas and concluded that in each area, air pollution mortality was significantly less from electric vehicles. Others have found that, regardless of the electric vehicle adoption scenario they considered, ozone and PM2.5 concentrations declined with the adoption of electric vehicles. A number of states are requiring that electric vehicle infrastructure be deployed in disadvantaged communities to ensure that those communities can reap the environmental and public health benefits of these technologies. [EPA-HQ-OAR-2021-0208-0239-A1, p. 15-16]

Commenter: National Parks Conservation Association (NPCA)

Passenger vehicles contribute high levels of traditional air pollutants impacting many of our most beloved national parks. These include pollutants such as nitrogen oxides, particulate matter, ozone, and sulfur dioxide, all of which directly harm the health and wellbeing of park visitors, staff, wildlife, and ecosystems, as well as significantly impair visibility in our parks. Nearly 90% of national parks are plagued by haze pollution. On average, park visitors miss out on 50 miles of scenery across our national parks, with haze cutting down on as many as 90 miles of average visibility in the parks most impacted by vehicle pollution, such as Sequoia and Kings Canyon. With 48 national parks listed as Class 1 areas under the Clean Air Act's Regional Haze Rule, strong action is needed by the federal government to help restore visibility to natural levels in all Class 1 areas. This is especially relevant as states are currently in the midst of the regional haze state implementation planning process through which reductions to improve visibility are required by 2028. [EPA-HQ-OAR-2021-0208-0291-A1, p. 1]

A strong clean cars standard will provide clear benefits for these communities across the nation—from improving localized health outcomes in hot spot communities, to saving average American's billions at the pump. [EPA-HQ-OAR-2021-0208-0291-A1, p. 2]

Commenter: Oliver, Shaina

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, p. 72.]

As a Colorado resident, myself and my family have experienced the worst air quality this past summer of air quality levels above a 120 levels according to the IQ Air Report by 9News Colorado.

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, p. 74.]

Colorado State of the Air Report by the American Lung Association just gave us an F for ozone pollution. So we cannot stand by and lose another opportunity to strengthen a path to a hundred percent zero emissions new vehicle sales by 2035.

Organization: Pien, Natalie

[The following comments were submitted as testimony at the virtual public hearing on August 26, 2021. See Hearing Testimony – 26Aug2021, p. 44.]

Where I live, Northern Virginia is now an air quality marginal non-attainment area due to excessive ozone. Internal combustion engine vehicles, ICEs, emit ozone precursors as well as other pollutants that harm human health. I vividly recall the time I walked my now 33-year-old daughter in a stroller down a sidewalk in Leesburg. I became anxious and almost distraught realizing that I was exposing her to car exhaust. Zero emission vehicles would eliminate this experience and restore clean air and improved health to our communities, especially communities of color disproportionately exposed to air pollution.

Commenter: Program for Public Consultation

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, pp. 95-96.]

Overall, we find that large majority support the government taking action to reduce air pollution. In a September 2020 survey, 78 percent of voters assigned a very or somewhat high priority to the government working to reduce air pollution that causes negative health effects. This included 54 percent of Republicans, eight in 10 Independents, and 98 percent of Democrats. A survey in 2016 on the clean power plants proposal from the Obama Administration was a proposal to require all cars and trucks by 2025 to emit half the CO2 emissions of the 2010 model elicited support from 73 percent of voters, including 86 percent of Democrats, 71 percent of Independents, and 57 percent of Republicans. This also had bipartisan support in the states we oversampled, including Texas, Florida, and Oklahoma, and Ohio.

Commenter: Remilien, Sandra

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, p. 120.]

Particulate matter worsens asthma and causes premature death. Tailpipes cause air pollution. Electric cars do not emit tailpipe emissions or the gases that come from gasoline-powered cars. Fuel-efficient cars lower air pollution and emissions from cars. Fuel-efficient cars emit less carbon dioxide.

Commenter: Sabetta, Tracy

[The following comments were submitted as testimony at the virtual public hearing on August 26, 2021. See Hearing Testimony – 26Aug2021, pp. 100-101.]

We know that pollution from the transportation sector accounts for about 29 percent of the total U.S. greenhouse gas emissions, making it the largest contributor. Between 1990 and 2019, transportation sector pollution increased more in absolute terms than any other sector.

I'm fortunate that my daughter was not born with a respiratory illness but many of her friends were not that lucky. Pollution increases the frequency and severity of their asthma attacks and robs them of the opportunity to be a kid enjoying the outdoors the way most of us did as children. Extreme heat here in Columbus has closed 20 buildings in our city school district today, slated to be the first day of school for these kids.

Commenter: San Joaquin Valley Air Pollution Control District

The San Joaquin Valley faces one of the most significant air quality challenges in the country due to its unique meteorology, topography, and geography, and is currently in nonattainment of the latest federal ozone and PM2.5 standards. Near-term criteria pollutant emission reduction strategies are critical to achieve federal health-based standards within the timeframes called for by the San Joaquin Valley’s clean air attainment plans.

The San Joaquin Valley is one of the most heavily regulated air basins in the nation. After decades of implementing stringent stationary and mobile source emission reduction control strategies by the San Joaquin Valley Air Pollution Control District (District) and California Air Resources Board (CARB), over 85% of the San Joaquin Valley's emissions of oxides of nitrogen (NOx), the major precursor for both ozone and PM2.5 formation in the Valley, come from mobile sources. The presence of two major transportation corridors connecting Northern and Southern California and vehicle activity from one of the fastest-growing populations contribute significantly to the Valley's air quality and public health challenges. [EPA-HQ-OAR-2021-0208-0566-A1, p.1]

Building on past air quality improvement efforts, the District, in partnership with CARB, recently adopted the 2018 Plan for the 1997, 2006, and 2012 PM2.5 Standards (2018 PM2.5 Plan) that outlines the actions necessary for furtherimproving the Valley's air quality and meeting the federal air quality standards for PM2.5 by the applicable deadlines of 2024 and 2025. Additionally, District and CARB recently adopted the 2016 Ozone Plan to address the 2008 federal air quality standard for 8-hour ozone.

Since mobile source emissions contribute the majority of NOx emissions in the Valley, California action, made possible by the waiver of preemption process, along with supporting federal action to accelerate mobile source emissions reductions, are critical to the Valley's attainment of federal ambient air quality standards. Moving forward with these attainment efforts will be a major endeavor only achievable through a collaborative approach with Valley residents and businesses, and significant support and action at the local, state, and federal level.

The District's 2016 Ozone Plan and 2018 PM2.5 Plan both rely on emission reductions from California's Advanced Clean Cars regulation and other mobile source measures to support the Valley's attainment of the federal health-based NAAQS. Regarding the standards addressed in these specific plans, the Valley is classified as extreme non-attainment for the 2008 8-hour ozone standard, and serious non-attainment for the 1997 and 2006 PM2.5 standards (proposed Serious nonattainment for the 2012 PM2.5 standard). These plans demonstrate the critical importance of emission reductions from all mobile sources. The importance of state and federal agencies doing their fair share to address pollution sources under their control cannot be understated.[EPA-HQ-OAR-2021-0208-0566-A1, pp.1-2]

Commenter: Southern Environmental Law Center

Many major metropolitan areas in the U.S., including many in the South like Washington, D.C., Atlanta, and Birmingham, already suffer from elevated concentrations of ozone, nitrogen oxides (NOx), particular matter (PM), and volatile organic compounds (VOCs) and hotter temperatures can make air quality even worse. [EPA-HQ-OAR-2021-0208-0244-A1, p. 3]

Commenter: Spirit of the Sun

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, p. 134.]

I live in Palmer City, Colorado. We deal with several different forms of particulate pollution, mainly the transportation sector, and also other extractive industries, like Suncor fully-leased hydrogen cyanide, hydrogen sulfide, and benzene. We live with issues of respiratory and circulatory issues far before COVID. In Indigenous spaces, urban and rural, that does mean a death sentence.

Commenter: Tafoya, Ian

[The following comments were submitted as testimony at the virtual public hearing on August 26, 2021. See Hearing Testimony – 26Aug2021, p. 189.]

But this is really about people. We can talk about numbers all day, but saving people money, yes, also important, that's a co-benefit, but reducing the amount of pollution into our community, reducing the long-term impacts of carbon dioxide into our community, and other VOCs is going to help, and what we've seen is a direct connection between small particulate matter and COVID deaths.

Commenter: Tomcik, Patrice

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, pp. 258-259.]

Studies have shown that the highest daytime exposures of traffic pollution are within 500 feet of a busy road. On an average day, at least 10,000 vehicles and 500 light-duty trucks travel this heavily-congested roadway. Closing school windows and doors can help lessen the traffic pollutant exposures but the reality is, is that fine particles, ultrafine particles, gases, and vapors are able to readily penetrate the indoors where they can be breathed in by very young lungs.

many schools across the nation are built near busy roadways because the land is cheap. I know that children are especially impacted by pollution since their lungs and brains are still developing until early adulthood. Toxic air pollution exposures have deleterious effects that can last a lifetime.

Commenter: Uberuaga, Michelle

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, pp. 284-286.]

I'm also testifying because my family, like many Montana families, is impacted from air pollution from cars and trucks. Livingston is a small town in a rural county on the Northern edge of Yellowstone National Park, and you might imagine that we have pretty good air quality, but like every other place, we experience local pollution from vehicles. It's inescapable. In fact, pollution from vehicles can create serious air quality concerns even in Yellowstone National Park where cars often get lined up back-to-back sometimes for miles. The air pollution when that happens is visible as it sits in the air in remote river valleys.

In our little town, we experience pollution from vehicles regularly. Livingston, like many towns, sits right off I-90. When the freeway closes for bad weather, heavy truck traffic is rerouted right through our downtown, right down Main Street, past our elementary school. Sometimes traffic gets backed up for several miles, semis, cars, trucks, slowly inc through town, past schools, restaurants, and sidewalks. We can and we must do better for our kids and for our communities. An estimated six million children under 18 suffer from asthma.

We need your help. Local families and communities can work together to protect themselves from dangerous pollution, but we shouldn't have to, and many especially vulnerable communities just don't have the resources or time. We need your leadership to protect vulnerable children across our country from air pollution and climate change.

Commenter: Venner, Marie

[The following comments were submitted as testimony at the virtual public hearing on August 26, 2021. See Hearing Testimony – 26Aug2021, pp. 18-19.]

There has been an avalanche of research this past decade on the harms from vehicle emissions and their connection to every physical, cognitive, and emotional condition where inflammation is a component because fossil fuel emissions of all types cause this inflammation, cause 21 percent of dementia and Alzheimer's cases and vastly increase the risk of asthma and autism. My kids have asthma and my son is on the spectrum. Denver was the worst polluted city in the world one day this summer and has had over 50 days of dangerous air pollution, keeping us all indoors. As a public servant and public policy researcher, I was shocked at the extent of the health effects evidence, deaths from cancer, organ damage, as well as the most severe impacts to quality of life, learning, anxiety, depression, illness, cognitive declines, suicide, that I knew were not being considered in decisions to fund projects.

Commenter: Wisconsin Department of Natural Resources

The WDNR has identified several areas of EPA's proposal that can be improved or should be addressed in its final rule, which are described below. WDNR notes that the National Highway Transportation Safety Administration (NHTSA)'s companion rule to EPA's proposal also contains analyses of anticipated GHG and criteria pollutant emissions impacts, in some cases in more detail than EPA has provided. When appropriate, WDNR has referenced NHTSA's information in these comments. [EPA-HQ-OAR-2021-0208-0223-A1, p.1]

Table 45 in the preamble should be corrected. The columns in Table 45 of EPA's proposal (p. 43780), entitled 'Upstream (U.S. tons)' and 'Tailpipe emissions (U.S. tons),' appear to be mislabeled. EPA provides the referenced upstream and tailpipe emissions in Table 44. Table 45 would appear to be showing net annual emissions (in U.S. tons) and the percent change in emissions from baseline. While EPA's intention with this table could be assumed by the associated discussion in text, EPA should provide an appropriate correction in its final rule. [EPA-HQ-OAR-2021-0208-0223-A1, p.4]

EPA Response

EPA acknowledges comments of general support for the proposed program in the preamble to this rule, Section II.F.1, and Section 1.1 of this RTC document. EPA also acknowledges and agrees with comments in this RTC section stating that reductions in air pollutant emissions, are important to address ongoing threats to human health and the environment. The commenters supported the projected non-GHG emissions reductions from the proposal for many reasons, including: health effects associated with exposure to ozone, particulate matter (including increased rates of covid mortality in areas with higher $PM_{2.5}$ concentrations), and air toxics, and contributing to efforts to attain and maintain the ozone and $PM_{2.5}$ NAAQS and environmental effects like haze caused by emissions of NO_X and $PM_{2.5}$. EPA's final rule (see Section V.A of the preamble) will over time result in reductions of non-GHG tailpipe emissions and emissions from upstream refinery sources. We also project that the rule will result in small increases of non-GHG emissions from upstream EGU sources.

EPA agrees with the commenter who noted the issue with the table heading for Table 45 in the preamble of the proposed rule and has corrected the table headings, see Tables 35 through 37 in Section V of the preamble for the final rule.

15.2. Comments on Non-GHG Benefits Methodology

Commenters Included in this Section:

Alliance for Automotive Innovation
American Enterprise Institute (AEI)
California Air Resources Board (CARB)
Center for Biological Diversity (CBD)
Competitive Enterprise Institute (CEI)

Commenter: American Enterprise Institute (AEI)

The asserted health benefits of reduced emissions of particulate matter are not consistent with the available scientific analysis, and represent double counting given other regulatory measures promulgated under the Clean Air Act to reduce ambient particulate concentrations to levels that 'protect the public health' 'with an adequate margin of safety.' [EPA-HQ-OAR-2021-0208-0254-A1, p. 2]

Health benefits of reductions in particulates. EPA claims that reductions in particulate emissions would be an ancillary effect ('co-benefit') of the Proposed Rule, and so would provide additional benefits in the form of improved health. I mention here only in passing the highly speculative nature of such asserted health benefits: In a 2019 report, the EPA Clean Air Science Advisory Committee (CASAC) argued as follows.

The Draft PM PA depends on a Draft Particulate Matter (PM) Integrated Science Assessment (ISA) that, as noted in the April 11, 2019, CASAC Report on the Draft PM ISA, does not provide a sufficiently comprehensive, systematic assessment of the available science relevant to understanding the health impacts of exposure to PM, due largely to a lack of a comprehensive, systematic review of relevant scientific literature; inadequate evidence and rationale for altered causal determinations; and a need for clearer discussion of causality and causal biological mechanisms and pathways. Given these limitations in the underlying science basis for policy recommendations, and diverse opinions about what quantitative uncertainty analysis and further analysis of all relevant data using the best available scientific methods would show, some CASAC members conclude that the Draft PM PA does not establish that new scientific evidence and data reasonably call into question the public health protection afforded by the current 2012 PM2.5 annual standard. Other members of CASAC conclude that the weight of the evidence, particularly reflecting recent epidemiology studies showing positive associations between PM2.5 and health effects at estimated annual average PM2.5 concentrations below the current standard, does reasonably call into question the adequacy of the 2012 annual PM2.5 National Ambient Air Quality Standards (NAAQS) to protect public health with an adequate margin of safety. The CASAC also finds, in agreement with the EPA, that the available evidence does not reasonably call into question the adequacy of the current 24-hour PM2.5 standard, PM10 standard, or secondary PM standards and concurs that they should be retained.

The more important observation to be made for purposes of regulatory analysis is that the 'co-benefit' approach is deeply problematic because the Clean Air Act explicitly requires the EPA, upon making an 'endangerment' finding for a given criteria pollutant, to promulgate a National Ambient Air Quality Standard that 'protects the public health' with 'an adequate margin of safety.' Accordingly, the inclusion of the purported health benefits of reductions in particulate emissions as a benefit of the Proposed Rule is appropriate only if (1) the existing NAAQS for particulates fails to satisfy the requirements of the law, or if (2) the law itself creates a standard that is inefficiently lax.

If neither of those conditions is true, then the co-benefits analysis (3) will reduce emissions of the other pollutants to levels that are inefficiently low, that is, to levels at which the marginal costs of reductions exceed the marginal benefits. This is the case for criteria pollutants in particular, in that the establishment of the NAAQS must exclude cost considerations; this means that the NAAQS is likely already to reduce emissions of such pollutants to levels that are inefficiently low. At least one of these three conditions must be true. If a given region is in 'nonattainment,' that presumably is evidence that achievement of the NAAQS is more costly than is the case on average, so that imposition of a standard even more stringent is unlikely to be appropriate.

Note that the EPA during the Obama administration used the same co-benefit analysis for the Clean Power Plan, for the ozone rule,40 for the fine particulate (PM 2.5) rule, and for the Utility Mercury and Air Toxics Standards. [EPA-HQ-OAR-2021-0208-0254-A1, pp. 10-11]

The central reality is that the co-benefits approach for estimating the benefits of a given proposed rule has proven replete with abuse and political and bureaucratic gameplaying designed to support as 'appropriate and necessary' the adoption of rules that could not satisfy any honest benefit/cost analysis. This is no small matter. Consider the 2011 Obama EPA benefit/cost analysis of its Mercury and Air Toxics Standards (MATS) aimed at coal-fired powerplants. The EPA cost estimate for the intended reduction of mercury and other hazardous air pollutants (HAP) was $9.6 billion (year 2007 dollars); the estimated benefits were $1 million to $6 million, thus yielding estimated costs exceeding estimated benefits by at least 1600 to 1.

That was the finding for the 'direct' objectives of MATS. EPA argued that the rule was 'appropriate and necessary' because other CAA requirements failed to control powerplant HAP emissions adequately and because effective control technologies were available. EPA also declined to consider costs, arguing that it was not required to do so and should not. The Supreme Court in 2015 in Michigan v EPA ruled that 'EPA interpreted [section 112 of the CAA] unreasonably when it deemed cost irrelevant to the decision to regulate power plants' as appropriate and necessary in the context of HAP. The Court: 'One would not say that it is even rational, never mind 'appropriate,' to impose billions of dollars in economic costs in return for a few dollars in health or environmental benefits. ….. No regulation is 'appropriate' if it does significantly more harm than good.'

But EPA proceeded in 2016 to justify the rule by including indirect 'co-benefits,' over 90 percent of which were the asserted health benefits of reductions in emissions of fine particulates (PM2.5). Using a deeply dubious methodology, the health benefits of the PM2.5 reductions were estimated at between $33 billion and $90 billion, thus yielding benefits per dollar of costs between $4 and $9. Note that fine particulates are a criteria pollutant, as distinct from a HAP; EPA already limits ambient levels of PM2.5 in a separate regulation, and is required under the CAA to determine every five years whether that standard 'accurately reflects the latest scientific knowledge' on the health effects of exposure to particulates. It is inappropriate for EPA to include in the Proposed Rule the purported health benefits of reductions in a pollutant already regulated under a separate section of the Clean Air Act. [EPA-HQ-OAR-2021-0208-0254-A1, p. 12]

Commenter: Competitive Enterprise Institute (CEI)

The claim of harms by particulate matter smaller than 2.5 microns ('PM2.5') in the proposal are vastly overstated. EPA claims harms even in areas where EPA says emissions are low enough to protect public safety with an adequate margin of safety.

The Clean Air Scientific Advisory Committee ('CASAC'), established in 1977 under the Clean Air Act Amendments of 1977, 42 U.S.C. §7409(d)(2), provides independent scientific evaluation of EPA's air quality claims. The chairman of CASAC criticized EPA's analysis for having 'unstated, untested, unverified, or mistaken assumptions' and for failing 'to distinguish between true exposure values and estimated exposure values in analyzing and presenting information.' See attached. Rather than address these problems, EPA fired him and the rest of CASAC's independent experts. EPA is now relying on an older analysis that includes these same errors.2 These errors must be corrected if EPA's analysis is to be relied upon as an accurate account of the harms of PM2.5. [EPA-HQ-OAR-2021-0208-0652-A1, p. 2]

II. EPA Continues to Overstate the Harms of PM2.5 Emissions, Despite the Fact that It Has Full Notice of the Problems in Its Approach. The health effects of PM2.5 emissions play a major role in the EPA's new cost-benefit calculations. As is shown below, however, those effects were arbitrarily overstated and thus skewed EPA's calculations.

PM2.5 emissions are one of six criteria pollutants that are regulated under EPA's National Ambient Air Quality Standards (NAAQS). The Safer Affordable Fuel-Efficient (SAFE) Vehicles Rule for Model Years 2021-2026 Passenger Cars and Light Trucks, 85 FR 24854 (2020). Each of those NAAQS standards have been set by EPA at a level that 'allow[s] an adequate margin of safety' and is 'requisite to protect the public health.' 42 U.S.C. § 7409(b)(1).

In analyzing the changes in these emissions that would occur under the various alternatives considered, EPA viewed PM2.5 as raising the most serious health concerns. This was broken down by emission type in both the most recent prior rulemaking, 85 FR 24202, and in the NHTSA analysis, 86 FR 49773, but the current proposal doesn't directly compare the total emissions harms. Instead, EPA discusses the benefit-per-ton of each of the emissions. EPA finds that, at a 3% discount rate, PM2.5 harms start at $600,000 per ton while harms from SO2 start at $150,000 per ton and those from NOx start at $64,000. 86 FR 43791, Table 48.

PM thus ranks as the most harmful of the criteria pollutants, according to EPA. Because most particulates in vehicle emissions are on the order of 2.5 microns in diameter, a category known as PM2.5, it is this class of particulates that is the focus of the agency's attention. See The Safer Affordable Fuel-Efficient (SAFE) Vehicles Rule for Model Year 2021 – 2026, Final Environmental Impact Statement at S-7 (2020) ('Almost all of the PM in motor vehicle exhaust is PM2.5; therefore, this analysis focuses on PM2.5 rather than PM10.').

The agency based its assessments of PM2.5 on a 2009 Integrated Scientific Assessment for Particulate Matter (ISA). 86 FR 43790. The 2009 ISA categorized a series of human ailments based on their association with acute (short-term) or chronic (long- term) exposure, evaluating each ailment in terms of the strength of its causal relationship with ambient particulate matter. Id. As is shown below, these estimates are highly questionable.

One problem is that the agency relied on a 'benefits per ton' approach to evaluate the risk of premature deaths due to increases in emissions. 85 FR 24886-87. EPA has admitted in the past that this simplified approach could exaggerate the benefits of reducing emissions by 'as much as 10 percent' over more accurate modeling. 85 FR 24887.

However, there is a more basic problem with this per-ton approach: it overlooks the fact that PM2.5 emissions are a problem only in nonattainment areas, which are regions where concentrations of criteria pollutants exceed Federal standards. This follows from the fact that EPA itself has set NAAQS at levels that already provide 'an adequate margin of safety.' 42 U.S.C. § 7409(b)(1). According to EPA, only 6 counties in the country are currently in nonattainment, and yet EPA counts harms for PM2.5 in areas where it says they are at safe levels. EPA has presented no information to believe that other counties will go above this level.

As for the possibility that there is some health benefit in reducing PM2.5 to levels below NAAQS, EPA itself has noted the lack of evidence for that claim. In fact, EPA has concluded 'important uncertainties in the evidence for adverse health effects below the current standards and in the potential for additional public health improvements from reducing ambient PM2.5 concentrations below those standards.' EPA, Final Action: Review of NAAQS for Particulate Matter, 85 FR 82684, 82685 (Dec. 2020). This cuts against EPA's benefits-per-ton approach, which is not limited to the small number of nonattainment areas in the country.

Even more importantly, there are fundamental questions about how significant a threat PM2.5 is at any level encountered in everyday life. As demonstrated in a study by Steve Milloy, there are reasons to doubt that it is—reasons that EPA has ignored. S. Milloy, Will the Trump Fuel Economy Reform Proposal Create Deadly Air Pollution? (Oct. 2018), attached hereto.

Milloy examined the basic contention that the alleged deaths from PM2.5 emissions should be viewed on the same basis as traffic deaths. '[T]raffic deaths are real. No one disputes that they happen. But can the same be said for the claim that PM in outdoor air kills people?' 2018 Milloy at 2. In his view, the answer is no, and certainly not on the scale claimed by the agency.

Milloy bases his conclusion on several lines of evidence: epidemiological and clinical studies of humans; animal studies; and real-word experiences. Some of those doubts about the effects of PM2.5 first arose in 1996, shortly after EPA first proposed to regulate PM2.5. At that time EPA's CASAC—a statutorily required panel of experts selected by EPA to peer review its findings on PM2.5—determined that 'there was insufficient evidence to support the claim that PM2.5 was associated with death.' 2018 Milloy at 4.

EPA largely relies on what are known as the Six City and Pope studies for its claims of premature deaths from PM2.5. Id. Nonetheless, several recent studies have found no association between deaths and PM2.5. One is a 2015 study by Anthony Cox, who subsequently became chairman of CASAC, that found no drop in death rates despite a 30 percent decline in PM2.5 levels; another is a 2017 analysis of over two million deaths in California over a 12-year period, finding no association with PM2.5. 2018 Milloy at 5.

Among the studies highlighted by Milloy was one by epidemiologist James Enstrom that 'reanalyzed the Pope study with improved exposure data and reported no association between PM2.5 and death.' Id.

Given that startling finding, one would expect it to be extensively discussed in EPA's analysis, but it has not been discussed at all. However, the 2019 ISA dismissed all of this in two sentences: 'A recent reanalysis of early …ACS [American Cancer Society] results observed a null association between county-level averages of PM2.5 measured by the Inhalable Particle Network between 1979 and 1983 and deaths between 1982 and 1988 … Enstrom (2017)]. Inconsistencies in the results could be due to the use of 85 counties in the ACS analysis by Enstrom (2017) and 50 metropolitan statistical areas in the original ACS analysis (Pope et al., 1995).' EPA, 2019 ISA for PM, 11-67.

This ‘could be’ explanation, however, is no explanation at all. It says nothing about why Pope’s conclusion should be favored over Enstrom’s. If anything, Enstrom’s focus on a larger geographical area (in Milloy’s words, ‘improved exposure data’) is a point in his favor. 2018 Milloy at 5. This is far from the sort of reasoned analysis required on this issue.

The 2019 ISA took a similar approach in dismissing a 2017 Smith and Young study discussed by Milloy, which analyzed the over two million deaths that occurred in California in 2000-12 and found no association with PM2.5. Id. Once again, the ISA explained away that study’s findings largely on the ground that it analyzed a multi-county air basin, rather than the single county analyzed in the 2006 study that found a positive association. ISA at 11-9, comparing the Smith and Young 2017 study with that 2006 study. But this difference is no reason to discount the Smith and Yong study.

The problems that Milloy identified received no mention in any of the 2020 SAFE Final Rule’s decision that EPA now proposes to amend—not in the Rule itself, nor in the Final Regulatory Impact Analysis, nor in the Final Environmental Impact Statement, nor the 2019 ISA for particulate matter, nor in EPA’s proposed rule or its draft Regulatory Impact Analysis.

Many of Milloy’s contentions are supported by two subsequent reports from CASAC to EPA in 2019. EPA’s NAAQS proposal notes the importance of CASAC’s advice in the agency’s formulation of its PM2.5 policy. 86 FR 43790. In an April 2019 report to EPA, CASAC reviewed the agency’s draft ISA on particulate matter. Its major conclusion was that ‘the Draft ISA does not provide a sufficiently comprehensive, systematic assessment of the available science relevant to understanding the health impacts of exposure to particulate matter (PM).’ Cover letter from Dr. L.A. Cox, CASAC Chair, to EPA Administrator A.R. Wheeler (April 11, 2019) 1 (‘CASAC April 2019 Report’), attached and quoted in part at 85 FR 24099. Among its reasons for this conclusion were:

• ‘Lack of comprehensive, systematic review - some of the relevant and important scientific literature is not reviewed and study quality is not systematically considered. …’

• ‘Inadequate evidence for altered causal determinations - the CASAC finds that the Draft ISA does not present adequate evidence to conclude that there is likely to be a causal relationship between long-term PM2.5 exposure and nervous system effects; between long-term ultrafine particulate (UFP) exposure and nervous system effects; or between long-term PM2.5 exposure and cancer.’

• Need for ‘Clearer discussion of causality and causal biological mechanisms and pathways - specifically including pulmonary inflammation.’

Milloy has re-examined EPA’s claims for this rulemaking. See 2021 Comments by Steve Milloy, attached hereto. He notes that EPA has not cited any evidence that is more recent than 2014. In short, EPA cites nothing new to undercut Milloy’s 2018 analysis.

The CASAC April 2019 report, in its Consensus Responses, pointed to a number of basic weaknesses in EPA's approach: 'Some members of the CASAC think that the EPA must better justify their determination that short-term or long-term exposure to PM2.5 causes mortality.' April 2019 CASAC Report, Consensus Responses at 1, attached; 'The EPA's mortality causality determination appears to be based almost exclusively on epidemiology studies, which cannot be used in isolation to determine causation.' Id., Consensus Responses at 2, see attached.

In his individual comments, CASAC Chairman Cox identified certain errors that should exclude consideration of studies unless they were corrected, such as 'unstated, untested, unverified, or mistaken assumptions' and the failure 'to distinguish between true exposure values and estimated exposure values in analyzing and presenting information.' Id. at A-36-37. Cox pointed out that the Draft ISA omitted some studies 'that appear to be discordant with conclusions in the Draft ISA' and that the ISA needed to be 'meticulous in reporting negative results accurately.' Id. at A-27, A-31. He warned that the ISA 'should not uncritically accept results based on poor-quality or speculative quasi-experimental studies' (id. at A-32) and that some studies in the Draft ISA 'misrepresent estimated exposures as if they were true exposures, leading to false statements about what has been found.' Id. at A-45.

Cox also emphasized that researchers' estimates of human exposure to PM2.5 could be seriously erroneous. 'In general, studies that treat estimated exposures as true exposures and that ignore exposure estimation errors … do not support valid inferences about the shape of the C-R [concentration-response] curve for PM2.5. … Studies that do not address exposure measurement and estimation errors should not be used or cited as 'evidence' but should be excluded, unless they can be retroactively reanalyzed and corrected to model the effects of realistic exposure estimation errors.' Id. at A-43; see also December 2019 CASAC report at 4-5, whose 'Overarching Recommendations' include EPA's need to deal with such errors. Dr. L.A. Cox to EPA Administrator A.R. Wheeler 1 (Dec. 16, 2019).

To determine if a study properly accounted for such measurement errors, Chairman Cox recommended that EPA ask, 'Did the study use appropriate errors-in-variables methods or other techniques to correct for differences between true and estimated exposure values and between true and estimated values of other variables?' April 2019 CASAC Report at A-56.

The failure to account for measurement error is especially important in determining whether a threshold exists below which harm does not occur. EPA itself recognized that the 'possible influence of exposure measurement error, and variability among individuals with respect to air pollution health effects, tend to smooth and 'linearize' the concentration-response function, and thus can obscure the existence of a threshold or nonlinear relationship.' EPA, Preamble to the Integrated Science Assessments 29 (Nov. 2015), https://bit.ly/3nLdMoW.

But EPA has entirely ignored such errors-in-variables methods to account for measurement error. Errors-in-variables analysis was not even mentioned in any of the ISAs nor in this proposed rule. Instead, EPA continues to use studies which only estimate exposure to PM2.5 without correcting for measurement error. One instance among many is the 2017 Di et al. studies of Medicare patients, relied upon by EPA in the 2019 ISA. See ISA at 11-61, 11-70, and 11-72. In fact, EPA described the study as among its ‘strongest evidence’ (ISA at 11-97), despite the fact that Chairman Cox characterized it as treating ‘guesses … as if they were error-free measurements – a clear violation of sound statistical analysis for error-prone exposure estimates.’ CASAC December 2019 Report, p. B-21.

In EPA’s NAAQS Proposal, issued a year after the April 2019 CASAC Report, the agency stated that while it had not followed CASAC’s recommendation that a second draft ISA be prepared, it did address CASAC’s comments in the final ISA by expanding its text and by downgrading one causality determination. 85 FR 24099. But neither CASAC’s recommendations nor EPA’s responses had any apparent effect on the agency’s calculations of the alleged PM2.5 health impacts. The agency’s use of such methods as the ‘benefits-per-ton’ approach was essentially based on across-the-board modeling that largely ignored the numerous problems raised by CASAC.

EPA has arbitrarily failed to discuss why it rejected so many of its key recommendations and problems identified. These problems apply just as much to the 2009 PM ISA as the 2019 PM ISA. As Milloy said in his most recent comments, ‘This utter rebuke of the 2019 PM ISA and EPA’s scientific assessment of PM2.5 also applies to the 2009 PM ISA.’ See 2021 Milloy, attached. Because EPA has been put on notice of these problems by CASAC, it has a duty to consider them before continuing to rely on either the 2009 PM ISA or the 2019 PM ISA.

If the agency had properly assessed the health risks of PM2.5 emissions, its large estimate of health-related costs might well have been lower. This would likely have shifted the outcome of the decision-making process, which involved ‘balancing the factors considered in our assessment that the proposed standards are appropriate, and how this balancing of factors differs from that used in the SAFE rule.’ 86 FR 43781. And that shift would have been in the direction of a more lenient standard than the one proposed by the agency. [EPA-HQ-OAR-2021-0208-0652-A1, pp. 2-6]

EPA Response

EPA disagrees with the commenters’ contentions regarding the analysis of costs and benefits for this rulemaking. EPA’s analysis is consistent with applicable guidance and best practices for conducting benefit-cost analyses, including OMB Circular A-4, EPA’s Guidelines for Preparing Economic Analyses, and the Interagency Working Group (IWG) on Social Cost of Greenhouse Gases Technical Support Document: Social Cost of Carbon, Methane, and Nitrous Oxide Interim Estimates under Executive Order 13990. Guidance in both Circular A-4 and EPA’s Guidelines directs the Agency to quantify and monetize all impacts associated with a particular rulemaking to the extent feasible, including those that may be ancillary to the statutory purpose of the regulation. We consider our analysis consistent with the guidance, methodologically rigorous, and a best estimate of the projected benefits and costs associated with the final rule.

In addition, the following responses to comments are contained in Preamble Section VII.E:

EPA received comments asserting that quantifying and monetizing the health benefits of reduced emissions of particulate matter is not consistent with the available scientific evidence and that EPA did not consider the advice made by some members of CASAC that reviewed the 2019 PM ISA. We disagree that our estimates are not consistent with the available scientific evidence and the advice of the Clean Air Science Advisory Committee. In determining which health outcomes to quantify and monetize, EPA relies on the weight-of-evidence evaluation of relationships between $PM_{2.5}$ exposure and health effects conducted within the ISAs, which are the scientific basis of the NAAQS review process. ISAs represent thorough evaluations and syntheses of the most policy-relevant science. EPA uses a structured and transparent process for evaluating scientific information and determining the causal nature of relationships between air pollution exposures and health effects. The ISA development process is detailed in the *Preamble of the Integrated Science Assessments*,[60] which describes approaches for literature searches, criteria for selecting and evaluating relevant studies, and a framework for evaluating the weight of evidence and forming causality determinations. EPA quantifies and monetizes health effects that the ISA determines are "causal" or "likely to be causal." The focus on categories identified as having a "causal" or "likely to be causal" relationship with the pollutant of interest allows for the estimation of pollutant-attributable human health benefits in which the Agency is most confident.

As part of the process of developing an ISA, the Clean Air Scientific Advisory Committee (CASAC) is statutorily required to review the science underlying decisions about the NAAQS. CASAC provides independent review of draft ISA documents for scientific quality and sound implementation of the causal framework that informs the ISA before it is finalized. The 2020 PM NAAQS review was completed without the benefit of a PM-specific panel supporting the CASAC, as had been done in prior reviews. However, CASAC did have access to a pool of consultants who were available to respond in writing to questions from CASAC members. With limited access to relevant expertise, CASAC did not reach consensus on the determination that there is a causal relationship for $PM_{2.5}$ exposure (i.e., both short- and long-term) and mortality presented within the draft PM ISA. After the disbandment of the 20-member CASAC PM panel, CASAC noted that "Additional expertise is needed for [CASAC] to provide a thorough review of the [PM NAAQS] documents" and recommended the Administrator reappoint "the previous CASAC PM panel or panel with similar expertise."[61] In his final decision to retain the PM standards, after considering CASAC's advice, the EPA Administrator, "placing the greatest weight on evidence of effects for which the ISA determined there is a causal or likely causal relationship with long- and short-term $PM_{2.5}$ exposures,"[62] concluded that the current PM NAAQS are necessary to protect public health. Thus, the Administrator fully considered CASAC's recommendations with respect to assessing the health risks of PM in the review of the

[60] See https://cfpub.epa.gov/ncea/isa/recordisplay.cfm?deid=310244
[61] In the time since the previously chartered CASAC, EPA has recognized the significant accumulation of new scientific studies since the cutoff date of the 2019 PM ISA (January 2018) and published a draft supplement to the 2019 PM ISA. The Supplement found that recent studies further support, and in some instances extend, the evidence that formed the basis of the causality determinations presented within the 2019 PM ISA that characterizes relationships between PM exposure and health, including mortality.
[62] 85 FR 82715. The effects for which the 2019 ISA determined there is a causal or likely causal relationship with long- and short-term $PM_{2.5}$ exposures include respiratory effects, cardiovascular effects, and mortality.

PM NAAQS and EPA is being consistent with the conclusions of the PM NAAQS review in this action.

Commenters also asserted that health benefits from reductions in human exposure to ambient concentrations of $PM_{2.5}$ only occur above the level of the primary health-based NAAQS, and that accounting for the health benefits of $PM_{2.5}$ at all represents double counting given other regulatory measures promulgated under the Clean Air Act to reduce ambient concentrations of $PM_{2.5}$. The EPA disagrees with this assertion. First, it is important to recognize that the NAAQS "shall be ambient air quality standards…which in the judgment of the Administrator" are "requisite" to protect public health with an "adequate margin of safety" (CAA Section 109). "Requisite" means sufficient but not more than necessary while an "adequate margin of safety" is intended to address uncertainties associated with inconclusive evidence and to provide a reasonable degree of protection against hazards that research has not yet identified. The CAA does not require eliminating all risk, and therefore, the NAAQS does not represent a zero-risk standard. Additionally, EPA is reconsidering the 2020 decision to retain the PM standards because available scientific evidence and technical information suggests that the current standards may not be adequate to protect public health and welfare, as required by the Clean Air Act.

As detailed in the 2019 PM ISA and previous assessments in support of the PM NAAQS, EPA's review of the science has consistently found no evidence of a threshold below which exposure to $PM_{2.5}$ yields no health response. Specifically, the 2019 PM ISA found that "extensive analyses across health effects continues to support a linear, no-threshold concentration-response (C-R) relationship." This conclusion in the 2019 PM ISA is supported by the more recent evaluation of the health effects evidence detailed in the recently released Draft Supplement to the PM ISA which found "continued evidence of a linear, no-threshold concentration-response (C-R) relationship."

Regarding double-counting, the emissions attributed to this final rulemaking are incremental to all other currently promulgated air pollution regulations and can therefore be monetized without double-counting previously achieved benefits from mobile source emissions reductions. However, EPA also notes that while it takes costs and benefits into consideration in selecting standards, it is not required, and historically has not sought, to set standards based on the results of the benefit-cost analysis in an attempt to maximize net benefits. EPA is required to establish standards to reduce air pollution that endangers public health and welfare, taking into consideration the cost of compliance and lead time. As discussed in Section VI of the preamble, this is the approach EPA took in setting these standards. EPA did take note of the results of the RIA, finding that the fact that benefits exceed costs substantially reinforced the conclusion that the standards were appropriate, but also noting that the net benefits could be higher or lower than presented, given the reasonable range of potential costs and benefits. Thus, EPA disagrees that a change in the estimated benefits would have necessarily resulted in a meaningful change in how the impacts of the final standards compare to the alternatives, or in selection of different standards.

Commenter: Alliance for Automotive Innovation

Regarding uncertainty analysis, EPA and NHTSA are using simplified benefit per ton multipliers for PM2.5 emissions without including sensitivity analysis of each of the key inputs identified by the EPA Science Advisory Board ("SAB"). SAB recommended sensitivity analyses of alternative values of the dose-response function, differential toxicity by type of particle, and spatially-dependent VSL values.189

Commenter: California Air Resources Board (CARB)

The Benefits of the Standards Outweigh the Costs and are Likely Greater Than U.S. EPA Estimated. As described above, CARB agrees that more stringent standards will deliver significant benefits to society that far outweigh their costs. CARB supports the work of U.S. EPA to reconsider its approach to estimating the impacts of the proposed standards. But CARB believes the standards are more beneficial than U.S. EPA estimates and encourages the agency to improve its analysis of the costs and benefits of more stringent emission standards in several respects.

The Proposed Standards Will Reduce Harmful Particulate Pollution. The proposed standards will also reduce particulate matter (PM) pollution, another serious threat to public health, and will have greater benefits than the proposal acknowledges. The Benefits-per-Ton (BPT) analysis for the proposal, corroborated by U.S. EPA's Integrated Science Assessment and Policy Assessment, demonstrate the harmful human health effects of PM and, accordingly, the human health benefits of reducing PM emissions and exposures. CARB agrees the BPT method used by U.S. EPA is a well-established approach to estimating the health benefits from reductions in PM2.5 due to the proposed rule. However, U.S. EPA has noted that the BPT method is currently being updated, and CARB also agrees that this update is needed to ensure it is based upon the most updated Integrated Science Assessments and expanded health endpoints. For instance, U.S. EPA has acknowledged that it is currently using BPT estimates based on the 2009 PM ISA, including the Krewski et al. 2009 study for mortality, although there are newer studies available for mortality and other endpoints. Additional health endpoints that could be included in the BPT methodology include: lung cancer, Alzheimer's disease, and Parkinson's disease, among others, that show important associations with PM2.5 exposure in the 2019 PM ISA.

Recent evidence adds to the wealth of literature showing the harmful human health effects of PM at levels below the federal health-based air quality standards. In its review of the National Ambient Air Quality Standards (NAAQS) for PM, U.S. EPA's Integrated Science Assessment document found strong associations between short and long-term PM2.5 exposure and mortality and cardiovascular and respiratory effects. As stated in CARB and OEHHA's June 29, 2020 letter to the U.S. EPA Administrator, many epidemiological research studies and U.S. EPA's own scientists reported that health effects have been demonstrated below the current NAAQS standards.

Significant associations have been found between PM2.5 levels below the current EPA annual NAAQS standard and premature mortality in multicity epidemiological studies in the U.S. and Canada. These studies are representative of the overwhelming body of research that demonstrates adverse health impacts at PM2.5 levels below the current National Ambient Air Quality Standard. Therefore, even areas currently in attainment for the PM2.5 NAAQS would see health benefits from decreased PM levels, including the benefits from this proposal.

Commenter: Center for Biological Diversity, et al.

Finally, EPA recognizes that certain non-GHG health and environmental benefits are difficult to quantify, and would be even more significant under Alternative 2 than the Proposal. As mentioned above, some of these benefits include: increased visibility from less particulate matter in the ambient air (DRIA 7.1.3.1), the diverse effects of ozone on ecosystems (DRIA 7.1.3.2), the multifaceted impacts on biogeochemistry from nitrogen and sulfur deposition (DRIA 7.1.3.3), and the environmental effects of air toxics (DRIA 7.1.3.4). Combined with scientific uncertainty about the full extent of the effects of air toxics on human health, these environmental factors further tip the scale in favor of stronger protections. While it may be difficult to quantify these benefits precisely, they no doubt signal the irreparable harm that would occur to the environment and human health from adopting a weaker standard. [EPA-HQ-OAR-2021-0208-0651-A1, p. 21]

EPA undercounts the benefits of the PM2.5 reductions from more stringent standards and understates other air quality benefits. While EPA improves its monetization of health benefits attributable to tailpipe PM2.5 emission reductions, its process for monetizing upstream PM2.5 health benefits remains flawed. Fine particulate matter is a harmful criteria air pollutant that has been found to cause a variety of adverse human health impacts ranging from cardiovascular effects to premature mortality. EPA, Integrated Science Assessment for Particulate Matter (Dec. 2019) at ES-9 to ES-11, Tbl. ES-1 (2019 PM2.5 ISA). PM2.5 is emitted both by vehicles' tailpipes themselves as well as from upstream sources such as refineries and power plants. Although EPA updated the resources it relied on in monetizing the impact of reductions in PM2.5 attributable to the Proposal, it replicated errors it made in monetizing upstream PM2.5 health benefits and therefore understated the rule's benefits.

In its 2020 Final Rule, EPA relied on a 2018 technical support document from the Office of Air and Radiation to estimate benefits per ton (BPT) attributable reductions in PM2.5. EPA, Technical Support Document: Estimating the Benefit per Ton of Reducing PM2.5 Precursors from 17 Sectors (Feb. 2018) (2018 PM2.5 TSD). These sectors include on-road mobile sources, electric generating units, and refineries. 2018 PM2.5 TSD at 7, Tbl. 1.

The 2018 PM2.5 TSD utilized a three-step process to generate estimates of the BPT for each of 17 emissions sectors. Id. at 4-5. First, as relevant to direct PM2.5 emissions, EPA conducted photochemical modeling to predict annual average ambient concentrations of primary PM2.5 attributable to each of the 17 emission sectors. Id. at 4. Second, EPA used its 2017 Benefits Mapping and Analysis Program—Community Edition to estimate and monetize the health impacts associated with the attributable ambient concentrations of PM2.5. Id. Finally, EPA calculated BPT for PM2.5 by dividing the monetized benefits and avoided impacts of the emissions from each sector by the sector-specific emissions. Id. at 5.

The 2018 PM2.5 TSD found that the BPT for a ton of PM2.5 differed significantly between source categories. This is due to factors such as proximity to populations, geographic distribution of sources, and information about where emissions are released (e.g., stack height). Id. at 6. Most pertinently, EPA found that PM2.5 emission reductions from refineries provide significantly greater health benefits on a per-ton basis than those from electric generation: $430,000-980,000/ton (2015$) for refineries versus $180,000-410,000/ton (2015$) in 2030 using a 3 percent discount rate. Id. at 20, Tbl. 11. The relative results hold across years and discount rates. Id. at 14-21, Tbls. 5-12.

In the Proposal, EPA no longer relies on the 2018 PM2.5 TSD to monetize the benefits of PM2.5 reductions from tailpipe emissions. Instead, EPA utilizes a BPT estimate from Wolfe et al. (2019) that improves the accuracy of the Agency's tailpipe health benefit assessment. Specifically, EPA explains that the BPT values from Wolfe et al. (2019) "provide better resolution by mobile sector and geographic area, two features that make them especially useful for quantifying the benefits of reducing emissions from the onroad light-duty sector." Proposal, 86 Fed. Reg. at 43,790.

While the use of the BPT estimates from Wolfe et al. (2019) will likely improve EPA's monetization of tailpipe PM2.5 emission benefits from the Proposal, for upstream emissions, EPA continues to rely on the 2018 PM2.5 TSD, id., and in doing so, replicates a fundamental error with its monetization of upstream emissions from the 2020 Final Rule.

EPA recognizes that upstream emission changes would result from a variety of sources including electricity generating unit sources, petroleum extraction, storage and transport sources, as well as sources upstream from the refinery. Id. These impacts are countervailing: more protective vehicle emission standards will reduce fuel consumption and therefore reduce refinery production; however, they will increase vehicle electrification and therefore increase electric generation. Nevertheless, EPA used a simplification that all upstream emission reductions were due to refining emission reductions, id., effectively netting increases in power plant emissions against decreases in refinery emissions without accounting for the differential health benefits.

EPA justified its simplification by pointing to its estimate that "the fleet penetration of electric vehicles attributed to the proposed standards is relatively small (i.e., the change in electric vehicle penetration is projected to change from 4 percent in the No Action case to 8 percent under the proposed standards)." Id. In the final rule, EPA should instead separately quantify and monetize upstream emission impacts for both refineries and power plants before netting those impacts. However, we note that correcting this error would only further support the case for stronger standards, as it causes the benefits of the PM2.5 reductions from the rule to be understated. [EPA-HQ-OAR-2021-0208-0651-A1, p. 45-47]

EPA's failure to quantify and monetize health benefits resulting from reductions in ozone and air toxics attributable to more stringent standards results in an understatement of the benefits of the rule. Although EPA recognizes the importance of quantifying the health and environmental benefits of the Proposal "because a failure to adequately consider ancillary impacts could lead to an incorrect assessment of a program's costs and benefits," Proposal, 86 Fed. Reg. at 43,789- 90, EPA further understates the non-GHG benefits of more stringent standards by failing to quantify benefits associated with reductions of several pollutants.

One source of underestimate is EPA's exclusion of benefits attributable to ozone and air toxics. Ground-level ozone is a widespread criteria air pollutant that inflames lung tissue and is associated with a number of respiratory and cardiovascular health impacts. Motor vehicles contribute to ozone formation through their emissions of both nitrogen oxides and volatile organic compounds, either of which can catalyze the formation of ozone depending on the relative amounts of each in the ambient air. DRIA at 7-2. EPA notes that, "the complex, nonlinear photochemical processes that govern ozone formation prevent us from developing reduced-form ozone BPT values," which EPA recognizes as "an important limitation" when using the BPT approach. Proposal, 86 Fed. Reg. at 43,790. EPA similarly acknowledges that there "would [] be impacts associated with reductions in air toxic pollutant emissions that result from the proposed program" that the agency did not attempt to monetize. DRIA at 7-24. According to EPA, "[t]his is because currently available tools and methods to assess air toxics risk from mobile sources at the national scale are not adequate for extrapolation to incidence estimation or benefits assessment." Id. Incorporation of these categories would have increased the net benefits of the Proposal. [EPA-HQ-OAR-2021-0208-0651-A1, p. 47-48]

EPA Response

EPA agrees with CARB that the use of benefit-per-ton (BPT) values to estimate the PM-related health benefits of the program "is a well-established approach" that nonetheless omits a number of other health and environmental benefits, such as ozone-related benefits. Commenters expressed concern that because the BPT approach leaves these benefits unquantified, the analysis undercounts air quality benefits. EPA believes that using the reduced-form BPT approach to benefits estimation approach was reasonable for the analysis conducted for this rulemaking though less robust than an analysis based on photochemical air quality modeling. EPA continues to refine our reduced form methods. We note that criteria pollutant-related health benefits are typically driven by reductions in PM-related mortality risk, which are reflected in the BPT-based analysis of benefits associated with the final rule. We would expect that monetizing the full suite of health and environmental benefits associated with the final rule would increase total benefits, and benefits would increase in proportion to the criteria pollutant emissions reductions achieved, for both the final program and the alternatives that were considered. However, as explained in Preamble Section VII.E, we are limited to the use of $PM_{2.5}$-related BPT values for this analysis. We do not expect that the omission of unquantified benefits would meaningfully change how the impacts of the final program compare to the alternatives, though the rule would be even more beneficial on net (compared to costs) if all benefits were quantified and monetized. Regarding uncertainty in the BPT estimates, the Alliance for Automotive Innovation referenced recommendations made by the Science Advisory Board in its review of EPA's Reduced Form Tools.[63] EPA is considering the SAB's recommendations in future work concerning reduced

[63] U.S. EPA – Science Advisory Board (U.S. EPA-SAB). 2020. Review of EPA's Reduced Form Tools Evaluation. EPA-SAB-21-001.

form benefits tools, but believes the current approach is reasonable, is consistent with applicable guidance and best practices for conducting benefit-cost analyses, and provides a best estimate of PM-related health benefits.

Regarding the request that EPA improve its analysis of benefits, and as discussed in Preamble Section VII.E and RIA Chapter 7.2, we note that EPA bases its benefits analyses on peer-reviewed studies of air quality and health effects and peer-reviewed studies of the monetary values of public health and welfare improvements. Very recently, EPA updated its approach to estimating the benefits of changes in $PM_{2.5}$ and ozone.[64,65] These updates were based on information drawn from the recent 2019 $PM_{2.5}$ and 2020 Ozone Integrated Science Assessments (ISAs), which were reviewed by the Clean Air Science Advisory Committee (CASAC) and the public.[66,67] EPA has not updated its mobile source BPT estimates to reflect these updates in time for this analysis. Instead, we use $PM_{2.5}$ BPT estimates that are based on the review of the 2009 PM ISA[68] and 2012 PM ISA Provisional Assessment[69] and include a mortality risk estimate derived from the Krewski et al. (2009)[70] analysis of the American Cancer Society (ACS) cohort and nonfatal illnesses consistent with benefits analyses performed for the analysis of the final Tier 3 Vehicle Rule,[71] the final 2012 PM NAAQS Revision,[72] and the final 2017-2025 Light-

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[64] U.S. Environmental Protection Agency (U.S. EPA). 2021a. Regulatory Impact Analysis for the Final Revised Cross-State Air Pollution Rule (CSAPR) Update for the 2008 Ozone NAAQS. EPA-452/R-21-002. March.
[65] U.S. Environmental Protection Agency (U.S. EPA). 2021b. Estimating PM2.5- and Ozone-Attributable Health Benefits. Technical Support Document (TSD) for the Final Revised Cross-State Air Pollution Rule Update for the 2008 Ozone Season NAAQS. EPA-HQ-OAR-2020-0272. March.
[66] U.S. Environmental Protection Agency (U.S. EPA). 2019a. Integrated Science Assessment (ISA) for Particulate Matter (Final Report, 2019). U.S. Environmental Protection Agency, Washington, DC, EPA/600/R-19/188, 2019.
[67] U.S. Environmental Protection Agency (U.S. EPA). 2020b. Integrated Science Assessment (ISA) for Ozone and Related Photochemical Oxidants (Final Report). U.S. Environmental Protection Agency, Washington, DC, EPA/600/R-20/012, 2020.
[68] U.S. Environmental Protection Agency (U.S. EPA). 2009. Integrated Science Assessment for Particulate Matter (Final Report). EPA-600-R-08-139F. National Center for Environmental Assessment – RTP Division, Research Triangle Park, NC. December. Available at: <http://cfpub.epa.gov/ncea/cfm/recordisplay.cfm?deid=216546>.
[69] U.S. Environmental Protection Agency (U.S. EPA). 2012. Provisional Assessment of Recent Studies on Health Effect of Particulate Matter Exposure. EPA/600/R-12/056F. National Center for Environmental Assessment – RTP Division, Research Triangle Park, NC. December. Available at: https://cfpub.epa.gov/ncea/isa/recordisplay.cfm?deid=247132.
[70] Krewski D., M. Jerrett, R.T. Burnett, R. Ma, E. Hughes, Y. Shi, et al. 2009. Extended Follow-Up and Spatial Analysis of the American Cancer Society Study Linking Particulate Air Pollution and Mortality. HEI Research Report, 140, Health Effects Institute, Boston, MA.
[71] U.S. Environmental Protection Agency. (2014). Control of Air Pollution from Motor Vehicles: Tier 3 Motor Vehicle Emission and Fuel Standards Final Rule: Regulatory Impact Analysis, Assessment and Standards Division, Office of Transportation and Air Quality, EPA-420-R-14-005, March 2014. Available on the internet: http://www3.epa.gov/otaq/documents/tier3/420r14005.pdf.
[72] U.S. Environmental Protection Agency. (2012). Regulatory Impact Analysis for the Final Revisions to the National Ambient Air Quality Standards for Particulate Matter, Health and Environmental Impacts Division, Office of Air Quality Planning and Standards, EPA-452-R-12-005, December 2012. Available on the internet: http://www3.epa.gov/ttnecas1/regdata/RIAs/finalria.pdf.

duty Vehicle GHG Rule.[73] We expect this lag in updating our BPT estimates to have only a minimal impact on total PM benefits, since the underlying mortality risk estimate based on the Krewski study is identical to an updated $PM_{2.5}$ mortality risk estimate derived from an expanded analysis of the same ACS cohort.[74] The Agency is currently working to update its mobile source BPT estimates to reflect these recent updates for use in future rulemaking analyses.

Regarding comments about the use of refinery-related BPT values as a surrogate for the monetization of all upstream emissions impacts, EPA agrees with the commenters that sector-specific BPT values are preferable to monetize sector-specific emissions. For the final rule, upstream emissions have been apportioned to the refinery and EGU sectors and we apply corresponding BPT values to monetize those emissions impacts. More information on non-GHG emissions impacts of the final rule can be found in Preamble Section V and RIA Chapter 5.1.

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[73] U.S. Environmental Protection Agency (U.S. EPA). (2012). Regulatory Impact Analysis: Final Rulemaking for 2017-2025 Light-Duty Vehicle Greenhouse Gas Emission Standards and Corporate Average Fuel Economy Standards, Assessment and Standards Division, Office of Transportation and Air Quality, EPA-420-R-12-016, August 2012. Available on the Internet at: http://www3.epa.gov/otaq/climate/documents/420r12016.pdf.

[74] Turner, MC, Jerrett, M, Pope, A, III, Krewski, D, Gapstur, SM, Diver, WR, Beckerman, BS, Marshall, JD, Su, J, Crouse, DL and Burnett, RT (2016). Long-term ozone exposure and mortality in a large prospective study. Am J Respir Crit Care Med 193(10): 1134-1142.

16. Basis for the Standards Under the Clean Air Act, Including Comments on EPA's Justification for the Standards and EPA's Balancing of Factors Under the CAA 202(a), Including how This Balancing is Different Than in the SAFE Rule

<u>Commenters Included in this Section</u>

American Council for an Energy-Efficient Economy (ACEEE)
American Fuel & Petrochemical Manufacturers (AFPM) et al
Americans for Prosperity
Bay Area Air Quality Management District
California Air Resources Board (CARB)
California Attorney General Office, et al.
Center for Biological Diversity, et al.
Consumer Federation of America
District of Columbia Department of Energy and Environment
Elders Climate Action (ECA)
Energy Innovation Policy and Technology LLC
Energy Strategy Coalition
Environmental Defense Fund (EDF)
Environmental Law & Policy Center (ELPC), et al.
Environmental Protection Network (EPN)
Fuels Freedom Foundation
Growth Energy
Ingevity Corporation
Institute for Policy Integrity
International Council on Clean Transportation
International Union, United Automobile, Aerospace & Agricultural Implement Workers of America (UAW)
Kreucher, Walter
Lucid USA, Inc. (Lucid)
Minnesota Pollution Control Agency (MPCA) and Minnesota Department of Transportation (MnDOT)
National Coalition for Advanced Transportation (NCAT)
New Mexico Environment Department
New York State Department of Environmental Conservation
Northeast States for Coordinated Air Use Management (NESCAUM)
Ohio Attorney General Office, et al.
Platt, Keari
South Coast Air Quality Management District
Southern Environmental Law Center

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

EPA has the authority under the Clean Air Act to set technology-forcing standards. At this critical juncture, it is imperative that EPA adopt emissions standards to catalyze investments in technological advancements and accelerate electrification beyond what is likely to occur in the absence of new standards. [EPA-HQ-OAR-2021-0208-0251-A1, p. 13]

Commenter: American Fuel & Petrochemical Manufacturers (AFPM) et al

While the American Fuel & Petrochemical Manufacturers (AFPM) and the Western States Petroleum Association (WSPA) support increased fuel efficiency, the proposed rule misinterprets EPA's and the National Highway Transportation Safety Administration's (NHTSA's) respective roles in establishing light-duty vehicle (LDV) fuel economy standards, neglects to apply a full life-cycle analysis (LCA), and overstates the benefits and understates the costs of electric vehicles (EVs). Consequently, this proposed rule does not conform to statutory requirements and should be revised. [EPA-HQ-OAR-2021-0208-0286-A1, p. 1]

Congress Tasked NHTSA, not EPA, to Establish Fuel Economy Standards. Both NHTSA and EPA have a role to play in increasing efficiency and reducing GHG emissions harmoniously, but EPA's proposal ignores NHTSA's role.9 The Energy Policy and Conservation Act (EPCA) designates NHTSA as the lead in setting fuel economy standards. The Clean Air Act (CAA), on the other hand, authorizes EPA to regulate motor vehicle emissions that 'may reasonably be anticipated to endanger public health or welfare.'10 For the past eleven years, these authorities were exercised through joint rulemakings11 to ensure harmonization. This was necessary because the agencies acknowledged that 'the relationship between improving fuel economy and reducing carbon dioxide (CO2) tailpipe emissions is a very direct and close one.'12

The Supreme Court also determined that while NHTSA's and EPA's obligations to regulate CO2 emissions from motor vehicles may overlap, 'there is no reason to think the two agencies cannot both administer their obligations and yet avoid inconsistency.'13 EPA should thus defer to NHTSA's fuel economy standards and focus on motor vehicle GHG emissions other than from the tailpipe, such as regulating automotive air conditioning refrigerant leakage (HFCs) or the use of reflective glass, coatings, and paints to reduce air conditioning usage. At the very least, EPA and NHTSA should conduct a joint, coordinated rulemaking that respects each agency's statutory limits on its authority in this overlapping area. The approach EPA embraced in the proposed rule renders NHTSA's fuel economy standards moot and is thus contrary to Congress's intent.

Congress designated NHTSA to set fuel economy standards using a particular process while considering relevant factors. As part of that process, EPCA requires NHTSA to consult with EPA and the Department of Energy.14 EPCA limits NHTSA's standard-setting authority, requiring NHTSA to set the 'maximum feasible average fuel economy' in light of 'technological feasibility, economic practicability, the effect of other motor vehicle standards of the Government on fuel economy, and the need for the United States to conserve energy.'15 None of these express procedural and substantive checks would have meaning if EPA could circumvent them by unilaterally issuing a CO2 tailpipe standard under CAA Section 202(a), as it attempts to do in this proposal.16

Unfortunately, the gap between the Agencies' programs continues to widen. EPA here intends to alter NHTSA's existing maximum feasible average fuel economy standards, via CO2 standards, for MY 2023 without NHTSA making any changes for that model year. They do not even attempt to 'avoid inconsistency.'17

Promulgating a duplicative and inconsistent tailpipe emissions program, like the Agency proposes here, thwarts Congressional direction, creates uncertainty, imposes unnecessary costs, and wastes scarce government resources. [EPA-HQ-OAR-2021-0208-0286-A1, pp. 2-3]

EPA Must Utilize a Life-Cycle Analysis to Quantify Emissions. It is critical to employ a life-cycle analysis, based on sound science, that accounts for each vehicle's emissions, regardless of powertrain, over its lifetime, including emissions associated with its production, recharging/refueling, drivetrain replacements, required infrastructure modifications, and end-of-life disposal options. Every transportation mode uses energy and impacts the environment. Highlighting only tailpipe emissions with misleading euphemisms like 'zero emissions vehicles' results in a distorted view of actual environmental impacts of motor vehicle technologies that have no basis in the regulatory process.

Section 202 of the CAA requires EPA to perform LCAs when setting vehicle emissions standards. Section 202(a)(1) requires EPA to 'prescribe…standards applicable to the emission of any air pollutant from any class or classes of new motor vehicles or new motor vehicle engines, which…cause, or contribute to, air pollution which may reasonably be anticipated to endanger public health or welfare.'18 While tailpipe emissions are the most obvious emissions from new motor vehicles or their engines, emissions from electricity generation, too, are emissions 'from' EVs because operating EVs are the 'source, cause, agent, or basis' for such emissions.19 Likewise, emissions relating to battery mining, production, and disposal or recycling of batteries or power sources like coal emissions 'from' EVs because EVs are the 'source, cause, agent, or basis' for such emissions. LCA ensures that these emissions 'from' EVs are addressed by EPA's vehicle emissions standards, as they are required to be, rather than ignored by focusing on tailpipe emissions. Without LCA, the Agency cannot reasonably assess the stringency or GHG reduction benefits of its proposed standards, nor can it reasonably assess the costs and benefits; thus, EPA cannot assure that its standards appropriately and justifiably protect public health or welfare without LCA.

EPA projects that the proposed standards could be met by gradually increasing sales of plug-in electric vehicles in the U.S., up to about 8 percent market share (including both EVs and plug-in hybrids) by MY 2026. In its analysis, the Agency accounted for slight increases in emissions from electric generation units (EGUs)20 due to increased EV penetration rates but did not account for any emissions, or other environmental impacts, associated with battery mining, production, and disposal, or recycling of batteries or power sources like coal. Significant GHGs are emitted during an EV's lifecycle. As EPA takes steps towards implementing its planned transition to widespread EVs, the Agency must consider that such a transition would require a massive reconfiguration of the electric power system, including distribution transformers, conductors, and substations, which would lead to a significant increase in mining of minerals and production of steel, generating significant additional GHG emissions compared to a business-as-usual scenario. As such, a lifecycle perspective is required to understand any potential GHG emissions reductions achieved by EVs. Quantifying lifecycle GHG emissions is an issue of central relevance to this rulemaking and such a quantification must be undertaken before advancing the rulemaking.

EPA should review the underlying research collected and highlighted in a recent paper published by ConservAmerica, which we incorporate by reference into these comments.21 Each study ConservAmerica reviewed used an LCA approach to analyze the vehicles emissions based upon 'vehicle size and performance, battery size and lifetime, the carbon intensity of electricity generation and fuel production, and the state of technology advancements.' Recognizing these relevant parameters, the review concludes that 'a variety of automotive technologies and powertrains deliver comparable GHG emission reductions,'22 and that all vehicle technologies should be examined based on the entire lifecycle of the vehicle and their energy sources, as all vehicles produce GHG emissions.

Scientists confirm that the carbon intensity of battery manufacturing has a large contribution to the lifecycle carbon emissions of EVs, which typically start with a GHG emissions deficit.23, 24 EPA must also consider the effect of increasing battery needs worldwide. For instance, increased demand for components of EVs (including the minerals needed to produce Li-ion batteries), all other things being equal, increases prices. Some observers have predicted that EV production will become more carbon intensive as it becomes more difficult to obtain the materials needed for battery production.25, 26, 27 [EPA-HQ-OAR-2021-0208-0286-A1, pp. 3-5]

Congress designated NHTSA to set fuel economy standards. NHTSA is the agency that through EPCA can maintain one national program while respecting Congress's procedural and substantive considerations. EPA's actions bypass the statutory guardrails included in EPCA. EPA must also more fully and accurately account for the costs and benefits in this rule, including carbon reductions and fuel savings, by evaluating all vehicles technologies on a lifecycle basis and based on identical emissions and fuel economy tests of real-world driving conditions. [EPA-HQ-OAR-2021-0208-0286-A1, pp. 7-8]

Commenter: Americans for Prosperity

The Proposed Rule Violates Section 202(a) of the Clean Air Act. Under Section 202(a) of the CAA, '[t]he Administrator shall by regulation prescribe (and from time to time revise) in accordance with the provisions of this section, standards applicable to the emission of any air pollutant from any class or classes of new motor vehicles or new motor vehicle engines, which in his judgment cause, or contribute to, air pollution which may reasonably be anticipated to endanger public health or welfare.'2 The Administrator must exercise reasonable judgment and decision-making under Section 202(a).

For this proposed rule, EPA is 'changing its 2020 position and restoring its previous approach by proposing to find, in light of the statutory purposes of the Clean Air Act and in particular of section 202(a), that it is more appropriate to place greater weight on the magnitude and benefits of reducing emissions that endanger public health and welfare, while continuing to consider compliance costs, lead time and other relevant factors.'3 The Agency has broad authority under Section 202(a), 'EPA is afforded considerable discretion under section 202(a) when assessing issues of technical feasibility and availability of lead time to implement new technology. Such determinations are 'subject to the restraints of reasonableness,' which 'does not open the door to 'crystal ball' inquiry.'' NRDC, 655 F.2d at 328, quoting International Harvester Co. v. Ruckelshaus, 478 F.2d 615, 629 (D.C. Cir. 1973).'4 The proposed rule violates this requirement, relying almost entirely on EPA's vehicle standards finalized in 2012 and the voluntary commitments of five automakers as the justification for compliance costs and lead time.

The 2012 final rule set standards for model years 2017-2025. As part of the 2012 vehicle standards a Mid-term Evaluation (MTE) was required, EPA began this process in 2016. The process was rushed, giving stakeholders and the public only thirty days to comment. EPA signed off on the MTE one week prior to President Trump taking office and more than one year before the midterm review was scheduled to be completed. In 2017, automakers asked the Trump administration for relief from the stringent standards knowing it would be difficult to meet the targets by 2025.5 The automakers knew the rules would impose significant costs and were not aligned with consumer preferences.6

In December 2017, Mitch Bainwol, then-President and CEO of Alliance of Automobile Manufacturers, testified before the House Energy and Commerce Committee Subcommittee on Digital Commerce and Consumer Protection that:

'[M]uch has changed since the agencies issued the final rulemaking for the MY 2017-2025 vehicle fuel economy/GHG emission standards in 2012… I pointed out how several of the assumptions – such as gas prices, technology effectiveness and cost, and the consumer acceptance of advanced technology vehicles – on which the agencies determined that automakers would be able to comply with the current MY 2022-2025 standards have drastically shifted since 2012. That pattern has only continued, making compliance with the more aggressive later year standards very challenging.'7

The other assertion EPA relies on to satisfy Section 202(a) requirements is the readiness of automakers to meet the stringency, compliance cost, and lead time being proposed. This hinges on the five automakers that joined the California Framework and other automakers who have recently stated their commitment to lowering vehicle emissions and moving toward EVs. These public relations representations from consistently noncompliant manufacturers are in no way binding or enforceable. The five automakers that joined the California Framework represent only one-third of automakers and in 2017 they were petitioning the federal government for less stringent standards. Even the Center for Biological Diversity recognizes these statements are empty, '[a]utomakers tore up the last promise they made to cut pollution, so why would anyone trust their new one . . . . Voluntary pledges from auto companies make a New Year's resolution to lose weight look like a legally binding contract.'8

The use of the 2012 standard as Section 202(a) justification is not reasoned decision-making. Automakers have not been compliant with stringent standards set during the Obama administration and will not be able to achieve the even more stringent standards being proposed.

According to EPA's 2020 Automotive Trends Report, out of 14 large vehicle manufacturers, only three achieved regulatory compliance based on emission performance without help from banked credits. All other large manufacturers used a combination of banked or purchased credits, along with technology improvements, to achieve compliance in model year 2019.9 EPA acknowledges, 'In the last four years, the industry GHG performance has been above the industry-wide average standard, resulting in net withdrawals from the bank of credits to maintain compliance.'10 EPA has created its authority to establish a greenhouse gas credit trading program, as well as the retroactive commandeering of credits from model year 2021 and 2022, from whole cloth. This absence of statutory authority is underscored by the explicit delegation of authority to the Department of Transportation/NHTSA under EPCA for related trading programs. Section 202(a) requires reasoned decision-making, this reliance on non-binding voluntary statements from noncompliant automakers is a clear violation of Section 202(a). Put differently, automakers have failed to achieve EPA's stringent vehicle standards technologically, raising fundamental questions about the reasonability of the agency's decision-making. [EPA-HQ-OAR-2021-0208-0226-A1, pp. 1-3]

The Proposed Rule Violates Key Provisions of CAA Sections 307(d). EPA's proposed rule is subject to CAA Section 307(d), as published in the Federal Register EPA does not acknowledge its statutory and legal authority in this rulemaking being subject to Section 307(d). Section 307(d) establishes unique docketing and procedural requirements, Senator Carper raised serious concerns regarding these requirements last year when EPA promulgated the SAFE rule.16 Under Section 307(d)(4)(b)(ii) '[t]he drafts of proposed rules submitted by the Administrator to the Office of Management and Budget for any interagency review process prior to proposal of any such rule, all documents accompanying such drafts, and all written comments thereon by other agencies and all written responses to such written comments by the Administrator shall be placed in the docket no later than the date of proposal of the rule.'17

During the SAFE rulemaking the docketing concerns raised by Senator Carper brought on an Inspector General evaluation. As stated in the Office of Inspector General report 'OGC attorneys said that in joint rulemakings in 2010 and 2012, as well as for the final SAFE Vehicles Rule in 2020, the Agency's practice was to treat [National Highway Traffic Safety Administration] NHTSA as a coauthor both before and after initiating interagency review. Using this interpretation, NHTSA would not be considered an 'other agency' for purposes of the docketing provision.'18 EPA's current proposed rule is not a joint rulemaking with NHTSA and is subject to Section 307(d)(4)(b)(ii).

EPA has violated this provision; the proposed rule and 12866 interagency comments speak of a collaborative process with NHTSA. 'EPA has coordinated with NHTSA, both on a bilateral level as well as through the interagency review of the EPA proposal led by the Office of Management and Budget.'19 There is no evidence in the docket of their bilateral or interagency coordination, EPA is using NHTSA's updated modeling and has a shared interest in this area. The Agency 'notes that EPA may coordinate with NHTSA, and has done so, regardless of the formality of joint rulemaking. EPA has consulted significantly with NHTSA in the development of this proposal. Consultation is the usual approach Congress specifies when it recognizes that EPA and another agency share expertise and equities in an area.'20 As stated in the proposed rule, if EPA has consulted significantly with NHTSA throughout the development process this should be seen in the docket to remain transparent, this is not a joint rulemaking and NHTSA is not considered a coauthor. [EPA-HQ-OAR-2021-0208-0226-A1, pp. 4-5]

Commenter: Bay Area Air Quality Management District

We applaud President Biden for directing EPA to reconsider the dangerously flawed SAFE Vehicles Rule and appreciate EPA's efforts that have resulted in proposal of the Revised Model Year (MY) 2023 and Later GHG Standards. The SAFE Rule used analyses that were unsound, relying on bad data; relaxed 2012 National Clean Car Standards ('Obama-era standards') already shown to be feasible; and, by significantly weakening the standards, ignored the opportunity to phase in readily achievable technological advancements over time. The Bay Area Air District agrees with EPA's assessment in the NPRM that 'in light of the significant contribution of light-duty vehicles to transportation sector GHG emissions, standards more stringent than those relaxed in the SAFE rule are appropriate under the Clean Air Act'. [EPA-HQ-OAR-2021-0208-0283-A1, pp.1-2]

EPA's Proposal in spirit addresses many of the Air District's previous concerns with the greenhouse gas standards portion of the SAFE Vehicles Rule. All options in the NPRM are improvements over the SAFE standards [EPA-HQ-OAR-2021-0208-0283-A1, p.2]

Commenter: California Air Resources Board (CARB)

U.S. EPA has a legal obligation to follow the science and the Clean Air Act and cut emissions as deeply as possible. [EPA-HQ-OAR-2021-0208-0643-A6, p.1]

As CARB and many others explained in multiple comments on the SAFE proposal3 and subsequent briefing in the litigation challenging the Final SAFE standards,4 U.S. EPA's decisions, actions, and supporting analyses were deficient and fundamentally wrong in many respects. The SAFE rules and actions also failed to meet U.S. EPA's fundamental obligation under the Clean Air Act to protect public health and welfare, as they allowed continuing dangerous emission levels despite U.S. EPA's determination that these emissions threaten public health and welfare and the availability of feasible reductions. [EPA-HQ-OAR-2021-0208-0643-A6, p.7]

The Proposal Meets the Statutory Direction to Protect Public Health by Reducing Pollution. CARB welcomes the Administrator's recognition that Congress enacted Section 202 of the Clean Air Act to address the threats to public health and welfare from pollution by new motor vehicles.75 As the proposal discusses, Congress directed U.S. EPA to adopt motor vehicle pollution control standards at levels to address all manner of air pollutants that may reasonably be anticipated to endanger public health and welfare.

The current standards do not properly respond to this core mandate. CARB supports the Administrator's proposal to adhere to Congress's direction to reduce the threat to public health and welfare by limiting, in the near- and far-terms, harmful greenhouse gas emissions. Notably, these more stringent standards will bestow significant net benefits on society, even if they impose some cost on automakers.

The preferred alternative, Alternative 2, and the requirement for further emission reductions in model year 2026 all meet U.S. EPA's obligations under the Clean Air Act when exercising its authority to establish emission standards. CARB supports and agrees with the comments of the California Attorney General and multi-state coalition that this range of standards advances the objectives of Section 202(a) of the Clean Air Act. They will significantly reduce pollution from motor vehicles. In the time available, they can be met with existing technology at a cost that is reasonable, particularly considering their benefits for protecting public health and welfare. [EPA-HQ-OAR-2021-0208-0643-A6, p.28]

As U.S. EPA correctly recognizes,81 and as further explained in the accompanying comments of the California Attorney General, manufacturers have had a decade to plan for the National Program standards. In contrast, the SAFE Vehicles Rule is a recent concoction that has been nothing but uncertain throughout its existence.

The SAFE Vehicles Rule proposal was extensively panned in voluminous, detailed, well-reasoned comments. And because so much of the criticism was valid, the final analysis for the SAFE Vehicles Rule deviated in many significant ways from the proposal. But it remained deficient. The final rules were immediately challenged by multiple petitioners; those consolidated cases are in abeyance pending the outcome of this proposal,82 in response to the President's direction to reconsider it.83 The federal agencies have realized the Final SAFE Rule standards were inappropriate and proposed to restore more stringent standards. At no time have the Final SAFE Rule standards provided a stable platform for automakers to plan their products.

Commenter: California Attorney General Office, et al.

EPA has long recognized that GHG emissions from new motor vehicles and new motor vehicle engines endanger public health and welfare, and, under Section 202(a) of the Clean Air Act, this recognition triggers a mandatory duty to reduce such emissions. [EPA-HQ-OAR-2021-0208-0245-A1, p.1]

There is, thus, every reason for EPA to act quickly to replace the unlawful and woefully inadequate SAFE 2 standards with more stringent ones that satisfy the agency's statutory mandate to reduce emissions of harmful air pollution. [EPA-HQ-OAR-2021-0208-0245-A1, p.1]

We urge EPA to quickly adopt the rigorous standards that the circumstances, its statutory mandate, and the record demand. [EPA-HQ-OAR-2021-0208-0245-A1, p.2]

In 2018, EPA and NHTSA ('the Agencies') proposed to freeze their respective standards at model year 2020 levels for six years, meaning no increase in stringency would be required in model years 2021-2026 (although model year 2021 had not been part of the Mid-Term Evaluation). 83 Fed. Reg. 42,986 (Aug. 24, 2018). In April 2020, the Agencies published final SAFE 2 standards that increase in stringency by approximately 1.5% each year, 85 Fed. Reg.

24,174 (April 30, 2020), a rate far lower than the annual increase (approximately 5%) required by the standards promulgated in 2012. Id. at 25,106. The Agencies' analysis projected that EPA's SAFE 2 standards will increase GHG emissions by up to 923 million metric tons, id. at 24,176, and will cause up to 1,000 premature deaths, and other adverse health impacts, due to increases in criteria pollutant emissions, id. at 25,119. Notably, the Agencies also acknowledged and reaffirmed that technologies sufficient to comply with the more stringent standards promulgated in 2012 had 'already been developed, have been commercialized, and are in-use on vehicles today.' Id. at 25,107. The Agencies also confirmed that the SAFE 2 standards will cost consumers money overall, because increases in fuel expenditures will exceed estimated decreases in vehicle prices. Id. at 24,180-81.95

Many of the undersigned (and other parties) challenged the SAFE 2 standards in the D.C. Circuit Court of Appeals. Although briefing had commenced, those cases were placed in abeyance after President Biden's January 20, 2021 Executive Order directed EPA and NHTSA to reconsider the standards. [EPA-HQ-OAR-2021-0208-0245-A1, pp.17-18]

Section 202(a) of the Clean Air Act demands nothing less. We urge EPA to adopt the most stringent standards it concludes are feasible, commensurate with the undeniable need for urgent and rigorous action. [EPA-HQ-OAR-2021-0208-0245-A1, p.18]

Section 202(a) Requires EPA to Reduce Threats to Public Health and Welfare from Harmful Air Pollution. Under Section 202(a)(1) of the Clean Air Act, EPA 'shall by regulation prescribe . . . standards applicable to the emission of any air pollutant from any class or classes of new motor vehicles . . ., which in [its] judgment cause, or contribute to, air pollution which may reasonably be anticipated to endanger public health or welfare.' 42 U.S.C. § 7521(a)(1). 'By employing the verb 'shall,' Congress vested a non-discretionary duty in EPA,' Coalition for Responsible Regulation, Inc. v. EPA, 684 F.3d 102, 126 (D.C. Cir. 2012), rev'd in part on alternative grounds, the purpose of which is clear: reduce or eliminate the threats to public health and welfare of deleterious air pollutants. See 42 U.S.C. § 7401(b)(1) (declaring a goal of the Clean Air Act 'to protect and enhance the quality of the Nation's air resources so as to promote the public health and welfare and the productive capacity of its population'); Massachusetts, 549 U.S. at 532 (explaining that 'EPA has been charged with protecting the public's 'health' and 'welfare'' in Section 202(a)).

In SAFE 2, EPA disregarded its statutory mandate and Congress's objective of reducing harmful emissions. The agency adopted standards that, by its own estimate, would increase GHG emissions by 923 million metric tons, 85 Fed. Reg. at 24,176, and thereby exacerbate the long recognized and well-documented threats to public health and welfare posed by the climate crisis.96 97 EPA also projected that its SAFE 2 standards would increase criteria pollution, 85 Fed. Reg. at 25,059-60, and result in adverse public health impacts such as premature deaths, asthma exacerbation, and non-fatal heart attacks, id. at 25,112-13. These preventable increases in harmful air pollution needlessly enhanced known threats to public health and welfare, and the Administrator failed to 'square [] [this] with the statutory objectives that Congress specified.' See Independent U.S. Tanker Owners Comm. v. Dole, 809 F.2d 847, 854 (D.C. Cir. 1987). Rather, the Administrator improperly prioritized 'reducing the cost of compliance on the regulated industry and the upfront (but not total) cost to consumers,' 86 Fed. Reg. at 43,786, over the reduction in harmful air pollution that Section 202(a) expressly demands.98 See Independent U.S. Tanker Owners Comm., 809 F.2d at 854 (Administrator 'is not free to substitute new goals in place of the statutory objectives without explaining how these actions are consistent with [his] authority under the statute'). See also Proof Brief of State and Local Government Petitioners at 43-45, Competitive Enterprise Institute, et al. v. NHTSA, No. 20-1145 (D.C. Cir. Jan. 14, 2021).

Unlike the SAFE 2 standards, EPA's Proposal comports with its congressional mandate in Section 202(a). EPA properly recognizes that it is required to reduce harmful air pollution. The Proposal, and particularly the more stringent alternatives included therein, will further the statutory objective and reduce, rather than exacerbate, threats to public health and welfare. EPA projects that the proposed standards will reduce GHG emissions by more than 2,200 million metric tons of CO_2, 2.7 million metric tons of CH_4, and 71,000 metric tons of N_2O through 2050, in addition to reductions in criteria pollutant emissions. 86 Fed. Reg. at 43,785. And the more stringent standards in Alternative 2 would reduce harmful emissions even more. Id. at 43,739 (Table 8). EPA correctly describes these emissions reductions as an 'essential factor' in its determination of the appropriate level of the proposed standards, id., and properly places greater weight than in its SAFE 2 rule on the statutory goal of reducing harmful pollution, id. at 43,786. We support EPA's return to a proper balancing of factors in setting vehicle emission standards—including the proper emphasis on reducing harmful air pollution and mitigating threats to public health and welfare. [EPA-HQ-OAR-2021-0208-0245-A1, pp.18-20]

The only express statutory constraint on EPA's mandate to control harmful air pollution is the requirement that EPA determine there is sufficient lead time for the standards it promulgates—that the standards provide 'such period as the Administrator finds necessary to permit the development and application of the requisite technology, giving appropriate consideration to the cost of compliance within such period.' 42 U.S.C. § 7521(a)(2). As the D.C. Circuit held not long after this section was enacted, this requires EPA to 'provide the requisite lead time to allow technological developments' while avoiding 'undue economic disruption' in the auto industry, such as the 'doubling or tripling the cost of motor vehicles.' Motor & Equip. Mfrs. Ass'n, Inc. v. EPA (MEMA I), 627 F.2d 1095, 1118 (D.C. Cir. 1979). EPA may find that lead time is sufficient where there are 'plausible reasons for [EPA's] belief that the industry will be able to solve … problems in the time remaining.' NRDC v. EPA, 655 F.2d 318, 333–34 (D.C. Cir. 1981). [EPA-HQ-OAR-2021-0208-0245-A1, p.24]

Measures—such as the standards in EPA's proposal—that reduce pollution in these communities are urgently needed, and addressing that need (and others described above) is mandatory under Section 202(a). [EPA-HQ-OAR-2021-0208-0245-A1, p. 24]

EPA can more than plausibly find that lead time would be sufficient for each of the model-year standards it is considering here (including Alternative 2 and an additional 10 grams/mile of stringency in MY2026), and there is no reason to conclude that any of these standards would cause undue economic disruption. Because lead-time considerations can vary by model year, we address each year (or small group of similar years) separately below. And, as discussed in more detail below in Subsection D, we urge EPA to do the same in its final rule both because of variability in the facts associated with different model years and to support severability should one or more model-year standards be stayed or vacated. [EPA-HQ-OAR-2021-0208-0245-A1, p.24]

Thus, here, the only lead time question is whether automakers have sufficient time to develop and implement a compliance strategy for each of the model years at issue. And, under the longstanding design of this regulatory program (which EPA is not proposing to change), compliance strategies involve not only the fleet an automaker plans to sell in a given model year but also strategic decisions concerning whether and when to earn, purchase, bank, and use credits. See 86 Fed. Reg. at 43,733. Consideration of both of these aspects of automaker compliance strategies leads to only one conclusion: there is sufficient lead time for all the standards included in EPA's proposal. As we explain further below, EPA should consider adopting its Alternative 2 standards for MY2023 and should not finalize standards for that year that are less stringent than its preferred alternative. Regardless of where EPA sets the standards for MY2023, it should finalize Alternative 2's standards for MYs 2024-2026 with the proposed additional 10 grams/mile of stringency in MY2026. Finally, EPA should also make separate lead-time findings for each model year (or group of similar model years) to support severability of the model-year standards should that be necessary. [EPA-HQ-OAR-2021-0208-0245-A1, p.25]

Indeed, any changes in plans automakers made in reliance on the SAFE 2 standards remaining in place for MY2023 would have been unreasonable. There was only a very 'limited period' between when SAFE 2 was finalized and President Biden's direction to reconsider, and the SAFE 2 standards have been vigorously challenged since their adoption. See Mozilla Corp. v. FCC, 940 F.3d 1, 64 (D.C. Cir. 2019) (holding reliance interests unreasonable where rule was in effect for 'barely two years' and 'faced persistent legal challenges'). In those challenges, vacatur of SAFE 2 and reinstatement of the standards promulgated in 2012 was an available remedy. See, e.g., Nat'l Parks Conservation Ass'n v. Semonite, 925 F.3d 500, 501 (D.C. Cir. 2019) (describing vacatur as 'default remedy to correct defective agency action'); Sugar Cane Growers Co-op. of Fla. v. Veneman, 289 F.3d 89, 97 (D.C. Cir. 2002) (characterizing vacatur as 'restor[ing][the status quo ante'). Where, as here, 'agency orders on which the [parties] claim to have relied not only had never been judicially confirmed, but were under unceasing challenge,' 'reliance is typically not reasonable.' Verizon Tel. Companies v. FCC, 269 F.3d 1098, 1110 (D.C. Cir. 2001). [EPA-HQ-OAR-2021-0208-0245-A1, pp.26-27]

Each Model Year's Standards Should Be Severable. Whatever standards EPA adopts, it should include a severability provision for each model year indicating that it would adopt each model year's standards even if other model-year standards are stayed or vacated.152 EPA should also support severability by making independent lead-time (and any other necessary) findings for each model year. In other words, EPA should make it clear that 'the agency would have adopted' each model year's standards on their own and that each model year's standards could function even if earlier model years' standards were stayed or vacated.153 For example, EPA should find that the MY2024 and later-year standards it adopts would provide adequate lead time even if the MY2023 standards EPA finalizes are stayed or vacated. EPA should make similar findings for each year. These findings are well-supported by the existing record, as discussed above.

Moreover, if one or more early model years were stayed, automakers would have even greater opportunities to accumulate windfall credits in those years, further underscoring that more stringent standards in the outer years can and should remain in effect. [EPA-HQ-OAR-2021-0208-0245-A1, pp.31-32]

We are encouraged that EPA has drastically improved the analysis it relied on for the SAFE 2 standards, correcting multiple, serious errors as well as unrealistic input assumptions. See, e,g., 86 Fed. Reg. at 43,769 Table 30. As discussed in more detail in SAFE 2 briefing, and in the comments and appendices submitted by CARB, we agree with, among other things, EPA's decisions to allow the modeling to apply high-compression ratio technologies to far more vehicles than the SAFE 2 modeling did and to return to the 10% rebound estimate it has previously employed.154 After correcting these (and other) errors, the resulting analysis is reasonable and justified. We also support EPA's decision to use the Corporate Average Fuel Economy Compliance and Effects Modeling System (CCEMS). While EPA should continue to refine its modeling capabilities for future rulemakings, including developing OMEGA2, EPA's approach to analyzing net benefits for all its proposed standards allows for more direct comparison with the SAFE 2 Rule and clearly demonstrates the need and bases for standards more stringent than SAFE 2.

We also very much agree with EPA's conclusion that a properly conducted cost-benefit analysis, such as the one EPA has performed here, strongly supports more stringent standards—either EPA's preferred alternative or Alternative 2 (and the additional 10 grams/mile added to either for MY2026). As EPA notes, net benefits have consistently been clear for all increases in stringency to GHG standards—from the initial standards finalized in 2010 to the Phase 2 standards finalized in 2012 and to the 2016 TAR and 2017 Final Determination in the Mid-Term Evaluation process. See 86 Fed. Reg. at 43,734-35 (noting that 'results of … earlier analyses, as well as the updated analysis … performed [here], have all produced very similar results in several key metrics'). As discussed in CARB's separate comments (including attached expert analyses), EPA should consider further revisions to its cost-benefit analysis, which would cumulatively show even greater net benefits to the proposed standards. CARB Comments at 33-40. For example, EPA should change its price elasticity figure from the -1.0 it used (erroneously) in SAFE 2 to one with an absolute value much closer to zero. Id. at 38-39 (citing expert analysis from Prof. Ken Gillingham). Without such changes, EPA's cost-benefit analysis underestimates the true net benefits, though the net benefits EPA calculates clearly support its proposed action(s). Indeed, EPA's cost-benefit analysis establishes that the proposed standards would significantly benefit society, producing (as underestimated) between $86 billion and $140 billion of total net benefits. 86 Fed. Reg. at 43,735 (Table 4). EPA projects that consumers would save between $120 billion and $250 billion on fuel costs. Id. Although many of these benefits remain unquantified, the proposed standards would generate between $22 billion and $280 billion in climate benefits from greenhouse gas reductions and at least $3.6 billion to $8.8 billion in benefits from reduction in fine particulate matter. Id. at 43,795 (Tables 54-55). [EPA-HQ-OAR-2021-0208-0245-A1, pp. 32-33]

We are encouraged that EPA's SC-GHG analysis, by accounting for global climate harms, has corrected serious errors in SAFE 2's social cost of carbon ('SCC') analysis that used a scientifically and legally indefensible domestic number. As CARB and the multi-state coalition have explained,155 SAFE 2's domestic SCC ignored the best available science and failed to consider an important aspect of the problem. Indeed, agency reliance on an interim domestic SCC in lieu of the global SCC has been held arbitrary and capricious,156 whereas agency reliance on the global SCC has been upheld.157 We recommend EPA identify these errors in SAFE 2's SCC analysis and explain why EPA needed to correct them and return to its longstanding recognition—dating as far back as 2008, under the Administration of President George W. Bush—that 'GHGs are global pollutants' that require a global analysis.158 [EPA-HQ-OAR-2021-0208-0245-A1, p.33]

Commenter: Center for Biological Diversity, et al.

Standards under Clean Air Act Section 202(a) Must Give Primary Importance to the Need to Reduce Emissions to Mitigate Dangers to Public Health and Welfare. Clean Air Act section 101(b)(1) declares that the purpose of the Act is to "protect and enhance the quality of the Nation's air resources so as to promote the public health and welfare." 42 U.S.C. § 7401(b)(1). Section 202(a) in turn directs the Administrator to promulgate new motor vehicle emissions standards that address emissions of air pollutants that "in his judgment cause, or contribute to, air pollution which may reasonably be anticipated to endanger public health or welfare." 42 U.S.C. § 7521(a). EPA's statutory duty is to reduce the dangers it identifies through vehicular emission standards, while taking into account considerations of timing, technological feasibility and cost. See Coal. for Responsible Regulation, Inc. v. EPA, 684 F.3d 102, 122 (D.C. Cir. 2012).

Under the statute and basic requirements of reasoned decision-making, when EPA acts under Section 202(a), it must arrive at a response commensurate with the harm the vehicle emissions it regulates cause to public health and welfare and explain how its standards reduce the "endanger[ment]" that it has identified. Any "balancing" of factors—including available technology, costs, and lead time—must prioritize the principal harm-reduction mandate animating the statute. The 2020 Final Rule failed in these respects. In that rule, EPA almost completely ignored the central pollution problem caused by greenhouse gas emissions— climate change—and disregarded EPA's own findings regarding its severity and the urgent need for mitigation. Nowhere did EPA explain how weakening standards could be justified under the statute given the acknowledged dangers to health and welfare. See Competitive Enterprise Inst. v. EPA, D.C. Cir. No. 20-1145, Brief of Public Interest Organization Petitioners, at 8-12 (ECF 1880214), attached as Exhibit 45.

EPA had previously acknowledged that the preexisting standards established by the 2012 Final Rule were "the most significant federal actions ever taken to reduce GHG emissions . . . in the U.S." 2017 and Later Model Year Light-Duty Vehicle Greenhouse Gas Emissions and Corporate Average Fuel Economy Standards, 77 Fed. Reg. at 62,630 (Oct. 15, 2012) (2012 Final Rule). And EPA has itself repeatedly documented the massive damage wrought by vehicular GHG emissions and the urgency of curtailing climate change. See Joint NGO Climate Change Comments 2-7. Yet EPA proceeded to adopt a rule that increases emissions and fuel consumption dramatically, increasing GHG emissions from affected vehicles by at least 867 million more tons. The Safer Affordable Fuel-Efficient (SAFE) Vehicles Rule for Model Years

2021-2026 Passenger Cars and Light Trucks, 85 Fed. Reg. 24,174, 24,176 (Apr. 30, 2020) (2020 Final Rule).

The 2020 Final Rule's rollback in standards defied reports from leading scientific bodies, and EPA itself, that sound the alarm for immediate action to lower GHG emissions. EPA's duty under the statute is to prescribe standards reducing the "endanger[ment]," while considering necessary lead time in light of technology and compliance costs. 85 Fed. Reg. at 24177. EPA cannot rationally perform that task without fully examining the nature, magnitude, and effects of climate-changing pollution. EPA nowhere explained why it was reasonable, in light of its own endangerment findings and the catastrophic harms documented in this record, to weaken its prior standards, vastly increasing vehicular emissions despite ready availability of effective technologies to reduce them. EPA's discussion of climate change in the 2020 rule's preamble consisted of little more than references to the National Highway Traffic Safety Administration (NHTSA) Environmental Impact Statement (EIS). 2020 Final Rule, 85 Fed. Reg. at 24,846, 24,849, 25,111 n.2480. In that document, NHTSA arbitrarily brushed off the effects of nearly a billion metric tons of climate pollution as "extremely small in relation to global emissions trajectories," [FEIS, S-13] – an arbitrary and dismissive approach irreconcilable with any serious effort to mitigate climate dangers, let alone with EPA's special statutory charge to protect public health and welfare. In the 2020 Final Rule, EPA remained conspicuously silent on the central statutory concern, and failed to explain how a dramatic weakening of standards – and adoption of standards that accomplish much less than can be achieved with readily available technologies – comported with the agency's Clean Air Act duties to protect public health or welfare.

In the 2020 Final Rule, EPA improperly attempted to recast Section 202(a)'s directive to impose standards to reduce dangerous emissions—bounded by consideration of timing, technical feasibility and cost—as an open-ended balancing test giving the agency "effectively complete discretion," Oceana, Inc. v. Locke, 670 F.3d 1238, 1242 (D.C. Cir. 2011). But Section 202 is no such blank check: As the Proposal correctly observes, "the purpose of adopting standards under CAA section 202 is to address air pollution that may reasonably be anticipated to endanger public health and welfare. Indeed, reducing air pollution has traditionally been the focus of such standards." 86 Fed. Reg. at 43,729. In developing standards under Section 202, the agency cannot disregard or slight the statute's central mandate to reduce dangers to public health and welfare. The proposal represents a positive step insofar as EPA restores public health and welfare to the center of its analysis under Section 202. And, on the record before it, EPA is clearly correct to conclude that "[g]reater reductions in GHG emissions from light duty vehicles over these model years are both feasible and warranted as a step to reduce the impacts of climate change on public health and welfare." Id. at 43,781.

The 2020 Final Rule did not result from an "alternative" balancing of statutory factors; it was an indefensible, unreasoned subordination of the statute's central objective and core requirement. EPA need not find that the 2020 Final Rule violated the statute in order to revisit the standards that the 2020 rule established. But in this rulemaking EPA should confirm that whatever room for balancing of factors Section 202(a) provides, the statute does not give the agency an open-ended authority to adopt whatever standards it wishes; to invent spurious "factors" (such as an overriding preference for avoiding "upfront costs" even when discounted fuel costs would far exceed them); or disregard the statutory mandate to reduce emissions that endanger public health and welfare. [EPA-HQ-OAR-2021-0208-0651-A1, p. 16-18]

EPA Should Acknowledge the Patent Mistakes that Underlie the 2020 Final Rule. “Agencies are free to change their existing policies as long as they provide a reasoned explanation for the change.” Encino Motorcars, LLC v. Navarro, 136 S. Ct. 2117, 2125 (2016). In order to change course, EPA does not need to demonstrate that the 2020 Final Rule was contrary to statute or arbitrary and capricious. See generally FCC v. Fox Television Stations, Inc., 556 U.S. 502, 515 (2009).

However, EPA should acknowledge that the 2020 Final Rule was marked by serious errors that require correction regardless of any changes in policy views. The 2020 Final Rule’s central reliance on a claim that consumers have an extraordinary preference for “upfront” vehicle cost savings over later fuel-cost savings, see, e.g., 85 Fed. Reg. at 25,111, 25,210, 25,171, was not just a different policy perspective; it was flat wrong. EPA and NHTSA had already accounted for the fact that purchase prices and fuel costs occur at different times (i.e., for the time value of money) by using a discount rate to convert future costs and benefits to their present value. Id. at 24,281. By later assigning even more weight to upfront costs, the Agencies “double-discounted” future cost savings, violating long-established agency practice and guidance, economic theory, and common sense. This is not a reasonable policy judgment; it has no grounding in the statute or established economic analysis.60

In the Proposal, EPA properly moves away from the 2020 Final Rule’s approach to upfront costs, 86 Fed. Reg. at 43,785. But, in doing so, EPA should make clear that the need to reject that approach is more than a “change in policy priorities.” Id. EPA should acknowledge that this aspect of the 2020 Final Rule was not only inconsistent with EPA’s current policy priorities, but was also outside the bounds of reasonable analysis. Nothing in the statute or in rational economic analysis authorized the 2020 Final Rule’s reliance on upfront costs as a basis for overriding statutory priorities and the results of conventional cost-benefit analysis.

And the double-counting of upfront costs was hardly the only patent error in the 2020 Final Rule that cannot fairly be characterized merely as a differing weighing of policy considerations. The 2020 rule was based upon numerous patent analytical errors – outright mistakes – that severely distorted the analysis underlying the decision to weaken the existing emission standards. Many of these errors are described in detail in the NGOs’ joint petition for administrative reconsideration.61 These are not debatable-but-defensible policy judgments, but patent errors that EPA should acknowledge. The multiple clear analytical mistakes further confirm that the 2020 Final Rule’s gratuitous weakening of emissions standards must be rescinded. [EPA-HQ-OAR-2021-0208-0651-A1, p. 18-19]

Commenter: Consumer Federation of America

The Trump administration, reintroduced over two dozen (28) errors in its SAFE 2 rule which had previously been corrected. By reintroducing these errors into the rule, the benefit-cost ratio calculated by CFA of the standard in place before SAFE 2 to be 5-to-1, but subsequently has been reduced to a mere 1.1-to-1. By reversing many of these errors through this proposed rulemaking and taking into account key changes, the benefit ratio has risen to 2.2-to-1. [EPA-HQ-OAR-2021-0208-0297-A1, p. 1]

Table 3.1 presents EPA's summary of changes in its analysis compared to the Trump administration's SAFE 2 Rule. We have highlighted the major changes that EPA correctly concluded the Trump administration failed to justify. The references in the Table are to the chapters in the Regulatory Impact Assessment.

The first three items involve the valuation of greenhouse gases and other pollutants. At one level, this is just an updating of the values used, although the cost of carbon is considerably large, consistent with international analyses and consensus, and the cost of methane is included. At another level, it represents a symbolically and quantitatively significant return to the treatment of externalities. Since climate change is a global problem, it takes into account the full global value of reducing emissions. The fourth item is a significant change that affects the economics of the proposed standard in two ways. EPA returns to a 10 percent rebound rate, which it had justified before the Trump administration doubled it. Increasing the rebound rate reduces the estimate of fuel savings and assumes a much larger increase in driving than is justified, which affects the 7th item, congestion. EPA has once again justified its use of a 10 percent discount rate. CFA has argued that a lower discount rate can be justified today and certainly will be more appropriate in the future.

Items 5, 6, 7 and 9, involve updates of values that increase the net benefit slightly. As discussed below, CFA believes a lower discount rate (1% to 2%) should be included to set the result in perspective. Because climate change is a long-term, global phenomenon, the 3 percent discount rate undervalues the impact on future generations. In fact, EPA uses a lower and more narrow range to assess the value of greenhouse gas reduction (2.5% to 5%).

Items 11 and 12 involve the availability of technologies, which has been updated and involves a very significant impact on the estimation of costs and net benefits. As discussed below, the Trump administration had inappropriately doubled the projected cost of the technologies. The EPA justified a much lower number in the earlier Technical Assessment Review (TAR) and did so again here. Item 13 involves the modeling of credits, which lowers the projected fuel and emission savings somewhat. [EPA-HQ-OAR-2021-0208-0297-A1, p. 11; Table 3.1 can be found at docket number EPA-HQ-OAR-2021-0297-A1, p. 12.]

These corrections to the flawed SAFE 2 rule account for the bulk of the difference in the benefit-cost ratio. They are well justified in the proposed rule and address the 'third-party' criticisms of the SAFE 2 rule.

Table 3.2 presents a summary of the CFA criticism of the SAFE 2 rule compared to other third-party evaluations. The CFA column identifies over a dozen mistakes that the Trump administration had reintroduced into its analysis. We then provide three critical articles, as well as references to other evaluations, showing the type of error. Finally, we estimate the impact of the errors on our calculation of the benefit/cost ratio. [EPA-HQ-OAR-2021-0208-0297-A1, p. 12; Table 3.2 can be found at docket number EPA-HQ-OAR-2021-0297-A1, p. 13.]

Many of the elements in Table 3.2 track with the differences EPA noted in Table 3.1 for its modeling of the benefits and costs. The three broad categories, overestimation of costs, underestimation of benefits, and the value of driving, summarize the individual elements. [EPA-HQ-OAR-2021-0297-A1, p. 14; Tables 3.1 and 3.2 can be found at docket number EPA-HQ-OAR-2021-0297-A1, p. 12 and 13]

Commenter: District of Columbia Department of Energy and Environment

DOEE supports EPA in strengthening GHG standards for light-duty vehicles under Clean Air Act § 202(a). [EPA-HQ-OAR-2021-0208-0240-A1, p.1]

Commenter: Elders Climate Action (ECA)

To Stabilize the Climate as Quickly as Possible, and Protect the Public Health, EPA Must Set a Zero Emissions Standard for GHG Emissions from New Motor Vehicles, and Begin Phasing in the Standard With the 2026 Model Year.

The Clean Air Act authorizes EPA to set emission standards for motor vehicles ‘as needed to protect public health or welfare, taking costs, energy and safety into account.’3 We ask the Administrator to make the determination that emissions of both GHGs and precursors to the criteria pollutants PM and ozone emitted from light duty vehicles must be reduced to zero to -- 1) protect the public health and welfare from the many adverse effects of climate warming, and 2) prevent the direct injury to health caused by pollutants emitted from internal combustion engines.

The Act provides that ‘[a]ny such [standard] under this subchapter may provide for a phase-in of the standard.’4 We ask the Administrator to begin phasing in a zero emission standard by establishing a sales mandate that requires each manufacturer to achieve 30% ZEV sales during the 2026 MY with the goal of achieving 100% ZEV sales by 2030 in order to achieve zero emissions from on-road light duty vehicles by 2045. [EPA-HQ-OAR-2021-0208-0521-A1, p. 3]

Urgent Need for Zero GHG Emission Standard to Achieve GHG Reductions. Harm to public health and the environmental, property and economic resources of our communities incorporated into the CAA definition of ‘public welfare’ was anticipated and comprehensively described in the Administrator’s Endangerment Finding that established the basis for regulating six GHGs under the CAA.5 All of the anticipated harms have now been demonstrated to vary degrees, and are accelerating rapidly as the planet continues to heat up. [EPA-HQ-OAR-2021-0208-0521-A1, p. 4]

In its Regulatory Impact Assessment, at 2-15, EPA acknowledges that

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

But EPA does not disclose what its 'long-term GHG reduction goals' are, how it intends to achieve them, or whether and how the current rulemaking contributes to achieving those goals. The reasonableness of the current proposal turns on whether EPA 1) is committed to achieving the GHG reductions identified by the IPCC as necessary to avoid the dire public health and environmental consequences of warming greater than 1.5°C, 2) believes that zero emissions from on-road vehicles are a necessary component of the President's national policy of transforming the U.S. into a zero emission economy by 2050, and 3) can establish how the current proposal contributes to a strategy designed to achieve those objectives.

In the absence of any consideration of these factors and an explanation by the Agency of how it has addressed those factors in developing its proposed decision in this rulemaking, the current proposal fails to consider relevant factors, fails to provide a rational basis for the proposal, and is arbitrary and capricious. [EPA-HQ-OAR-2021-0208-0521-A1, p. 12]

The expected increase in the severity and frequency of harms to health and the public welfare that will be caused by more extreme events that will occur as the global mean temperature advances toward and above the 1.5°C level resulting from growing GHG concentrations in the atmosphere, establish the need for a zero GHG emissions standard for light duty vehicles pursuant to section 202(b)(1)(C) of the Clean Air Act. [EPA-HQ-OAR-2021-0208-0521-A1, p. 12.]

NAAQS Attainment for Ozone and Particulate Matter Requires a Zero Emission Standard. In addition to the public health and welfare effects of a warming climate caused by GHG emissions, the persistent ozone nonattainment status of most American cities since the initial enactment of the CAA in 1970, the addition of new counties to the list of nonattainment areas, the worsening of ozone concentrations and the frequency of ozone exceedance days, and the demonstrated adverse health impacts of fine particles emitted by ICEs also demand that EPA issue a zero emission standard for LDVs. [EPA-HQ-OAR-2021-0208-0521-A1, p. 13]

Commenter: Energy Innovation Policy and Technology LLC

We are heartened with EPA's statement that the proposed action serves 'as a critical building block for a comprehensive, multipollutant longer-term regulatory program implementing EPA's statutory authority under the CAA.'[v] [EPA-HQ-OAR-2021-0208-0605-A1, pp. 2]

We commend the EPA for their rigorous analytical work to determine the clear shortcomings of the SAFE Vehicles Rule for Model Years MY 2021-2026 Passenger Cars and Light Trucks rules, which clearly failed to reduce GHGs and other air pollutants from the transportation sector and ignored the disproportionate impacts of tailpipe emissions on BIPOC and low-income/low-wealth populations. In addition, the proposed rules addressing MY 2023 is key to ensuring the standards take effect as soon as possible, so the U.S. does not lose yet another year in its efforts to clean up the transportation sector, mitigate climate change, and save consumers money. Yet, while the proposed rule is an improvement over the SAFE rules, the preferred option still falls short of what is needed. [EPA-HQ-OAR-2021-0208-0605-A1, p. 4]

Commenter: Energy Strategy Coalition

EPA Must Address Greenhouse Gas Emissions from Motor Vehicles, which the Proposed Rule Appropriately Does. Courts have held that EPA has a requirement to address GHG emissions from motor vehicles.5 The D.C. Circuit explained in Coalition for Responsible Regulation, Inc. v. EPA that 'in the Endangerment Finding, EPA determined that motor-vehicle emissions contribute to greenhouse gas emissions that, in turn, endanger public health and welfare; the agency therefore was in no position to 'avoid taking further action,' by deferring promulgation of the Tailpipe Rule.'6 The Court found that EPA's interpretation of its responsibilities under the Clean Air Act to set emission standards for cars and light trucks as 'unambiguously correct.' Additionally, D.C. Circuit judges who are on the en banc panel that heard oral argument in the cases concerning the Clean Power Plan reaffirmed this obligation when the Court partially granted EPA's request for abeyance of the litigation, reminding the agency that 'in 2009, EPA promulgated an endangerment finding, which we have sustained…That finding triggered an affirmative statutory obligation to regulate greenhouse gases.'7 Given the transportation sector's significant contribution to GHG emissions, EPA should not take any actions counter to this statutory obligation and the emission reduction opportunities from motor vehicles.

The Proposed Standards reflect EPA's consideration of a number of relevant factors, including the technical feasibility of the proposed standards, the moderate costs per vehicle, the savings to consumers in fuel costs over the lifetime of the vehicle, the very significant reductions in GHG emissions and fuel consumption, and the significantly greater quantified benefits compared to quantified costs. We agree with EPA's assessment in that the Proposed Standards are appropriate under EPA's section 202(a) authority. [EPA-HQ-OAR-2021-0208-0533-A1, p.2]

Commenter: Environmental Defense Fund (EDF)

Automakers' demonstrated ability to comply with EPA's GHG standards using earned or otherwise acquired compliance credits is thus an essential part of the agency's Section 202(a)(2) analysis. [EPA-HQ-OAR-2021-0208-0688-A1, p. 8]

This means that finalizing EPA's proposed MY 2023-2026 standards would comport with CAA Section 202(a)(2). No waiting "period" can be "necessary" if the pace of "application of the requisite technology" to comply, 42 U.S.C. § 7521(a)(2), will for several model years into the future roughly mirror the pace presently codified by regulation and which pace no automaker has suggested is too precipitous--and fall well short of the pace of improvement that automakers long expected the law would require of them in MY 2023-2025. [EPA-HQ-OAR-2021-0208-0688-A1, p. 8-9]

Commenter: Environmental Law & Policy Center (ELPC), et al.

Section 202 of the Clean Air Act requires the EPA to issue regulations to control motor vehicle emissions that 'in [the Administrator's] judgment cause, or contribute to, air pollution which may reasonably be anticipated to endanger public health or welfare.' 42 U.S.C. 7521(a)(1). As the proposed rule notes, EPA made a finding in 2009 that greenhouse gas emissions 'may reasonably be anticipated to endanger the public health and welfare of current and future generations.'[5] EPA therefore has a statutory duty to address these climate-changing, health-and-welfare-endangering emissions, and must issue vehicle emission standards that match the urgency of the crisis. [EPA-HQ-OAR-2021-0208-0567-A1, pp 2]

The Clean Air Act provides that EPA's vehicle emission standards 'shall take effect after such period as the Administrator finds necessary to permit the development and application of the requisite technology, giving appropriate consideration to the cost of compliance within such period.'42 U.S.C. § 7521(a)(2). EPA acknowledges that the automakers were already planning for the strong standards issued in 2012.[20] [EPA-HQ-OAR-2021-0208-0567-A1,p.3]

We also note that EPA clearly has the authority under the Clean Air Act to act separately from NHTSA. Even though the two agencies have jointly proposed and finalized rulemakings in the past in order to harmonize their respective vehicle emissions and fuel-efficiency standards, there is no requirement that the agencies act jointly, and their separate statutory authority and statutory duties make it logical for them to act separately here. [EPA-HQ-OAR-2021-0208-0567-A1, pp. 4]

Commenter: Environmental Protection Network (EPN)

In the past, EPA has exercised its discretion under Section 202(a) to provide some manufacturers who meet specific criteria temporary relief in the form of additional lead time, based on a careful evaluation of the circumstances for those manufacturers. For example, EPA previously provided 'Temporary Lead Time Allowance Alternative Standards' for manufacturers that met certain sales criteria to address lead time concerns in the initial years of the MY2012 to 2025 GHG program.[23] EPA carefully limited the form and scope of the temporary relief to fit the circumstances and placed various restrictions on the provision to avoid inappropriate loss of emissions reductions. [EPA-HQ-OAR-2021-0208-0213-A1, p.12-13]

Commenter: Fuels Freedom Foundation

With these goals in mind, Fuel Freedom commends the EPA for reconsidering the SAFE Rule. The rise in atmospheric CO_2 and rising temperatures reflect an increasingly urgent need to mitigate potential impacts on health and human welfare. Yet in the SAFE Rule the EPA had effectively deferred its obligation to reduce GHG emissions in light-duty transportation—not only minimizing the EPA's own endangerment finding for CO_2, but compromising global competitiveness of U.S. industry when light duty standards in the rest of the world are moving in the opposite direction.

Since 2009, the EPA has significantly reduced GHG emissions from light-duty transportation by regulating tailpipe CO_2 standards. Nonetheless, as noted in the Proposed Rule, transportation is today the biggest source of GHGs, with light-duty vehicles contributing the largest portion. For the long term, regulating vehicle technology will not be enough. To sufficiently reduce carbon intensity, our national policies need to adopt a more holistic approach.

EPA's authority to reduce CO_2 emissions, reaffirmed by the U.S. Supreme Court,1 is not limited to vehicle emissions alone.2 [EPA-HQ-OAR-2021-0208-0231-A1, p. 1]

Commenter: Growth Energy

EPA ignores the lifecycle benefits of ethanol, while not considering the full lifecycle emissions of other vehicle technologies including electric vehicles. The NPRM does not have any extended discussion regarding lifecycle analysis of vehicle greenhouse gas emissions, which includes tailpipe emissions, "upstream" greenhouse gas emissions associated with the fuel and vehicle production, and carbon uptake of biogenic materials whereby carbon is effectively "recycled" in biofuels.

In a veiled discussion, the NPRM does recognize – and then selectively ignores – upstream emissions. The NPRM say its analysis estimates the "GHG and non-GHG emission impacts (tailpipe and upstream)" of the proposal (NPRM at 43,734). Later, the NPRM emphasizes analysis of "upstream emissions associated with the fuels used to power those vehicles (both at the refinery and the electricity generating unit)." (NPRM at 43,777). However, the NPRM then says, "EPA is continuing to use tailpipe-only values to determine vehicle GHG emissions, without accounting for upstream emissions (EVs and PHEVs will continue to use 0 g/mile through MY 2026)." (NPRM at 43,746).

Thus, EPA selectively ignores lifecycle emissions associated with fuel use derived from electricity. The NPRM assumes-away the upstream emissions of EVs and PHEVs, assigning them a value of zero grams per mile, even though the NPRM assumes electric power plants – and thus EVs – will use fossil fuel electricity through 2050 (NPRM at 43,779-80).

The importance of fully considering lifecycle greenhouse gas emissions is widely recognized by EPA and other stakeholders. For instance, the credits generated under the California Low Carbon Fuel Standard (LCFS) are based on lifecycle greenhouse gas emissions.10 The United States Department of Energy and national labs have extensively assessed lifecycle greenhouse gas emissions of light duty vehicle fuels, including in conjunction with the GREET model used by EPA.11 The NPRM itself notes that "upstream emissions factors" used in its models are from the "DOE/Argonne GREET model." (NPRM at 43,779). Furthermore, materials in the interagency review materials for this docket note "The GREET model is widely recognized as a reliable tool for life cycle analysis (LCA) of transportation fuels and has been used by several regulatory agencies."12 A National Academy of Sciences report in this docket's interagency review materials finds a "full fuel cycle assessment more fully captures the total light-duty vehicle system greenhouse gas emissions and energy consumption than an onboard, in-use consumption or emissions metric, and more evenly compares vehicles using different fuels."13

The National Academy of Sciences, in these docketed materials, further finds that “use of only tailpipe rather than full-fuel-cycle GHG emissions incentivizes the deployment of zeroemission vehicles, but it misrepresents the actual carbon emissions associated with energy use in a light-duty fleet,” and “As alternative powertrain technologies continue to be adopted, considerations of life cycle environmental impacts and how vehicle policies may affect multiple sectors become especially important.”14 The National Academy of Sciences further finds:

“Notably, if deep GHG emissions reduction is a goal, then there will need to be consideration of not only onboard vehicle emissions, but also the emissions from related sectors, like electricity (for vehicle charging), and manufacturing (of vehicles and their materials and components). This motivates the need for life cycle thinking.15 ”

Other stakeholders have recognized the importance of the EPA vehicle program fully considering lifecycle greenhouse gas emissions. For instance, in a statement on release of the NPRM, NGVAmerica stated “EPA is aware of the environmental benefits of renewable [fuel], but it has resisted including credits for fuels based on upstream emission reductions. The fact that EPA is unwilling to look at the well-to-wheel benefits of different fuels and technologies and reward them with regulatory credits puts … low-carbon fuels at a significant disadvantage to electric vehicles.”16

This lifecycle greenhouse gas emissions issue is not new to EPA. In addition to the above-referenced citations to upstream emissions in the NPRM, EPA’s 2012 final rule on vehicle greenhouse gas standards stated, “EPA is glad to see the advances in research on this important topic [of lifecycle greenhouse gas emissions] and plans to monitor new work in this area,” but “the agency continues to believe that, as of the time of this rulemaking, there is too much uncertainty about the life-cycle impacts of future advanced technologies to conduct the type of detailed, vehicle-specific assessments that would be needed in a regulatory context.”17 The state of lifecycle impacts knowledge has evolved considerably since 2012, including numerous analyses, and implementation of California’s LCFS where ethanol has played a key role as one of the largest sources of greenhouse gas emission reductions under that program.18 [EPA-HQ-OAR-2021-0208-0279-A1, p. 3-5]

Commenter: Ingevity Corporation

In this NPRM, EPA maintains a narrow ‘tailpipe only’ view of GHG emissions, which does not appropriately account for the full lifecycle GHG emissions and the GHG reduction benefits of alternative technologies and fuels.

The purpose of EPA’s GHG regulation is to reduce GHG emissions, and, given the long survival period of CO2 in the atmosphere, there is little difference on the effect of GHG emissions whether they are produced during the production of the vehicle and battery, from the tailpipe, or during the production of electricity. The problem is that EPA’s well-to-wheels analysis inherently tipped the scale in favor of electric vehicles by ignoring the substantial amount of energy used to produce lithium ion batteries. Many studies are now being made on lifecycle emissions, and there are wide estimates in the magnitudes of upstream emissions.

EPA's exclusive recognition of battery electric vehicles as 'game-changing' technology and making electric vehicles the sole beneficiary of valuable 0 g/mile CO2 credit incentives have been based on a narrow well-to-wheels (tailpipe only) view of emissions. However, in 2016, Argonne National Laboratory issued a report evaluating the full life-cycle (or cradle-to-grave) emissions of several fuel pathways, including fossil natural gas and battery electric vehicles .21 The study finds that BEVs are expensive to operate and do not provide significantly larger GHG reductions than gasoline hybrid electric vehicles (HEVs) that operate at half the cost. The study also finds that CNG vehicles, utilizing fossil natural gas, provide 70% of the GHG reductions at 20% of the cost of avoidance in comparison to BEVs .22 The table below summarizes these findings. [The table can be found on p.10 of Docket number [EPA-HQ-OAR-2021-0208-0227-A1]]. [EPA-HQ-OAR-2021-0208-0227-A1, p,10]

The Manufacturers of Emission Controls Association (MECA) recently completed a comprehensive scientific analysis for cradle-to-grave (full lifecycle) greenhouse gas (GHG) emissions for traditional ICE vehicles, HEVs, PHEVs, and NGVs (including NGVs fueled by RNG). As shown in the table below, the results show a NGV crossover SUV operating on RNG has 92% lower emissions than a similar ICE version operating on gasoline and 67% lower emissions than a BEV operating on the 2030 California energy grid. Such analyses confirm that EPA's 'tailpipe only' view is limiting and restricts alternative, and in some cases more effective and lower cost, GHG reduction technologies from being adopted by OEMs and consumers. Ingevity believes the EPA should adopt a full-lifecycle approach as it is the most appropriate and effective method to evaluate alternative vehicle and fuel technologies to achieve real-world GHG reductions. [The tables can be found on p.11 of Docket number [EPA-HQ-OAR-2021-0208-0227-A1] [EPA-HQ-OAR-2021-0208-0227-A1, p.11]

Commenter: Institute for Policy Integrity

EPA should affirm that strong standards help correct market failures that prevent consumers from achieving valuable fuel savings on their own. The SAFE 2 Rule distorted its balancing of factors based on unsupported assumptions about consumer valuations. EPA now correctly balances those factors, but should go further to highlight additional market failures that interfere with consumers purchasing optimal levels of fuel economy on their own, and should conclude that standards are necessary to help correct at least some persistent market failures. [EPA-HQ-OAR-2021-0208-0299-A1, p. 1]

Section 202 of the Clean Air Act instructs EPA to balance its mandate to safeguard 'public health and welfare' with an 'appropriate' consideration of costs.4 In the Proposed Rule, EPA correctly recognizes that a finding of significant net benefits 'reinforces' its conviction that it is 'appropriate[ly] weighing . . . the statutory factors and other relevant considerations.'5 [EPA-HQ-OAR-2021-0208-0299-A1, p. 2]

EPA Should Select the Alternative That Will Maximize Net Social Welfare and Promote Distributional Justice, Consistent with Its Statutory Mandate and Executive Orders [EPA-HQ-OAR-2021-0208-0299-A1, p. 2]

Moreover, the executive order that instructed EPA to revise the SAFE 2 Rule reminded agencies to simultaneously advance the interests of public health, the environment, justice, workers, and communities. A related presidential memorandum, issued the same day, reaffirmed the principles of Executive Orders 12,866 and 13,5637—including that agencies should select regulatory alternatives that 'maximize net benefits' while also accounting for distributive impacts and equity.8 EPA should follow these principles in setting its vehicle standards. [EPA-HQ-OAR-2021-0208-0299-A1, p. 2]

EPA Can Finalize Its Proposed Standards with Adequate Lead Time for the 2023 Model Year, Consistent with Prior Standards. Under Clean Air Act Section 202(a), emission standards may take affect 'after such period as the Administrator finds necessary to permit the development and application of the requisite technology, giving appropriate consideration to the cost of compliance within such period.'17 Thus, when setting new standards, EPA must consider—among other factors—how much lead time is necessary for automakers to comply with new standards. [EPA-HQ-OAR-2021-0208-0299-A1, pp. 3-4]

The Clean Air Act does not require a specific number of days or months for lead time. Instead, EPA has the discretion to balance what is required of manufacturers by any particular regulatory standard versus the time to comply and determine in its judgment how much lead time is necessary. When previous standards have required significant investment in new technologies and could not be achieved with existing technology, EPA has provided somewhat longer lead times in the past. But if a new standard can already be met with existing technology, without extensive redesign of powertrains and engine lines, EPA has the discretion to provide much shorter lead times. Here, EPA has properly exercised its discretion to determine how much lead time is necessary given existing compliance options, and has acted consistently with its historical regulation of vehicle tailpipe emissions.

Congress Provided EPA With Significant Discretion to Determine Appropriate Lead Time. The statutory history and structure suggest that EPA should balance lead time against how technologyforcing its standards are, so when compliance options are readily available, a shorter lead time is permissible. When drafting the Clean Air Act, Congress sought to confront the problems of an automotive industry that previously had no obligation or incentive to reduce its emissions. Congress understood that state-of-the-art pollution controls would not be developed 'until some sort of regulation took it by the hand and gave it a good pull.'21 So Congress crafted a statutory scheme that would require EPA to regulate through the 'drastic medicine' of setting stringent standards that would 'force the state of the art.'22 Through the technology-forcing structure in Title II of the Clean Air Act, Congress readily demonstrated its intent for EPA 'to project future advances in pollution control capability . . . [and] 'press for the development and application of improved technology rather than be limited by that which exists today.''23 Congress instructed EPA in 1970 that it must set standards for MY 1975 that would reduce hydrocarbons and carbon monoxide emissions by more than 90% compared to MY 1970 levels,24 and set future standards to take effect 'after such period as the Administrator finds necessary to permit the development and application of the requisite technology.'25 Congress directed EPA to consider lead time when setting standards because it expected EPA to set stringent standards that would require the development of new emissions controls. Over more than five decades of mobile source regulation since then, EPA has drastically reduced automotive emissions. And it has indeed done so by issuing standards that have sometimes asked automakers to 'do what seems to be impossible.'26

But EPA's proposed standards here do not ask the same of automakers. Instead, the current proposal seeks to remedy a misguided, arbitrary rollback27 by re-proposing standards for MY 2023 that are equivalent to, or even less stringent than, those that were set almost a decade ago28—standards with which many vehicle models already comply. This hardly presents a situation where automakers need significant lead time to rework their product lines. Given the discretion granted to EPA, the agency need not 'provide detailed solutions to every engineering problem' or 'rebut all speculation that unspecified factors may hinder [meeting the standard]' when evaluating adequate lead time.29 Rather, EPA 'need only identify the major steps necessary for development . . . and give plausible reasons for its belief that the industry will be able to solve those problems in the time remaining.'30 Here, EPA has provided a more than sufficient explanation in the Proposed Rule for why the agency expects automakers to be able to meet its proposed MY 2023 standards.

Indeed, given that a significant percentage of the MY 2021 automotive fleet already meets the MY 2023 proposed fleet average standard,31 EPA's analysis is far from a ''crystal ball' inquiry,'32 but rather is based on a reasonable assessment of the domestic automotive fleet. In addition, EPA is providing multiple new flexible compliance options for automakers, including extending the availability of credits generated in MYs 2016–2020, extending multiplier credits, and expanding the off-cycle credits program. These extended flexibilities come on top of other existing flexibilities, like credit trading, the large bank of available credits,33 and the carryback period for compliance. Further, five automakers (and more than one-third of domestic automotive sales) since 2019 have been in compliance with a framework agreement with California to voluntarily meet emission targets for MY 2023 that are equivalent to EPA's new proposed standards. Indeed, EPA could easily increase the standards' stringency, especially for MYs 2024–2026, and, if it retains sufficient flexible compliance options, still determine that 'the development and application of the requisite technology'34 already exists. [EPA-HQ-OAR-2021-0208-0299-A1, pp. 4-6.]

First, EPA should clarify that, whereas the SAFE 2 Rule distorted its balancing of long-term savings versus upfront costs in ways grossly inconsistent with economic practices, regulatory precedent, and statutory mandates, EPA now properly balances the appropriate factors consistent with best economic practices. [EPA-HQ-OAR-2021-0208-0299-A1, p. 8.]

The SAFE 2 Rule Distorted Its Balancing of Factors Based on Unsupported Assumptions About Consumer Valuations; EPA Now Correctly Balances the Factors. EPA's Proposed Rule is far too generous in characterizing the SAFE 2 Rule as merely 'balancing the[] factors' by 'plac[ing] greater weight' on upfront costs as compared to long-term fuel savings,56 public health gains, and other benefits to social welfare.57 The SAFE 2 Rule in fact relied on a distorted balancing of costs and benefits to justify a costly rollback that would increase emissions. By putting forward revised vehicle standards that will reduce emissions and generate net social welfare, EPA has now properly balanced the factors that it must consider in a way once again consistent with principles for economic analysis and rational decisionmaking, and with its statutory responsibilities. EPA should therefore explicitly justify its current approach not as a reweighing of factors, but rather as correcting the SAFE 2 Rule's distorted approach, which had broken from best practices and decades of regulatory precedent.58 Justifying the rule as following the proper approach, rather than just as a reweighing of factors, will give the rule a stronger, more durable foundation.

The Clean Air Act requires EPA to give 'appropriate consideration to the cost of compliance.'59 But when EPA tried to balance the SAFE 2 Rule's costs and benefits in 2020, it found that the rollback's net effects at best 'straddle[d] zero' or were 'directionally uncertain,' depending on the choice of discount rate; in fact, the analysis conducted at a 3% consumption-based discount rate showed that the rollback would result in billions of dollars in net costs.60 EPA therefore explicitly admitted that it could not rely on its cost-benefit analysis to justify the rollback.61 By instead increasing the 'weight' ascribed to upfront costs in order to justify the rollback,62 EPA correspondingly decreased the weight given to longer-term benefits, including fuel savings and environmental gains. But embellishing upfront costs by diminishing long-term cost savings and other effects was not an 'appropriate' consideration of costs: it violated best economic practices and decades of regulatory precedent.

In economic terms, the weight assigned to upfront versus long-term effects is determined by the discount rate.63 As the SAFE 2 Rule acknowledged, ascribing a high discount rate to consumers' valuations of future fuel savings can influence results such that fuel savings will appear not to outweigh the consumers' opportunity cost of purchasing a model with higher fuel economy.64 Yet the SAFE 2 Rule offered no persuasive theory or evidence for why consumers would selectively apply a much higher discount rate to fuel savings, let alone why society should excessively discount fuel savings.65

In promulgating the SAFE 2 Rule, EPA and NHTSA speculated without adequate support that perhaps fuel economy upgrades entailed some unidentified technology tradeoffs that resulted in hidden opportunity costs for consumers, allegedly causing consumers to discount the value of future fuel savings.66 But as Policy Integrity detailed in our 2020 report Shortchanged: How the Trump Administration's Rollback of the Clean Car Standards Deprives Consumers of Fuel Savings,67 the agencies failed to marshal adequate theoretical or empirical support for such speculations.68 Many fuel economy technologies increase performance,69 and even if manufacturers may occasionally reduce select vehicle features like weight to achieve an inexpensive boost to fuel economy, such compliance choices would significantly decrease regulatory costs in ways that the agencies did not account for in the SAFE 2 Rule.70 Given that consumers can access financing at relatively low rates to purchase additional fuel-economy technologies that will pay for themselves, there is no justification to assume that—absent market failures—rational consumers would apply exceedingly high discount rates selectively just to future fuel savings.71

Though the SAFE 2 Rule's main cost-benefit analysis did fully value fuel savings,72 the agencies' justification for the costly rollback departed from those findings. EPA wrongly claimed in 2020 that a full consideration of fuel savings 'distorts the comparison,' and the agency inappropriately focused on ‘upfront vehicle technology costs’ by assuming that consumers may rationally choose ‘to buy a new vehicle at a lower up-front price even if that vehicle will incur a more-than offsetting level of fuel costs over its lifetime.’73 This approach to balancing the factors broke from decades of prior regulatory practice of acknowledging the existence of market failures and consistently considering the full energy savings of regulatory actions.74 Ultimately, EPA got its conclusion entirely backwards in the SAFE 2 Rule: overly discounting the long-term benefits of vehicle standards is what ‘distorts’ the analysis, by ignoring an important factor.

Case law supports that it was not appropriate for the SAFE 2 Rule to overly discount future cost savings in a way that disproportionately weighted upfront costs while effectively ignoring much of the longerterm effects. As the Supreme Court ruled in Michigan v. EPA, it is unreasonable to read a statutory reference to ‘appropriate’ as ‘an invitation to ignore’ a key effect; instead, ‘[c]onsideration of cost reflects the understanding that reasonable regulation ordinarily requires paying attention to the advantages and the disadvantages of agency decisions.’75 Courts similarly have faulted agencies for ‘put[ting] a thumb on the scale by undervaluing the benefits and overvaluing the costs of more stringent standards,’76 and for ‘inconsistently and opportunistically fram[ing] the costs and benefits’ of regulatory action.77 By placing a thumb on the side of upfront costs and opportunistically ignoring longterm benefits, the SAFE 2 Rule fell far short of the statutory instructions to give ‘appropriate consideration to the cost of compliance’ and balance that factor against public welfare.78

By applying appropriate discount rates to the consideration of costs and benefits and selecting a policy choice that will deliver net benefits and advance the Clean Air Act’s purpose, EPA is now correcting the SAFE 2 Rule’s departure from best economic practices and from an appropriate balancing of statutory factors. EPA should justify its approach not as a reweighting of factors, but rather as correcting the SAFE 2 Rule’s distorted approach, which had broken from best practices and decades of regulatory precedent. [EPA-HQ-OAR-2021-0208-0299-A1, pp. 9-11]

As Executive Order 12866 requires, agencies should identify the specific market failures or other problems that their rules address and assess the significance of the problems.83 [EPA-HQ-OAR-2021-0208-0299-A1, p. 12.]

EPA’s Return to Its Prior Estimate of Rebound Effect Is Appropriate. While EPA and NHTSA previous relied on a 10% rebound estimate in the Clean Car Standards issued in 2012, the agencies used a 20% rebound estimate in the final SAFE 2 Rule in 2020.132 The agencies’ departure from prior practice in the SAFE rulemaking was arbitrary and capricious, and EPA’s return to 10% in the proposal here is more consistent with the best available evidence.

To arrive at the new estimate in the SAFE 2 Rule, the agencies in 2020 made significant changes to their assumptions about the magnitude of the rebound effect. These changes resulted in a significant increase in the costs and fatalities that the agencies attributed to the baseline standards.133 Those fatalities and costs helped serve as the agencies’ justification for the misguided 2020 rollback of those standards.134 But the agencies’ methodological changes in the

2018 SAFE proposal and 2020 final SAFE 2 Rule were inconsistent with the best available evidence regarding rebound.

Policy Integrity provided comments during the SAFE rulemaking demonstrating that EPA and NHTSA's selection of a 20% value for rebound effect was arbitrary and capricious.135 By restoring the value of rebound effect to 10%, consistent with the agency's practice prior to the SAFE rulemaking, EPA has improved the accuracy of the CCEMS model for this rulemaking by using a value supported by an appropriate meta-analysis of the academic literature.136

As Policy Integrity noted in comments on the SAFE proposal, EPA and NHTSA failed to adequately explain their departure from a 10% rebound effect. The agencies ignored studies that supported a lower rebound value, including studies relied upon by the agencies in the past and new studies published since the prior rulemaking.137 Overall, the agencies failed to present sufficient evidence in 2020 to support abandoning its prior use of a 10% rebound effect.138

In contrast, EPA has now conducted an updated and rigorous literature review that more fully presents the large body of academic literature on the rebound effect.139 This literature review includes studies that were previously considered by the agencies but ignored in the SAFE rulemaking, including Greene (2012),140 Wang and Chen (2014),141 and Gillingham (2016);142 studies that Policy Integrity recommended the agencies consider in the SAFE rulemaking, including Gillingham (2015)143 and Wenzel and Fujita (2018);144 and studies published after the SAFE rule was finalized, including Knittel and Sandler (2018),145 Gillingham and Munk-Nielsen (2019),146 and Gillingham (2020).147

Most importantly, EPA has now evaluated the available economic literature to determine which studies were most relevant to the proposed standards, weighting the analysis based on geographic/timespan relevance, time period of study, reliability/replicability, and strong statistical/methodological basis.148 In the SAFE rulemaking, the agencies calculated a simple average from the arbitrarily incomplete set of studies they considered—a flawed methodology, inconsistent with EPA's own guidelines for reaching conclusions using multiple studies, that led to an improperly inflated rebound effect.149 As Policy Integrity noted in previous comments, a meta-analysis focusing on closely matched studies—as EPA has done in the Proposed Rule—is a much more rigorous approach to evaluate results based on multiple studies.150

In addition, EPA has now offered several specific reasons why the agencies' prior rebound estimate of 20% are likely overstated. First, consumers' total VMT (vehicle miles traveled) may be more responsive to sharp increases in fuel prices as compared to the gradual decrease in fuel costs-per-mile that will result from these proposed standards, and therefore any rebound effect resulting from the standards may be smaller than some historical estimates of rebound based on price fluctuations.151 Second, consumers are likely to respond less to small changes in their costs per mile traveled as they become wealthier, and total U.S. GDP is projected to increase over time based on the latest projections.152 Together, these two considerations further suggest that an estimate of 10% or lower is appropriate, whereas the 20% estimate was much too high. And while EPA could not quantify the possible indirect and economy-wide rebound effects due to limited data,153 such effects are likely small and, to the extent they exist, they may be offset by the two consumer response factors discussed above. [EPA-HQ-OAR-2021-0208-0299-A1, pp. 19-20.]

In the regulatory proposal underlying the SAFE 2 Rule, EPA and NHTSA projected that the price elasticity for new car and light truck sales ‘ranged from -0.2 to -0.3’—meaning, in other words, that a 1 percent increase in sticker price would decrease sales by only 0.2–0.3 percent.162 Yet in the final Safe 2 Rule, the agencies abruptly rejected their earlier elasticity estimate and drastically increased the price elasticity more than three-fold. The agencies claimed that the price elasticity for new vehicles was -1—meaning that new car sales would decline by 1 percent for every 1 percent increase in sticker price.163 But the agencies offered minimal justification for this substantial revision. And by making this change in the final rule, the agencies did not provide an opportunity for comment.164

Policy Integrity provides these comments now to urge EPA not to rely on the overly conservative estimate of demand elasticity from the SAFE 2 Rule. The agency should instead conduct a full review of the relevant economic literature, which confirms that vehicles are currently an inelastic good in the long run—with a price elasticity far below -1 in absolute terms.

After EPA and NHTSA abruptly changed the demand elasticity in the final SAFE 2 Rule, Policy Integrity issued a report reviewing the relevant literature.165 As further explained in this report, the SAFE 2 Rule erroneously relied on short-run estimates of demand elasticity even though long-run estimates are more appropriate for standards that apply several years into the future,166 and even though the agencies used long-run estimates of other inputs elsewhere in their rule analysis.167 Table 1 (see appendix) demonstrates that EPA’s continued use of -1 is overly conservative compared to the most current literature. [Table 1 can be found at docket number EPA-HQ-OAR-2021-0208-0299, p. 25]

The estimate chosen for sales elasticity has a significant impact on EPA’s analysis, as it directly influences the dynamic fleet share model’s projection of sales and scrappage impacts and fleet size, thus affecting key projections such as criteria pollutant and greenhouse gas emissions.168 By continuing to use the conservative demand elasticity from the SAFE 2 Rule, EPA may be undervaluing the net benefits of its new proposed standards by as much as $10 billion.169 [EPA-HQ-OAR-2021-0208-0299-A1, pp. 22.]

Commenter: International Council on Clean Transportation

Table 4 compares technology penetration levels between the SAFE final rule (1.5% annual CO2 reductions) and the proposed rule. To match the modeling inputs used by EPA for the proposed rule, the comparison uses the sensitivity case with HCR2 available in the SAFE final rule for 2030 (FRIA Table VI-473, page 1777).31 Compared with the SAFE rule technology penetration for the HCR2 sensitivity case, the proposal increases HCR penetration by 7% and strong hybrids by 3%, but turbocharger penetration decreases by 13% and cylinder deactivation by 9%. Overall, it appears the proposed rule has little impact on pulling additional conventional technology into the fleet compared with the SAFE rule. Most of the CO2 reductions from the SAFE rule to the 2023+ proposal appear to be due to the 4.3% increase in PHEVs+BEVs combined with the multiple credits for PHEVs and BEVs and the other credit provisions adopted in the proposed rule. [EPA-HQ-OAR-2021-0208-0522-A1, p. 18; The tables can be found on p. 16 of Docket number EPA-HQ-OAR-2021-0208-0522-A1]

Commenter: International Union, United Automobile, Aerospace & Agricultural Implement Workers of America (UAW)

The Environmental Protection Agency's Revised 2023-26 Model Year (MY) Light-Duty Vehicle Greenhouse Gas (GHG) Emissions Standards by and large strike the right balance of continuing to reduce automotive GHG emissions and encourage automakers to invest in new technologies that will benefit autoworkers and the economy. In addition, UAW does not support the current SAFE Vehicles Rule put in place by the previous administration for a variety of reasons. The SAFE Rule threatened to disrupt the 'One National Program', creating uncertainty for the industry. Uncertainty undermines long-term investment. It also puts the U.S. auto industry at risk of falling behind on advanced technology vehicles and sustainable innovation, at a time when other nations were promoting increased efficiency and lower emissions. The SAFE Rule inadvertently posed risk to the U.S. economy, the domestic auto industry, our members, our retirees, and the communities that rely on a thriving auto industry. [EPA-HQ-OAR-2021-0208-0749-A1, p. 1]

Commenter: Kreucher, Walter

EPA does not have the authority to circumvent the clear meaning of the statute that prevents anyone other than the Secretary of Transportation from setting standards related to vehicle fuel economy or authorizing California to do so. Further, the proposed rule includes dedicated and dual fueled vehicles contrary to Federal statute and therefore must be withdrawn. In addition, the proposal uses arbitrary and capricious assumptions and will not provide the benefits predicted. [EPA-HQ-OAR-2021-0208-0199-A1, p. 1]

EPA is free to regulate GHGs from fuels, buildings, refineries, powerplants, and a host of point sources. It does not possess the authority to regulate GHGs from automobiles and trucks, an authority granted exclusively to the Department of Transportation. There is simply no reasonable explanation why two Federal Agencies should issue standards that regulate the same thing1. Carbon dioxide regulation is fuel economy regulation by another name as clearly acknowledged in the SAFE Rulemaking. This 'fundamental and unnecessary complication in the currently-existing regulatory framework' must cease immediately and EPA must abandon its carbon dioxide standard which by the Agencies own admission in the Supplemental Environmental Impact Analysis attached to the proposal will not impact global mean temperature, sea levels, or ocean acidity. [EPA-HQ-OAR-2021-0208-0199-A1, pp. 2-3]

By statute, only the Secretary of the Department of Transportation can regulate vehicle fuel economy. Once the Secretary issues a rule (or declines to issue more stringent standards), all other proposals and final rules related to vehicle fuel economy are void ab initio as the issuing entity does not possess the statutory authority to issue such rules. Such rules include any vehicle greenhouse gas standards and alternative or dual fuel vehicle mandates issued by EPA or any state. [EPA-HQ-OAR-2021-0208-0199-A1, p. 10]

Neither EPA nor NHTSA offers any new science that would compel a change in the stringency of the CAFE standards or greenhouse gas standards, especially one under ‘unusually condensed’ timing.

There have been no new studies since the prior rulemaking. No evidence is presented on technological breakthroughs in support of the proposals. The only thing that changed are the Administrators of the agencies.

Political ideology is not science. The will of the Administrators is not a reason for changing a rule. Instituting a rule change (or withdrawing a previous rule) because of political ideology is the definition of arbitrary and capricious rulemaking. [EPA-HQ-OAR-2021-0208-0199-A1, p. 14]

Commenter: Lucid USA, Inc. (Lucid)

EPA has the authority under the Clean Air Act (Title II, Part A) to establish nationwide ZEV requirements. Under Section 202(a) of the Clean Air Act, EPA 'shall by regulation prescribe (and from time to time revise) … standards applicable to the emission of any air pollutant from any class or classes of new motor vehicles … which may reasonably be anticipated to endanger public health or welfare.' 42 U.S.C. § 7521. The Agency 'has clear authority to set standards under CAA section 202(a) that are technology forcing when EPA considers that to be appropriate,' 74 Fed. Reg. 49,454, 49,464–6 (Sep. 25, 2009). A national ZEV program would be a technology forcing program contemplated by § 202(a). [EPA-HQ-OAR-2021-0208-0528-A1, p.6]

Commenter: Minnesota Pollution Control Agency (MPCA) and Minnesota Department of Transportation (MnDOT)

Under the Clean Air Act, and in particular section 202(a), Congress charged EPA with protecting the public’s 'health' and 'welfare.' In light of EPA’s statutory purpose, it is entirely reasonable and consistent with congressional intent for EPA to place greater weight on the benefits of reducing harmful emissions over other factors, such as costs and lead time, that the agency considers when setting motor vehicle emission standards. Thus, the MPCA and MnDOT support EPA’s decision to change the position taken in the SAFE rule and return to its previous approach of placing greater weight on the magnitude and benefits of reducing emissions that endanger public health and welfare, while continuing to consider compliance costs, lead time, and other relevant factors. [EPA-HQ-OAR-2021-0208-0211-A1, p.3]

Commenter: National Coalition for Advanced Transportation (NCAT)

EPA’s Authority Under Clean Air Act Section 202(a). Clean Air Act Section 202(a)(1) directs EPA to promulgate standards for emissions of air pollutants from any class or classes of new motor vehicles or new motor vehicle engines which cause or contribute to air pollution that may reasonably be anticipated to endanger public health or welfare.3 Following the Supreme Court's decision in Massachusetts v. EPA, 549 U.S. 497 (2007), holding that GHGs are within the Clean Air Act's definition of "air pollutant", id. at 528- 29, EPA in 2009 issued an Endangerment Finding for GHGs.4 This finding obligated EPA to set GHG emissions standards for motor vehicles,5 which EPA has promulgated for light-duty vehicles in multiple rulemakings. 6 EPA jointly promulgated those prior rules setting GHG emissions standards along with NHTSA's rules governing corporate average fuel economy standards under NHTSA's separate Energy Policy and Conservation Act authority. However, no federal law or regulations require EPA to take such a joint approach. Rather, EPA's authority under Clean Air Act Section 202(a) fully supports the approach that EPA sets forth in this Proposed Rule to independently promulgate GHG standards.

EPA considers several factors when setting vehicle emission standards under Clean Air Act Section 202(a). These standards are technology-based and are premised on a finding of technological feasibility.7 Relatedly, EPA considers the lead time for the standards. See 42 U.S.C. § 7521(a)(2) (standards must take effect after the period EPA "finds necessary to permit the development and application of the requisite technology, giving appropriate consideration to the cost of compliance within such period."). EPA has interpreted Section 202(a) to allow the agency to set technology-forcing standards.8 EPA must also consider the cost to entities directly subject to the standards.9 EPA considers safety in setting standards, and Clean Air Act Section 202(a)(4) prohibits use of emissions controls to comply with the standards if they "will cause or contribute to an unreasonable risk to public health, welfare, or safety in its operation or function."10

EPA's Prior Rulemakings Setting MY 2023-2026 GHG Standards. In 2012, EPA issued a final rule setting light-duty vehicle GHG emissions standards for MY 2017–2025 (2012 Rule) based on a robust technical record. In the 2012 Rule, EPA also promulgated regulations providing for a mid-term evaluation process through which EPA, before April 1, 2018, would determine whether the vehicle GHG emissions standards established for MY 2022-2025 are appropriate in light of the record before the EPA at that time.11 In November 2016, based on the technical assessment report, public comments, and the record before the agency, EPA issued a proposed determination that the MY 2022-2025 standards remained appropriate under CAA Section 202(a).12 In January 2017, EPA issued a final determination confirming the MY 2022-2025 standards were appropriate and would be maintained going forward.13 Then, following the change in Administration, EPA decided to reconsider the standards set in the 2012 Rule.14 In July 2020, EPA issued a final rule revising the MY 2021–2025 standards (2020 Rule) to significantly reduce their stringency, and EPA also issued a new standard for MY 2026.15

Shortly after EPA's 2020 Rule was finalized, NCAT, along with multiple groups of stakeholders—including States, air districts, public interest organizations and other industry stakeholders—challenged EPA's actions in the 2020 Rule as arbitrary and capricious and unlawful. 16 In briefing, NCAT explained how the agencies' treatment of electric vehicles and related technologies demonstrates that the 2020 Rule rollbacks are arbitrary and capricious. NCAT's brief is attached as Exhibit A to these comments [Exhibit A can be found at Docket number EPA-HQ-OAR-2021-0208-2039-A2] . These consolidated cases are currently being held in abeyance, pending the outcome of EPA's rulemaking process for the Proposed Rule (and NHTSA's separate proposed rulemaking).17 [EPA-HQ-OAR-2021-0208-0239-A1, p. 2-4]

EPA's GHG emissions standards incentivize and support investment in the development and deployment of electric vehicles, other advanced low-emission and zero-emission vehicles and the infrastructure to support them. Federal vehicle standards have helped drive investment in electric vehicle manufacturing and technology because performance standards incentivize manufacturing vehicles with lower GHG and criteria pollutant emissions and provide a mechanism by which vehicle manufacturers that deploy innovative technologies and out-perform the standards can earn and sell tradeable compliance credits. Federal standards also play a key role in catalyzing major infrastructure and economic development plans. Accordingly, EPA's reduction in the stringency of the standards in the 2020 Rule adversely affected the marketplace for transportation electrification and deployment of advanced vehicle technologies and supporting infrastructure across the country, undermining the important work and investments of manufacturers and infrastructure companies, including utilities and electric vehicle service providers. EPA's longerterm GHG emissions standards for MY 2027 and beyond will play an important role by providing benchmarks to give manufacturers, state air agencies, public utility commissions and consumers a sense of long-term clarity, as discussed further in Section VII below.

NCAT membership includes U.S. manufacturers of all-electric vehicles that are sold across the U.S., and thus are subject to EPA's standards. NCAT members also include companies engaged in electricity generation, transmission and distribution that supports electric vehicles and companies involved in manufacturing, deploying, and operating electric vehicle charging infrastructure. NCAT's members collectively have invested, or are in the process of investing, billions of dollars in manufacturing electric vehicles and deploying charging-related infrastructure. NCAT members are making those significant investments and implementing long-term business strategies, in large part, to support the implementation of vehicle GHG emissions regulations. The regulations and resulting investments will stimulate technology innovation and market competition, enable consumer choice, attract private capital investments, and create high quality jobs.

Electric vehicles and other advanced technology vehicles and supporting infrastructure play a critical role in supporting U.S. global competitiveness, economic growth, energy security, and cost-effective protection of public health and environmental quality. To remain a leader in the global automotive market, the U.S. must continue to support policies that encourage adoption of electric and other advanced technology vehicles and related infrastructure to serve the needs of American consumers. The U.S. electric vehicle market has grown and is expected to continue substantial growth into the future. See Section IV, A, 1 and 3. Electric vehicle battery costs have continued to decline, reducing the cost of electric vehicles relative to other vehicles. See Section IV, A, 4. Charging infrastructure providers continue to expand charging networks across the country and utilities are investing in the grid and transportation electrification infrastructure programs to support and complement those efforts. See Section IV, B. NCAT supports EPA adopting strong standards that continue to advance electric vehicle deployment and infrastructure investment. [EPA-HQ-OAR-2021-0208-0239-A1, p. 4-5]

Commenter: New York State Department of Environmental Conservation

New York supports EPA's proposal to remove the multiplier incentives for natural gas vehicles for MYs 2023-2026 previously provided under the SAFE Rule. [EPA-HQ-OAR-2021-0208-0238-A1, p.3]

New York urges EPA to adopt the rule to revise existing national greenhouse gas emission standards for passenger cars and trucks through model year 2026. The SAFE rule relaxed the stringency of the standards, ignored established science and technologies, and will result in increased greenhouse gas emissions as well as regulatory uncertainty for the automotive industry. [EPA-HQ-OAR-2021-0208-0238-A1, p.3]

Commenter: Northeast States for Coordinated Air Use Management (NESCAUM)

Placing Greater Weight on Emission Reduction Benefits Is Appropriate Under the Clean Air Act. Under the Clean Air Act, and in particular section 202(a), Congress charged EPA with protecting the public’s 'health' and 'welfare.' In light of EPA’s statutory purpose, it is entirely reasonable and consistent with congressional intent for EPA to place greater weight on the benefits of reducing harmful emissions over other factors, such as costs and lead time, that the agency considers when setting motor vehicle emission standards. Thus, NESCAUM concurs with EPA’s decision to reject the position taken in the SAFE Vehicles Rule and return to its previous approach of placing greater weight on the magnitude and benefits of reducing emissions that endanger public health and welfare, while continuing to consider compliance costs, lead time, and other relevant factors. [EPA-HQ-OAR-2021-0208-0259-A1, p. 4]

Commenter: Ohio Attorney General Office, et al.

Ohio and 15 other States submit these comments in opposition to the notice of proposed rulemaking entitled, 'Revised 2023 and Later Model Year Light-Duty Vehicle Greenhouse Gas Emissions Standards,' set forth at 86 Federal Register [EPA-HQ-OAR-2021-0208-0258-A1, p.1]

The proposed rule is transparently outcome driven, not the product of reasoned decisionmaking. The EPA repeatedly acknowledges that, in developing the proposed rule, it considered California uniquely. But California’s unconstitutional favoritism under the Clean Air Act, and attempted domination of federal policy, is not a valid basis for promulgating nationwide emissions standards. Moreover, the proposed standards rest on an overly speculative cost-benefit analysis and entirely fail to consider how reliance on China for raw materials and manufacturing will harm our national security. The proposed rule should be withdrawn [EPA-HQ-OAR-2021-0208-0258-A1, p.1]

A California partnership is not a valid basis for establishing nationwide carbon emission standards. When the EPA released its proposed rule, the White House released congratulatory statements from stakeholders—automakers, auto worker unions, climate activists, and California. 'We look forward to continuing our decades-long collaboration with federal partners to build on California's clean car leadership and deliver the investments needed to support the nationwide build-out of clean vehicle infrastructure,' Governor Newsom provided.[2] No other State is included in this partnership: not, for example, Ohio, which ranked first in car production in 2018,[3] Kentucky, which has the highest light-vehicle production per capita,[4] or Michigan, which leads the nation in auto-manufacturing jobs [5].

The proposed rule emphasizes throughout the outsized role California played in creating the proposed standards. The EPA 'coordinated extensively with the California Air Resources Board,' as it developed the proposal.[6]'California has long been a partner in reducing light-duty vehicle emissions, often leading the nation by setting more stringent standards before similar standards are adopted by EPA.'[7].

Indeed the EPA attempts to color its proposal as reasonable given existing automaker behavior pursuant to California's Framework Agreements.[8] It boasts: 'the California Framework Agreements were a key consideration in our development and assessment of the proposed EPA standards.'[9] The only reason California was able to establish 'Framework Agreements' upon which the EPA heavily relies is due to the possibility that California would regain its waiver of preemption under section 209(b)(1) of the Clean Air Act, allowing California, and only California, to set emissions standards that are more stringent than those adopted by the federal government.[10] The Framework Agreements, signed by BMW, Ford, Honda, Volvo, and Volkswagen, are largely premised on these automakers' belief, or at least uncertainty, that California would again hold outsized regulatory power through a section 209(b) waiver.[11] [EPA-HQ-OAR-2021-0208-0258-A1, p.2]

Unsurprisingly, then, the EPA has proposed standards that closely resemble the California Framework projected targets.[12] [EPA-HQ-OAR-2021-0208-0258-A1, p.3]

Section 202(a) of the Clean Air Act requires the EPA to establish national standards for emissions of pollutants from new motor vehicles which cause or contribute to air pollution which may reasonably be anticipated to endanger public health or welfare.[13] The EPA must consider technological feasibility[14] and costs to regulated entities.[15] The EPA may consider other factors reasonably allowed by Congress, like safety issues.[16] But no reasonable interpretation of the statute allows California, and California alone, to be a factor in setting national motor-vehicle emissions standards. And an agency rule is arbitrary and capricious where it 'relie[s] on factors which Congress has not intended it to consider.' Motor Vehicle Mfrs. Ass'n v. State Farm Mut. Auto. Ins. Co., 463 U.S. 29, 43 (1983). [EPA-HQ-OAR-2021-0208-0258-A1,p.3]

The EPA engages in this illegitimate partnership with California given California's special status under section 209 of the Clean Air Act. But Section 209(b)(1) violates the doctrine of equal-sovereignty—a doctrine inherent in our Constitution and express in Supreme Court precedent—by allowing California to exercise sovereign authority that the Act takes from every other State. This unequal treatment is unconstitutional, full stop. Because section 209(b) is unconstitutional, and because the EPA has embedded unequal treatment into its proposed rule, any final rule based on the EPA proposal is arbitrary, capricious, and contrary to law [EPA-HQ-OAR-2021-0208-0258-A1, p.3]

The Constitution and Supreme Court precedent require States to be treated as equal sovereigns. As just explained, the EPA's proposed rule rests largely on the idea that California has unique authority to regulate air quality under the Clean Air Act. The Act does indeed say that, in Section 209(b)(1). But the Act's special treatment of California violates the Constitution. And the EPA cannot reasonably rely on California's ability to wield unconstitutional power over her sister States.

The United States of America 'was and is a union of States, equal in power, dignity and authority, each competent to exert that residuum of sovereignty not delegated to the United States by the Constitution itself.'[17] This 'constitutional equality' among the States,'[18] derives from the Constitution's text and structure. [EPA-HQ-OAR-2021-0208-0258-A1, p.3]

Indeed, the principle is so deeply embedded in our constitutional order that the Supreme Court treats the States' sovereign equality as a 'truism.'[19] The equal-sovereignty of the States is one of those principles that, while 'not spelled out in the Constitution,' is 'nevertheless implicit in its structure and supported by historical practice.'[20] [EPA-HQ-OAR-2021-0208-0258-A1, p.4]

In using California's super-sovereign authority as a basis for the proposed rule, the EPA relied on a statute that is not even constitutional. It is inherently arbitrary and capricious, and contrary to law, to adopt a standard predicated on an unconstitutional law. [EPA-HQ-OAR-2021-0208-0258-A1, p.6]

If Congress intended for California's waiver to dictate national standards, it would have said so. Even if California exceptionalism were appropriate under our federalist system, the EPA has the appropriate inquiry exactly backwards. Under the proposed rule, California sets its desired emissions policy, and then the federal government seeks to conform. But under the statute, California may only be granted a waiver if the EPA determines its standards are 'at least as protective of public health and welfare as applicable Federal standards.'[46] This scheme shows that EPA must make its determination first—finalizing a national standard that is protective of air quality, feasible, and reasonable—and then, after it has established a standard, consider any proposals from California.

This ordering makes sense, especially because giving California special treatment up front has concrete negative effects in other States when it comes to carbon emissions. Conforming with carbon-emission standards requires vehicle manufacturers to make 'changes to the entire vehicle.'[47] Because car manufacturers make only one national fleet, whatever standard California invents becomes the national standard. This means the vehicles available to Ohioans are not governed by Ohio's standards or the Federal government's standards, but rather by California's standards. That not only offends the Constitution, but it makes bad policy. [EPA-HQ-OAR-2021-0208-0258-A1, p.6]

Ohio and California have different key industries, different commuting patterns, and different access to alternative fuel stations, and reasonably need different vehicles or different timelines to transition to new vehicles. [EPA-HQ-OAR-2021-0208-0258-A1, p.7]

Where the EPA considers the States equally in setting standards, it can assess feasibility in the manner Congress intended. Where it considers California at the outset, all other States are cut out, it creates an irrational policy that favors certain States in a manner Congress never intended [EPA-HQ-OAR-2021-0208-0258-A1, p.7]

The Clean Air Act was designed to 'protect and enhance the quality of the Nation's air resources.'[75] Since that time, technological advances from American innovators have worked to create a 78 percent drop in criteria and precursor pollutants, all while our economy remained strong.[76] But rather than advance this positive trend, the proposed rule attempts to please California, which remains the single most problematic State in attaining National Ambient Air Quality Standards.[77] The EPA has disbanded its mission of improving the air Americans breathe, and focused instead on receiving international recognition for climate leadership.[78] In doing so, it has left consumers, manufacturers, our Constitution, and American security behind. [EPA-HQ-OAR-2021-0208-0258-A1, p.11]

Commenter: Platt, Keari

With such a large impact on overall GHGs, it is wise for the EPA to target LDVs. Requiring automakers to reduce GHG emissions from LDVs will reduce the nation's overwhelming contribution to global emissions and climate change impacts. [EPA-HQ-OAR-2021-0208-0201-A1, p. 2]

Commenter: South Coast Air Quality Management District

While the proposal acknowledges the 2020 SAFE rulemaking 'significantly weakened' standards established in 2012, 86 FR at 43726, it notably omits mention that the SAFE rule was also profoundly arbitrary and capricious. Still today, that action faces legal challenges (currently in abeyance) rightly demanding its judicial invalidation. Aside from the outlandish legal defects, the SAFE rule, along with its lead-up maneuvering, was profoundly damaging to the trajectory of transportation emissions reductions that are needed to protect public health and welfare. History will take note of these points whether or not EPA should, in this regulatory action, squarely admit to the many fatal errors both procedural and substantive that pervaded the SAFE rule. At minimum, however, EPA should make clear when it states it is merely 'reaching a different conclusion,' see 86 FR at 43729, or implies that is merely weighing or balancing statutory factors differently than in the SAFE rulemaking, see 86 FR at 42786, that it is not substantively engaging with that action's many serious allegations of error, nor (despite carrying forward aspects of the technical record) is it purporting to substantively defend any of those choices. EPA should at least acknowledge the superficial irregularities of the SAFE rule lest it be credited as precedential. Anything less glosses over what was a deeply flawed rule record. [EPA-HQ-OAR-2021-0208-0215-A1, p.2]

Moving on, the South Coast AQMD applauds this proposal for putting the Clean Air Act (CAA) back to work and bringing these important standards on track. As graphically represented inFigure 1, 86 FR 43732, the current proposal stands to mitigate much of the damage made by the SAFE rule, while reinstating and recapturing much of the benefits that EPA had long ago and sensibly expected to materialize in its 2012 rule for light-duty vehicles. [EPA-HQ-OAR-2021-0208-0215-A1, p.2]

EPA errs in conflating its statutory role under section 202(a)(4)(A) with its accounting of estimated 'safety' impacts in terms of 'changes in vehicle scrappage, fleet turnover, and VMT.'

The proposal terms safety a relevant consideration. 86 FR at 43279. EPA must be cautious in carrying forward or normalizing the erroneous approaches on this subject set out in the SAFE rule. When EPA states it 'currently believes it is more appropriate to consider the risk of injuries per mile traveled,' 86 FR at 43786, it appears to suggest there was a semblance of appropriateness to how the SAFE rule purported to address vehicle safety. This is not correct or supportable. EPA could not in the SAFE rule or now in this proposal cite Clean Air Act section 202(a)(4)(A)—addressed to how EPA must handle safety-compromising design elements—as justification for its study of changes in the use of vehicles in the fleet or the turnover of the fleet to newer vehicles. While these may be allowable topics of study in terms of Executive Order compliance, they are not legally or analytically valid 'vehicle safety' considerations for purposes of setting standards. Even for the case of relative mass changes or 'mass reduction as a technology option,' see 86 FR at 43793, EPA should acknowledge that issue is only, arguably4 statutorily pertinent in regard to whether there may be some 'unreasonable risk' under the prescribed factors of section 202(a)(4)(B). But EPA nowhere in this proposal or in the prior SAFE rule addresses that provision. Instead, and regrettably, in the proposal's section titled 'Safety Considerations in Establishing GHG Standards,' 86 FR at 43793, EPA gratuitously remarks four times that it is being 'consistent' with the SAFE rule. The District objects to EPA's perpetuation of an amorphous, overarching safety consideration. This is both analytically sloppy and it papers over the cynical branding behind EPA's 'SAFE' rule that was beset with disingenuous and faulty safety claims. EPA should not finalize this proposed approach without first examining whether these supposed 'relevant' 'considerations' in 'establishing… standards' are backed by any prior implementation history,5 deemed valid by any prior judicial precedent, or are consistent with Congressional direction.6 EPA must acknowledge it only has a proper basis for considering aspects of 'safety' in setting standards when there is a basis in the statutory text and purpose or when it is backed by judicial precedent. [EPA-HQ-OAR-2021-0208-0215-A1, pp.5-6]

4 EPA is empowered to set regulations based on classes or categories, including gross vehicle weight. See CAA section 202(a)(3)(A)(i). Thus, merely having a vehicle with lower mass is arguably not any kind of cognizable "risk" for purposes of section 202(a)(4)(A).

5 Any search for 202(a)(4)(A) in the Federal Register should confirm it is not.

6 There is particularly no warrant for fleet turnover arguments. This supposed safety concept as a basis for standard setting is proved illogical by transplanting the same argument to the

hypothetical of an agency charged to set new vehicle safety standards. If, for example, both airbags and antilock brakes would be reasonable safety additions to vehicles, there should be no argument that the safety benefits of the first-intime required feature takes such precedence that boosting scrappage and turnover is more important than having, as Congress directs, overall optimal safety in new vehicles.

Commenter: Southern Environmental Law Center

Under the Trump administration, EPA substantially weakened GHG emissions standards for light-duty vehicles for model years 2021 through 2026 (the SAFE Rule). This was a significant step back for the U.S. in its efforts to address the climate crisis and protect public health, since the transportation sector is the largest source of GHG emissions nationally—as well as in most of the South—and emissions from light-duty vehicles account for a majority of that pollution. The Biden administration announced its intention to review the weakened standards on its first day in office, and has since put forward ambitious plans to promote cleaner vehicles. In August, EPA released its proposed rule to establish more stringent GHG emissions standards for light-duty vehicles. We welcome this proposal, and urge EPA to adopt the strongest standards possible under the Clean Air Act.[EPA-HQ-OAR-2021-0208-0244-A1, p. 1]

While these stronger standards would still not entirely close the cumulative GHG reduction gap between the SAFE Rule and the 2012 Rule, they are closer than the current proposal and it is critical that EPA make up this lost ground as quickly as possible. [EPA-HQ-OAR-2021-0208-0244-A1, p. 2]

EPA should adopt the strongest possible tailpipe GHG emissions standards under the Clean Air Act. [EPA-HQ-OAR-2021-0208-0244-A1, p.2]

For these and many other reasons, immediate and decisive action is needed to reduce U.S. GHG emissions. Tailpipe emissions standards are one of the most important tools available given the significant contribution of light-duty vehicles to GHG emissions. EPA should adopt the strongest possible standards under the Clean Air Act. The current proposal, however, leaves attainable GHG emissions reductions on the table. The proposed standards do not reach the compliance targets from the 2012 Rule until after model year 2025, even though the 2012 Rule[17] and subsequent 2017 Midterm Evaluation [18] provided ample justification for these more aggressive CO2 targets—despite the fact that these analyses were conducted at a time when GHG- reducing and EV technologies were more expensive and less widely available. The evidence supporting more stringent emissions standards has only grown stronger.

The pace of introduction of clean vehicle technologies has increased rapidly and the EV and PHEV manufacturing and sales landscape is quite a bit more advanced than when the 2012 Rule was promulgated. In part, decreasing costs are helping to make EVs more common. In 2010, lithium-ion battery packs cost over $1,000 per kilowatt hour (kWh); today the battery packs cost roughly $125 per kWh.[19] Hybrid EVs accounted for only about 2.4 percent of vehicles sales in model year 2015, but that figure jumped to approximately 6.5 percent of vehicle sales by model year 2020.[20] By the end of 2024, almost 100 EV and PHEV models are expected to be available to consumers.[21] Almost every major vehicle manufacturer in the U.S. has launched, or is in the process of launching, an EV line and many have publicly stated ambitious EV and PHEV manufacturing and sales goals.[22] Furthermore, as explained by EPA in its Regulatory Impact Analysis (RIA), vehicle manufacturers are believed to remain largely on track to meet the 2012 standards due to the multi-year nature of the vehicle development process.[23] [EPA-HQ-OAR-2021-0208-0244-A1, pp. 3-4]

EPA Response

EPA appreciates the comments in support of final standards as stringent or more stringent than the proposed standards, and EPA's decision to restore emissions reduction to the center of its decision making on light duty GHG standards, while at the same time taking into account cost of compliance and lead time, and considering other relevant factors. EPA disagrees with the suggestion that it is required to set standards that maximize net benefits, as calculated in the RIA. EPA is not required to take such an approach under section 202(a) of the Clean Air Act, and has not taken this approach in the past. Rather, EPA has considered the need for reductions of emissions to reduce pollution that endangers public health and welfare, and the cost of compliance and lead time. As discussed in the preamble, EPA has presented an analysis of benefits and costs in the RIA, including sensitivity analysis to examine how much results might be higher or lower than the quantified values we present. EPA seeks continually to revise and improve its methods for costs and benefits, with the updates since the SAFE rule described in the RIA.

American Fuel and Petroleum Manufacturers commented that EPA and NHTSA should be harmonizing their standards, and that EPA cannot finalize standards more stringent than NHTSA's because it would frustrate Congressional intent in the passage of the fuel economy provisions of EPCA. Similarly, other comments state that NHTSA has the sole statutory authority to regulate fuel economy.

EPA disagrees with these comments. As the Supreme Court has explicitly recognized, EPA and NHTSA have distinct sources of authority and distinct responsibilities to the public: "EPA has been charged with protecting the public's 'health' and 'welfare,' 42 U.S.C. § 7521(a)(1), a statutory obligation wholly independent of DOT's mandate to promote energy efficiency. See Energy Policy and Conservation Act, § 2(5), 89 Stat. 874, 42 U.S.C. § 6201(5)."[75] Thus, EPA considered it well-settled that the agency has authority to regulate greenhouse gas emissions from light duty vehicles separate and apart from NHTSA's authority to regulate fuel economy.

The Supreme Court further concluded that "there is no reason to think the two agencies cannot both administer their obligations yet avoid inconsistency."[76] EPA agrees that this is possible, and it has been and continues to be an important principle of EPA's light duty GHG program. However, EPA disagrees that in order to avoid inconsistency it is necessary for the agencies to

[75] *Massachusetts v. EPA*, 549 U.S. 497, 532 (2007).
[76] *Id.*

conduct joint rulemaking[77] or that the standards must be identical. Indeed, as the commenter appears to recognize, the programs have never been identical. For example, EPA's program allows credits for air conditioning refrigerant leakage which reduce hydrofluorocarbon (HFC) emissions, allows unlimited credit trading between car and truck fleets, provides multipliers for EVs and other advanced technologies, and regulates additional GHGs including methane and nitrous oxide. The NHTSA program has none of those features, but does have a backstop standard based on domestic manufacturing content and allows for payment of fines as a means of compliance, which are features not found in EPA's program. EPA does not believe these differences, which in many cases are directly attributable to differences in statutory authority between the agencies, result in "inconsistency" between the program, although in some cases they might result in automakers having a slightly different compliance strategy for each program. EPA concludes that a continuation of an approach where the agencies coordinate while adopting standards that are consistent with their respective statutory authorities is the best means of each agency complying with Congressional direction, and is not inconsistent with either EPCA or the Clean Air Act. Growth Energy and AFPM commented that EPA should conduct life cycle analysis (LCA) for fuel and vehicle production. AFPM asserted that LCA is required under the CAA. EPA disagrees that it is required to perform a life cycle analysis of vehicle and fuel production before setting vehicle standards, or to treat emissions of air pollutants attributable to electricity generation, or the mining, production or disposal of batteries for electric vehicles, as emissions "from" new motor vehicles. The Clean Air Act's entire structure evidences a clear divide between stationary sources (regulated under Title I) and mobile sources (regulated under Title II). There may be indirect impacts of stationary source regulation on mobile sources and vice versa, and it may be appropriate to consider those impacts in some circumstances, but it would be inappropriate and contrary to the plain text of the Clean Air Act to conflate the consideration of indirect impacts, when appropriate, with actually treating stationary source emissions as mobile source emissions. *Cf. Coal. for Responsible Regul., Inc. v. E.P.A.,* 684 F.3d 102, 128–29 (D.C. Cir. 2012), *aff'd in part, rev'd in part sub nom. Util. Air Regul. Grp. v. E.P.A.*, 573 U.S. 302 (2014), *and amended sub nom. Coal. for Responsible Regul., Inc. v. Env't Prot. Agency*, 606 F. App'x 6 (D.C. Cir. 2015) ("EPA was not arbitrary and capricious by not considering stationary-source costs in its analyses"). Congress directed EPA to address emissions from manufacturing fuels and vehicles under EPA's authority to reduce pollution from stationary sources and to address emissions from the operation of light duty vehicles under its authority to reduce pollution from mobile sources. It would be contrary to the purpose of the Clean Air Act if EPA declined to adopt otherwise-appropriate standards to reduce emissions from new light duty vehicles because additional reductions in pollution could be, but had not yet been, achieved by refineries, electric generating units, or vehicle manufacturers (due to vehicle production facilities). EPA interprets the Clean Air Act as directing EPA to consider regulation of emissions for each sector according to the applicable statutory requirements for each program. Congress has established and EPA intends to continue to undertake regulation of GHG consistent with those statutory requirements.

[77] See Preamble section II.A.8

With respect to consideration of the indirect impacts, it is neither feasible nor required under the Clean Air Act for EPA to estimate every indirect environmental effect of these standards, such as changes in material from steel to aluminum, or the environmental effects of additional mining of minerals to be used in battery manufacturing. Moreover, EPA finds the result of life cycle analyses depend heavily on the scope of the analysis and the data available assessed. For example, one commenter (Ingevity) cited a study that relied on outdated data with respect to road load reduction, Li-ion battery energy density, and the energy sources either currently used within the U.S. electric grid or near-term electric generation energy source trends. As a result, the cited 2016 ANL study predicts average conventional internal combustion engine (ICE), CNG, HEV, BEV90, and BEV210 life cycle GHG emissions to be approximately 350-450, 320-370, 240-345, 250-300, and 250-440 gCO_{2e}/mi, respectively. A more recent analysis based on more recent vehicle data from the 2020 EPA Trends Report, and more recent energy source data from the 2020 International Energy Agency - World Energy Outlook, shows life cycle BEV GHG emissions of 100-160 gCO_{2e}/mi, less than half that of the older ANL study despite an assumption of increased BEV range within the more recent study.[78,79,80]. The commenter (Ingevity) also cites a MECA analysis of natural gas vehicle GHG emissions, however only provided isolated data tables without either a copy of the study or a citation that would allow review of the study's methodology. Such a review would be crucial for determining whether or not the study included a full accounting of factors of critical importance to NGV life-cycle GHG emissions, such as fugitive methane emissions during extraction, refining, compression, and end-use. The GHG life-cycle emissions for BEVs within the table from MECA analysis also conflict with the life-cycle emissions from ANL study also cited by the commenter (Ingevity). BEV life cycle emissions within the table from the MECA analysis are only one-third to one-half of those cited within the ANL analysis. EPA's decision to not include the emissions associated with battery production, as the commenter recommends, is based on our current assessment of existing LCA studies, and the degree of uncertainty in the study results relative to magnitude of the impact on overall emissions. EPA is not making any determination here about the potential value of LCA for informing standards in the future, and we will continue to monitor further developments in LCA studies on the impacts of battery production.

Consistent with its past practice, EPA has sought to identify and consider the most significant indirect impacts for consideration, such as the impact of the rebound effect on production and distribution of fuel. Thus, EPA is not ignoring the upstream effects of these standards on fuel production (whether petroleum fuel or electricity). EPA has taken into consideration in setting the standards the RIA's estimated effects of the rule on reduced petroleum and increased electricity production. In fact, to monetize the $PM_{2.5}$-related impacts of upstream emissions, we apply BPT values that were developed for the refinery and electric generating unit (EGU) sectors. However, EPA is not required to structure standards in a particular way to reflect those anticipated effects, e.g., by revising the 0 g/mile provision for EVs, and EPA concluded in light

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[78] Bieker, G. (2021) A Global Comparison of the Life Cycle Greenhouse Gas Emissions of Combustion Engine and Electric Passenger Cars. ICCT.

[79] U.S. EPA. The 2020 EPA Automotive Trends Report - Greenhouse Gas Emissions, Fuel Economy, and Technology since 1975. EPA-420-R-21-003, January 2021.

[80] International Energy Agency. (2020). World energy outlook 2020. http://www.iea.org/weo

of the ongoing industry shift towards electrification it is reasonable to maintain that provision at least as a transition provision for the model years at issue here. Altering EPA's approach to setting standards to attempt to assess a full lifecycle analysis taking into consideration fuel and vehicle production is beyond the scope of this rulemaking.

Americans for Prosperity asserted that since this is not a joint rulemaking with NHTSA, EPA violated CAA 307(d) by not docketing materials related to interagency coordination. EPA agrees that this rulemaking is subject to the provisions of section 307(d) of the Clean Air Act,[81] and is not a joint rulemaking with NHTSA. EPA disagrees, however, that it has violated the docketing provisions of section 307(d)(4)(B)(ii) related to comments received from other agencies. That provision requires, in part, docketing of written comments from other agencies on drafts of proposed rules submitted to the Office of Management and Budget (OMB) for any interagency review process prior to proposal. Nothing in that provision requires EPA to document discussions or docket any written comments arising out of consultations with NHTSA during the period when EPA was identifying and considering options for the proposal, or undertaking initial steps to draft a proposal, before EPA management concluded the draft was ready for submission to OMB. In fact, docketing such communications (when not required by section 307(d)) would be contrary to well-established principles concerning intragovernmental consultation, which is entitled to the protection of the deliberative process privilege to encourage full and frank discussion among agencies. Thus, it is entirely consistent with section 307(d) and proper for EPA to consult with NHTSA informally, to ensure coordination of the two agencies' programs, but not docket those discussions that occurred prior to interagency review. In addition, EPA did docket all written comments of other agencies (including NHTSA) that it received through the interagency review process, together with all written responses by EPA to those comments.

EPA disagrees with the assertion made by Americans for Prosperity that EPA relied "almost entirely on EPA's vehicle standards finalized in 2012 and the voluntary commitments of five automakers as the justification for compliance costs and lead time." As explained at greater length in the preamble and RIA, EPA relied on a significant technical record, including data about technologies currently deployed in the vehicle fleet and modeling about manufacturers' ability to adopt additional emissions reduction strategies for their fleets, as well as the structure of the program, incorporating important flexibilities such as averaging, banking and trading across the entire fleet, to reach its conclusions about compliance costs and lead time for this rulemaking. EPA does believe the 2012 standards are relevant, in light of automotive design cycles and the model years covered by the 2012 rule and this rule. EPA recognizes that automakers were under no legal obligation to enter into the California Framework Agreements, but the Agreements demonstrate an ability and intention by those automakers to meet more stringent standards than the SAFE 2 standards, which is likewise relevant. However, particularly in light of EPA's decision to adopt more stringent standards in this rule, the 2012 standards and the national targets under the California Framework Agreements were confirmatory to, rather than necessary elements of, EPA's analysis of lead time and compliance costs.

[81] See Section VIII.K of the preamble.

EPA also disagrees with the comment from Walter Kreucher that a change in Administration is an insufficient basis for EPA to change course, provided we acknowledge the change in course and provide good reasons for it, as we have done in Preamble VI. *See e.g, FCC v. Fox Television Stations, Inc.*, 556 U. S. 502 (2009).

EPA acknowledges the comment from the California Attorney General's Office that each model year of standards should be severable. EPA recognizes that the earlier model years for which we are setting standards will have relatively less lead time than the later model years, and finds that even in the absence of revised standards for one or more earlier model years, we would still adopt these final standards for the other model years, because there is sufficient lead time to meet those later standards (and if earlier model year standards were not revised it would only increase automakers' ability to generate and bank credits for use in compliance with later standards). Likewise, although EPA intends to undertake a subsequent rulemaking for MY2027 and beyond, EPA is setting these standards based on its assessment of appropriate standards for each of the model years 2023 through 2026 and the appropriateness of the earlier standards is not dependent on the later standards, or on EPA's upcoming rulemaking.

SCAQMD asserted that EPA has conflated statutory requirements under CAA section 202(a)(4)(A) with our projected safety impacts in terms of 'changes in vehicle scrappage, fleet turnover, and VMT'. In response, EPA acknowledges that the requirements of section 202(a)(4)(A) are not so broad as to include changes in vehicle purchase, ownership, and use decisions, but instead are more narrowly defined to evaluate an whether an 'unreasonable risk' to safety in the vehicle operation or function is caused or contributed to by an 'emission control device, system, or element of design.' We have concluded that no device, system, or element of design adopted for the purposes of complying with these standards will impact vehicle operation or function in such a way as to increase risk.

The CAA does not, however, preclude EPA from considering safety more broadly for the purpose of our benefit-cost analysis, as we describe in Preamble VII.H and RIA 5.3. While we recognize that not all metrics for characterizing safety should be given weight in promulgating standards under section 202, in our estimation of societal costs of fatal and non-fatal injuries we include consideration of any changes in risk that are projected due fleet mix changes and the relative mass differences between vehicles in collisions, and the ownership and operation of vehicles, including changes in scrappage decisions. We also include societal impacts that arise from changes in VMT due to the rebound effect, and the associated increase in projected fatal and non-fatal injuries, which are mostly offset by the societal value of that additional driving.

EPA acknowledges the comments from Institute for Policy Integrity (IPI) and the South Coast Air Quality Management District relating to errors in the SAFE rule. IPI comments that EPA should identify the market failures that this rule addresses. The primary market failure that this rule is addressing is GHG emissions, a classic case where the private benefits and costs of controlling emissions do not match the societal benefits and costs. Other market failures appear to exist, such as the failure of private markets to provide all the fuel-saving technologies that pay for themselves; we discuss those in Preamble VII.A, RIA 8.1.1, and Section 17 of the RtC, and find that the rule provides net benefits from provision of increased fuel economy.

EPA disagrees with comments from the Ohio Attorney General Office characterizing "the outsized role California played in creating the proposed standards" (and a similar suggestion from Americans for Prosperity that the proposed rule places undue emphasis on the California Framework Agreements). It is true that EPA consulted with California in considering options for the draft proposed rule, because many stakeholders expressed interest in having a "national" program, where automakers can plan to produce the same vehicle fleet and meet the applicable standards in all 50 states. In addition, as discussed in the preamble and this RTC, EPA considered the national targets under the California Framework Agreements relevant, but not dispositive, for its assessment of feasibility and lead time considerations. However, the decision about what standards to adopt was made by the Administrator based on his judgment about what standards were appropriate under Section 202(a), in light of emissions reductions, cost of compliance, lead time, and other relevant factors.

EPA also disagrees with the commenter's apparent suggestion that EPA should not consider the benefits of a potential national ("50 state car") program during the rulemaking because section 209(b) is unconstitutional. It is well-established that administrative agencies lack the authority to find statutory provisions unconstitutional. *See, e.g., Johnson v. Robison*, 415 U.S. 361, 368 (1974). Moreover, EPA does not believe that allowing California to exercise its police powers to address its longstanding and continuing "compelling and extraordinary conditions" disadvantages any state. In fact, the ability to adopt California standards has benefited many states by offering low cost means of achieving emissions reduction and attaining National Ambient Air Quality Standards without creating an unworkable patchwork of state requirements.

17. Consumer Impacts/Consumer Welfare/Consumer Acceptance of Vehicles

<u>Commenters Included in this Section</u>

Allen, Martin
Alliance For Automotive Innovation
American Enterprise Institute (AEI)
American Fuel & Petrochemical Manufacturers (AFPM) et al
California Attorney General Office, et al.
Center for Climate and Energy Solutions (C2ES)
Competitive Enterprise Institute et al.
Consumer Reports (CR)
Egbert, Judi
Energy Innovation Policy and Technology LLC
Environmental Protection Network (EPN)
General Motors LLC (GM)
Haines, Meredith
Hall, Marilyn
Hyundai America Technical Center, Inc. (Hyundai)
Institute for Policy Integrity
Maine Department of Environmental Protection
Mass Comment Campaign sponsored by Consumer Reports (19,038)
Motor & Equipment Manufacturers Association (MEMA)
National Automobile Dealers Association (NADA)
National Coalition for Advanced Transportation (NCAT)
Nissan North America, Inc.
Pennoyer, Marguerite
Pien, Natalie
Securing America's Future Energy
Schrier, Paul
Southern Environmental Law Center
Steitz, Jim
Stellantis
Tesla
Toyota Motor North America, Inc. (Toyota)
Volkswagen Group of America, Inc. (Volkswagen)

Commenter: Allen, Martin

[The following comments were submitted as testimony at the virtual public hearing on August 26, 2021. See Hearing Testimony – 26Aug2021, p. 24.] I'm going to speak to you about my personal experiences as an electric vehicle owner and the issues of upfront costs, range anxiety, and a need for improved infrastructure. [The following comments were submitted as testimony at the virtual public hearing on August 26, 2021. See Hearing Testimony – 26Aug2021, pp. 25-26.] Range anxiety. Did I have range anxiety? Oh, yeah, I have range anxiety. Did I get over it? Yes, very quickly. I live in the Watchung Hills, New Jersey, and we get some inclement winter weather here. So a four-wheel drive vehicle was a requirement. My EV, which has dual motors, is set by me to get approximately 250 miles on a complete charge, and I can get over 300 miles fully charged. I charge my car around once or twice a week. I installed a Level 2 240-volt charge in my garage in my townhome house at a cost of less than $300. I get a full charge at home in around six hours, but I almost never charge from zero at home. Let me tell you a story how I got over range anxiety. Soon after getting my electric vehicle, I went on vacation and parked my car at the airport. On the way to the airport, I discovered that I had less than 60 miles left of estimated charge. What if the estimate was wrong? What if there wasn't sufficient charge to get home?

So when I left the airport, I put on the standard regenerative braking, slowed my speed, used my brakes probably a bit more frequently than I would have normally, and I arrived at home with an estimated miles of more than what I started with. As for quick charging stations, I have used a couple and within 15 or 20 minutes, any short coffee break, my car has been fully charged. I'm over anxiety, no more range anxiety.

EPA Response

EPA appreciates the commenter’s positive experience with EV range. As more charging infrastructure is developed, concerns over range anxiety are expected to ease.

Commenter: Alliance For Automotive Innovation

Helping consumers bridge near-term cost premiums with purchase incentives

There is much uncertainty regarding EV price parity with internal combustion engine (“ICE”) vehicles, and while some segments may achieve this earlier than other segments, we do not expect this to occur prior to 2030 for some more popular segments and likely later for others. Many consumers may be unable, or simply unwilling, to shoulder the higher upfront cost premiums. Purchase incentives help to close the price gap and drive EV sales. A study by Resources For the Future finds that federal income tax credits resulted in a 29 percent increase in EV sales.13 Federal, state, and local governments have the opportunity to put in place rebates and other incentives to drive market share for electric vehicles.

With the goal of significantly increasing the number of EVs on the road, purchase incentives should fully apply to the broadest range of vehicles and be available to the broadest range of consumers. Incentives should be applicable to vehicles produced by all manufacturers (including by raising or eliminating the current per-manufacturer cap), non-discriminatory between companies, and widely available to preserve consumer choice as more EVs come to the market across all models and price points. [EPA-HQ-OAR-2021-0208-0571-A1, p. 5]

Continued actions and commitments by automakers to improve the availability, variety, and affordability of EVs in the United States Manufacturers are on pace to debut almost 100 pure electric models by the end of 2024.

Metrics and milestones that align with nationwide EV sales targets

For the nine above action items, development of specific metrics to track progress and identify milestones linked to EV sales targets will be critical. This will ensure the necessary conditions for success are being developed and provide federal, state, and local governments with guidance on policies and funding needed to expand electrification across the nation. [EPA-HQ-OAR-2021-0208-0571-A1, p. 6]

Private Fuel Savings
The CAFE Compliance and Effects Modeling System ("CAFE Model") assumes manufacturers will adopt technologies, absent regulation, that pay for themselves within 2.5 years of vehicle ownership. Overall, given that the existing body of evidence about consumer valuation of fuel economy does not reach definitive findings, a sensitivity-analysis approach to the 2.5-year payback period may be warranted.

Payback Period

The largest category of benefits in the rulemakings is private fuel savings for motorists.

The amount of private fuel savings due to the standards should be based on a proper baseline characterization of the amount of fuel-saving innovation in ICE vehicles that will occur if the MY 2024-2026 vehicles are not subject to stricter standards. The Agencies have recognized this issue. The RIAs assume that innovations that pay for themselves within 2.5 years of vehicle ownership will be implemented by manufacturers voluntarily and are therefore incorporated into the baseline fleets from MYs 2024-2026.

NHTSA asks for comment on whether, instead of making this 2.5-year assumption, it should assume that the new technologies will be channeled by automakers to accomplish further improvements to performance, on the assumption that consumers value the performance gains even more than the net-beneficial fuel savings.[172] Under this scenario, all the innovation-related gains in fuel economy and GHG reduction would be assigned to the stricter standards, and none to market forces.

Auto Innovators urges caution on this point because the Agencies have not yet developed a practical analytic approach to value the private (hedonic) benefits of performance (or the opportunity costs of foregone performance gains from stricter standards). Unless and until the agencies are prepared to quantify the monetary value of performance as well as fuel savings, then an analytic move in the posited direction seems premature. Moreover, the current 2.5-year payback assumption is consistent with the reality that consumers are heterogenous (some strongly value performance, others value fuel economy, and still others value both to various degrees). And the current assumption captures the reality that the typical consumer does not account for anything close to 15 years of fuel savings when they compare alternativemodels with respect to price, fuel savings and other important attributes.

On the other hand, Auto Innovators recognizes that there is uncertainty as to whether 2.5 years is the best approximation of a complicated set of consumer and manufacturer perceptions, as explained by the Agencies in the CAFE and GHG NPRM preambles, in the NHTSA and EPA RIAs, and by the National Academies.[173] Auto Innovators supports sensitivity analysis of alternatives to the 2.5-year point estimate, possibly as low as one year and as high as four years.

A recent analysis by economists at Resources for the Future ("RFF"), which relies primarily on revealed-preference studies of changes in fuel prices, suggests that a somewhat longer payback period is supportable.[174] The RFF analysis is worthy of consideration.

The RFF analysis does not consider the stated preference studies that provide a basis for the 2.5 year estimate and that were cited by the National Research Council in 2015 and by the Agencies in previous rulemakings. One of the advantages of the stated-preference approach is that study designs can directly address consumer reaction to new technologies; the findings of the revealed preference studies are more difficult to interpret. They may offer more insight about consumer reaction to changes in fuel prices than to changes in technologies.[175] A well- known weakness of the stated-preference approach is that consumer responses to hypothetical questions are not necessarily validated when those same consumers make decisions in the marketplace.

Overall, given that the existing body of evidence about consumer valuation of fuel economy does not reach definitive findings, a sensitivity-analysis approach to the 2.5-year payback period is warranted.

Both EPA and NHTSA recognize fuel savings as significant in the benefit-cost analysis. These fuel savings accumulate to consumers based on assumed prices of fuel, fuel efficiency for combinations of technologies, and travel over the lifetime of the vehicle. Each analysis recognizes that independent of regulations, consumers will adopt fuel saving technologies that pay back quickly.180

We suggest that the Agencies also consider "attribute substitution" affects (wherein households buy and use vehicles with differing fuel economy attributes to suit their needs, e.g., a large SUV and a midsize car) in the consideration of rebound.

The Agencies have not yet incorporated another type of rebound effect, sometimes called "attribute substitution", which occurs at the vehicle purchasing stage and may also occur when households make decisions about which vehicles to use on trips (e.g., urban versus rural trips, and short trips versus long trips).

Some balancing of vehicle attributes occurs in households without any regulatory inducement. If a household owns a relatively fuel-efficient small car, they may be inclined to purchase a minivan or large SUV as their second vehicle. In Norway, households with a fully battery-operated electric vehicle – the dominant propulsion system in the market -- sometimes purchase a luxurious diesel-powered car or a premium PHEV as their second vehicle.191

As emerging economics literature suggests that attribute substitution could somewhat diminish the effectiveness and cost-effectiveness of NHTSA's CAFE standards, EPA's GHG standards and other policies aimed at boosting the fuel economy of the new-vehicle fleet.192 When regulations induce households to own a more fuel-efficient vehicle or an advanced technology vehicle, households may choose to "trade" (balance) some of the enhanced fuel economy in their new vehicle for more performance, safety, seating space, cargo space or towing capability in their next vehicle purchase. This "attribute" substitution occurs in multi- vehicle households, which account for about 75% of the households that purchase new passenger vehicles in the US.

In a long-term setting where all vehicle types are becoming more fuel efficient, the magnitude of attribute-substitution effects is attenuated. However, the U.S. faces at least a 15- year transition process, but possibly as much as 30-year, where households will be owning at least one electric vehicle and at least one internal combustion engine vehicle that could range from a small car to a pickup truck or large SUV. [EPA-HQ-OAR-2021-0208-0116]

EPA Response

EPA agrees that purchase incentives would likely speed the adoption of EVs. That said, it is not within EPA's purview to provide purchase subsidies. EPA believes the expanded variety in offerings of EVs by automakers will increase their suitability for more vehicle buyers, and thus also increase EV adoption. EPA will monitor sales of EVs as part of its compliance program.

EPA has conducted extensive analysis of the role of fuel costs in the vehicle purchase decision. Although there is no consensus on the value, the modeling in CCEMS that assumes 2.5 years of fuel consumption in the purchase decision, as discussed in Preamble Section VII.A. and RIA Chapter 8.1.1, is on the low end of the distribution of estimates of consumer valuation of reduced fuel consumption. For these reasons, EPA considers its evaluation of the impacts of the standards on vehicle purchases to be reasonable, or conservative. EPA has not conducted a sensitivity assessment of this value due to the way it is coded in CCEMS.

As discussed in RIA Chapter 8.1.1, EPA finds very wide ranges of estimates for the willingness of vehicle buyers to pay for fuel economy and for performance. EPA agrees that it is premature to incorporate the value of performance in the benefits until research is more conclusive about these values. EPA agrees that the RFF analysis cited by the Alliance is worthy of consideration within the larger literature.

Regarding attribute substitution, EPA's reviews of literature on consumer vehicle demand have found great variation in results, even among studies considered very high quality.[82] Thus,

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[82] See, e.g., Helfand, G., and Wolverton, A. (2011). "Evaluating the Consumer Response to Fuel Economy: A Review of the Literature." International Review of Environmental and Resource Economics 5: 103-146; Doremus, J., et al. (2019). "Simpler is better: Predicting consumer vehicle purchases in the short run." Energy Policy 129: 1404-1415; Greene, D., et al. (2018). "Consumer Willingness to Pay for Vehicle Attributes: What Do We Know?" Transportation Research Part A 118: 258-279.

Archsmith et al. (2020)[83] may suggest an important aspect of household vehicle choice, but it is unlikely to be the last word on the topic. In addition, as the authors themselves note, “we readily acknowledge that households may be substituting an attribute that is correlated with fuel intensity, such as size or power, and not fuel intensity itself” (p. 4). That is, while their study analyzes fuel intensity, it may actually be studying households that prefer to have portfolio of different-sized vehicles, or vehicles with different power. For these reasons, EPA does not consider it appropriate to rely on this study alone to examine the effects of household attribute substitution.

Commenter: American Enterprise Institute (AEI)

The inclusion of fuel savings — roughly twice as large as the purported environmental benefits — is illegitimate as an economic benefit of a proposed regulation. [EPA-HQ-OAR-2021-0208-0254-A1, p. 5]

Fuel savings. The conceptual purpose of any proposed regulation is the correction of some set of purported inefficiencies inherent in market allocational outcomes, usually assumed to result from some social resource or other cost not reflected in market prices. This is the standard definition of an externality. (I shunt aside here the issue of whether government can be predicted to adopt policies yielding systematic allocational improvement.) Fuel savings themselves represent no such divergence between market prices and resource costs apart from the climate effects (discussed below) and other such assumed impacts not reflected in market prices. Accordingly, fuel savings are not relevant analytically, for reasons addressed immediately below, and the EPA methodologically is engaged in an obvious exercise in double counting in the Proposed Rule by including both asserted fuel savings and reductions in purported externalities created by fuel consumption.

Even shunting that observation aside, the inclusion of fuel savings is illegitimate as a component of the ‘benefits’ of the Proposed Rule because the economic benefits of fuel savings are captured fully by consumers of fuels. There is no ‘externality’ attendant upon fuel consumption per se, and if ‘fuel savings’ are to be considered relevant for purposes of benefit/cost analysis, then the adverse effects or costs of a (forced) reduction in fuel consumption must be included in the analysis. The EPA claims that the fuel savings attendant upon implementation of the Proposed Rule would yield a benefit stream through 2050 the present value of which is between $120 billion and $250 billion. That the Proposed Rule would force consumers of fuels to change their consumption patterns in ways that would not be observed without the Proposed Rule demonstrates that the ‘fuel savings,’ even if we accept the underlying calculations, must be accompanied by some explicit or implicit costs, which in turn must be greater than the value of the purported fuel savings. That obviously is why we do not observe the allocational outcomes

[83] Archsmith, J., K. Gillingham, C. Knittel, and D. Rapson (2020). “Attribute Substitution in Household Vehicle Portfolios.” https://econjim.com/pdf/WP/HHPort/HHPort.pdf , accessed 11/12/2021.

envisioned in the Proposed rule as a result of market forces. Why does market behavior not yield the fuel economy parameter for the vehicle fleet envisioned in the Proposed Rule?

In order to see this clearly, suppose that the Proposed Rule were simply to outlaw entirely the use of motor fuels by cars and light trucks, forcing consumers massively to use bicycles, horse-drawn carts, and similar substitutes backward as a technological matter. It is no answer to say that electric vehicles and the like would be substituted without loss of value in terms of consumption value; the fact that such technologies have not been adopted by markets in the aggregate, even given the subsidies embedded in current policies, demonstrates that these technologies must impose some set of disadvantages in terms of costs and/or performance. The data reported by the Energy Information Administration show that in 2019 expenditures on motor gasoline alone in the transportation sector were about $357 billion.15 Under the EPA methodology, that 'fuel saving' in total would be an annual benefit of such a hypothetical rule outlawing the use of motor fuels, and the disadvantages of bicycles, horse-drawn carts, and the like — the marginal benefits of using motor vehicles — would be irrelevant. Under the methodology underlying the Proposed Rule, the more stringent the constraint imposed upon fuel use, the greater the benefit from 'fuel savings.' Amazingly, this is the analytic framework underlying this part of the estimated benefits asserted in the Proposed Rule. It is not to be taken seriously. [EPA-HQ-OAR-2021-0208-0254-A1, pp. 5-6]

EPA Response

AEI asserts the market for fuel economy operates efficiently, and thus has no externality or other market failure; if the present value of fuel savings exceeds the technology costs, it states, then there must be "some explicit or implicit costs" associated with those technologies. AEI does not provide evidence to support this assertion.

EPA has been monitoring this area of concern since previous LD GHG rulemakings and in the Midterm Evaluation. In addition to regularly updating our estimates of technology costs and fuel savings, EPA has conducted several studies (discussed in RIA Chapter 8.1.1) that examine whether there are "explicit or implicit" (hidden) costs associated with the technologies, in addition to the financial costs. The statistical evidence for new technologies producing hidden costs is, at best, weak; in fact, fuel-saving technologies show positive associations with desirable operational characteristics far more often than they have negative associations. On that basis, as discussed in Preamble Section VII.A. and RIA Chapter 8.1.1, EPA concludes that there is in fact a failure in the market for fuel economy: there seem to have been existing fuel-saving technologies that were not commonly included in new vehicles previous to the standards that, after they were adopted, proved to have reasonable payback periods and did not reveal significant adverse effects. In other words, private markets previously failed to provide these technologies, and vehicle buyers have experienced fuel savings and not suffered known adverse effects with their adoption. This conclusion is based on the factual record rather than economic theory.

Neither EPA nor scientific literature has yet come to a conclusion on the cause of this failure. As discussed in Preamble VII.A. and RIA Chapter 8.1.1, a number of hypotheses have been suggested for both consumer and producer behavior that might contribute to this phenomenon, such as consumer undervaluation of fuel consumption and first-mover disadvantage for producers. The evidence to date is inconclusive as to which effects in fact contribute to under-adoption of cost-effective fuel-saving technologies. The studies that have sought to estimate consumer willingness to pay for fuel economy, for instance, have produced a very wide range of findings, including significant undervaluation, close-to-perfect valuation, and some overvaluation. Thus, this hypothesis remains unproven, as do others.

It is therefore appropriate for EPA to include the reduced fuel consumption resulting from our final standards in the benefit-cost analysis (BCA). The BCA compares the costs and fuel consumption in the absence of the standards with the costs and fuel consumption in the presence of the standards. This "with/without" comparison is standard in BCA; OMB Circular A-4, for instance, directs agencies "to measure the benefits and costs of a rule against a baseline. This baseline should be the best assessment of the way the world would look absent the proposed action."[84] If there were evidence of hidden costs of the technologies, EPA agrees that it would be appropriate to include those costs in the BCA. In the absence of such evidence, though, EPA considers it appropriate to value such costs at zero.

In sum, EPA considers its estimates of the technology costs and fuel savings to be appropriate, and its estimates of zero for "explicit or implicit" costs to be based on the best available evidence.

Commenter: American Fuel & Petrochemical Manufacturers (AFPM) et al

EPA Overstates the Benefits of the Rule, Particularly EVs

The proposed rule does not explicitly mandate any specific vehicle technology, however, EPA acknowledged that the stringency of the proposed standard would result in automobile manufacturers including about 8 percent EVs (including plug-in hybrids) in their fleets. Moreover, the President issued Executive Order 14037 on the same day as this proposal, 'setting a goal that 50 percent of all new passenger cars and light trucks sold in 2030 be zero-emission vehicles, including battery electric, plug-in hybrid electric, or fuel cell electric vehicles.' As such, the Agency must take special care to appropriately calculate the costs and benefits of the EVs in this rule.

According to EPA, the proposal would save American drivers $120 to $250 billion in fuel costs through 2050.29 EPA also notes that '[b]ecause the use of vehicles varies widely across vehicle owners, another way to estimate the effects of the standards is to examine the 'break even' number of miles—that is, the number of miles driven that would result in fuel savings matching the increase in up-front costs.'30 EPA calculates the aggregate value of fuel savings that result

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[84] Office of Management and Budget (2003). "Regulatory Analysis," section E.2. https://obamawhitehouse.archives.gov/omb/circulars_a004_a-4/#e , accessed 11/10/2021.

from reductions in fleet-wide fuel use and include rebound effects, credit usage, and advanced technology multiplier use. However, research shows EVs and ICEVs are not perfect substitutes, and EVs are driven substantially fewer miles than comparable ICEVs, which EPA ignored in its calculations. Without considering this real-world implication, the Agency arbitrarily overstates avoided tailpipe emissions and potential fuel savings. [EPA-HQ-OAR-2021-0208-0286-A1, p.5]

A recent National Bureau of Economy Research (NBER) study finds that EVs are being driven less than half the annual miles driven by conventional cars, which undermines assumptions that the technology will replace a vast majority of trips currently using gasoline.35 The study finds that EVs are driven just 5,300 miles per year, less than half the average ICEV. This single omission could result in the Agency arbitrarily doubling any estimated avoided emissions. Assuming reductions in emissions based on the faulty premise that EVs are driven the same distance as ICEVs distorts the cost-benefit analysis, including total carbon emissions reductions and the fuel savings calculations. Policymakers must have a more complete picture about EVs before costly and irreversible commitments are made to the technology as the primary solution to decarbonizing transportation.36

Further research shows EV-owning consumers tend to buy larger second cars, potentially wiping out substantial fuel efficiency savings (and carbon reductions). 37 According to recent research by professors from Yale, MIT, and the University of California-Davis (UC-Davis), even consumers who have already bought EV vehicles are less likely to choose another EV vehicle as an additional car.38, 39 The Yale, MIT, and UC-Davis study used long-term data tracking households over several vehicle replacements, and found that “attribute substitution” is a common phenomenon where households buy an additional vehicle with very different attributes than the first vehicle (the “kept vehicle”).40 For example, a household may choose to prioritize cargo space or the need to be able to travel long distances over fuel economy if it already owns an electric car. Attribute substitution has: a large countervailing effect on the fuel economy of the newly purchased vehicle. For example, in our preferred specification, increasing the fuel economy of the kept vehicle by 10 percent results in a 4.8 percent decrease in the fuel economy of the purchased vehicle.41 The authors observed “significant changes in usage patterns that further reduce the net fuel savings” through increases in mileage for both vehicles that “erodes over 60% of the fuel savings from the fuel economy increase of the kept vehicle on net….”42 Attribute substitution introduces a new and previously unaccounted for phenomenon that reduces the effectiveness of higher fuel economy standards or EV mandates. EPA does not account for attribute substitution in its proposal, but should do so to more accurately quantify the benefits of the proposal. [EPA-HQ-OAR-2021-0208-0286-A1, pp.6-7]

29 This indicates that EPA recognizes this rule is related to fuel economy and should be led by NHTSA.

36 Moreover, it is notable that the above-referenced study evaluates EVs in the State of California (where more than 50% of U.S. EVs are located). Because the study does not include any colder climates, where EV performance degrades materially during winter months, it likely overestimates the average miles driven per EV in the U.S. Other studies that claim to show

higher EV miles traveled include EVs used for commercial business and cannot be considered by EPA as representative of the typical EV.

EPA Response

The Burlig et al. paper,[85] cited as evidence that EVs are driven less than ICE vehicles, uses data from the 2017 National Household Transport Survey. As noted in Chakraborty et al. (2022),[86] EVs in the 2017 NHTS, excluding Tesla, commonly had maximum range of 70-80 miles; many recent EVs have ranges greater than 200 miles. In contrast to Burlig et al., Chakraborty et al. (2022) find that EVs in California are driven about the same as ICE vehicles, displaying neither rebound effects nor range anxiety. This latter study is based on data from 2019 in California. EPA agrees that how EVs are used matters for estimates of emissions impacts, but we disagree that the Burlig et al. study should be the basis of estimates for EV VMT. Indeed, a news article about the paper[87] quotes Burlig as saying, "The fleet in 2017 is not the same as the fleet in 2021. . . . I'm not trying to say that we are predicting the future, but I do think it's important to understand what EV driving has looked like." The Chakraborty et al. study, using more recent data better reflecting improved EV ranges, suggests that EPA's assumption of EVs and ICE vehicles having similar VMT is a reasonable starting point.

Regarding attribute substitution, EPA's reviews of literature on consumer vehicle demand have found great variation in results, even among studies considered very high quality.[88] Thus, Archsmith et al. (2020)[89] may suggest an important aspect of household vehicle choice, but it is unlikely to be the last word on the topic. In addition, as the authors themselves note, "we readily acknowledge that households may be substituting an attribute that is correlated with fuel intensity, such as size or power, and not fuel intensity itself" (p. 4). That is, while their study analyzes fuel intensity, it may actually be studying households that prefer to have portfolio of

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[85] Burlig, F., Bushnell, J., Rapson, D., Wolfram, C. (2021). "Low Energy: Estimating Electric Vehicle Electricity Use." National Bureau of Economic Research Working Paper 28451, http://www.nber.org/papers/w28451, accessed 11/12/2021.

[86] Chakraborty, D., S. Hardman, and G. Tal (2022). "Integrating plug-in electric vehicles (PEVs) into household fleets- factors influencing miles traveled by PEV owners in California." Travel Behavior and Society 26: 67-83.

[87] Mulkern, A. (2021). "How much do drivers use EVs? Clashing studies fuel debate." Climatewire 2/19/2021, https://subscriber.politicopro.com/article/eenews/1063725485 , accessed 11/12/2021.

[88] See, e.g., Helfand, G., and Wolverton, A. (2011). "Evaluating the Consumer Response to Fuel Economy: A Review of the Literature." International Review of Environmental and Resource Economics 5: 103-146; Doremus, J., et al. (2019). "Simpler is better: Predicting consumer vehicle purchases in the short run." Energy Policy 129: 1404-1415; Greene, D., et al. (2018). "Consumer Willingness to Pay for Vehicle Attributes: What Do We Know?" Transportation Research Part A 118: 258-279.

[89] Archsmith, J., K. Gillingham, C. Knittel, and D. Rapson (2020). "Attribute Substitution in Household Vehicle Portfolios." https://econjim.com/pdf/WP/HHPort/HHPort.pdf , accessed 11/12/2021.

different-sized vehicles, or vehicles with different power. For these reasons, EPA does not consider it appropriate to rely on this study alone to examine the effects of household attribute substitution.

In sum, EPA's regulatory analyses rely on a broader range of literature than just the two studies cited by AFPM, and EPA believes it is inappropriate to rely specifically only on these two studies.

EPA agrees that vehicle greenhouse gas emissions affect vehicle fuel consumption, and thus incorporates those effects in its benefit-cost analysis. Nevertheless, the purpose of the rule, as discussed in Preamble Section I.A., is "revised, more stringent national greenhouse gas (GHG) emissions standards for passenger cars and light trucks under section 202(a) of the Clean Air Act (CAA), 42 U.S.C. §7521(a)."

Commenter: California Attorney General Office, et al.

The costs of these technologies are reasonable (and, in some cases, are declining), and the application of these technologies generally results in consumers saving money over the life of a new vehicle because the fuel savings substantially exceed the costs to consumers of the applied technology. [EPA-HQ-OAR-2021-0208-0245-A1, p.1]

Many of these offerings have been extraordinarily successful, with some models even completely selling out.129 These successes can be attributed, at least in part, to consumer demand for features of these vehicles that are unrelated to their GHG-reducing attributes, such as rapid acceleration, electric power output for use at remote sites or in emergencies, and increased horsepower.130 They can also be attributed, again in part, to shareholder demands.131 Automakers can, and to some extent must, continue to expand these offerings to respond to those demands, and these offerings (and their popularity) support more stringent standards as early as MY2023. [EPA-HQ-OAR-2021-0208-0245-A1, pp.27-28]

<u>EPA Response</u>

EPA agrees that EVs provide desirable attributes unrelated to their GHG-reducing attributes, and that these attributes will contribute to their adoption. EPA also agrees that the costs of EVs are expected to fall over time, increasing their financial acceptability.

Commenter: Center for Climate and Energy Solutions (C2ES)

Zero-emission vehicles represent a powerful economic opportunity for both U.S. manufacturers and vehicle owners and operators. Although average upfront vehicle costs currently remain higher for zero-emission vehicles than their combustion-engine counterparts, recent analysis projects up-front costs of electric vehicles to reach parity with internal combustion engine vehicles as early as 2025.6 Even with higher up-front costs, maintenance costs of zero-emission vehicles are up to 40 percent lower on a per-mile basis, and lifetime charging costs can save electric vehicle drivers between $3,078 and $10,445 over 15 years.7 [EPA-HQ-OAR-2021-0208-0287-A1, p.3]

C2ES recognizes that regulations and performance standards are not implemented in a vacuum; large-scale proliferation of electric vehicles in the U.S. market will require significant investment at the federal, state, and local policy levels, as well as strong ambition from the private sector, and will rely heavily on increased demand by American drivers for low- and zero-emission vehicles. Policies like electric vehicle tax credits, point-of-sale rebates for new and used vehicles, and other purchase incentives are crucial. [EPA-HQ-OAR-2021-0208-0287-A1, pp.3-4]

As price remains a significant barrier to access for many households, incentivizing further expansion of low- and zero-emissions technologies to bring down costs and improve access should be an essential goal of any transportation emissions reduction program. [EPA-HQ-OAR-2021-0208-0287-A1, p.6]

EPA Response

EPA agrees that, especially as the up-front costs of EVs decreases, the total cost of ownership of EVs will become lower than that of ICE vehicles. EPA also agrees that complementary public policies outside of EPA's authorities, such as vehicle subsidies, would facilitate their adoption, and that access for lower-income households is an important consideration. See RIA Chapter 8.4 for more discussion of the effects of the standards on vehicle affordability, and Chapter 8.4.1 in particular for effects on lower-income households.

Commenter: Competitive Enterprise Institute et al.

Motor vehicle GHG standards have three unavoidable downsides. Such policies (1) increase vehicle ownership costs,3 (2) restrict consumer choice,4 [EPA-HQ-OAR-2021-0208-0292-A1, p. 1] and (3) make the average vehicle less crashworthy than it otherwise could be. 5

3 Manufacturers spend tens of billions of dollars annually on technology to comply with GHG standards. That increases the average cost of new vehicles, which in turn can price middle-income households out of the new-car market. 'The Average New Car Price Is Now Over $40,000,' Autotrader reported in February, https://www.autotrader.com/car-news/the-average-new-car-price-is-now-over-40000. The proposed standards are projected to increase average vehicle cost by $1,022 relative to the no-action (SAFE Rule) scenario. See EPA, Draft Regulatory Impact Analysis, Revised Model Year 2023 and Later Light Duty Vehicle GHG Emission Standards, August 2021, p. 4-14, Regulatory Impact Analysis, LD GHG 2023-2026.pdf (hereafter, EPA 2021, DRIA).

4 Regulatory agencies have different priorities than consumers. If that were not so, consumers would demand the same average fuel economy the EPA deems optimal, and GHG standards would not be 'needed.' GHG standards unavoidably shift capital and engineering talent from consumer priorities to bureaucratic priorities.

EPA Response

The average price of a new vehicle depends, not only on the prices of vehicles, but also the sales mix. As discussed in RIA Chapter 8.4.4, low-priced vehicles continue to exist. EPA agrees that cost increases can affect vehicle affordability; see RIA Chapter 8.4 for further discussion of this topic. At the same time, the standards offer a desirable characteristic – reduced fuel consumption – that, over the vehicle's lifetime, exceed those up-front costs; see Preamble Section VII.J. for discussion of those effects for new and used vehicle buyers.

The footprint-based standard is intended to support the diversity of vehicle sizes in the fleet. As described in the response to American Enterprise Institute above in this chapter, EPA has not found evidence that vehicle buyers have faced losses of other attributes in their new vehicles, and neither CEI nor AEI have presented evidence of those losses. Thus, while EPA agrees with CEI that it should account for the increase in up-front costs and any losses to vehicle attributes, EPA considers its accounting for the benefits and costs of the standards to have taken into account all relevant impacts on consumers, including both the increase in up-front costs and the reduction in operating costs.

Safety impacts are discussed in Section 21 of this Response to Comments.

Commenter: Consumer Reports (CR)

However, this proposal leaves significant consumer savings on the table and does not go far enough to meet the climate challenge ahead of us. [EPA-HQ-OAR-2021-0208-0602-A1, p.4]

Commenter: Mass Comment Campaign sponsored by Consumer Reports (19,038)

and they leave billions of dollars in consumer savings on the table, as stronger standards could save drivers up to $88 billion on gas, maintenance, and costs for vehicles purchased in the next 5 years. [EPA-HQ-OAR-2021-0208-0602-A2, p.1]

EPA Response

EPA's standards are based on multiple considerations, including their feasibility, compliance cost, and lead time, as provided in section 202(a) of the CAA. As discussed in Preamble Sections II. and VI., the decisions in this final rule balances these and other factors.

Commenter: Egbert, Judi

[The following comments were submitted as testimony at the virtual public hearing on August 26, 2021. See Hearing Testimony – 26Aug2021, p. 177.]

I need and do use a fuel efficient vehicle, which is a hybrid Prius. I find this vehicle, which gets about 45 to 50 miles per gallon, can adequately and comfortably help me contribute to a thriving community

<u>EPA Response</u>

EPA is pleased that this commenter found a fuel-efficient vehicle that suits her needs.

Commenter: Energy Innovation Policy and Technology LLC

The companion Policy Report finds that achieving the DRIVE Clean Scenario requires a combination of policy and regulatory changes at the federal, state, local, and utility level, including:

• Strengthened EPA tailpipe emission standards that support ZEV sales and reduce overall tailpipe emissions for all ground vehicle classes to 0 g/mile by 2035;

• Continued adoption of state ZEV standards and rules;

• Incentives for EVs and charging infrastructure to help more consumers access affordable new and used EVs and convenient charging;

• Workforce programs that help streamline the transition to EVs and create new jobs;

• Incentives for domestic manufacturing to encourage the production and sale of electric cars and trucks;

• EV-friendly rules, codes, permitting, interconnection, and rates. [EPA-HQ-OAR-2021-0208-0605-A1, pp. 9-10]

<u>EPA Response</u>

These comments primarily address EV incentives that are outside EPA's authority or the scope of this rulemaking, though EPA agrees that they would facilitate adoption of EVs. As discussed in Preamble Section I.A.2, EPA is planning to initiate a rulemaking to establish multi-pollutant emission standards for MY 2027 and later.

Commenter: Environmental Protection Network (EPN)

Better and cheaper batteries have also allowed automakers to increase EV range. A decade ago, EV range was often on the order of 100 miles. Now, most EVs have ranges between 200 and 300 miles. While such EV ranges are still less than the typical highway range for gasoline cars, they are more than sufficient for most drivers who typically travel 20-50 miles per day and for others who have convenient charging access in their home garages or workplaces. Higher EV ranges are possible, of course, but there is a tradeoff between vehicle range and cost, and automakers will likely offer multiple battery sizes and costs, allowing consumers to choose the best package for their circumstances. [EPA-HQ-OAR-2021-0208-0213-A1, pp. 5-6]

EPN cannot speak on behalf of the industry, of course, but there is mounting evidence that many automakers are convinced that EVs are the future of the industry for multiple reasons: they will be higher-quality designs that consumers will prefer, they will be simpler and cheaper to build, and they will be required by countries fulfilling their commitments to the Paris Climate Agreement to protect the planet and public health. This apparent belief by multiple major automakers that there is an attractive powertrain technology ready to replace fossil fueled internal combustion engines is unprecedented in the century-plus history of the automobile industry. [EPA-HQ-OAR-2021-0208-0213-A1, p. 6]

But EVs are not superior in every way, and at least for the foreseeable future, EVs will entail some disadvantages as well: range between refueling will be shorter and they will take longer to recharge (not so important with overnight home charging, but a meaningful drawback in the middle of a long highway trip), access to public refueling stations may be more limited than to gasoline stations (at least initially), and certain types of driving, such as boat towing or steep road grades, may require additional technology and cost.

It is well accepted in the economics literature that many consumers are risk averse, especially with large expenditures. It is easy to stick with what you know and let others be the 'guinea pigs' for a new technology.

Some automakers may choose to delay their transition to EVs as long as possible, in the hopes of 'milking as much profit' as they can from their existing gasoline vehicle designs and engine/transmission/assembly plants.

Finally, EPN agrees with statements by some individual automakers and the Alliance for Automotive Innovation that there is a critical need for complementary federal policies to support a fast transition to EVs in at least three areas: the extension of federal tax credits/rebates for consumers who are willing to buy EVs in the next few years, the buildout of a nationwide public refueling infrastructure, and a modernized and more sophisticated electric grid to support widespread EV use. The Biden administration infrastructure bills include all these critical components, which are currently being debated in Congress. None of these programs would fall under the purview of EPA, of course. [EPA-HQ-OAR-2021-0208-0213-A1, p. 7]

EPA Response

As discussed in RIA Chapter 4.1.4 and Preamble Section III.B.3, EPA projects that, while 17 percent of the vehicles sold in MY 2026 will be EVs, the large majority of vehicles sold subject to these standards will use gasoline. The policies that EPN cites to promote adoption of EVs are beyond EPA’s authority or the scope of this rulemaking, though EPA agrees that they would facilitate widespread adoption of EVs.

Commenter: General Motors LLC (GM)

The 200,000 unit per manufacturer cap on the $7,500 Federal EV Tax Credit, 26 U.S.C. § 30D, should be modified to ensure that the credit does not penalize first movers in this space, currently putting companies like GM at a severe pricing disadvantage in the market for several years.

• This incentive should be available to consumers at the point of sale and should be able to be used by all retail, commercial, and government entities.

• A federally funded program should be established to drive EV adoption through federal, state, and local government fleet EV purchase commitments (recognizing that many government fleets cannot take advantage of tax credits).

• A federally funded national EV-awareness campaign should be established, including EV experience centers across the United States, K-12 education programs, and media programs that highlight the benefits of driving electric for both retail consumers and fleet operators.[EPA-HQ-OAR-2021-0208-0234-A1][p.4]

GM recognizes that increased EV charging infrastructure is necessary for battery electric vehicles to achieve scale. To support this development, GM recommends the following initiatives for federal leadership and support:

• Reestablish and reform the EVSE (Electric Vehicle Supply Equipment) Infrastructure Tax Credit, 26 U.S.C. § 30C, to convert it into a refundable tax credit that can be used by all retail, commercial, and government entities.

• Establish a federal grant program to accelerate public and private workplace charging.

• Establish a federal grant program to accelerate investment in urban and high-density DC fastcharging hubs.

• Establish a national building code that requires all new residential construction (single family homes and multi-unit dwellings) to support EV charging.

• Establish a federal program to ensure all EV charging stations in the U.S. are easily identifiable to consumers (e.g. some uniformity in appearance).

• Enactment of the provisions of EV infrastructure included in the Bipartisan Infrastructure Bill passed by the U.S. Senate on August 10, 2021 and presently pending before the U.S. House of Representatives. [EPA-HQ-OAR-2021-0208-0234-A1][p.5]

EPA Response

These comments address EV incentives that are outside EPA's authority or the scope of this rulemaking, though EPA agrees that they would facilitate adoption of EVs.

Commenter: Haines, Meredith

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, p. 114.]

Our communities will have cleaner air benefits sooner and will be more choices in electric vehicles, and I want consumers to get a strong signal that zero emission vehicles are the future and that is the future we want with lower running costs, cleaner air to breathe, and wider ecosystem benefits.

EPA Response

EPA agrees that zero-emissions vehicles can have lower operating costs and can improve air quality and provide other ecosystem benefits.

Commenter: Hall, Marilyn

[The following comments were submitted as testimony at the virtual public hearing on August 26, 2021. See Hearing Testimony – 26Aug2021, pp. 21-22.]

I am fortunate that I was able to purchase a plug-in hybrid car that meets my needs, is a great car that I've already taken on a few road trips. I only wish that the battery would carry my car farther between charges so that I would not need to rely on gasoline as much as I do. There's a huge market for electric cars that will become even larger as the technology improves. I have found tremendous interest in hybrid electric cars since I started driving mine. Friends have asked to check out my car to see whether it would work for them. Strangers approach me at charging stations with questions about the technology. Some folks have commented longingly that they would like to own an electric vehicle but they need prices they can afford The proposed rule can help that to happen for American consumers. People want electric cars.

EPA Response

EPA expects EV technology will improve over time, especially as automakers develop greater experience in producing them, and that costs will decrease over time; see RIA Chapters 2.3.3 and 2.3.4.

Commenter: Hyundai America Technical Center, Inc. (Hyundai)

Consumer acceptance is growing as driver exposure to EVs increases, EV model availability expands and appeals to a wider consumer base, infrastructure becomes more accessible and reliable, and incentives narrow the price gap between EVs and gasoline vehicles.

It is important to continually analyze EV sales to understand how the sales demand is being driven, and it is necessary to formulate relevant metrics to forecast whether the market can sustain continuing aggressive growth. There are a number of ways to proactively evaluate whether the EV market is healthy, as described below.

1. Consumer reasons for rejecting EVs and associated trends should be continuously monitored. Surveys providing rejection reasons can show fundamental consumer concerns with EVs. In a healthy market, rejection reasons should not be foundational (i.e. infrastructure, vehicle range, vehicle cost). Therefore, foundational concerns should decline over time.

2. The number of EV intenders (people who state future intent to purchase EVs) should be compared to the number of actual EV purchasers. Over time, the gap between these two numbers should narrow.

3. Financial incentives provided by auto manufacturers to purchase EVs should decrease over time as price parity improves between EVs and gasoline vehicles, and consumer acceptance of EVs grows.

4. As the share of gasoline vehicles declines, consumer willingness to pay premiums over Manufacturer Suggested Retail Price for gasoline vehicles may suggest consumer apprehension towards EVs. The cost differential between EVs and equivalent gasoline vehicles should be monitored for this indicator.

5. 'Days to Turn' in the industry is the average number of days vehicles remain in dealer inventory prior to sale. This metric should be monitored for both EVs and gasoline vehicles. If the number of days is decreasing for EVs and increasing for gasoline vehicles, this could indicate a healthy EV market. The opposite could indicate EV hesitancy.

6. Evaluate GHG performance by manufacturer in conjunction with the factors listed above to further assess the health of the EV market.

All of these components are vital to understanding whether the EV market expansion will be successful, and provide insight into how to proactively address any issues before they impact the goals of GHG reduction.

In addition, complementary consumer awareness programs that explain the benefits of electric vehicles are critical. Hyundai and other automakers are broadly marketing new electric vehicles on a variety of platforms. Hyundai also supports the national Drive Change Drive Electric4 campaign, a unique public-private partnership between auto manufacturers and U.S. Northeast states to improve consumer awareness, understanding, consideration and adoption of electric cars, including battery electric, plug-in hybrid electric, and fuel cell electric vehicles.

The Federal Government could supplement the efforts of manufacturers by launching a national consumer education campaign. This could include Public Service Announcements, social media posts, a consumer-focused website, and a helpline as resources for consumers to answer questions about EVs, such as charging locations, installation of home chargers, or how to access Federal and/or local EV incentives. [EPA-HQ-OAR-2021-0208-0603-A1, pp. 3-4]

As an emerging technology, electric vehicles remain more expensive than conventional gasoline vehicles. The timing of cost parity between EV and gasoline vehicles is unknown and there are numerous variables that will impact when it will occur (e.g. battery prices, cost reductions due to economies of scale, and raw material pricing).

Until then, consumer incentives are critical in reducing the price gap and accelerating EV market growth. Consumer incentives and cost parity should be monitored and incentives adjusted, as needed, to assure they bridge the price gap between electric and conventional vehicles. [EPA-HQ-OAR-2021-0208-0603-A1, p.5]

EPA Response

EPA agrees that consumer acceptance of EVs deserves monitoring, and Hyundai suggests some useful metrics that EPA will consider, taking into account the availability of such information. Nevertheless, the majority of vehicles subject to these standards that are expected to be sold through MY 2026 are not EVs, but gasoline-powered vehicles; see Preamble Section III.B.3. and RIA Chapter 4.1.4 for further information.

Consumer incentives to reduce EV costs are outside EPA's authority or the scope of this rulemaking, though EPA agrees that such measures would facilitate adoption of EVs.

Commenter: Institute for Policy Integrity

EPA should affirm that strong standards help correct market failures that prevent consumers from achieving valuable fuel savings on their own. The SAFE 2 Rule distorted its balancing of factors based on unsupported assumptions about consumer valuations. EPA now correctly balances those factors, but should go further to highlight additional market failures that interfere with consumers purchasing optimal levels of fuel economy on their own, and should conclude that standards are necessary to help correct at least some persistent market failures. [EPA-HQ-OAR-2021-0208-0299-A1, p. 1]

EPA has begun to make appropriate changes to its modeling approach, but further adjustments in the future would more fully capture the benefits of strong standards. [EPA-HQ-OAR-2021-0208-0299-A1, p. 1]

Going forward, EPA should revise the sales and scrappage models to be more consistent with real-world purchasing behaviors, such as moving to a long-run sales elasticity estimate and correcting the assumption that consumers will indefinitely continue to irrationally value only 2.5 years of fuel savings. [EPA-HQ-OAR-2021-0208-0299-A1, p. 2]

Notably, comparing technology costs to fuel savings also suggests that Alternative 2 may have greater net benefits for individual consumers.10 Given EPA's findings that lower-income families benefit more from net fuel savings,11 Alternative 2 should also advance equity goals. [EPA-HQ-OAR-2021-0208-0299-A1, p. 2.]

EPA Should Affirm that Strong Standards Help Correct Market Failures that Prevent Consumers from Achieving Valuable Fuel Savings on Their Own

In the Final Rule, EPA should offer much stronger conclusions about its approach to consumer valuation. [EPA-HQ-OAR-2021-0208-0299-A1, p. 8]

First, EPA should clarify that, whereas the SAFE 2 Rule distorted its balancing of long-term savings versus upfront costs in ways grossly inconsistent with economic practices, regulatory precedent, and statutory mandates, EPA now properly balances the appropriate factors consistent with best economic practices. [EPA-HQ-OAR-2021-0208-0299-A1, p. 8.]

Second, EPA should conclude that there is considerable evidence that multiple market failures contribute to consumers purchasing less vehicle efficiency than would benefit them, and so there is a clear role for regulations to correct these market failures. Third, EPA should reiterate that the constant performance assumption built into its analytical model obviates the need to estimate any potential lost consumer welfare from forgone attributes—which would, in any case, likely be small and offset by countervailing effects. [EPA-HQ-OAR-2021-0208-0299-A1, pp. 8-9]

EPA Should Cite Additional Evidence and Theories of Market Failures and Should Affirmatively Conclude that Standards Help Correct Market Failures

The Proposed Rule and the supporting draft Regulatory Impact Analysis ('DRIA') discuss numerous explanations for why consumers are not able on their own to achieve optimal levels of fuel savings. However, EPA should more thoroughly identify the full range of market failures and more clearly conclude that regulations are necessary to help correct such market failures and so deliver net savings to consumers.

The Proposed Rule's preamble identifies several consumer behaviors that help explain the 'energy efficiency gap,' the phenomenon that describes how consumers do not always on their own purchase levels of energy efficiency that will save them money over time. Specifically, the Proposed Rule cites 'myopic loss aversion,' incomplete understanding of fuel savings, and not prioritizing fuel consumption in the complex process of selecting a vehicle.79 In the Final Rule, EPA should connect these consumer behaviors to specific market failures, namely: myopia and loss aversion (which are two separate market failures); informational costs and asymmetries; and a variety of market failures that can affect prioritization, including salience, satisficing, positional externalities, and others.80 Similarly, the Proposed Rule cites several producer-side explanations, including the large fixed costs of investments to switch to new technologies, and the complex and uncertain processes involved in technological innovation and adoption.81 Again, the Final Rule should connect these with specific market failures, like first-mover disadvantages and network externalities.82 As Executive Order 12,866 requires, agencies should identify the specific market failures or other problems that their rules address and assess the significance of the problems.83

The Proposed Rule's conclusion—that despite the lack of 'consensus in the literature' on 'which of these hypotheses for the efficiency gap explain its apparent existence,' EPA 'cannot reject the observation that the energy efficiency gap has existed for light-duty vehicles'84—is much more lukewarm than it needs to be. In fact, there is strong evidence that multiple market failures continue to plague consumers throughout the vehicle market.85 The Final Rule should conclude that, given the broad range of potential market failures, stronger vehicle standards are clearly necessary to help consumers achieve net savings.

The DRIA offers some more details, by discussing additional market failures like positional externalities and first-mover effects.86 However, the DRIA also offers the rather subdued conclusion that ‘it is not clear whether consumer behavior is responsible for the energy efficiency gap,’ and leaves it as ‘an open question why’ the gap exists, though it concedes that ‘it appears to have happened.’87 Again, in either the Final Rule, the Final RIA, or both, EPA should make a much stronger conclusion. Even though it may not be clear which market failure is the dominant cause of the energy efficiency gap, there is considerable evidence that at least some market failures are in part responsible for consumers purchasing less vehicle efficiency than would benefit them, and so there is a clear role for regulations to correct these market failures.

To support this stronger conclusion, EPA should add descriptions of both additional market failures that exist, as well as additional evidence for the market failures that are already mentioned. EPA should also make clearer that different market failures may apply to different categories of consumers, as the market failures that affect purchases by individual consumers may be the same or different from market failures that affect small business fleets, governmental and institutional fleets, or corporate fleets of light-duty vehicles.88 The literature recognizes multiple additional market failures that EPA has not yet discussed in the Proposed Rule or DRIA. These additional failures include:

• Dealership incentives, biases, and information asymmetries. Consumers typically must purchase new vehicles from dealerships, and salespeople have significant influence on consumer purchasing decisions.89 Yet salespeople’s own incentives and biases may cause informational asymmetries that prevent consumers from purchasing optimal fuel efficiency.90 Studies have found that dealers and salespeople often believe (whether or not it is true) that electric vehicles and other highly efficient cars have lower profits for dealers than gas-powered cars,91 including less profits from dealership-provided service and maintenance opportunities on electric vehicles, lower ‘back-end’ profits on trade-ins of electric vehicles, and commission structures that may not compensate salespeople for the perceived increased paperwork and transaction costs of selling electric vehicles.92 Perhaps partly because of such incentives, consumers and ‘mystery shoppers’ conducting research have often complained of poor dealership experiences when trying to purchase electric vehicles, citing salespeople’s limited knowledge and dishonesty; misinformation about electric vehicle’s costs, range, and other attributes; inconsistent enthusiasm among salespeople for electric vehicles; dealerships’ lack of inventory for more efficient and electric vehicles; poor timeliness for completing paperwork and delivery of electric vehicles; limited promotional materials on energy efficiency; and dealerships’ inability to facilitate consumers’ cost comparisons of electric versus gas vehicles.93 Some dealerships have admitted that poor sales training is a major barrier to electric vehicle sales.94 Because consumers rely on dealerships, but dealerships have different incentives and information than consumers, market failures can occur.

• Split incentives. When the purchaser of a vehicle does not have to pay the costs of fuel usage, this can create a market failure known as ‘split incentives’ or the ‘principal-agent problem.’95

Economists have found, for example, that split incentives can lead to undervaluation of fuel economy in the shipping industry, as parties that own or operate trucks are frequently not responsible for fuel costs.96 A similar dynamic can occur in other contexts, such as in the large rental vehicle fleets of light-duty vehicles, since rental companies do not pay for fuel costs. Government intervention can ensure that purchasers make societally optimal investments in energy efficiency technologies when they receive inadequate market incentives because of principal-agent problems.97

• Network externalities. Though EPA mentions some network effects, there is additional evidence of market failures in this area. The benefits of a new technology sometimes depend on widespread adoption by others, creating a situation where ‘proven’ technologies are chosen even though others would save more money in the long run.98 Network externalities can affect investments in electric vehicle charging, maintenance facilities, natural-gas refueling, and replacement parts.99 In turn, these externalities can affect a range of consumers and vehicles, from individuals to businesses, and from passenger cars to heavy-duty trucks. Because consumers buying alternative fuel or more efficient vehicles must make predictions about the future development of these critical networks in order to estimate their long-term savings, various market failures from information asymmetries and costs, myopia, and loss aversion all come into play here. Transaction costs and principal-agent dynamics may also prevent some vehicle consumers from getting access to the charging facilities at their apartment buildings or office buildings that they would require before purchasing electric vehicles, even as those buildings’ owners may be uncertain about their tenants’ demand for such charging facilities.100 Fuel economy and vehicle emission standards help resolve the coordination, first-mover, and informational problems facing the developers of this network infrastructure, thereby providing greater certainty that consumers can achieve long-term cost savings.101

• Salience, inattention, and mental accounting. Evidence continues to show that even though consumers have access to fuel economy labels, they may not accurately or fully factor those values into their decisions. The fuel economy differences among similar vehicles tend to be small on a miles-per-gallon (MPG) basis, and so may not be particularly salient.102 Salience bias may therefore cause consumers to inefficiently undervalue fuel economy in their vehicle purchasing decisions. Consumers also continue to misunderstand that fuel costs are inversely related to fuel economy (what is known as the ‘MPG illusion’).103 Consumers may value such information only in relative rather than absolute terms,104 and so may undervalue potential fuel costs savings. Left-digit bias may also affect consumer interpretation of relative MPG values, as it does when consumers focus on only the left-most digit in prices (e.g., the 99-cent price effect) or in the odometer values on used cars.105 [EPA-HQ-OAR-2021-0208-0299-A1, pp. 12-15]

• Additional myopia and inattention, including short-termism. Though EPA refers to myopia, the evidence for such market failures is more extensive than EPA recounts.106 Though myopia and inattention may more commonly plague individual consumers, economists have also found that managers at certain companies can exhibit similar kinds of inattention and so fail to implement many energy efficiency initiatives despite positive paybacks.107 Businesses may also face a kind of myopia called short-termism, in which certain corporate employees have an incentive to favor short-term profits over long-term investments if, for example, their personal compensation or career prospects are tied to near-term earnings.108 Employees with such incentives may have reason to purchase cheaper, less efficient vehicles.109 To the extent shorttermism is exacerbated by an informational asymmetry either between employees (who know that lower vehicle purchase prices will favorably boost short-term earnings reports) and investors (who may not know that more efficient vehicle purchases could have increased their long-run returns), or is caused by myopia, the phenomenon is a market failure.110 Economic studies suggest that short-termism can affect managers' choices about energy efficiency specifically,111 and about environmental sustainability more broadly.112 [EPA-HQ-OAR-2021-0208-0299-A1, pp. 15-16.]

• Manufacturer market power. Though EPA mentions how strategic marketing choices by manufacturers can result in inefficient under-supply of fuel economy to some consumer segments (and inefficient over-supply in other market sectors),113 EPA does not fully connect this inefficient pattern to market power. Because of the limited competition in at least some segments of the vehicles market, manufacturers may be able to act strategically when pricing vehicles and when producing vehicles with combinations of different fuel economy and other vehicle features in order to push consumers towards purchases that lead to higher manufacturer profits at the expense of optimal fuel economy.114 There is a relatively small number of firms producing several types of vehicles and engines across the light-duty and heavy-duty markets.115 This market failure therefore could influence purchases by all consumer groups and across several vehicle classifications.

• Additional first-mover effects. EPA mentions the first-mover disadvantages that may cause manufacturers to under-invest in research into new fuel-efficiency technologies in the face of uncertainty, but there is additional evidence for this market failure. Economists have noted that the first-mover disadvantage can be especially pronounced when returns to society are greater than those to the investor, as is the case with fuel-efficiency technologies that reduce oil use and greenhouse gas emissions.116 Short-termism can also compound the first-mover disadvantage, as manufacturers have to balance the immediate costs and risks of research against the longer-term profits from future sales. Since each manufacturer faces muted incentives to be the first to research and deploy new technologies, without regulations, no manufacturer is likely to produce vehicles with the socially optimal level of energy efficiency.117 Because manufacturers are responding to consumer demand for fuel economy that multiple other market failures have already depressed, this first-mover dynamic can exacerbate the energy efficiency gap.118 First-mover effects can also affect vehicle consumers, including corporate and institutional purchasers.119 Without regulatory incentives, firms may underinvest in purchasing such efficiency-enhancing technology as they all wait for their competitors to go first and bear the costs of testing the implementation of new technology.

• Additional information costs and asymmetries, including experience goods. Though EPA refers to some informational costs, the evidence for market failures is more extensive than EPA recounts.120 Consumers may also lack information to fully value some benefits of more efficient vehicles—like the benefit of not having to stop as often (or at all) to refuel—until after the consumer has already purchased and experienced the good.121 Because insufficient information can mute consumer demand for fuel economy, this can also lead manufacturers to underinvest in fuel economy and in lowering greenhouse gas emissions. EPA should cite these additional market failures and evidence, and EPA should offer a clearer conclusion that there is considerable evidence that at least some market failures are responsible for consumers purchasing less vehicle efficiency than would benefit them, and so there is a clear role for regulations to correct these market failures. [EPA-HQ-OAR-2021-0208-0299-A1, pp. 16-17]

EPA Should Clearly State that Its Model's Constant Performance Assumption Obviates the Need to Estimate Lost Consumer Welfare (Which Is Likely Small)

The Proposed Rule appropriately concludes that the SAFE 2 Rule was inaccurate in finding that vehicle standards would substantially change vehicle attributes and consumer choices,122 and the Proposed Rule further notes persuasive evidence that manufacturers can implement fuel-efficiency technologies without imposing hidden costs.123 Indeed, not only has the marginal rate of substitution between power and fuel economy changed over time, such that newer technology improvements do not reduce power,124 but many fuel-efficiency technologies enhance power, performance, handling, or other attributes.125 The DRIA expands on this evidence and also notes that EPA's analytical model assumes that manufacturers will incur any additional costs necessary to hold performance constant, and yet EPA does not estimate either the cost savings that would follow if manufacturers instead chose to trade off some performance attributes for lower emissions to some extent, nor does EPA estimate the benefits from installing fuel-efficient technologies while maintaining or increasing performance attributes.126 EPA should therefore even more strongly conclude that the constant performance assumption built into the current model obviates the need to estimate any potential lost consumer welfare from forgone attributes. Moreover, not only is any such lost welfare likely small,127 but it would also be offset by countervailing effects: vehicles with slightly less horsepower, for example, would have lower risks of accidents and reduced negative positional externalities,128 and some fuel-efficient technologies indirectly but automatically improve other performance attributes in ways that would benefit consumers.129 [EPA-HQ-OAR-2021-0208-0299-A1, pp. 17-18]

EPA Should Rethink the Unrealistically Conservative Assumption that Consumers Value Only 2.5 Years of Fuel Savings

EPA compounds how conservative its sales model is by applying its elasticity estimate to the change in 'net price,' by which EPA means the difference between technology costs and the estimated fuel savings over just 2.5 years. EPA bases the 2.5-year estimate on manufacturers' assumption about the limited extent to which consumers value future fuel savings, and EPA admits that the assumption 'deserves further evaluation.'170

As explored above in the section of these comments on consumer valuation, multiple market failures and consumer behavioral patterns explain why consumers may appear—in the baseline scenario—not to fully factor future fuel savings into their current purchasing decisions; yet once fuel economy increases under future regulations, consumers will fully value the actual fuel savings that show up as extra money in their bank accounts or wallets; and, over time, consumers may therefore begin to more fully account for fuel savings in future purchasing decisions. As stronger vehicle emissions standards begin to place more vehicles with higher fuel economy into the marketplace, consumers will see more of their friends and neighbors driving fuel-efficient vehicles, more marketing materials and dealership presentations on fuel-efficient vehicles, more charging stations and maintenance facilities to service fuel-efficient vehicles, more labels with higher MPG numbers, and so forth. As the regulations begin to correct some of the market failures that currently exist, and as the marketplace changes in response, consumer behaviors will change as well, and consumers will likely begin to factor fuel economy more into their purchasing decisions over time—though so long as some market failures continue to persist, consumers will continue to need the assistance of regulations to optimize the fuel economy of their vehicles. But by assuming that consumers currently only value 2.5 years' worth of fuel savings and will never value more, even as the market changes over time, is simply not a realistic assumption and is not consistent with the best available evidence or theories. EPA should therefore rethink this unrealistically conservative assumption in the future. [EPA-HQ-OAR-2021-0208-0299-A1, p. 23]

101 Resolving the coordination and informational problems facing the developers of network infrastructure may also be an independent justification for government regulation of fuel economy, beyond its contribution to the energy efficiency gap.

108 A similar dynamic could exist in government, and so affect local, state, and federal government fleet purchases, if officials are rewarded for short-term cost savings rather than long-term fiscal health.

109 This incentive could be muted by a firm's accounting practices if costs and expenses are amortized over time.

118 Because it creates externalities and coordination issues that raise the cost of developing beneficial technologies, the first mover disadvantage facing manufacturers may also be an independent justification for government regulation of fuel economy, beyond its contribution to the energy efficiency gap.

119 For example, some focus-group studies of medium- and heavy-duty truck purchasers have found that they may hesitate to purchase more fuel-efficient vehicles because they are unsure about their reliability. See Heather Klemick, Elizabeth Kopits, Keith Sargent & Ann Wolverton, Nat'l Ctr. for Env't Econ., Heavy-Duty Trucking and the Energy Efficiency Paradox, 12, 20 (2014), https://www.epa.gov/sites/default/files/2014-12/documents/heavy-duty_trucking_and_the_energy_efficiency_paradox.pdf.

121 These kinds of 'experience goods' can create market failures. See Cass R. Sunstein, Rear Visibility and Some Unresolved Problems for Economic Analysis (with Notes on Experience Goods), 10 J. BENEFIT-COST ANALYSIS 317, 342–46 (2019). Experience goods have been associated with plug-in hybrids. See Margaret Taylor & K. Sydny Fugita, Lawrence Berkeley Nat'l Lab'y, Consumer Behavior and the Plug-In Electric Vehicle Purchase Decision Process: A Research Synthesis 9, 49 (2018).

EPA Response

See Preamble Section VII.J and RIA Chapters 8.4.1 and 8.4.2 for discussion of impacts on used vehicle buyers and low-income households. Also see Preamble Sections I.A.2 and VI. for our explanation of the appropriateness of the standards under the Clean Air Act, and how we considered statutory and other factors.

Preamble Section VII.B and RIA Chapter 8.1.2 discuss the role of fuel consumption in the vehicle purchase decision as well as the choice of demand (sales) elasticity. EPA agrees that, in its future modeling efforts, it should revisit the assumption that consumers take into consideration 2.5 years of fuel consumption in their purchase decision. See Section 18, below, for discussion of the choice of demand elasticity.

EPA has stated its conclusion that the market for fuel-saving technologies has not operated efficiently, and that there have been net benefits, including to vehicle buyers, from making vehicle greenhouse gas standards more stringent. EPA has not come to a conclusion on why there are failures in the market for fuel-saving technologies. EPA has discussed a number of hypotheses, and NYU IPI seeks to add to that list, primarily by adding more detail to existing theories. While these additional hypotheses deserve further consideration as potential explanations for the efficiency gap, EPA's approach to date has been to focus on examining whether the market failure exists, because that existence provides the basis for our approach to benefit-cost analysis; see the response above to comments from American Enterprise Institute. We have also observed that the standards in place since MY 2012 have both contributed to the adoption of fuel-saving technologies and have not to date contributed in a measurable way to additional hidden costs; thus, the standards appear to be operating as expected. EPA agrees that the constant performance assumption obviates the need to estimate losses from foregone performance. We also agree that some fuel-saving technologies improve some other vehicle attributes. EPA hopes and expects that researchers will continue to pursue reasons that the market for fuel-saving technologies operates inefficiently, because that exploration may suggest additional approaches for the effective reduction of vehicle GHG emissions.

Commenter: Maine Department of Environmental Protection

Unfortunately, while EPA's proposal acknowledges that industry can comply with the proposed standards through use of existing GHG reduction technologies, selling additional vehicles with today's technology is unlikely to 'jump-start' either further market penetration or the technical innovation necessary for truly widespread acceptance of ZEVs. [EPA-HQ-OAR-2021-0208-0225-A1, p.2]

<u>EPA Response</u>

The analysis in this FRM projects that the standards being finalized will lead to greater penetration of EVs than in the NPRM: e.g., 17 percent instead of 8 percent in MY 2026. See Preamble Sections III.B.3 and III.C. for further discussion of this topic. In addition, as discussed in Preamble Section I.A.2, EPA expects to develop a subsequent rule for MY 2027 and beyond that will build on the standards finalized here and contribute to further advances in technologies as well as further reductions in vehicle GHG emissions.

Commenter: Motor & Equipment Manufacturers Association (MEMA)

The vehicle supplier industry is committed to working toward a cleaner transportation future. The goals outlined in the pre-2026 proposal and the 50 percent ZEV goal in 2030 will require not only significant investments by suppliers but also significant coordination and long-term commitments by state, federal and local governments on complementary policies. These goals will also require actions by industries outside the vehicle industry. There must be an overall comprehensive plan that prepares the industry and the U.S. consumer for these technology advances.

While MEMA understands many of these necessary policies are not within the jurisdiction of the EPA, the success of the transition to ZEVs depends on a multi-faceted and coordinated approach from the federal government. Complementary polices will be needed for these advanced technologies to be attractive to consumers and compete among the other technologies available. This coordinated approach will be essential to support vehicle suppliers' investments, allow these advanced technologies to compete, and encourage continued innovation to meet the nation's goals.

The EO 14037, establishing the ZEV goal, outlines that the Departments of Commerce, Labor, and Energy will work together to achieve the goal by directing them to accelerate innovation and manufacturing in the vehicle sector, strengthen the domestic supply chain, and grow jobs.47 MEMA strongly supports investments to strengthen the U.S. manufacturing supply chain and preserve supplier jobs. This includes investments at the supplier level for research and development and retooling of existing facilities. Vehicle suppliers take a leadership position and take on significant risk in developing and planning these advanced technologies years in advance of deployment. The supplier industry needs to thrive if the vehicle industry is going to meet its goals.

MEMA urges policymakers at all levels to ensure there is an overall comprehensive plan to prepare U.S. consumers for this advanced transportation future. Demand-side issues that must be addressed to achieve the nation's short and long-term goals include:

1. consumer incentives allowing adoption of ZEVs and GHG-reducing technology to be more financially feasible;

2. consumer adoption and uptake of ZEVs; and

3. infrastructure to utilize and support ZEVs effectively.

These polices include consumer purchase incentives of electric and fuel cell vehicles, investments in electric and fuel cell vehicle charging and refueling infrastructure as well as consumer education.

In order to ensure our supplier manufacturing and workforce is supported, a strategic plan must include supply-side polices. Policy must aim to accelerate the development, commercialization, manufacture, and deployment of new, advanced technologies in the U.S. It is critical the supplier industry have increased access to government provided resources, including investments and incentives for the research and development, and increased manufacturing, and funding for facility retooling. Importantly for suppliers, MEMA strongly supports investments and programs to further develop and sustain our skilled workforce, including training to upskill workers, as these development needs are evolving with the transition to higher levels of electrification.

Because vehicle suppliers take significant risk in planning and committing to developing these advanced technologies years in advance of deployment, cohesive complementary policies are essential to support supply- and demand-side polices and advance the industry’s innovation and support the nation’s GHG goals. [EPA-HQ-OAR-2021-0208-0249-A1, p. 14-15]

EPA Response

These comments address ZEV incentives that are outside EPA’s authority or the scope of this rulemaking, though EPA agrees that they would facilitate adoption of ZEVs.

Commenter: National Automobile Dealers Association (NADA)

“Push” mandates do not necessarily equate to “if they build them, they will come” and NADA’s concern with EPA’s proposed mandates is premised principally on this basic fact. The critical nature of new vehicle consumer purchase behavior must be viewed properly through the lens of an ever-changing light-duty vehicle marketplace that keys on the willingness and ability of prospective purchasers to buy ever more expensive new vehicles with enhanced GHG emissions reduction performance. The current proposal is flawed and incomplete in its evaluation of these key marketplace factors because, as in EPA’s 2012 rule, key demand-side marketplace factors including whether OEMs will be able to make and deliver compliant vehicles that are both marketable and affordable have not been adequately considered.

EPA’s final rule should set mandates that maximize light-duty fleet turnover, not inhibit it as projected under the proposal. In so doing, EPA must appropriately account for the variables, data, and analyses necessary to understand how prospective purchasers behave, and thus will likely behave with respect to the MY 2023-2026 vehicles at issue. Doing so is critical to maximizing GHG reduction effectiveness given that, as noted above, regulatory benefits will not be achieved unless and until vehicles subject to new mandates are sold or leased to end-users.

EPA’s Proposed Standards Will Diminish the Ability and Willingness of Consumers to Purchase New Light-Duty Motor Vehicles. Whether vehicles with enhanced GHG performance languish on dealer lots or are successfully delivered to new light-duty vehicle customers depends on whether consumers are able and willing to purchase the performance enhancement. GHG mandates must reflect an accurate understanding by EPA of how prospective purchasers will react when new vehicles subject to new mandates are delivered to market at prices higher than similar vehicles unburdened by the costs of those mandates.

As detailed below, unlike for many regulated goods, prospective purchasers of new light-duty vehicles have transportation options which include the used vehicle marketplace, existing vehicle service and repair, and alternatives to light-duty vehicle transportation. Moreover, factors influencing the willingness of prospective purchasers to buy or lease include consumer confidence, perceived operating costs, and expected residual values. [EPA-HQ-OAR-2021-0208-0290-A1, p. 4]

Consumer Demand for Fuel Efficiency Fluctuates With Gas Prices as Does Fleet Sales Mix. Estimates of future fuel savings are not simple financial calculations, such as where one can use a discount rate as a corporation might for its cost of money when calculating the net present value of a potential project. EPA must consider the expectations of able and willing prospective purchasers because it is those expectations that ultimately determine behavior in the marketplace. Prospective purchasers form expectations of the net present value of future fuel savings that are related, but not closely related, to a standardized financial calculation.22 During dramatic upward swings in the price of gasoline followed by heavy media coverage, consumers place a large value on fuel economy, as revealed by shifts in demand to more fuel-efficient segments of the market. During slow and steady increases in the price of gasoline with little or no media attention, consumer demand reveals a diminished value for fuel economy.

Higher fuel economy performance has the potential to benefit consumers, but it is just one factor that can influence a consumer’s willingness to purchase and, like all variables, changes over time and with market conditions. If fuel prices remain at or near current levels, the TCO benefits associated with EPA’s proposal will not “pencil out” for most new vehicle prospective purchasers. Moreover, fundamental product mix shifts, such as from large cars to light-duty trucks, and from smaller footprint cars to SUVs and CUVs, must also be considered for MYs 2023-2026. Barring a sudden and prolonged spike in fuel prices, new light-duty vehicle customers are, on average, unlikely to shift to more fuel-efficient vehicles and, in fact, are likely to do the opposite. Gasoline price projections in the Annual Energy Outlook for the years covered by the proposal range from $2.55/gallon to $2.79 /gallon.23 These price projections are less than what exists today and are certainly unlikely to cause retail customers to shift their preferences from pickups, SUVs and CUVs back to cars, for example.

A Consumer’s Willingness to Purchase Based on Fuel Economy Must Be Viewed in the Context of Other Vehicle Attributes. Further, when assessing the valuation of fuel economy improvements by prospective purchasers, the financial benefits of future fuel savings cannot be separated from the utility lost by necessary reductions to other vehicle qualities and performance. For example, if a consumer values an increase in fuel economy of 1 mpg at $500 but gaining this 1 mpg forces a reduction in power or safety valued at $600, the value of the fuel economy gain is negative. Consumer behavior indicates how these tradeoffs are valued. Indeed, these tradeoffs are available today in dealership showrooms offering new light-duty vehicles with a wide variety of fuel economy performance, along with variations in safety and performance features.

A study released earlier this year examined the tradeoff between fuel economy and vehicle performance and determined that the willingness of consumers to purchase increased horsepower/acceleration is three times their willingness to purchase increased fuel economy.24

The study also found that models attempting to assess willingness to purchase for fuel economy without controlling for tradeoffs, likely suffer from omitted variables bias. Specifically, the study found that: "Economists and policy makers have focused on the energy efficiency gap under the presumption that if there is a gap, tighter standards would raise private consumer welfare."25 They argue that this inference is incorrect because policy makers have failed to consider the effects of tightening emissions and fuel economy standards on other vehicle attributes such as performance. This trade-off between fuel economy and vehicle performance has been documented in the literature, causing performance to increase less than if there was not a tightening of the standards.26 Because of this, studies that estimate the welfare benefits of increased fuel economy must also consider how consumers value other vehicle attributes as well. The study found that consumers are willing to pay 54 cents for $1 dollar of discounted fuel cost savings, in contrast to Busse, et al. (2013) who find full valuation by consumers, and Allcott and Wozny (2014) who found that consumers are willing to pay 76 cents for $1 of discounted fuel cost savings.27 It finds similar undervaluation by using Busse's methodology, suggesting that the differences in the sample period rather than methodology explain the discrepancies.28

Of course, consumers of any product will accept product improvements if they are free. Thus, fuel economy improvements are most acceptable when customers are not required to pay for them. Moreover, when consumers are asked about paying for fuel economy, they largely are unwilling to do so. The aforementioned study found that consumers are willing to pay just $94 for a 1% increase in performance arising from fuel saving technology adoption. This contrasts with a willingness to pay $1,100 for a 1-second reduction in 0-60 acceleration time. The study also notes that failing to control for the endogeneity of fuel economy and performance when modelling, will understate consumer valuation of fuel economy and performance.29

EPA Has Not Adequately Considered Consumer Behavior and Marketplace Realities. In its proposal, EPA paid some attention to the issues discussed above, but did not draw definitive conclusions and relied on analyses and papers that miss the mark.30 The studies EPA relied on were either "in progress," or focused on evaluations of vehicle operating characteristics and found only that the presence of emission reductions "more often correlated with positive evaluations than negative ones."31 EPA apparently failed to consider studies assessing how new light-duty vehicle consumers actually value emissions reduction/fuel economy technology when making purchase decisions, a failure that undermines its ability to propose GHG reduction mandates premised on realistic and accurate conclusions.

Given the deficiencies in the studies referenced in the proposal, it is incumbent upon EPA to perform a meaningful meta-analysis to account for the temporal shifting of consumer preferences. In comments responding to prior EPA rulemakings and regulatory actions, NADA provided numerous citations on consumer purchase decision-making and how new vehicle purchasers rank fuel economy in terms of other vehicle attributes. How and when consumers value fuel economy changes with time and, like most vehicle attributes, fuel economy choices are dependent on numerous factors. Because of its importance, EPA should directly address the critical importance of the temporal shifting of consumer preferences.

EPA also must never rely on simple "purchaser satisfaction" surveys or vehicle evaluations by professional automobile reviewers, especially when new vehicle purchaser survey data is readily available. EPA can and should focus on what actual new vehicle buyers want and are willing to pay for, as evidenced by actual vehicle purchasers. [EPA-HQ-OAR-2021-0208-0290-A1, p. 6-9]

EPA Response

EPA agrees that many factors affect how potential purchasers will respond to new vehicles subject to the standards. EPA disagrees that it has not appropriately analyzed these factors. It is important to distinguish between the role of fuel savings in the vehicle purchase decision, and the fuel savings that vehicle buyers experience once the vehicle is purchased. Even if, as NADA argues, vehicle buyers undervalue fuel savings in the vehicle purchase decision, or if that value fluctuates with gasoline prices, those who buy a more fuel-efficient vehicle will nevertheless spend less money on fuel and will therefore be able to use those savings for other purposes. Because benefit-cost analysis is based on a comparison of the world with vs. the world without the standards (see response to American Enterprise Institute in this section), the projected fuel savings are appropriate to use in the benefit-cost analysis. EPA includes sensitivity analysis of the effects of different fuel prices on net benefits in RIA Chapter 10.4. As RIA Table 10-19 shows, net benefits are positive even with AEO's low fuel price projections.

As discussed in Preamble Section VII.B. and RIA Chapter 8.1, EPA estimates a reduction in sales of up to 1 percent, though we also explain that this reduction may overestimate adverse effects on vehicle sales: in particular, if vehicle buyers put more value on reduced fuel and operating costs than are considered in the CCEMS modeling conducted for this rule, sales effects would be less negative or possibly even positive. EPA has conducted extensive analysis of the role of fuel costs in the vehicle purchase decision. Although there is no consensus on the value, the modeling in CCEMS that assumes 2.5 years of fuel consumption in the purchase decision, as discussed in Preamble Section VII.A. and RIA Chapter 8.1.1, is on the low end of the distribution of estimates of consumer valuation of reduced fuel consumption. For these reasons, EPA considers its evaluation of the impacts of the standards on vehicle purchases to be reasonable, or conservative.

Leard et al. (2021)[90] provides estimates of willingness to pay (WTP) for performance and fuel economy. EPA discusses the concern over tradeoffs between performance and fuel economy and consumer WTP for vehicle attributes in Preamble Section VII.A. and RIA Chapter 8.1.1. There are many estimates of these WTP values, and they cover a very wide range; this paper contributes one more set of estimates where there does not yet seem to be a consensus. It is unclear from NADA's comment whether it is concerned that WTP varies specifically due to time, or due to other factors that happen to vary, and those factors should be taken into account. EPA in fact sponsored research conducting a meta-analysis of values for willingness to pay for

[90] Leard, B., J. Linn, and Y. Zhou (2021). "How Much Do Consumers Value Fuel Economy and Performance? Evidence from Technology Adoption." Review of Economics and Statistics, in press.

vehicle attributes,[91] and took into account the different timing of the underlying studies as well as other factors. The meta-analysis was not able to account well for the wide variation in estimates for WTP, reflecting the lack of consensus over these values.

In addition, the cost estimates for the technologies are based on holding performance constant, as NYU IPI notes in its comments. Because it is possible to improve fuel economy and reduce GHG emissions without adverse effects on performance, the costs of achieving the standards take into account foregone performance impacts.

NADA does not explain its objection to purchaser satisfaction surveys, which are based on the responses of actual new vehicle buyers, which are its preferred source of data; we note that Leard et al. (2021) relies on such a dataset. Nor does it explain its resistance to evaluations from professional automobile reviewers. EPA considers both these kinds of data potentially useful.

Commenter: National Coalition for Advanced Transportation (NCAT)

Sales and Growth: Electric vehicle sales in the U.S. have continued to grow dramatically. Over two million electric vehicles (battery electric vehicles and plug-in hybrid electric vehicles) have been sold cumulatively in the U.S. from January 2010 to the present. 18 Nearly 375,000 electric vehicles have been sold in 2021 as of August. 19 In the last year, electric vehicle sales have "skyrocket[ed]."20 A total of 43,721 electric vehicles (28,460 battery electric vehicles and 15,261 plug-in hybrid electric vehicles) were sold during the month of August 2021 alone in the United States, which captured 4% of total light-duty vehicle sales that month. 21 The share of electric vehicles in new car sales grew dramatically to 4.4 percent in 2020, substantially higher than 2.5 percent in 2019.22 This increase in electric vehicle sales has continued despite low gas prices, and even as car sales generally declined due to the pandemic.23

Projected sales: President Biden's recent Executive Order on Strengthening American Leadership in Clean Cars and Trucks set a goal that 50% of all new passenger cars and light trucks sold in 2030 be zero emission vehicles (including battery electric, plug-in hybrid electric, or fuel cell electric vehicles). 24

It is clear that electric vehicle sales have and will continue to increase, and that many projections are underestimates.25 Even the very conservative U.S. Energy Information Administration (EIA) predicts that battery electric vehicle sales will increase faster than any other type of vehicle sales, growing by 6% per year on average with 200- and 300-mile range vehicles reaching almost 2 million vehicles (combined) per year in 2050.26 EVAdoption predicts that by 2030, electric vehicle sales will be nearly 30% of all new car sales nationwide and nearly 57% in California.27

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[91] U.S. Environmental Protection Agency (2018). "Consumer Willingness to Pay for Vehicle Attributes: What is the Current State of Knowledge?" EPA-420-R-18-016, https://cfpub.epa.gov/si/si_public_file_download.cfm?p_download_id=536423&Lab=OTAQ (accessed 4/15/2021); Greene, D., A. Hossain, J. Hofmann, G. Helfand, and R. Beach (2018). "Consumer Willingness to Pay for Vehicle Attributes: What Do We Know?" Transportation Research Part A 118: 258-279.

In the nearer-term, IHS Markit estimates that electric vehicles will double their 2020 market share by the end of 2021, and make up 10% of new car sales nationwide by 2025.28 The Goldman School of Public Policy at the University of California, Berkeley has summarized the estimates of some of these projections and others, showing that electric vehicles will likely be between 5% and 35% of new vehicle sales by 2035. [Figure 3 can be found on p. 7 of Docket number EPA-HQ-OAR-2021-0208-0239-A1] [EPA-HQ-OAR-2021-0208-0239-A1, p. 5-6]]

Consumer Acceptance: Consumers increasingly know about and are interested in purchasing electric vehicles. In summer 2019, Consumer Reports found that 63% of Americans were interested in electric vehicles. 53 A year later, Consumer Reports' summer 2020 survey found that number had increased to 71% of U.S. drivers who would consider buying an electric vehicle in the future, with almost a third suggesting it would be their next purchase.54 The interest in electric vehicles is even greater among younger buyers. 55 And the trend is growing rapidly. In a recent survey, the number of U.S. adults who said they would consider buying or leasing an electric vehicle rose four percentage points in just the first four months of 2021.56 The growing acceptance may be due to increasing range,57 model availability,58 and consumer familiarity with electric vehicles owned by family and friends or operated by commercial entities.59 The drop in electric vehicle prices, driven by strong consumer demand, has also reached a "tipping point" such that more consumers are willing to consider going electric.60

Demand for electric vehicles has come out of the COVID-19 pandemic even stronger61 and can play a role in pandemic recovery. Many car owners say they intend to buy an additional car in the next three months because of COVID-19, and the pandemic has also encouraged many others to buy cars who do not currently own one.62 Consumers, particularly younger people buying their first cars, are increasingly interested in sustainable options.63 According to polling data from McKinsey, 56% of North American respondents said they are more interested in purchasing a hybrid or electric vehicle because of the pandemic, with half of them saying they were "significantly more" interested; this is driven by recent air quality improvements and increased concern about sustainability.64

Increased Electric Vehicle Fleet Demand: Fleet vehicles are shifting to electric models. Rideshare and ride hail companies, for example, are already beginning the transition. Uber and Lyft both have a 2030 target for going all-electric.65 To get there, Uber has committed $800 million over the next five years to pay drivers for the environmental attributes of their rides.66

In addition to shared mobility, Amazon ordered 100,000 small electric delivery vans from NCAT member Rivian.67 Electric vehicles represent a growing number of fleet acquisitions for DOE Clean Cities,68 states, and alternative fuel providers.69 A group of 150 mayors have come together to pool their purchasing power through the Climate Mayors EV Purchasing Collaborative, reducing the cost of procuring electric vehicles for municipalities.70 [EPA-HQ-OAR-2021-0208-0239-A1, p. 10-12]

<u>EPA Response</u>

EPA agrees that consumer interest in EVs is growing, and that this increased interest will contribute to greater adoption of EVs in coming years.

Commenter: Nissan North America, Inc.

Thanks to the leadership and early investment of Nissan and others, the EV market has steadily grown over the last 10 years, albeit slower than many expected. Transitioning from long existing and established technology takes time and significant financial investment. This responsibility must be shared among the industry, its customers, and governmental entities. Widespread adoption of EVs requires not only that the automotive industry broadly embrace investment in this technology, but also that consumers show willingness to adopt the new technology. Nissan and other industry leaders have invested billions of dollars in an effort to stimulate growth, not only investing in technology and product development but also in infrastructure and consumer outreach/education. Nissan strongly supports federal, state, and local investment in market measures to complement the efforts already in place by industry leaders such as Nissan to further encourage this shift towards EVs.

For example, Nissan believes investment in EV infrastructure and consumer incentives is essential to encouraging the growth of the EV market. In the last several years, Nissan has invested significantly in EV infrastructure and provided consumer benefits such as free public charging and credits towards charging as part of the Nissan Energy Perks program in partnership with EVgo.2 While the federal and state governments have provided some consumer incentives for purchasing and leasing EVs, these incentives are not always stable and their future availability is unpredictable. Maintaining and expanding market-based governmental efforts such as tax credits and other purchase incentives, developing infrastructure, and allowing use of HOV lanes are essential to expanding the EV market share. Nissan encourages the Administration to complement the industry's efforts by continuing to offer these and other consumer incentives, and to invest in consumer education regarding the environmental and financial benefits of transitioning to EV technology. Moreover, Nissan encourages the Administration to consider investing in incentives on the industry side, including manufacturing incentives and R&D incentives for vehicle manufacturers and their suppliers who invest time and considerable financial resources in making EV technology more reliable and cost-effective. [EPA-HQ-OAR-2021-0208-0529-A1, p. 4-5]

EPA Response

These comments address EV incentives that are outside EPA's authority or the scope of this rulemaking, though EPA agrees that they would facilitate adoption of EVs.

Commenter: Pennoyer, Marguerite

[The following comments were submitted as testimony at the virtual public hearing on August 26, 2021. See Hearing Testimony – 26Aug2021, pp. 29-30.]

However, I wanted to share my husband's recent experience in trying to purchase a light-duty pickup truck as just one example of the need for ever-stronger standards.

He had just retired last year and was looking for a small truck to tackle a number of home construction projects and canoeing trips. He searched long and hard to try to find an acceptable option for a light truck that had zero or low greenhouse gas emissions, either hybrid or all-electric. There were almost exactly zero available options. Pressure to innovate has been stymied for pickup trucks by loopholes and lack of pressure on the industry. These wildly popular and energy inefficient pickup trucks now seem to be among the most common type of personal vehicle seen on Maine's roads and the nation's highways.

EPA Response

In coming years, as the Alliance for Automotive Innovation notes in its comments in this section, EVs will be offered in more vehicle classes. This greater variety in offerings is expected to facilitate adoption of EVs, because people like the commenter’s spouse will find them more readily available, and even those not as focused on zero or low GHG emissions may find that an EV suits their purposes.

Commenter: Pien, Natalie

[The following comments were submitted as testimony at the virtual public hearing on August 26, 2021. See Hearing Testimony – 26Aug2021, p. 45]

As an EV driver, I don't miss going to the gas station to buy gas. I don't miss going to the car dealer to pay for regular service and repairs.

A 2018 study by the University of Michigan found that operating an EV is less than half the cost of operating an ICE. There's so many benefits to be gained.

EPA Response

EPA agrees that low operating and maintenance costs are a valuable feature of EVs.

Commenter: Securing America’s Future Energy

President Biden has laid out a vision for an electrified transportation future. He has set a goal to make half of all new light-duty vehicle sales electric by 2030. He has called for federal investments to help build a nationwide vehicle charging network. He is advocating for an expanded and extended tax credit for the purchase of new electric vehicles. And he has sought funding to support the manufacture of an electric vehicle supply chain in the United States. But if we expect automakers to invest in this transition, they need confidence that if they build the vehicles, that customers will buy them. Perhaps the most effective tool to help expand the market for electric vehicles is the federal light-duty vehicle greenhouse gas emission and fuel economy standards. The stringency of the standards set in these programs, and the use of other tools in these programs to incentivize electric vehicles, can help expand the market. [EPA-HQ-OAR-2021-0208-0527-A1, p. 2]

EPA Response

As discussed in RIA Chapter 4.1.4 and Preamble Section III.B.3, EPA projects that 17 percent of the vehicles sold in MY 2026 will be EVs. While there is uncertainty about consumer response to EVs, as NCAT notes in its comments in this section, EV adoption has been increasing in recent years.

Commenter: Schrier, Paul

As an American consumer, I stand against the proposed rule change that would make finding affordable vehicles even more difficult because of the following reasons:

Perhaps most telling is problems galore with EVs themselves, which are being recalled due to vehicle fires, sudden losses of power, and failures to start. Within the last year recalls by General Motors, Hyundai, and Ford involved 132,500 electric vehicles and cost a combined $2.2 billion.

Unsurprisingly, these issues have resulted in a lack of consumer confidence. After all, who wants to buy a vehicle that might burst into flames at any moment, or refuse to start when youre already fifteen minutes late to work? [EPA-HQ-OAR-2021-0208-0466, p.1]

And thats only the beginning. Its proving difficult to convince drivers to re-charge their cars and trucks instead of quickly refueling them with gasoline or diesel. EVs also remain significantly more costly than gas-powered vehicles, meaning government incentives mostly help affluent buyers, not average families. And the issue of charging stations is challenging for people who live in apartments or homes without garages or an adequate electrical panel to charge electric cars. [EPA-HQ-OAR-2021-0208-0466, p. 1]

EPA Response

Concerns over EV safety are discussed in Section 12.1 of this Response to Comments. As discussed in Preamble Sections VII.A. and VII.M. and RIA Chapters 8.1 and 8.4, EVs both have higher up-front costs and lower operating costs; how vehicle buyers assess these tradeoffs will affect their purchase decisions. In addition, access to vehicle charging is a concern until more public charging stations are available. Nevertheless, the large majority of vehicles subject to these standards that are expected to be sold through MY 2026 are not EVs, but gasoline-using vehicles. Buyers who are reluctant to buy EVs will find an abundance of choices.

Commenter: Southern Environmental Law Center

In addition to lower fuel costs associated with more efficient internal combustion vehicles, stricter emission standards will also encourage manufacturers to make EVs more widely available—which will help drive the market closer to the Biden administration’s goal of having

50 percent of all new light-duty vehicles sold in the U.S. in 2030 be zero-emissions vehicles. [32] Adoption of Alternative 2 is expected to result in approximately 10 percent of the market share being EVs by model year 2026,[33] compared to only about 8 percent of the market share under the proposed standards.[34] EVs are anticipated to reach parity in upfront costs with internal combustion vehicles in a few years,[35] and increased EV sales will expand the used EV market. [EPA-HQ-OAR-2021-0208-0244-A1, p. 5]

This will help to make EVs available and affordable to more consumers. EVs have many benefits for drivers, including improved handling and lower maintenance costs. For example, owning an EV saves the typical driver between $6,000 and $10,000 over the lifetime of the vehicle as compared to a gas car due to reduced fuel and maintenance costs [36] [EPA-HQ-OAR-2021-0208-0244-A1, p. 5]

EPA Response

As discussed in RIA Chapter 4.1.4 and Preamble Section III.B.3, EPA projects that 17 percent of the vehicles sold in MY 2026 will be EVs. EPA agrees that EVs are getting less expensive over time, that their operating and maintenance costs are lower than for ICE vehicles, and that they can have additional desirable attributes, including performance.

Commenter: Steitz, Jim

Manufacturers have tremendous ability to drive purchaser preference. Their complaints about difficulties selling fuel-efficient vehicles are self-fulfilling prophecies and must be disregarded. If the auto manufacturers must accept lower profit margins to drive sales of fuel-efficient and electric vehicles, this is a trivial concern. [EPA-HQ-OAR-2021-0208-0422, p. 2]

EPA Response

As discussed in Preamble Section VII.A. and RIA Chapter 8.1.1, EPA has investigated the role of fuel economy in consumer vehicle purchase decisions. We have found a very wide range of estimates of consumers' willingness to pay for additional fuel economy, ranging from significant undervaluation of the lifetime fuel savings expected to occur, to overvaluation of those savings. EPA's sales analysis in RIA Chapter 8.1.3 suggests that adverse sales impacts are likely to be up to about 1 percent, and may be less negative or even positive.

Commenter: Stellantis

Increase Consumer Awareness Of EVs - Additional federal support for consumer education and advertising can build off success in regional campaigns, like the Veloz 'Electric for All' and the NESCAUM 'Drive Change, Drive Electric' campaigns. These programs foster collaboartion among a broad group of stakeholders to help understand and overcome critical barriers and promote the purchase of EVs nationwide. [EPA-HQ-OAR-2021-0208-0532-A1, p. 5]

As part of the Build Back Better Plan, President Biden has proposed $174B in new spending on electrification incentives for consumers, manufacturers and charging infrastructure; with $7.5B for charging infrastructure included in the bipartisan infrastructure plan that passed the Senate in August. Stellantis believes policies like these are absolutely critical to the transition and necessary for the achievement of the Administration's sales targets. We are relying on execution of the above commitment and more from the Biden Administration and U.S. policymakers to provide the full suite of supportive policies included in the Build Back Better Plan.

Upfront vehicle costs remain a barrier to consumer adoption of electrified vehicles. Based on 2018 data, a report by the National Academy of Sciences indicated, 'The incremental cost for BEVs are at least $8,500 for the medium car (i.e., $36,800 BEV150 versus $28,300 conventional) to about $26,000 for the long-range SUV (i.e., $57,000 BEV300 versus $31,000 conventional).'27 For many popular vehicle segments and for longer range plug-in electric vehicles, price parity with ICE vehicles may not be achieved until 2030 or later, and while the PHEV price differential versus conventional ICE vehicles is projected to be smaller by 2030, NAS projected no price parity points in any vehicle class. The price difference between electrified powertrains and ICEs is largely attributable to the high-cost of battery technology. The NAS Report assumptions rely on significant battery cost reductions to close the price gap, but recent research has questioned how accurate battery cost reduction predictions will be.28

Significant, consistent consumer purchase incentives are vital until the cost of electrification reaches parity with traditional ICEs. These incentives have shown to be effective in various regions. On the state level, in New York, electric car sales increased 74% when the state implemented its EV rebate, and in Georgia, sales dropped 90% when its incentive was phased out.29 30 In a 2019 survey in California, where the Clean Vehicle Rebate Program (CVRP) has provided over $900 million to California residents over the lifetime of the program, 90% of the respondents ranked the CVRP rebate as moderately, very, or extremely important, and 54% said they would not have purchased their ZEV without it.31 32

Looking towards national incentives in other countries, the trend continues. The McKinsey Electric Vehicle Index showed that 'the EV market in China declined by 31% in the second half of the year after the government cut subsidies. In the United Kingdom, sales of plug-in hybrid electric vehicles (PHEVs) fell by 15% after the government stopped subsidies for hybrids.'33 Consumer financial incentives work and have helped establish markets for EVs around the world.

The existing federal incentive in the U.S. has been similarly vital to creating a domestic EV market. The incentive does a good job of recognizing that batteries drive the cost of EVs and the dollar amount is scaled based on battery capacity, an appropriate proxy for size and relative cost. Consumers have significantly capitalized on the federal funding – at a maximum tax credit of $7,500, it was projected in 2019 that by the end of fiscal year 2022, the U.S. will have spent $9.7B on the Plug-in Vehicle Tax Credit.34

Given these concerns and the potential of a well-designed incentive to create and bolster a better EV market, the federal electric vehicle incentive should be restructured and expanded. Continue to recognize battery as the driving cost and maintain scaling based on battery size, but eliminate the manufacturer vehicle cap and make the credit refundable, ideally moving it altogether to the consumer point-of-purchase. A significant financial incentive goes beyond closing the cost gap between electrified technology and traditional ICEs – it can also help overcome barriers in addition to cost and incentivize consumers to switch to the new electrified technology. [EPA-HQ-OAR-2021-0208-0532-A1, p. 21]

Electric vehicles are a new technology for most drivers. With this in mind, there needs to be federal leadership on consumer education to familiarize vehicle buyers with the technology and how it can fit with their lifestyles. In terms of charging infrastructure, for example, an educational campaign coordinated between utilities and EV charging providers could provide planning tools for types and quantities of chargers, cost estimates, and even best practices for home or worksite upgrades. At the state level, consumer awareness campaigns such as Veloz and Drive Change. Drive Electric., funded by automakers, states, and others, seek to not only raise consumer awareness of and comfort with EV technology, but also provide an environment to identify and address barriers to EV adoption. Types of activities these groups might undertake include media campaigns, online EV explorer materials, interactive lists of available EV incentives, or even in-person ride-and-drive events. The goal is to create awareness, overcome major EV adoption barriers such access to charging, cost (incentives available), and simplify the transition from traditional internal combustion vehicles to electrified vehicles. While automakers spend significant resources promoting their individual products, alternative consumer-facing campaigns help promote EV adoption from all angles.

To date, these consumer awareness campaigns have been very limited in scope and budget. Collaboration amongst a larger group of stakeholders (government, automakers, utilities, charging station providers, NGOs, and others) could further enhance consumer awareness and education outreach efforts. The federal government should consider a consumer education program like the work being done at the state level, with an appropriately scaled and expanded level of funding to reach consumers nationwide and make sure they are aware of the steps being taken to promote vehicle electrification. [EPA-HQ-OAR-2021-0208-0532-A1, p. 32]

EPA Response

Most of these comments address EV incentives that are outside EPA's authority or the scope of this rulemaking, though EPA agrees that they would facilitate adoption of EVs. EV costs are discussed in Section 12.1 of this Response to Comments.

Commenter: Tesla

Tesla believes that the transition to a fully electrified light duty vehicle sector can and will happen quicker than EPA anticipates. As demonstrated by Model 3 being the world's best-selling premium sedan38 and the Model Y becoming one of the top selling SUVs in the country,39 consumers continue to embrace electric vehicles. As a leading automotive trade group recently touted, 'consumer interest is growing because these vehicles are reliable, efficient, safe, and particularly fun to drive.'40 Indeed, there is widespread public support for policies that support the transition to ZEVs41 and consistently growing consumer interest in EV purchases.42 A recent survey found that almost 56% of consumers are likely to buy a hybrid or electric vehicle for their next car purchase and over 40% think green-conscious cars will outnumber gas-powered cars in the U.S. by 2030. 43 Tesla believes that more stringent standards can appropriately set the pathway to encourage widespread deployment of ZEVs and set the stage for a fleet-wide light-duty vehicle standard of 0 g/mi CO2 starting in MY 2030 (i.e., 100% EV sales by 2030). [EPA-HQ-OAR-2021-0208-0278-A1][pp.6-7]

EPA Response

EPA agrees that consumer interest in EVs is increasing.

Commenter: Toyota Motor North America, Inc. (Toyota)

Electrified powertrains must become more accessible to mainstream consumers for a carbon neutral future to be realized. Toyota market research has found consumer attitudes are shifting to a greater openness about alternative powertrains as seen if Figure 2. That growth in consumer openness is also being observed in vehicle segments that have traditionally been less inclined toward alternative powertrains. The changing attitudes appear to stem from increasing consumer exposure to electrified powertrains via the growing availability of vehicle models, styles and types, and the media attention created through manufacturer and government announcements. [EPA-HQ-OAR-2021-0208-0531-A1, p. 7] [Figure 2 can be found on p. 7 of Docket number EPA-HQ-OAR-2021-0208-0531-A1]

While the openness to electrification is growing, converting that openness to purchase intent and ultimately vehicle sales remains a challenge. As mentioned previously, the market share for BEVs, PHEVs, and FCEVs has averaged 2.4% percent over the 2018 – 2021 period. Potential buyers still see obstacles to ownership because of price, range anxiety, charging time, lost utility and host of other factors presenting a more expensive and less convenient proposition compared to their current vehicle as seen below (Figure 3). A general lack of knowledge and misunderstanding contribute to these purchase barriers. [EPA-HQ-OAR-2021-0208-0531-A1, p. 7] [Figure 3 can be found on p. 8 of Docket number EPA-HQ-OAR-2021-0208-0531-A1]

Converting openness to vehicle purchases entails bolstering the value proposition of electrification with more certain refueling availability, greater cost parity, and more of a perceived overall benefit relative to today's powertrains. This will take time and requires a systems-based approach where auto companies continuously make better vehicles, our customers both want and can afford those vehicles, and the government helps with infrastructure, codes and standards, and demand-side policies during the transition. We strongly agree with AAI's comments that specify a list of ten shared responsibilities including an all-of-government effort needed to support the transition to electrified vehicles. Toyota stands ready to do its part. [EPA-HQ-OAR-2021-0208-0531-A1, p. 8]

EPA Response

EPA agrees that vehicle buyers appear to be gaining familiarity and comfort with electrified vehicles, and that this will increase adoption of vehicles with these technologies. While the “shared responsibilities” mentioned are outside EPA’s authority or the scope of this rulemaking, EPA agrees that they would facilitate adoption of EVs.

Commenter: Volkswagen Group of America, Inc. (Volkswagen)

We must note, however, we are concerned by proposals in Congress that will hurt our ability to compete in the US market by creating discriminatory purchasing incentives for EVs that would not be available to VW Groups' US produced EVs and imported EVs. Limiting consumer choice compromises our ability to meet EPA's greenhouse gas reduction and future EV goals. [EPA-HQ-OAR-2021-0208-0237-A1, p.2]

As ambitious and committed as VWGOA is to the accelerated deployment of zero-emissions battery electric vehicles, we want to underscore how critical it is that all elements of the surrounding EV ecosystem be worked equally aggressively. Otherwise, our ambitions as well as those of the Administration, will be put at significant risk.

Policies that build consumer awareness provide valuable financial and non-financial consumer incentives, and fund the deployment of new fueling infrastructure are critical to providing consumers the confidence that they will be supported at the point of sale and over the lifetime of ownership. Namely, VWGoA wants to highlight the following list of necessary activities and initiatives, a similar version of which have also been identified by the broader industry, which must occur in parallel and are of paramount importance to meet the stated national EV adoption ambitions:

• Purchase incentives fair and equitable purchase incentives which are fully available to all qualifying electric vehicles. Restricted incentives will distort the market for EVs, limit consumer choice, and impact the ability of all manufacturers to meet increasingly stringent regulations

• EV infrastructure in sufficient quantity and type to meet the EV charging needs (i.e., residential, workplace, and publicly accessible high-speed chargers) commensurate with each year's EV adoption targets; • Fleet purchase requirements that facilitate federal, state, and local governments leading by example in EV adoption that meets or exceeds consumer adoption goals.

• Inclusion of EV charging in EPA's national Renewable Fuels Program (RFS) and/or a new national Low Carbon Fuels program that provides direct incentive to OEMs to deploy EVs;

• Robust support and properly structured incentives for EV and battery manufacturing, including sourcing of critical minerals, that don't distort the consumer market;

• Research, collaboration and guidance supporting the development of a battery component and EV recycling system in the United States consistent with global standards;

• Consumer and commercial fleet EV education programs to dramatically improve technology awareness and overcome persistent misunderstanding of how electric vehicles operate, as well as their capability to meet a diverse range of use cases.

• Adopting global standards for electrification technology and design

It is worth noting that the first item in the above list, purchase incentives, are a point of intense debate at the moment, and although not within the direct purview of the agency, we would underscore the criticality of accelerating electric vehicle adoption to meet not only the Administration's climate goals, but air quality requirements that many local governments are struggling to meet. Discriminatory EV purchase incentives which are not available to all vehicles that meet the targeted environmental attributes could ultimately attenuate EV adoption by U.S. drivers through distortions in the consumer marketplace, particularly if the subset of 'qualifying vehicles' does not meet the full range of consumer needs. We believe that the stakes are too high to tinker with the market in this way -- transportation is the #1 source of greenhouse gases in the U.S. and to pursue demand side policies that distort the marketplace would put the desired EV adoption trajectory at serious risk. [EPA-HQ-OAR-2021-0208-0237-A1, pp.4-5]

EPA Response

These comments address EV incentives that are outside EPA's authority or the scope of this rulemaking, though EPA agrees that they would facilitate adoption of EVs.

17.1. Analysis of fuel consumption, fuel savings and fuel cost offsets

Commenters Included in this Section

Brandt, Peter
Center for Biological Diversity, et al.
Consumer Federation of America
Environmental Defense Fund (EDF)
Environmental Protection Network (EPN)
Holmgreen, Jack
Kuntz, Laurie
National Coalition for Advanced Transportation (NCAT)

Witt, Anthony

Commenter: Brandt, Peter

[The following comments were submitted as testimony at the virtual public hearing on August 26, 2021. See Hearing Testimony – 26Aug2021, p. 214.]

It's going to save American drivers between 120 to 250 billion in fuel costs to go through with the proposed enhanced emissions standards for passenger cars and light trucks.

EPA Response

EPA agrees that this rule will provide both fuel cost savings and emission reductions.

Commenter: Center for Biological Diversity, et al.

EPA's assessment of consumer impacts provides important insights into the implications of stronger GHG standards, though it understates the benefits to consumers. While not a statutory consideration in the setting of motor vehicle emission standards under CAA 202, EPA has historically considered consumer impacts in evaluating proposals to modify its standards. EPA's approach to considering consumer impacts in the Proposal differs from the 2020 Final Rule in two primary ways. First, EPA broke down consumer impacts over discrete segments of the lifespan of the vehicle to provide additional information about the equity impacts of the Proposal on vehicle owners. Second, EPA simplified its analysis to focus exclusively on technology costs and fuel savings. As discussed below, EPA's election to analyze consumer impacts over discrete segments of vehicle lifespan was appropriate and EPA provided a reasoned explanation for doing so in this rulemaking. EPA's narrowing of the consumer analysis from the 2020 Final Rule to exclude several categories of costs and benefits on balance will result in EPA understating the consumer benefits of more stringent standards. [EPA-HQ-OAR-2021-0208-0651-A1, p. 48]

EPA provided a reasoned explanation for deviating from the 2020 Final Rule in analyzing and considering vehicle costs spread over the lifetime of the vehicle, which provides important information about the equitable implications of more stringent standards. In the NPRM, EPA broke down its analysis of consumer impacts into five-year increments (viz. the first 5 years; the next 5 years; the third 5 years) and quantified the fraction of incremental technology costs and fuel cost savings that would be experienced by the owner of the vehicle during each of those 5-year periods. Proposal, 86 Fed. Reg. at 43,798. EPA also calculated a break-even number of miles that the owner or purchaser of a new, 5-year old, and 10-year old vehicle would need to drive for fuel cost savings to offset the incremental technology cost. Id.

This approach differed from the 2020 Final Rule. In that rule, EPA declined to follow comments urging it to "calculate and consider fuel savings, spread over the lifetime of the vehicle up to 39 years and experienced by multiple owners." 85 Fed. Reg. at 25,110. Rather, EPA asserted that "the upfront vehicle technology costs (and associated financing costs) are a more important factor." Id. at 25,111.

Not only was EPA's elevation of upfront vehicle technology and financing costs over customer fuel savings and other benefits arbitrary in the 2020 Final Rule, but EPA has clearly explained its basis for changing course in the NPRM and "consider[ing] the total fuel savings of the vehicle, over its lifetime," Proposal, 86 Fed. Reg. at 43,785, emphasizing the importance of understanding the broader equity implications of more stringent standards. As EPA explained, "[d]isregarding [the fuel vehicle lifespan] benefits, which often accrue to lower income households, who more often purchase used cars, would provide a less accurate picture of total benefits to society." Id. As EPA observes, less affluent individuals are frequently purchasers of used vehicles. The payback period (in miles) for incremental technology costs decreases with vehicle age (since vehicle resale value decreases in a nonlinear manner). Thus, for a 5-year old MY 2026 vehicle, technology costs would be offset by fuel cost savings after only 32,000 miles, as compared to approximately 177,000 miles for the purchaser of a new vehicle. Id. at 43,798.

Consideration of consumer impacts over different phases of the vehicle's lifetime is important for understanding the equity implications of the new standards. More stringent standards are likely to have a disproportionately beneficial effect on purchasers of used vehicles and a progressive economic effect. It is reasonable for EPA to consider these equitable impacts in determining the final standards. [EPA-HQ-OAR-2021-0208-0651-A1, p. 48-49]

EPA failed to account for the beneficial impacts of reduced fuel prices resulting from stronger GHG standards.

EPA further understates the consumer benefits of more stringent standards by ignoring the reduction such standards would cause not just in fuel consumption but also in fuel prices. Both total fuel consumption and the price per gallon of fuel will impact the consumer benefits of new standards. See, e.g., NHTSA 2021 NPRM, 86 Fed. Reg. at 49,793 ("Fuel for vehicles costs money for vehicle owners and operators, so all else equal, consumers benefit from vehicles that need less fuel to perform the same amount of work."); id. at 49,809 ("The sensitivity cases suggest that fuel prices exert considerable influence on net benefits—where higher and lower prices not only determine the dollar value of each gallon saved, but also how market demand responds to higher levels of fuel economy in vehicle offerings."). Yet, EPA considered the rule's impact only on the former.

To evaluate the consumer benefits of the Proposal, EPA used NHTSA's CCEMS model, which as NHTSA explains, treats fuel price exclusively as an input. Id. at 49,625 ("Many of these inputs are developed outside of the model and not by the model. For example, the model applies fuel prices; it does not estimate fuel prices."). Consequently, EPA did not consider the impact that the rule would have on fuel prices.

Basic principles of microeconomics affirm that reductions in fuel consumption (i.e., reduced fuel demand) decreases the price of fuel. However, EPA nowhere accounts for this fuel price reduction. EPA projects the rule will result in a reduction of 291 million barrels of oil (9.9% of 2020 U.S. consumption) through 2050. Proposal, 86 Fed. Reg. at 43,789, Tbl. 46. This substantial reduction in petroleum demand will undoubtedly have an appreciable impact on fuel prices.113 EPA's failure to account for this impact causes EPA to further understate the benefits of stronger GHG standards to consumers. [EPA-HQ-OAR-2021-0208-0651-A1, p. 50]

EPA Response

EPA appreciates CBD et al.'s support for the analysis of the consumer impacts of the standards, presented in Preamble Section VII.J. for this FRM.

The effects of the standards on domestic fuel prices are not expected to be significant. The price of gasoline is based on the price of oil, which is set in world markets, not domestic markets. Though the volume reduction in fuel consumption is significant in the context of the U.S. economy, in the world context its effect on price is expected to be small due to inelastic demand; see the discussion of rebound in RIA Chapter 3.1 for discussion of consumer response to changes in fuel prices. We agree that, if the effect is measurable, EPA will have underestimated the net benefits of the rule.

Commenter: Consumer Federation of America

Our economic analysis shows, and the agency seems to agree that this can all be done with a net positive benefit-cost ratio. The total cost of driving will go down, measured by the pocketbook saving consumers. Public health and environmental benefits increase an already positive benefit-cost ratio. Given that finding and the already demonstrated commitment to infrastructure, all Americans of all income levels will be better off at the end of the transition. [EPA-HQ-OAR-2021-0208-0297-A1, p. 24]

EPA Response

EPA agrees that as a result of our final standards, net benefits are positive, the per-mile cost of driving will go down, and environmental benefits will accrue. See Preamble Sections VII.I. and J., and RIA Chapters 6, 7, and 10.

Commenter: Environmental Defense Fund (EDF)

Standards that eliminate tailpipe pollution from new passenger cars and light trucks by 2035 could. . .

• Save consumers over $5,000 over the life of the average vehicle. [EPA-HQ-OAR-2021-0208-0688-A1, p. 2]

Some of the benefits include:• Saving buyers of a new 2027 battery electric vehicle (BEV) more than $5,300 over the life of the vehicle. In 2035, buyers of new BEVs will save more than $8,200 compared to a gasoline vehicle; [EPA-HQ-OAR-2021-0208-0688-A1, p. 37]

EPA Response

EPA agrees that, as the up-front costs of BEVs falls, their net lifetime savings will increase.

Commenter: Environmental Protection Network (EPN)

Given the lower fuel and maintenance costs associated with EVs, a consumer who buys an EV today and drives it for many years will frequently realize a lower overall cost of ownership, but the upfront EV cost premium is still often cited as a major reason why many consumers do not seriously consider an EV purchase. [EPA-HQ-OAR-2021-0208-0213-A1, p.5]

EDF projects that consumers would benefit from new EVs being slightly less expensive to purchase and maintain beginning in 2027, and from large fuel savings due to the much lower cost of electricity per mile relative to gasoline. Owners who buy and retain a typical new model year 2035 vehicle for its full useful life would realize lifetime savings of about $8,200 relative to a comparable gasoline vehicle. [EPA-HQ-OAR-2021-0208-0213-A1, p. 7]

<u>EPA Response</u>

EPA agrees that, as the up-front costs of BEVs falls, their net lifetime savings will increase.

Commenter: Holmgreen, Jack

[The following comments were submitted as testimony at the virtual public hearing on August 26, 2021. See Hearing Testimony – 26Aug2021, pp. 40-41.]

My '06 Sienna travels about 500 miles on 30 gallons of gasoline while my Hybrid Sienna will go that far with 12 gallons. That comes out to about a 55 percent increase in efficiency. A fully electric vehicle, however, such as the Tesla plug-in models, while having zero gasoline emissions, is actually less efficient due to the shorter range, reliance on charging from the grid, which in Texas is overwhelmingly powered by natural gas and some coal with very little wind or solar.

<u>EPA Response</u>

The range of BEVs has increased substantially in recent years. The GHG intensity of BEVs compared to ICE vehicles is also changing over time, as electricity production becomes less GHG-intensive. For instance, whereas Holland et al. (2016)[92] found that BEVs produce fewer environmental benefits than ICE vehicles in much of the country, Holland et al. (2020)[93] find the reverse when they updated their information on electricity generation. Thus, while EPA agrees that local circumstances affect the relative environmental intensity of EVs compared to ICE vehicles, the ongoing reductions in emissions from electricity generation are improving the environmental impacts of EVs.

Commenter: Kuntz, Laurie

[92] Holland, S., E. Mansur, N. Muller, and A. Yates (2016). “Are There Environmental Benefits from Driving Electric Vehicles? The Importance of Local Factors.” American Economic Review 106: 3700-3729.

[93] Holland, S., E. Mansur, N. Muller, and A. Yates (2020). “Decompositions and Policy Consequences of an Extraordinary Decline in Air Pollution from Electricity Generation.” American Economic Journal: Economic Policy 12: 244-274.

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, pp. 209-210.]

Setting strong federal clean car standards through 2026 can put us back on track to save consumers up to $80 billion in reduced gas, maintenance, and price costs over the lifetime of new vehicles purchased during the next five years while restoring clean air in our communities.

EPA Response

EPA's comparison of fuel costs to vehicle ownership costs is in Preamble Section VII.J. EPA agrees that vehicle operating costs will be lower as a result of these standards.

Commenter: National Coalition for Advanced Transportation (NCAT)

Lower Lifetime Costs: Electric vehicle use results in significant cost savings for consumers.79 Consumer Reports finds that the total cost of ownership for the nine most popular electric vehicles—considering purchase price, fueling costs, maintenance, and more—is less on average than their conventional fuel counterparts.80 The benefits of electric vehicles add up to "many thousands of dollars" in savings, "with most EVs offering savings of between $6,000 and $10,000."81 Electric vehicle drivers save around 60% on fuel costs,82 which varies across states, but in no state is electric vehicle fueling more expensive than conventional fueling.83 And electric vehicles have lower maintenance costs than conventional fuel vehicles. Total cost of ownership for electric vehicles is expected to decline by at least a third by 2035, while the total cost for conventional fuel vehicles remains the same,84 with one report estimating that electric vehicles will be $12,800 less expensive than conventional fuel vehicles on average by 2030.85 [EPA-HQ-OAR-2021-0208-0239-A1][EPA-HQ-OAR-2021-0208-0239-A1, p. 13]

EPA Response

EPA agrees that operating and maintenance costs for EVs are lower than for ICE vehicles, and that, as up-front costs of EV technology decreases, total cost of ownership will also decline.

Commenter: Securing America's Future Energy

In 2011 there were only two electric vehicle models available in the United States. Today, however, there are now nearly 20 electric vehicles available to U.S. consumers.13 Still, electric vehicles represent just one out of every 58 new vehicles sold in the United States.[14] While this sales penetration ratio is an improvement over the rates of just a decade ago, electric vehicles remain a niche product within a car market that sold more than 14.46 million units last year.[15]

Greatly expanded model availability of EVs over the last several years has helped to interest new consumers in electric vehicles. By the end of 2020, electric vehicles were available in nearly every vehicle segment—compact cars, sedans, and SUVs, with more new vehicles, including full size pickup trucks on the near horizon. Current reports show that as many as 18 new models of electric vehicles will be available for sale by 2022.[16]

Despite the progress in bringing electric vehicles to market, the transition to electrification remains in its early stages. National sales remain heavily skewed, as approximately 37 percent of the nation's electric vehicle sales have been concentrated in California,[17] a state that in 2020 represented only 11 percent of the total new vehicle market.[18] Moreover, it can be more difficult to find a selection of electric vehicles or inventory at dealers outside California or the other states that have chosen to adopt California's strict vehicle emission standards.[19] [EPA-HQ-OAR-2021-0208-0527-A1 p. 7]

EPA Response

EPA agrees that EV adoption is in its early stages, and that increased availability of different models and styles will contribute to increasing adoption.

Commenter: Southern Environmental Law Center

[31] The national average gasoline cost burden is 7 percent of total income. Shruti Vaidyanathan, Peter Huether, & Ben Jennings, Understanding Transportation Energy Burdens, AM. COUNCIL FOR AN ENERGY-EFFICIENT ECON., iii (May 2021), https://www.aceee.org/sites/default/files/pdfs/transportation_energy_burdens_final_5-13-21.pdf. When accounting for race, in the Southeast the gasoline burden is 6.9 percent for white households, 9.5 percent for Black households, 9 percent for Hispanic households, and 4.3 percent for Asian households. Id. at 14. The gasoline burdens for low-income households are even greater: 13.8 to 14.1 percent on average nationwide. Id. at 8.

EPA Response

EPA agrees that fuel savings are important for households, including lower-income households; see Preamble Section VII.M. and RIA Chapter 8.4.1 for further discussion of these issues.

Commenter: Witt, Anthony

[The following comments were submitted as testimony at the virtual public hearing on August 26, 2021. See Hearing Testimony – 26Aug2021, p. 167.]

My seven-year-old hybrid vehicle gets 40 miles to the gallon. The relatively high fuel economy of my hybrid saves money at the gas pump and I know that I'm doing a small part to limit use of non-renewable resources and reduce carbon emissions.

EPA Response

EPA appreciates that the commenter is happy with his fuel-efficient vehicle.

17.2. Affordability and equity

Commenters Included in this Section

Allen, Martin
American Council for an Energy-Efficient Economy (ACEEE)
Americans for Prosperity
Attorney General of Missouri et al.
Bednar, Valencia
California Air Resources Board (CARB)
Center for Biological Diversity, et al.
Center for Climate and Energy Solutions (C2ES)
Connecticut Department of Energy and Environmental Protection
Consumer Reports (CR)
Dream Corps Green for All et al.
Durrer, Ely
Environmental Protection Network (EPN)
Haines, Meredith
Institute for Policy Integrity
Kreucher, Walter
Mass Comment Campaign sponsoring organization unknown-5 (71)
National Automobile Dealers Association (NADA)
National Coalition for Advanced Transportation (NCAT)
Osbourn, Paul
Peavler, Jean
Platt, Keari
Poore, Michael
Southern Environmental Law Center
Stellantis
Taxpayers Protection Alliance
Tesla
Trevino, Erandi
Trombetta, Nick
Valero Energy Corporation (Valero)

17.2.1. Tradeoffs between Up-Front Costs and Operating and Maintenance Costs

Commenter: Allen, Martin

[The following comments were submitted as testimony at the virtual public hearing on August 26, 2021. See Hearing Testimony – 26Aug2021, pp. 24-25.]

Upfront costs. Yes, purchasing an EV is more expensive than purchasing a petroleum-fueled car. However, the cost savings for ownership of an all-wheel drive SUV to an all-wheel drive EV have been remarkable. I went from spending over $200 per month in gasoline alone as compared with a nominal additional cost to my home electricity of maybe $30 a month, a difference in cost that more than offset my higher monthly lease payments for my EV.

After that, I have zero maintenance charges on the new car, no oil changes, no fuel changes, no filter changes, no periodic scheduled maintenance costs, and I'm saving more than the upfront costs on my 'more expensive electric vehicle.'

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

Greater efficiency can also provide significant cost savings for drivers when they refuel their vehicles. Low-income households are especially burdened by fueling costs, paying three times more than their higher-income counterparts on gasoline, as a percent of their total income (Vaidyanathan, Huether, and Jennings 2021). [EPA-HQ-OAR-2021-0208-0251-A1, p.2]

Commenter: Americans for Prosperity

This proposed rule is the most expensive to date of the Biden administration; EPA estimates $150 billion through 2050.1 These new burdensome vehicle regulations will raise the price of a new vehicle by $1,044, constraining choice and replacing consumer preferences with politically preferred technology and fuels that hurt the most vulnerable citizens. [EPA-HQ-OAR-2021-0208-0226-A1, p. 1]

Commenter: Bednar, Valencia

[The following comments were submitted as testimony at the virtual public hearing on August 26, 2021. See Hearing Testimony – 26Aug2021, p. 210.]

I need cars to become cheaper so my family can get one.

Commenter: Center for Climate and Energy Solutions (C2ES)

The greatest barrier to purchasing an electric vehicle for many households is the up-front cost of the vehicle; although lifetime operating and maintenance costs of electric vehicles are significantly lower than those of internal combustion engine vehicles, purchase prices for both new and used models currently remain significantly higher. Performance standards and policies should support rapid cost reductions and access to more affordable vehicles. [EPA-HQ-OAR-2021-0208-0287-A1, p.4]

Commenter: Durrer, Ely

On one hand I feel like I agree with this concept. But, on the stronger hand I do not agree with this. Whether light duty vehicles or heavy duty vehicles, each one is going to cause green house gasses. I do not think that you can make cars more environmentally friendly without making the cost go up. I do think that the environment needs our help but on the flip side, it is very costly to make vehicles that are better for the environment. A good majority of the population cannot afford vehicles like that [EPA-HQ-OAR-2021-0208-0375, p. 1]

Commenter: Environmental Protection Network (EPN)

This economic calculus is also changing. With battery prices continuing to drop due to innovation and scale and gasoline vehicles getting more expensive, there is a consensus that EVs will become cost competitive with gasoline cars in the next few years. Subsequently, EVs are expected to become lower in cost than their gasoline counterparts, due to simpler designs and fewer moving parts. Then the economic proposition becomes incredibly appealing to consumers—an EV will have both a lower purchase price and be cheaper to fuel and maintain. [EPA-HQ-OAR-2021-0208-0213-A1, p.5]

Commenter: Haines, Meredith

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, p. 114.]

To keep this in very human scale terms, driveway issues, if you will, with Alternative 2 consumers will have more dollars in their pockets, in their budgets, and Consumer Reports tells me it would be $2,100 per vehicle.

Commenter: Mass Comment Campaign sponsoring organization unknown-5 (71)

As an American consumer, I stand against the proposed rule change that would make finding affordable vehicles even more difficult because of Price Tag of Cars & Bat. Longevity etc. [EPA-HQ-OAR-2021-0208-0549,p.1]

Commenter: National Automobile Dealers Association (NADA)

Assuming the requisite desire, prospective purchasers of new light-duty vehicles must also be able to purchase or lease. Critical factors impacting ability include financial wherewithal (for most consumers, this means creditworthiness), and for alternative and new technology vehicles, the availability of convenient, cost-effective refueling. Importantly, most light-duty vehicle operators cannot afford to make a new vehicle purchase. The chart below, which is based on data from an average new vehicle purchase and on reasonable assumptions about how a U.S. household budgets for a new vehicle purchase, just under 41% of U.S. households can afford to buy a new vehicle purchase in the current market. [Chart # can be found on p. 5 of Docket number EPA-HQ-OAR-2021-0208-0290-A1]

A light-duty car or truck purchase is the most expensive consumer transaction made by most households. Unlike for most other consumer goods, more than 90 percent of consumers finance the new light-duty vehicles they acquire by means of a credit sale or lease, with less than ten percent involved in all-cash transactions. When prospective purchasers lack sufficient creditworthiness to enable a lender or lessor to finance the new light-duty vehicles they desire, they may be compelled to consider other options, including less expensive new vehicle choices. At some point, no new vehicle options are available, leaving consumers with three principal transportation choices: the used vehicle marketplace, maintaining their current personal transportation (vehicle service and repair), or foregoing personal transportation altogether in favor of potentially less practical and convenient (if available) transportation options like public transportation, or ride-hailing (e.g., Uber, Lyft, or taxis).

Importantly, with respect to the new vehicles subject to EPA's proposal, whether prospective purchasers can get financed (and on what terms) will not at all depend on whether those vehicles offer prospective purchasers improved GHG emission reduction performance or better fuel economy. When underwriting loans or leases, lenders and lessors do not consider whether new vehicles offer more torque or horsepower, improved fuel economy, reduced GHG emissions, ubiquitous cup holders, or prettier paint. All that matters is whether prospective purchasers are creditworthy; that is, whether they will comply with their payment obligations as spelled out in their loan or lease. Regarding new vehicles themselves, lenders and lessors use objective criteria and focus on one key factor: the total amount financed.

EPA's proposal keys on the increased fuel economy performance resulting from enhanced GHG emission reductions (i.e., operating cost reductions) as potentially mitigating or offsetting the higher up-front costs needed to buy such performance, particularly for lower-income households.18 Admittedly, certain business and "fleet" buyers may use total cost of ownership (TCO) analyses that balances higher up-front costs against lower operating costs. But for the vast majority of prospective purchasers, TCO "payback" cost/benefit analyses are flawed and problematic for several reasons.

Consumers shopping for vehicles with better fuel economy19 cannot obtain that improved fuel economy unless they are able to pay for it. As noted above, over 90 percent of new vehicle customers finance or lease, typically at or near the maximum terms for which they qualify. Thus, when vehicle prices increase due to higher costs, consumers may no longer qualify for the same loan or lease amount. Moreover, increased per vehicle costs constrain the ability of retail consumers to obtain loans with affordable monthly payments. Simply, it is commercially unreasonable to expect vehicle lenders and lessors to know and account for potential reductions in vehicle operating costs, such as those that may result from lower fuel costs, because they cannot predict actuarially whether any such cost reductions will be saved, let alone applied to a loan or lease. And while EPA asserts in its proposal that some lenders give discounts on loans to purchase more fuel-efficient vehicles,20 the reality is that lenders and lessors do not consider vehicle operating costs when they offer loan or lease terms, which, as noted, usually reflect the maximum for which a consumer qualifies.21 [EPA-HQ-OAR-2021-0208-0290-A1, p. 4-6]

Commenter: National Coalition for Advanced Transportation (NCAT)

Declining Battery Costs: Electric vehicle battery costs have continued to decline, reducing the cost of electric vehicles relative to other vehicles.71 Bloomberg New Energy Finance finds that the cost of lithium-ion batteries fell 89% from 2010 to 2020—with a 13% drop in just 2020 alone.72 This trend is expected to continue due to advances in battery chemistry and the opportunities presented by economies of scale as the battery market grows.73

Declining Purchase Price: Electric vehicles are rapidly moving toward purchase price parity, in part because of declining battery costs. Between 25% and 40% of a battery electric vehicle's total price is typically attributable to the battery. 74 UBS75 and BNEF76 both predict that by 2025, battery prices will have dropped so much that battery electric vehicles will no longer cost more to manufacture than conventional fuel vehicles. The Goldman School of Public Policy predicts this price parity in the mid to late 2020s.77 By 2022, there will be at least six electric vehicles models priced below $30,000. 78 [EPA-HQ-OAR-2021-0208-0239-A1, p. 12-13]

Commenter: Osbourn, Paul

[The following comments were submitted as testimony at the virtual public hearing on August 26, 2021. See Hearing Testimony – 26Aug2021, pp. 186-187.]

While I believe the EPA plan has a noble intent, I am concerned about the economic impact and it potentially having a counterproductive result.

We have seen trucks go from 2012 selling around $25,000 to today at over $45,000 and this current plan looks to drive things well north of 50. With the addition of precious metals that will have to go into the catalyst calibration time, we expect that.

We're already seeing fleets in dealers around the country placing record orders for Model Year '22. Some manufacturers have already shut off the order window as early as November, which normally would have stayed open well into March or April of next year.

The reason they're doing it is to avoid what they believe to be higher prices of the Model '23 and newer vehicles.

Commenter: Peavler, Jean

As an American consumer, I stand against the proposed rule change that would make finding affordable vehicles even more difficult because electric vehicles are more expensive, used gasoline vehicles would become obsolete and have no resale or trade-in value, and any still-existing gasoline vehicles would be small, lightweight, and unsafe because of the increased fuel economy standards they would need to meet. [EPA-HQ-OAR-2021-0208-0395, p. 1]

Commenter: Southern Environmental Law Center

Drivers are estimated to save between $150 billion and $290 billion through 2050 under Alternative 2 (as compared to between $120 billion and $250 billion under the proposed standards over that same period) .[30] These savings make a real difference for drivers, especially for low-income households and households of color that generally spend a greater proportion of their income on transportation costs .[31] [EPA-HQ-OAR-2021-0208-0244-A1, p. 5]

[31] The national average gasoline cost burden is 7 percent of total income. Shruti Vaidyanathan, Peter Huether, & Ben Jennings, Understanding Transportation Energy Burdens, AM. COUNCIL FOR AN ENERGY-EFFICIENT ECON., iii (May 2021). When accounting for race, in the

Southeast the gasoline burden is 6.9 percent for white households, 9.5 percent for Black households, 9 percent for Hispanic households, and 4.3 percent for Asian households. Id. at 14. The gasoline burdens for low-income households are even greater: 13.8 to 14.1 percent on average nationwide. Id. at 8.

Commenter: Tesla

Electric Vehicle Technology Costs Compare Favorably with ICE Vehicles and Are Rapidly Declining.

Tesla cannot achieve its mission without increasing consumer access to EVs, especially to those most negatively impacted by the effects of climate change. Therefore, Tesla is hard at work on battery cell innovations that it expects will lower kWh battery costs by over 50%.119 The Tesla Model 3 is the first EV in history priced on-par with its gas-powered equivalents, even before taking into consideration any regional subsidies and lower total costs of ownership from fuel and maintenance.120

As of June 2021, the Model 3 currently retails for less than the average cost of a light-duty vehicle in the U.S., estimated at over $42,258, the average price of a full-size pickup truck ($57,267) and the average price of a full size SUV ($68,173).121 Over five years of average driving, the ownership costs of a Tesla Model 3 are roughly the same as a Toyota Camry. 122 Notably, running costs such as fuel (electricity or gasoline), maintenance, tires and repairs for Model 3 should cost just over half of a mass-market ICE vehicle such as a Toyota Camry.123 [EPA-HQ-OAR-2021-0208-0278-A1][pp.14-15]

Commenter: Trevino, Erandi

[The following comments were submitted as testimony at the virtual public hearing on August 26, 2021. See Hearing Testimony – 26Aug2021, p. 194.]

As the previous speakers have noted, there is a big leap financial struggle that communities face in buying an electric vehicle. So that the only way that we can reach a point where electric vehicles are such a big part of our transportation system is if the people get help in order to make that initial payment.

[The following comments were submitted as testimony at the virtual public hearing on August 26, 2021. See Hearing Testimony – 26Aug2021, p. 195.]

So, please, I urge you to be as effective and as aggressive in terms of funding for making it so that people are even able to make that purchase because the way that it is right now, people are struggling even to buy cars at the lower end. They're becoming more expensive every day.

I'm sure you have heard about the chip shortage that has caused vehicle shortages all over the country. So vehicles are already becoming more and more expensive and electric vehicles are even more expensive than that.

So in order for it to be a reality for people who are not earning any additional money now that prices are going up, it would be really great to see a program that makes this a possibility for the communities that are impacted the most, the ones that are already at the fenceline with these refineries and these other sources of carbon emissions.

Commenter: Valero Energy Corporation (Valero)

Regarding consumer protection, although EPA concludes that the prohibitive up-front costs of electric vehicles will eventually be offset by fuel savings from improved efficiency, this conclusion is inconsistent with the findings of comprehensive assessments by Arthur D. Little Consulting and an April 2021 Report by Argonne National Laboratory.15 Further, the preamble acknowledges that consumers will be impacted by higher vehicle purchase costs and that this may particularly impact consumers' ability to obtain credit. Although EPA projects that the proposed rule will result in doubling the current electric vehicle fleet in a four-year period, the preamble omits any consideration of harm to consumers resulting from increased costs and diminished reliability resulting from increased electricity demand. It does not appear that EPA has considered the findings of a recent IEA report noting that there are insufficient mineral resources or processing capability to supply the need for electrification of the transportation sector. 16 EPA should evaluate whether such scarcities have the potential to result in significant price increases to consumers as well as shortages of batteries and vehicles. [EPA-HQ-OAR-2021-0208-0601-A2, p.7]

EPA Response

Many of these comments address the tradeoff between the increased up-front vehicles costs and the lower operating and maintenance costs due the to these standards or associated with EVs in particular. As discussed in Preamble Section VII.J., the estimated fuel savings for vehicles subject to the standards are expected to outweigh the up-front technology costs over the vehicle’s lifetime. The net purchase cost to an owner will depend on the vehicle age when bought, and, if sold, the length of time that the vehicle was owned. In general, the purchasers of older vehicles will see a greater portion of their depreciation costs offset by fuel savings. EPA agrees that, as the up-front costs of EVs decrease over time, the net lifetime savings and total cost of ownership of these vehicles will continue to fall. For more information from EPA’s updated analysis for the final rule, see Preamble section VII.J.

Some comments express concerns over the increase in up-front costs because the higher costs may limit purchases due to inability to access credit for the higher amount. As EPA discusses in Preamble Section VII.M. and RIA Chapter 8.4.3, while we recognize this concern, the evidence we have collected suggests that there is no clear criterion for determining how or whether people will have trouble gaining access to credit. Debt-to-income ratio, for instance, does not appear to be a rigid criterion: even if lenders use “objective criteria” to measure this ratio, there appears to be some discretion in how the ratio is used. In addition, some lending institutions offer a reduced loan rate for “green” vehicles, even though, as NADA points out, many lenders do not take into account reduced fuel consumption when deciding how much to lend.

NADA expresses concern that “At some point, no new options are available,” due to lack of access to credit. A recent EPA report analyzes the interconnectedness of the new and used vehicle markets.[94] If used vehicles become a more desirable option than new vehicles, then sellers of used vehicles will get a higher price. Because the initial sellers of used vehicles are those who bought new vehicles, the new vehicle buyers are recovering a greater proportion of the new vehicle costs. This higher resale price provides feedback to new vehicle buyers that they will not bear the full costs of the higher prices, and they are thus more willing to buy the higher-priced vehicles. The higher number of new vehicles then reduces the higher prices to used-vehicle buyers. This effect leads to lower impacts on new vehicle sales than if the feedback between the new and used vehicle markets is not considered. NADA’s extreme case thus is unlikely to materialize. This finding is discussed in RIA Chapter 8.1.2 and Section 18 of this Response to Comments in the form of the inelastic response of new vehicle sales to higher new vehicle prices. RIA Chapters 8.1.2 and 8.1.3 discuss our calculation of vehicle sales impacts, which we estimate to reduce sales by up to 1 percent, though the effects may be less negative or even positive.

Several commenters discuss the high average price of new vehicles and concerns over the standards increasing that price. A couple commenters point specifically to increased vehicle costs due to shortages of microchips. It is difficult to separate, in this average, the effect of higher vehicle costs from the effect of changes in the mix of vehicles purchased: when people buy a higher share of more expensive vehicles (for example, more SUVs instead of sedans), the average price increases even if the prices of all vehicles stay the same. The recent EPA Automotive Trends report shows the increase in production share of truck SUVs in recent years, with sedans and wagons decreasing their shares;[95] this trend is expected to contribute to the increase in average vehicle prices. The increase in microchips is expected to be due to pandemic supply chain issues and thus temporary. As discussed in Preamble Section VII.M. and RIA Chapter 8.4.4, a wide range of vehicle models and price points are available in the new vehicle market. See Preamble Section VII.A. and RIA Chapter 8.1 for further discussion of the role of reduced fuel consumption in vehicle purchase decisions.

With regard to the comments suggesting that financial support is needed for EVs to become a “big part of our transportation system,” the comments are outside the scope of this rulemaking and EPA does not have the authority to provide subsidies for vehicle purchases.

Even while EVs become a larger share of new vehicle purchases, used gasoline vehicles are expected to stay in use for several decades, due to their reliability. They will become obsolete or

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[94] U.S. Environmental Protection Agency (2021). The Effects of New-Vehicle Price Changes on New- and Used-Vehicle Markets and Scrappage. EPA-420-R-21-019, https://cfpub.epa.gov/si/si_public_record_Report.cfm?dirEntryId=352754&Lab=OTAQ, accessed 11/24/2021.

[95] U.S. Environmental Protection Agency (2021). 2021 EPA Automotive Trends Report. EPA-420-R-21-023, Section 3.A.

have no resale value only if EVs become very widespread in the used vehicle fleet as well as the new vehicle fleet.

See Section 21 for discussion of the safety impacts of the standards.

The performance-based, footprint-based standards are intended to maintain the diversity of vehicle sizes and utilities, while providing multiple paths for compliance. See Section 17.2.2 for further discussion of the impacts of the standards on choices of vehicles available.

See Section 12.1 for discussion of the effects of EVs on the reliability of electricity production.

See Section 12.1 for discussion of the costs specifically associated with EVs, and Section 19 of this document for discussion of access to minerals needed for EVs.

17.2.2. Effects on Lower-Income Households

Commenter: Americans for Prosperity

The Proposed Rule Will Raise the Cost of New Vehicles and Hurt the Most Vulnerable. In 2021 the average price of a new vehicle is over $40,000, nearly $2,300 above the average cost in 2020. 11 EPA's proposed rule is the most expensive rule to date from the Biden administration costing $150 billion through 2050.12 These new burdensome vehicle regulations will raise the price of new vehicles yet again with a low estimate from EPA of an additional $1,044 in cost per vehicle by 2026. The proposal constrains choice and replaces consumer preferences with politically preferred technology and fuels that hurt the most vulnerable Americans.

Affordable mobility for individuals, especially low-income individuals is essential to earn success, provide for their families, and ultimately realize their potential. In the Regulatory Impact Analysis (RIA) EPA claims, '[t]hese standards might affect affordability of vehicles and their impacts on low-income households in particular.'13 The Agency suggests 'online working and shopping may provide alternative ways to accomplish some goals, for those with stable access to internet services.'14 This out of touch response is one of many throughout the regulatory analysis, this does not present a solution to the problem for many working individuals or students that rely on a vehicle to get places.

EPA and the administration's focus on helping disadvantaged communities is lost in this proposed rule, many of these low-income individuals live in these communities. In the RIA the Agency states '[i]t is not clear how to identify the socially acceptable minimum level of transportation service. It seems reasonable to assume that such a socially acceptable minimum level should allow access to employment, education, and basic services like buying food, but it is not clear where consumption of transportation moves from necessity to optional.'15 When push comes to shove the Agency does not recognize affordable mobility or freedom of mobility as a means of allowing people to prosper in society. The Agency views this as a current 'necessity' that can change to an 'option'. Any supposed benefits from the proposed standard would not be going to these disadvantaged communities and would instead hurt them. What you can expect is, you will be priced out of new vehicles and used vehicles could increase in price too. This sentiment from EPA should concern consumers and environmental justice advocates. [EPA-HQ-OAR-2021-0208-0226-A1, pp. 3-4]

Commenter: Attorney General of Missouri et al.

Negative Impact on Working-Class Americans. The EPA claims to have considered the negative impact of this rule on lower-income families by analyzing 'The increase in the up-front costs of new vehicles subject to more stringent standards, and the decrease in operating costs from reduced fuel consumption over time.' FR 43737. Not surprisingly, the EPA concludes that in spite of the 'increase in up-front new vehicle costs ... the potential to increase the prices of used vehicles, to make credit more difficult to obtain, and to make the least expensive new vehicles less desirable compared to used vehicles,' all-in-all, this policy will benefit the poor. FR 43737. After all, reasons the EPA, at some point in the future, when upfront costs of this new technology and/or higher fuel efficiency standards has somehow been absorbed, the poor (who naturally buy less expensive traditional cars) will reap the benefits of a lower per-mile fuel cost. Or, with luck, there will be an 'increase access to transportation services, such as ridehailing and ride-sharing, where the lower per mile costs may play a larger role than up-front costs in pricing.' FR 43737. This gives the impression that the American public should not worry about making vehicles more expensive because minimum wage workers can always just call a cab or an Uber. Though the bureaucrats at the EPA seem oblivious to the real-world impact of their proposed regulation, as elected officials from our respective states we are concerned that costs will be shifted to those who can least afford them. [EPA-HQ-OAR-2021-0208-0288-A1, p.17]

Commenter: California Air Resources Board (CARB)

The proposed standards will also deliver greater economic benefits to those that need the most assistance. California agrees that for most of the population, operating and fueling costs are lower for electric vehicles, although it may not be the case for all individuals. In assessing standards and how they affect equity, California also agrees that it is important to consider the used car market since 70 percent of car purchases are used.74 More stringent standards benefit aftermarket buyers as well as new car buyers.

California appreciates EPA's actions to acknowledge past and current policies that result in environmental, health, and other social burdens and future actions to assess and minimize further harms, meet equity goals, and distribute community benefits intentionally and equitably. Looking at the affordability and equity impacts of the proposed standards is critical to ensuring that all communities benefit and are not negatively impacted. [EPA-HQ-OAR-2021-0208-0643-A6, pp. 27-28]

In sum, stricter emission standards that pay for themselves through reduced fuel costs would deliver greater benefits to the people that need them most – those with lower incomes who spend a greater percentage of their household budget on transportation. U.S. EPA fails to quantify these benefits. [EPA-HQ-OAR-2021-0208-0643-A6, p. 40]

Commenter: Center for Biological Diversity, et al.

To help address upfront affordability impacts for low income consumers, the Biden administration should develop targeted incentives for environmental justice communities.

Though upfront affordability impacts for lower income households are a concern, the Proposed Standards would reduce the total cost of vehicle ownership over its lifetime. DRIA at 8-20. The Proposal would benefit lower-income used-vehicle purchasers more than new vehicle purchasers (by offsetting the used vehicle cost with fuel cost savings much more quickly than for new vehicle purchases), Proposal, 86 Fed. Reg. at 43,798; see consumer impact section supra, and lower-income households may benefit more from operating cost reduction than the upfront cost increase because "they own fewer vehicles per household, spend more on fuel than on vehicles on an annual basis, and those fuel expenditures represent a higher fraction of their household income." Proposal, 86 Fed. Reg. at 43,804.175 Increasing stringency by adopting Alternative 2 plus would help bring more electric vehicles to the market faster, lowering upfront vehicle costs sooner, and increasing affordability for potential low-income purchasers as more electric vehicles are moved to the used car market.176 Nevertheless to help prepare for an electric vehicle future, this Administration should develop a suite of programs to address the barriers to electric vehicle adoption in environmental justice communities.

President Biden's E.O. 14008 directs federal agencies to develop programs to address disproportionate adverse impacts as well as accompanying economic challenges.177 This administration should address affordability implications of this Proposal and future increased vehicle electrification through targeted policy mechanisms that direct dollars to the consumers who most need it.

Studies have shown that low-income EV buyers are more responsive to incentives,178 and have suggested gradually increasing eligibility requirements by income.179 State policies offer examples of income-qualified policies that could be considered.180 California provides grants and affordable financing to help income-qualified Californians purchase or lease hybrid or electric vehicles.181 Pennsylvania offers an additional rebate for purchase of hydrogen fueled, battery and plug-in vehicles for low-income residents.182

For policy recommendations, we encourage review of the Greenlining Institute's "Electric Vehicles for All: An Equity Toolkit."183 Greenlining recommends that up-front vouchers or "instant cash rebates" like Connecticut's program184 are the most effective purchase incentive tool because they reduce the price of the vehicle at the time of purchase. Although tax credits can lower annual income taxes, because a purchaser has to wait until tax season for the benefit, and because low-income individuals usually have low tax liability, these mechanisms are less equitable. Financing assistance like loan loss guarantees for financial institutions or programs that buy down interest rates for consumers can improve loan options for potential low-income EV purchasers.

Policymakers can also ensure targeted deployment of public charging stations to support affordability and access for environmental justice communities. One California pilot program has a 15 percent minimum commitment with a goal of 20 percent in disadvantaged communities.185 [EPA-HQ-OAR-2021-0208-0651-A1, p. 73-76]

Commenter: Center for Climate and Energy Solutions (C2ES)

In addition to up-front costs, many households cite lack of access to charging infrastructure as a barrier.11 These households are overwhelmingly residents of lower-income communities or communities of color, and often historically marginalized communities who have disproportionately borne the largest costs of climate change and pollution, while contributing the least to global emissions.12 An equitable and just climate future should prioritize increased access to cleaner, quieter, safer, and lower emitting vehicles for these communities. [EPA-HQ-OAR-2021-0208-0287-A1, p.4]

In 2021 alone, states including Louisiana, Maryland, Indiana, and North Carolina announced millions of dollars in grants to local utilities and municipalities to install charging stations, many emphasizing expanding access for rural or low income communities.17 [EPA-HQ-OAR-2021-0208-0287-A1, p. 5]

Commenter: Connecticut Department of Energy and Environmental Protection

Additionally, EPA and the federal government need to adopt policies to improve access to clean forms of transportation in underserved and highly impacted environmental justice communities. [EPA-HQ-OAR-2021-0208-0264-A1, p.2]

Commenter: Consumer Reports (CR)

New car buyers on average are older, whiter, and wealthier than average,18 and the decisions they make determine the vehicles available for purchase on the used market. That means that the preferences of a smaller, less diverse subset of Americans largely drives the market for new cars, even if those vehicles do not match the needs and wants of the 70% of Americans who can’t afford, or chose not to enter, the new car market.19 Strong federal standards are necessary to ensure the needs of all Americans are met by the new car market, even those who cannot afford to participate in it. In setting these standards EPA should explicitly consider the needs of lower income Americans, who participate mainly in the used car market, and spend a larger portion of their income on fuel. [EPA-HQ-OAR-2021-0208-0602-A1, p.9]

Commenter: Dream Corps Green for All et al.

Strong GHG emission standards for passenger vehicles are essential to meet climate and racial equity goals. Racial inequalities in wealth, health, and risks from a changing climate based on where we live mean that every improvement to addressing climate change is especially beneficial to people and communities of color.[2] We may be beyond the point of being able to truly 'fix' the climate disaster that burning fossil fuels has wreaked, but every fraction of a degree matters. The big impact of a marginal difference in emission abatement is especially felt by the most vulnerable--people who live in floodplains or heat islands (often redlined neighborhoods), low-income households who may be uninsured or underinsured for health or property coverage, people who don't have the means to move or improve the resiliency of their homes, and people exposed to air pollution or who have pre-existing health conditions are all more vulnerable to the effects of climate change.[3] [EPA-HQ-OAR-2021-0208-0285-A1, pp.1-2]

In addition, the losses of low-wealth households are inherently underestimated in cost-benefit analyses from climate change because their assets are statistically undervalued compared to those of high-wealth households.[7] For example, the loss of a home due to flooding is calculated by the market value, which would assess a home in a high-wealth neighborhood as a greater loss than a home in a lower-wealth neighborhood, but it is still the loss of a family's home. This inherent bias in cost-benefit analysis that undervalues the quality of life and public health impacts for low-wealth- (disproportionately BIPOC) held assets is beyond the scope of this one rulemaking, but the presence and direction of this bias further supports adopting the strongest feasible emission standard that shows positive net benefits. [EPA-HQ-OAR-2021-0208-0285-A1, p.3]

Strong GHG emission standards for passenger vehicles help lower transportation costs for low-income drivers and advance long standing environmental justice goals. Cleaner vehicles save money. [EPA-HQ-OAR-2021-0208-0285-A1,p. 3]

In addition to the health, economic, and innovation benefits of stronger standards, cleaner vehicles actually have lower costs for both maintenance and fueling than dirtier vehicles. While in the short-term, adding low or zero-emission technology to vehicles does increase the upfront costs for new vehicles, the total cost of ownership for many cleaner vehicles is already lower,[9] and price parity on upfront costs of cleaner technology for new vehicles will occur for most passenger vehicles within five years.[10]

Low-income households spend a disproportionately higher share of their income on gasoline and purchase primarily used vehicles.[11] As EPA itself and Consumer Reports have pointed out, owners of used vehicles get the savings from cleaner vehicles at a lower upfront price because vehicles depreciate while their fuel economy remains steady.[12] Most vehicle owners, especially low-income vehicle owners, purchase used vehicles, and so the net benefits are progressive with the largest benefits going to lower-income households.[EPA-HQ-OAR-2021-0208-0285-A1, p.4]

Cleaner vehicles reduce health burdens. Low-wealth and BIPOC (Black, Indigenous, People of Color) communities experience disproportionate harm from vehicle pollution, which compounds exposure with other sources of pollution and disproportionate stressors, leading to increased rates of illness and premature death.[13] In addition, localized pollution hotspots are often overlooked in EPA's air quality monitoring,[14[so the benefits of reducing emissions from passenger vehicles in heavily polluted areas or highly trafficked corridors may be underestimated. [EPA-HQ-OAR-2021-0208-0285-A1, p.4]

Neglecting the most vulnerable among us has exacerbated the current pandemic and propped up a fossil-fuel based economy, which as we know, puts everyone at risk. We can build prosperity for all Americans by adopting pollution standards that are strong enough to protect the health of the most vulnerable and to encourage innovation and deployment of clean transportation solutions.[EPA-HQ-OAR-2021-0208-0285-A1, p.5]

Stronger standards improve access to electric vehicles. Stronger standards also improve equitable outcomes because they stimulate deployment and manufacturing of electric vehicles. As electric vehicle adoption becomes more widespread and EVs are readily available at different price points and in the used market, this will reduce the potential of “eco-apartheid” where people with high-wealth have access to efficient, electric vehicles and homes and people with low-wealth are stuck with high energy and fuel bills and health burdens while still being reliant on fossil fuels.15 [EPA-HQ-OAR-2021-0208-0285-A1, pp. 4-5]

Commenter: Institute for Policy Integrity

EPA should consider the economic effects to lower-income households as well as the environmental justice effects from changes to criteria and toxic pollution, and the environmental justice gains associated with the increased climate benefits from more stringent alternatives.15 If Alternative 2 plus the 5–10 g/mile increase for MY 2026 is consistent with equity goals as well as with EPA’s statutory mandates and with maximizing net benefits, that would further strengthen the case for selecting that combination of policy options. [EPA-HQ-OAR-2021-0208-0299-A1, p. 3]

Commenter: Kreucher, Walter

According to the NPRM, ‘the majority of both costs and benefits that occur under the proposed standards accrue to buyers of new cars and trucks, rather than society in general.’ Since only the wealthy can afford to purchase new vehicles, minority communities will be harmed by this rulemaking action. More specifically, only the ultra-wealthy can afford the price premium for costly electric vehicles (even with the tax credits which only the wealthy can use) advocated in the rulemaking.

The CAFE Model estimates that between $800 million and $1 billion will be spent on tax credits given to the wealthy for the purchase of electric vehicles. [EPA-HQ-OAR-2021-0208-0199-A1, p. 11]

Commenter: Osbourn, Paul

[The following comments were submitted as testimony at the virtual public hearing on August 26, 2021. See Hearing Testimony – 26Aug2021, pp. 186-187.]

The reason they're doing it is to avoid what they believe to be higher prices of the Model '23 and newer vehicles.

This also has a significant impact to the used truck market. The people that fix your roof and paint your house and deliver your Amazon packages and trim your trees, these folks typically drive used vehicles and those folks are also seeing particularly with the chip shortage incredible rises in prices. What they typically end up doing is extending the life of their vehicle. They will often just buy a new engine or rebuild the transmission and we get stuck with the same emissions that we had that we're trying to replace.

Commenter: Platt, Keari

Increased stringency standards work in tandem with state-run programs that enable low-income individuals to purchase fuel efficient vehicles. Often, low-income individuals and members of environmental justice communities are unable to obtain more energy efficient technologies. To address this issue, California operates the Clean Vehicle Assistance program, so that low-income individuals can purchase more efficient vehicles4. If automakers are required to put more of these vehicles on the market, qualified low-income individuals will likely have wider variety of affordable purchase options. With that, expanding the number of full electric vehicles sold will prompt automakers to provide more public charging stations, further increasing access to these vehicles.5 Overall, setting more stringent standards for automakers will ensure that there is variety of zero emissions cars on the market, benefitting all income groups. [EPA-HQ-OAR-2021-0208-0201-A1, p. 2]

Commenter: Poore, Michael

Additionally, while it does consider environmental justice issues, I believe more research needs to be conducted regarding short term affordability and equity. [EPA-HQ-OAR-2021-0208-0371, p. 1]

Commenter: Stellantis

Unfortunately, the current federal incentive structure does not go far enough to reach the necessary consumers for the future of electrification. The current structure phases out the credit for a manufacturer’s vehicles after 200,000 units are sold, which could help increase the diversity of vehicles in the short term, but is not expansive enough to capture market needs. Additionally, the current incentive is non-refundable and requires consumers to wait until their annual tax filings to benefit from any funds they are eligible for given their individual tax liability. This has been shown to leave out many consumers, particularly those in low- to moderate-income ranges. Figure 5, below, from the Center for Sustainable Energy shows how much of the incentive was received by consumers broken down by percentage of the Federal Poverty Level.35 [Figure 5 can be found on p. 23 at docket number EPA-HQ-OAR-2021-0208-0532-A1]

Commenter: Taxpayers Protection Alliance

Despite stated goals of reducing the likelihood and severity of significant climate change, proposed changes to current standards would do little to reverse current climate trends at a significant cost. The increased expenses that would result from tighter regulatory requirements would be disproportionately borne by low-income Americans, who have already had to face rising prices and dire job prospects over the past year. The Environmental Protection Agency

(EPA) can strive toward a better, cleaner future without imposing large runaway costs on consumers and taxpayers across the country. [EPA-HQ-OAR-2021-0208-0202-A1, p.1]

In recent years, emissions requirements have become a bipartisan endeavor. Politicians and political appointees across the aisle tend to agree on the need for some emission control, even if they disagree on the magnitude of required changes over time. For example, the current 'Safer Affordable Fuel-Efficient Vehicles Rule for Model Years 2021-2026 Passenger Cars and Light Trucks' (SAFE Rule) put into place by the Trump administration requires emissions to be reduced by 1.5 percent each year over the next five years.

In contrast, the current rule proposed by the EPA calls for approximately 5 percent annual reductions in light-duty vehicle emissions. This policy would essentially replicate the Obama administration's approach, continuing the unfortunate status-quo of administrations steering the regulatory state to reflect partisan preferences. The shift back to the Obama era would result in significant costs for a country already gripped by rising inflation. The EPA estimates $150 billion in increased costs through 2050. Given that there are roughly 17 million light-duty vehicles sold each year, the proposed changes would result in an indirect tax of approximately $300 for buyers. And like most lump-sum taxes on products, the impact would disproportionately be felt by low-income consumers. [EPA-HQ-OAR-2021-0208-0202-A1, p.1]

Commenter: Trombetta, Nick

[The following comments were submitted as testimony at the virtual public hearing on August 26, 2021. See Hearing Testimony – 26Aug2021, p. 217.]

Furthermore, clean cars standards are a win for everyone, consumers, car manufacturers, and the environment. It will allow customers to more easily afford fuel efficient vehicles which are frequently more expensive than gas-guzzling alternatives.

<u>EPA Response</u>

Commenters differ on whether the standards will benefit or harm lower-income households. EPA discusses the impacts of the standards on lower-income households in Preamble Section VII.M. and RIA Chapter 8.4.1. As discussed there, lower-income households disproportionately buy used rather than new vehicles, and, as some commenters note, they spend a higher share of their income on fuel than higher-income households. Attorney General of Missouri and Taxpayers Protection Alliance put more emphasis on the up-front costs of new vehicles than on the reduced operating and maintenance costs. As discussed in Preamble Section VII.J., buyers of used vehicles subject to these standards are expected to benefit more than buyers of new vehicles, because of the lower up-front costs of used vehicles that will also have reduced operating costs.

Americans for Prosperity (AFP) asserts that "the Agency does not recognize affordable mobility or freedom of mobility as a means of allowing people to prosper in society." RIA Chapter 8.4 discusses defining and measuring affordable mobility, in order to assess these effects. Among the challenges associated with defining affordable mobility is that transportation needs vary with individual circumstances, such as the nature of a person's employment, health, and where they live relative to work and shopping. Nevertheless, as discussed in RIA Chapter 8.4.1 and in the previous paragraph, we examine effects on lower-income households, who are expected to see benefits from lower vehicle operating costs. We note that AFP does not provide suggestions for defining or measuring affordable transportation. AFP considers EPA's mention of online working and shopping as possible adaptations "out of touch. . . for many working individuals or students that rely on a vehicle to get places." EPA's statement was in the context that many people in the U.S. currently do not own vehicles and already seek out alternatives to driving; other people who do have access to vehicles seek alternatives to using them, or to adding vehicles to their households. Reducing the operating costs of transportation alternatives may provide greater mobility through lower per-mile costs.

EPA disagrees with AFP, Attorney General of Missouri, Kreucher, and Taxpayers Protection Alliance that disadvantaged communities would not get benefits from these standards. As noted by Blue Green Alliance, CARB, CBD, Consumer Reports, Dream Corps Green for All, and discussed in RIA Chapter 8.3, many low-income communities are disproportionately affected by environmental damages associated with climate change and local air pollution, and will benefit from reduced emissions associated with these standards. In addition, as discussed in RIA Chapter 8.4.1, lower-income households disproportionately buy used vehicles; Preamble Section VII.J. provides calculations supporting the conclusion that used-vehicle buyers will get most of the benefits of more efficient vehicles meeting the final standards, because up-front costs are depreciated while fuel savings persist. As Consumer Reports notes, new vehicle purchasers are wealthier than average, and are therefore more likely to bear higher up-front costs than lower-income households.

EPA disagrees with the Attorney General of Missouri and the Taxpayers Protection Alliance that the standards will have minimal or negative impacts on the environment (see Preamble Sections IV. and V. and RIA Chapter 5.1), or the economy (see Preamble Section VII.I. and RIA Chapter 10) because we in fact project significant emission reductions and net societal benefits from the final standards. Energy security impacts are discussed in RIA Chapter 3.2, and impacts on lower-income households in RIA Chapter 8.4.1.

While EPA considers its assessment of affordability and equity implications of the standards to provide insights on these issues, we agree with Poore that further research would further clarify these effects.

AFP asserts that the standards will constrain choice and require "politically preferred technology." The standards are performance-based; they do not require any specific technology to be in compliance. In addition, the use of footprint-based standards is intended to support the diversity of vehicle sizes. Further, EPA's cost estimates are based on the diversity of vehicles in the fleet. As Helfand and Dorsey-Palmateer (2015) and Whitefoot et al. (2017) discuss, basing cost estimates on maintaining constant performance and other vehicle attributes is likely to overstate the costs of the standards, because automakers and vehicle buyers will decide for themselves whether to maintain attributes and increase costs, as modeled here, or reduce attributes and reduce costs.[96] They will choose the latter option only if they prefer it to the option modeled here. If they do, the chosen option must be preferable and thus have lower costs or higher benefits.

Complementary policies to assist lower-income (or other) households with EV purchases are generally beyond the authority of EPA or the scope of this rulemaking, though we agree such measures would facilitate EV adoption in those communities.

[96] Helfand, G., and R. Dorsey-Palmateer (2015). "The Energy Efficiency Gap in EPA's Benefit-Cost Analysis of Vehicle Greenhouse Gas Regulations: A Case Study," Journal of Benefit-Cost Analysis 6(2): 432-454; Whitefoot, K., M. Fowlie, and S. Skerlos (2017). "Compliance by Design: Influence of Acceleration Trade-offs on CO_2 Emissions and Costs of Fuel Economy and Greenhouse Gas Regulations." Environmental Science and Technology 51: 10307-10315.

18. Vehicle Sales Impacts

Commenters Included in this Section

California Air Resources Board (CARB)
California Attorney General Office, et al.
Center for Biological Diversity, et al.
Institute for Policy Integrity
National Automobile Dealers Association (NADA)

Commenter: California Air Resources Board (CARB)

CARB appreciates U.S. EPA's recognition that consumers value savings differently than presumed in the SAFE Final Rule. However, CARB continues to disagree that a sales elasticity of -1 is a valid estimate of consumer response to price changes. Even U.S. EPA's Science Advisory Board has criticized a sales elasticity estimate of -1. As Professor Gillingham explains in his enclosed expert comment, it is not much more than an assumption. The best evidence supports an elasticity of -0.34. U.S. EPA should adopt this estimate as its base case, which is close to its sensitivity case of -0.4, and explore sensitivity cases using a sales elasticity closer to zero.114 Underscoring the point, as Gary Rogers of Roush Engineering explains in his accompanying expert report, consumers are responding positively to the features and performance of the vehicles that pollute less. [EPA-HQ-OAR-2021-0208-0643-A6, p. 38]

U.S. EPA should apply more reliable estimates of the rebound and sales effects of more stringent standards to provide more reliable estimates of the costs and benefits of the proposal. In both instances, it happens that the net benefits are greater than otherwise estimated. [EPA-HQ-OAR-2021-0208-0643-A6, p. 38]

Commenter: California Attorney General Office, et al.

Notably, sales of these vehicles have outpaced EPA's projections.132 And there are good reasons to expect these trends to continue.133 [EPA-HQ-OAR-2021-0208-0245-A1, p.28]

Commenter: Center for Biological Diversity, et al.

EPA overstates the impact of stronger GHG standards on vehicle sales, increasing the costs and decreasing the benefits of more stringent standards.

EPA's use of a -1.0 price elasticity of demand for new vehicles is arbitrarily high and EPA should correct it to a price elasticity value that is lower in magnitude.

EPA's Proposal offers no support for its use of a -1.0 price elasticity of demand for new vehicles, merely stating that the value comes from the 2020 Final Rule and that the agency is working to review more recent estimates. 86 Fed. Reg. at 43,788. EPA is correct to reconsider using -1.0 as the price elasticity of demand applicable to this regulatory context, as this value is inaccurate, unsupported by both historical and recent research, and leads to an artificially high decline in new vehicle sales under the Proposal. Recent research supports a value closer to EPA's sensitivity analysis of -0.4, or even lower.

Using a more accurate value for the price elasticity of demand—one that is lower in absolute value, such as the -0.4 estimate used in EPA's sensitivity analyses—would provide a more realistic picture of the sales impacts of the LDV GHG regulations. Proposal, 86 Fed. Reg. at 43,788 (noting use of -0.4 in sensitivity analysis). The price elasticity of demand for new vehicles is a critical factor to consider in setting light-duty vehicle regulations because without this input EPA could not quantify the rule's effect on vehicle purchases. Changes in demand for new vehicles can have an impact on jobs, emissions, safety, and other factors relevant to the net benefits of revised standards.

Vehicles have different price elasticities depending on the timeframe considered, and sales of automobiles tend to be less sensitive to price fluctuations, especially in the long run.115 This is because in most areas of the United States vehicles are essential goods.116 EPA's Science Advisory Board explained that while "a consumer can easily hold on to their existing vehicle a bit longer[,] . . . an old vehicle will not be functional forever, and thus the long-run price elasticity for new vehicles is likely to be smaller [in magnitude] than the short-run elasticity."117 Therefore, it is common to distinguish between short-run elasticity values (sales effects that take place within one year of a price change)118 and long-run elasticity values (sales effects beginning approximately five years into the future).119 In the 2012 Final Rule, EPA acknowledged that -1.0 is "generally considered to be a short-run elasticity," 77 Fed. Reg. at 63,102 n.1300, and explained that price elasticity for vehicles is "smaller in the long run" because "though people may be able to change the timing of their purchase when price changes in the short term, they must eventually make the investment" in a new vehicle. Id. Thus, the 2012 Final Rule explained, while short-run elasticity may apply very briefly at the start of a program, "over time, a long-run elasticity may better reflect behavior." Id. Similarly, in the 2016 Midterm Evaluation Proposed Determination, EPA explained that "short run elasticity estimate[s] . . . may not be appropriate for standards that apply several years into the future."120

Because analyses of LDV GHG emissions standards project sales many years into the future, the long-run price elasticity is the relevant value to apply to the analysis. And because vehicle sales are less elastic in the long run, the price elasticity of demand for vehicles is substantively lower in magnitude in the long run than in the short run.

The -1.0 price elasticity value used in the Proposal is wholly unsupported and should not be used here. Because EPA draws the -1.0 price elasticity from the 2020 Final Rule, it is important to look at how that rule justified this value. In the NPRM, EPA states that the 2020 Final Rule estimated -1.0 "based on literature more than 25 years old." Proposal, 86 Fed. Reg. at 43,788; DRIA at 8-7. This value, however, was not even "based on literature more than 25 years old," but rather arbitrarily chosen by EPA during the 2020 rulemaking with minimal explanation and no real support from the relevant body of literature.

Based on the available research, the 2020 Rule NPRM conducted a data analysis and projected an elasticity in the range of -0.2 to -0.3. 83 Fed. Reg. at 43,075.121 In the 2020 Final Rule, however, EPA raised the elasticity estimate more than threefold. EPA's entire discussion about this massive change in price elasticity was only two sentences, and the agency included only a few mostly outdated citations. Authors of some of the key papers on price elasticity have called -1.0 a price elasticity number "far outside of any reasonable range that could be supported by the relevant literature."122

Experts have advised EPA numerous times that -1.0 is not an appropriate number for price elasticity for vehicle sales. During the 2020 rulemaking, one of EPA and NHTSA's peer reviewers, Dr. John Graham, explained that the relevant literature "with a proper focus on long-term price elasticity of demand, provides support for a price elasticity of demand that is well below -1.0 (in absolute value)," and that "the -1.0 elasticity figure does not have a solid grounding in economic evidence."123 Furthermore, EPA's Science Advisory Board advised the agencies that -1.0 was unjustified as a price elasticity of demand for new vehicles, explaining that the value was not based on the relevant body of academic literature (even the "literature more than 25 years old" that EPA mentions in the Proposal).124 The Science Advisory Board advised EPA to consider alternatives "both larger and smaller than -0.2 to -0.3," but EPA disregarded this advice.125 The small body of old literature relied on by EPA in the 2020 Final Rule does not actually support a -1.0 price elasticity of demand for vehicle sales because the studies were primarily short-run estimates of price elasticity, but the long run is the proper time frame to consider. In fact, the papers cited do not support even a short-run elasticity of -1.0.126

Specifically, the 2020 Final Rule, 85 Fed. Reg. at 24,617 n. 1641-42, relied on the following studies:

- McCarthy (1996): Estimated short-run elasticity of -0.87.127

- Bordley (1994): Assumed a short-run elasticity of -1.0, but did not estimate this value itself, nor provide justification for this assumption.128

- Kleit (1990): Assumed a long-run elasticity of -1.0, but cited another study, Irvine (1983), as the source of this value. Irvine (1983) was a partial literature review of papers published between 1967 and 1978, most of which reported short-run elasticity estimates.129 In fact, the few long-run estimates reported in Irvine support a long-run elasticity of -0.5 to -0.6 when using the median estimate or taking the mean without the outlier estimate.130 Kleit (1990) did not estimate an elasticity value itself.131

- CAR Report (2016): Estimated a mean long-run price elasticity of -0.61 and a short-run price elasticity of -0.79. EPA's 2020 Final Rule, however, improperly cited -0.72 as the CAR Report's long-run elasticity estimate. This latter value, according to the CAR Report, was influenced by an "extreme outlier" (published in 1957 using pre-World War II data), which the authors stated should be "excluded from consideration," making the -0.72 value cited in the 2020 Final Rule inaccurately large. Moreover, economists James Stock and Benjamin Leard have explained that even -0.61 "based on this literature is still too large," explaining that the CAR Report misreports the elasticity values from the one post-1970 paper that it cites and that “[u]sing the correct value” from the paper “would make the CAR Report’s estimated long-run price elasticity even smaller.” Specifically, the CAR Report separately reported elasticities for cars and light trucks from Fischer et al. (2007), ignoring substitution between the two, deriving a long-run elasticity based on this paper of -0.82. Because more stringent standards apply to all new light-duty vehicles, the correct elasticity is the combined market affected by a price increase, not one supposing that only cars are affected or, alternatively, only light trucks, which Fischer et al. (2007) estimates to be -0.36.132 The only long-run estimate from these studies considered in the 2020 Final Rule is the CAR Report’s -0.61. The other four estimates of between -0.8 and -1.0 are all short-run estimates. Moreover, they are the product of wildly outdated evidence, as EPA has acknowledged.133 Three of the studies are between 25-31 years old, but they mostly rely on data from the 1960s and 1970s, with some data even dating back to the 1920s.134 Thus, at most, the literature relied on in the 2020 Final Rule could support a short-run estimate of a magnitude close to but less than -1.0. A price elasticity of -1.0 based on this research is “a high-end estimate,”135 even for the short-run, and it is well-established that price elasticity of demand for vehicles decreases in magnitude in the long-run and should be substantially lower in magnitude. 2. The most recent literature supports a price elasticity value well below -1.0 in magnitude. The chart below ["Sales Elasticity Estimates" can be found on p. 56-59 of Docket number EPA-HQ-OAR-2021-0208-0651-A1] provides a comprehensive review of current and historical long-run and short-run elasticity estimates.136 The median elasticity of the studies published since 2000 (including an outlier estimate) is approximately -0.35, with a mean of -0.4, and those numbers decrease when looking only at studies published since 2010. 137 There is no basis for a price elasticity estimate of -1.0. EPA should revise this input to a more accurate value, such as the -0.4 estimate that is used in the Proposal’s sensitivity analyses and that is consistent with recent studies. The most recent reliable studies, such as Leard (2021) and Stock et al. (2018), would support values even lower in magnitude than -0.4. [EPA-HQ-OAR-2021-0208-0651-A1, p. 52-56]

121 This number was actually incorrectly calculated and too high due to a spreadsheet error identified in a Comment to the 2018 NPRM. It should be -0.07. See Stock, J.H. et al., Comment on Proposed Model Year 2021- 2026 Standards, EPA-HQ-OAR-2018-0283-6220 (Oct. 26, 2018). Attached as Exhibit 84.

129 Of the sixteen elasticities cited in Irvine (1983), thirteen are short-run elasticities. Irvine, F.O., Demand Equations for Individual New Car Models Estimated Using Transaction Prices with Implications for Regulatory Issues, 49 S. Econ. J. 764, 766 tbl. 1 (1983). Attached as Exhibit 87.

137 These values are consistent with a review done by several economists and detailed in an amicus brief filed in the litigation over the 2020 Final Rule. That review considered what the economists viewed as the four most relevant, distinct estimates of long-run elasticity based on original data analysis since 2000, and found a long-run price elasticity of demand for vehicles subject to the Proposal of between -0.03 and -0.61. See Amicus Brief of Economists at 25-26.

Commenter: Institute for Policy Integrity

EPA Should Use Long-Run (Not Just Short-Run) Estimates for Sales Elasticity in the Final Rule

As in the final SAFE 2 Rule, EPA has used a value of -1 to estimate the elasticity of demand.154 EPA admits that this estimate is ‘based on literature more than 25 years old’ and therefore the agency is reviewing more recent estimates and has run a sensitivity analysis at -0.4.155 Based on the best available evidence, EPA should in fact focus its main analysis on a lower demand elasticity based on long-run estimates.

Price elasticity measures the sensitivity of the sales of a particular product to fluctuations in that product’s price. While sales will typically increase when prices drop and decrease when prices rise, the strength of that relationship will depend on buyers’ need for the product and the availability of substitutes. Sales of necessity products with few comparable substitutes are likely more insensitive to price fluctuations. In economic terms, such products are inelastic. By contrast, products that are less essential or that can be easily substituted by other products are typically elastic, meaning that their sales are more sensitive to price fluctuations.156

Automobiles currently fall into the former category. Because automobiles are typically considered to be essential goods in most areas of the United States today, due to the current lack of adequate comparable substitutes, both economic theory and observed behavior finds that vehicle sales are relatively inelastic—meaning that price fluctuations produce just modest changes in vehicle sales.157 Indeed, EPA and NHTSA’s model even assumes that all consumers will remain in the automotive market, with used vehicles being the only reasonable substitute for new vehicles.158 Though this is an appropriately simplifying assumption for now, going forward the agencies should work toward a more realistic sales model if public transportation, ride sharing, and other alternatives become more available, and EPA should consider modeling changes in elasticity over time.

As shown in Table 1 (see appendix), the economic literature generally finds a relatively higher elasticity for short-run estimates of vehicle sales (effects within one year)159 but much lower elasticity for longer run estimates (especially for effects beginning five to ten years in the future).160 This reflects that vehicle sales are more elastic in the very short term because a consumer may delay a car purchase for a year or so when faced with higher prices, but most consumers facing modest prices changes are not willing to delay their car purchase more than that, given the general necessity of vehicle ownership and relative inability of current alternative modes of transportation to provide a complete substitute. Given that tailpipe emissions standards apply several model years in the future, and that the analytical model used by EPA and NHTSA projects sales impacts 30 years in the future, EPA has previously indicated that shortrun estimates of elasticity are not appropriate.161 [EPA-HQ-OAR-2021-0208-0299-A1, pp. 21-22] [Table 1 can be found at docket number EPA-HQ-OAR-2021-0208-0299, p. 25]

In the regulatory proposal underlying the SAFE 2 Rule, EPA and NHTSA projected that the price elasticity for new car and light truck sales ‘ranged from -0.2 to -0.3’—meaning, in other words, that a 1 percent increase in sticker price would decrease sales by only 0.2–0.3 percent.162 Yet in the final Safe 2 Rule, the agencies abruptly rejected their earlier elasticity estimate and drastically increased the price elasticity more than three-fold. The agencies claimed that the price elasticity for new vehicles was -1—meaning that new car sales would decline by 1 percent for every 1 percent increase in sticker price.163 But the agencies offered minimal justification for this substantial revision. And by making this change in the final rule, the agencies did not provide an opportunity for comment.164

Policy Integrity provides these comments now to urge EPA not to rely on the overly conservative estimate of demand elasticity from the SAFE 2 Rule. The agency should instead conduct a full review of the relevant economic literature, which confirms that vehicles are currently an inelastic good in the long run—with a price elasticity far below -1 in absolute terms.

After EPA and NHTSA abruptly changed the demand elasticity in the final SAFE 2 Rule, Policy Integrity issued a report reviewing the relevant literature.165 As further explained in this report, the SAFE 2 Rule erroneously relied on short-run estimates of demand elasticity even though long-run estimates are more appropriate for standards that apply several years into the future,166 and even though the agencies used long-run estimates of other inputs elsewhere in their rule analysis.167 Table 1 (see appendix) [Tabe 1 can be found at docket number EPA-HQ-OAR-2021-0208-0299, p. 25] demonstrates that EPA's continued use of -1 is overly conservative compared to the most current literature.

The estimate chosen for sales elasticity has a significant impact on EPA's analysis, as it directly influences the dynamic fleet share model's projection of sales and scrappage impacts and fleet size, thus affecting key projections such as criteria pollutant and greenhouse gas emissions.168 By continuing to use the conservative demand elasticity from the SAFE 2 Rule, EPA may be undervaluing the net benefits of its new proposed standards by as much as $10 billion.169 [EPA-HQ-OAR-2021-0208-0299-A1, p. 22.]

In its main analysis of its final rule, EPA should base its analysis on the best available estimates of long run sales elasticity. An estimate around -0.4 would be appropriate for a long-run estimate based on the most recent literature. EPA could consider higher estimates as sensitivity analysis, but a value as high as -1.0 is not supported by the literature to estimate the long-run elasticity. If EPA uses a value of -1.0, it should be as a sensitivity analysis that makes clear it is very conservatively focusing on a short-run estimate. [EPA-HQ-OAR-2021-0208-0299-A1, p. 23]

Commenter: National Automobile Dealers Association (NADA)

EPA acknowledges that its proposed mandates will likely depress new vehicle sales by approximately two percent compared to the sales rate it forecasted in the SAFE rule.12 At best, NADA believes this to be a significant underestimation. Regardless, EPA excuses the lower sales impact of its proposed mandates by suggesting that it no longer supports "the weight placed in the SAFE rulemaking on promoting fleet turnover as a standalone factor," stating that it is now looking at fleet turnover in the context of the full range effects of its proposed standards.13 EPA concludes that "the emissions reductions from more stringent standards far outweigh any temporary effect from delayed purchases."14 EPA also concludes that, after assessing the benefits of its proposed mandates over a vehicle's entire lifetime, lower operating costs resulting from fuel savings, including those that may accrue to later owners, will offset the increased upfront vehicle costs.15 [EPA-HQ-OAR-2021-0208-0290-A1, p. 2-3]

EPA Response

As discussed in Preamble Section VII.B. and RIA Chapter 8.1.2, EPA has re-evaluated the demand elasticity it is using in its analysis. For the final rule we use a less elastic value of -0.4 for our central case, based on the latest available data and considering public comments, with sensitivity analyses of -0.15 and -1. This revision, along with other changes in model inputs discussed in Preamble Section III. and RIA Chapter 4, results in estimates of vehicle sales impacts of up to -1 percent (compared to our NPRM estimate using a -1 sales elasticity of up to -2 percent); see RIA Table 8-2. EPA thus estimates that the sales impacts will be less negative than calculated in the NPRM. EPA notes that NADA did not provide data or other information to support its claim that vehicle sales impacts were underestimated. In addition, as discussed in Preamble Section VII.B. and RIA Chapter 8.1.2, EPA considers the maintained assumption that both producers and vehicle buyers consider 2.5 years of fuel consumption in the purchase decision to be conservative; adjusting this assumption would lead to more positive sales impacts. EPA agrees that it considers effects on fleet turnover in the context of considering other effects of the standards (see Preamble Section VI. and Section 16 of this document), and that EPA finds the reduced operating costs exceed the increase in up-front costs; see Preamble Section VII.J.

19. Energy Security Impacts

Commenters Included in this Section

Alliance for Automotive Innovation
American Enterprise Institute (AEI)
Attorney General of Missouri et al.
California Air Resources Board (CARB)
Center for Biological Diversity, et al.
CERES
Clean Fuels Development Coalition (CFDC)
E2 - Environmental Entrepreneurs
Merlotti, J.
Ohio Attorney General Office, et al.
Peavler, Jean
Securing America's Future Energy
Schrier, Paul
Valero Energy Corporation (Valero)

Commenter: Alliance for Automotive Innovation

In its use of the GREET model to estimate PM2.5 benefits from reduced upstream petroleum-sector sources, both Agencies appear to be assuming that a decrease in gasoline consumption in the U.S. will lead to a proportional decrease in the amount of upstream emissions during oil production, transportation and refining in the U.S. Without those decreases, there is no basis for assuming a reduction in PM2.5 emissions throughout the U.S. petroleum supply chain. However, in the energy-security benefits analysis (discussed below), the Agencies assume that over 90% of the petroleum impact of the proposed rules will occur in the form of reduced oil imports rather than reduced production of oil in the U.S. Moreover, the energy-security analyses in the RIAs and in the NHTSA TSD argue that the U.S. refinery sector will not be impacted significantly by a modest decline in U.S. gasoline consumption, since the U.S. refinery sector has opportunities to expand the export of refined products around the world. If the agencies maintain these energy security assumptions for the final rule, they cannot logically assume upstream PM 2.5 control benefits in the U.S. If the Agencies forecast PM2.5 health benefits outside the U.S. (e.g., from reduced production, transport and refining of petroleum elsewhere in the world), those health benefits should be based on applicable dose- response and valuation data and be reported separately as suggested in OMB Circular A-4.

Policies to support development of EV and battery manufacturing and domestic supply chains, including critical minerals. At present, most critical minerals necessary for the production of advanced EV motors and batteries are mined and processed outside of the United States, primarily in China. Additional domestic sources and processing capacity are needed to supply EV production and encourage domestic manufacturing and jobs. [EPA-HQ-OAR-2021-0208-0571-A1, p. 5]

Commenter: American Enterprise Institute (AEI)

The asserted 'energy security' externality of petroleum consumption and imports is fundamentally incorrect, in that there can be only one price in the international petroleum market, confronted equally by economies importing all or none of their oil. Nor are the defense costs of defending sea lanes or intersectoral economic effects relevant analytically. [EPA-HQ-OAR-2021-0208-0254-A1, p. 2]

Other purported benefits of the Proposed Rule are defined as climate-related benefits, 'energy security externalities caused by U.S. petroleum consumption and imports,' the health benefits of reductions in emissions of particulates, and the value of reduced refueling time needed for a vehicle fleet characterized by an increase in fuel economy. The Proposed Rule includes a 'rebound' parameter for increased vehicle use attendant upon a purported reduction in fuel costs, but that effect is highly speculative, and will not be addressed here.14 Each of these components of the purported benefit stream is incorrect analytically. [EPA-HQ-OAR-2021-0208-0254-A1, p. 5]

Energy security externalities caused by U.S. petroleum consumption and imports. The 'energy security' argument for reductions in petroleum consumption and imports is fundamentally flawed, however commonly asserted. The magnitude or percentage importance of imported oil is irrelevant to the availability of petroleum to the U.S. economy or the price that the U.S. would have to pay for imported oil.

Many observers argue that it was the 1973 OPEC oil embargo that created the gasoline queues and other market distortions observed in the U.S. during the 1973-4 time period, but that historical interpretation is not correct. Since there was and remains only one world market for crude oil, an embargo — a refusal to sell to a given buyer (i.e., impose a higher price on that buyer only) —cannot work, as market forces will reallocate oil so that prices are equal everywhere (adjusting for such minor complications as differential transport costs). The 1973 embargo aimed at the U.S., the Netherlands, and a few others had no effect at all: All the targeted nations obtained oil on the same terms as all other buyers, although the transport directions of oil trade changed because of the reallocation process. It was the production cutback by Arab OPEC that raised international prices; and it was the U.S. system of price and allocation controls that created the queues and other market distortions. Note that there was no embargo in 1979, but there was a production cutback in the wake of the Iranian revolution, and the U.S. again imposed price and allocation regulations. And, once again, there were queues and market distortions.36

Accordingly, there is no 'energy security externality caused by U.S. petroleum consumption and imports,' notwithstanding the assertions offered in the Proposed Rule. Nations that import none of their oil face the same prices, and price changes, as nations that import all of their oil; and the effects of supply disruptions are the same, except for exchange rate impacts and other such second-order effects. This part of the economic benefit of the Proposed Rule is illusory, and thus illegitimate analytically.

Some argue that the defense cost of policing sea lanes and other such budget cost parameters facilitating the oil trade is a source of an oil-import ‘externality.’ This is not correct: The effect of the Proposed Rule and other GHG regulations on the defense budget and force structure would be imperceptible, and in any event an attempt to allocate the costs of specific parts of that force structure among the various defense missions would be arbitrary. Another argument often made is the economic effect of changing oil prices across economic sectors, including indirect effects. This also is incorrect, as such effects, whether direct or indirect, are risks that can be evaluated and hedged by market participants. There is no ‘externality’ not reflected in market prices. [EPA-HQ-OAR-2021-0208-0254-A1, pp. 9-10]

14 In Table 3-3 of the RIA, the range of estimated ‘rebound’ effects is 0-87 percent.

36 See Benjamin Zycher, ‘Emergency Management,’ in S. Fred Singer, ed., Free Market Energy: The Way to Benefit Consumers, New York: Universe Books, 1984, pp. 74-98.

Commenter: Attorney General of Missouri et al.

Building on the IWG's flawed analysis, the EPA's rush to carbon-zero vehicles compounds the risk to the American economy with ever more stringent mandates. Although promising, such technology also comes with substantial negative impacts to the environment, the economy, the poor, and to national security. For these reasons, we urge the EPA with withdraw this proposed rule and leave in place the rule promulgated by the previous administration. [EPA-HQ-OAR-2021-0208-0288-A1, p.17]

In addition, human exploitation and ecological damage, international and diplomatic concerns abound. China is a major player in the emerging realm of high tech batteries and is heavily vested in controlling related raw natural resources around the globe. 'China's leading battery maker, CATL, is already exporting and has opened up production facilities abroad. Chinese firms have also become the largest investors in cobalt mining and processing facilities in the Democratic Republic of Congo, home to a large proportion of the world's cobalt, a critical element used in many NEV batteries. These investments have raised significant concerns about the availability and price of cobalt as well as the treatment of workers.' [15] The EPA's rush to mandate a massive societal and industrial shift away from gasoline engines in favor of a technology that is at substantial risk of geopolitical manipulation and supply chain vulnerabilities and which at present seems to be in no small part controlled by one of America's chief global adversaries, and a notorious human-rights abuser is extremely concerning. [EPA-HQ-OAR-2021-0208-0288-A1, p.16]

[15] Scott Kennedy, CSIS Briefs, November 2020.https://csis-websiteprod.s3.amazonaws.com/s3fspublic/ publication/201113_Kennedy NEV_ War_ v. 5%20%28002%29.pdf

Commenter: California Air Resources Board (CARB)

Stringent Standards Increase Domestic Energy Security. As Dr. Stanton discusses in her enclosed expert report, An Analysis of EPA's Proposed Revised 2023 and Later Model Year Light-Duty Greenhouse Gas Emission Standards, U.S. EPA has improved its analysis of the benefits of more stringent greenhouse gas emission standards, but still likely understates their benefits.115 Stricter standards will benefit the United States through decreased exposure to volatile oil prices, reduced prices from reduced demand, and potential savings to the federal budget from reduced dependency on imported oil.

The proposed standards will reduce U.S. oil demand. They are thus likely to reduce the global price of oil, known as a monopsony effect. This is true regardless of the position of the U.S. as a net exporter and in any event the net effect is not definitive; the U.S. is importing heavier crude oils to satisfy the needs of refineries.116 U.S. EPA's Draft Regulatory Impact Analysis disregards the monopsony impacts that come from decreased domestic demand. Instead, U.S. EPA treats this effect as a neutral transfer payment. It is not neutral in its effects. The shift of costs to oil producers and away from U.S. consumers would likely have wider societal benefits than the other way around.

Stricter standards that reduce consumption is also likely to reduce exposure to volatile prices. Dr. Stanton recognized that U.S. EPA 'appears to conservatively understate the costs of global oil market instabilities, omitting costs of managing oil market volatility and likely underestimating U.S. exposure to global oil markets.'117 CARB recommends that U.S. EPA consider a broader range of sectors that can be impacted by oil imports and prices. This is expected to more accurately show the benefits from stricter emission standards, including on the budgets of the federal government and consumers. [EPA-HQ-OAR-2021-0208-0643-A6, p.39]

Although U.S. EPA asserts it is not able to quantify the potential for stringent standards to reduce U.S. military expenditures, the available information suggests it could be significant. The U.S. military helps secure international oil production and imports.118 Studies cited in U.S. EPA's Draft Regulatory Impact Analysis of the proposal estimate the implicit subsidy of crude oil for this security ranges from $11.25 to more than $30 a barrel.119 If decreased demand for oil meant that the U.S. no longer needed to defend oil supplies and sea lines in the Persian Gulf, the savings to the U.S. defense budget could be significant. The RAND study cited by U.S. EPA stated that the U.S. defense budget could be reduced by 12-15%.120 The defense budget in 2019 was $704 billion. If this was reduced 12%, it would save U.S. taxpayers more than $84 billion a year.

Moreover, the U.S. military is the largest single consumer of oil in the world, using about 100 million barrels (despite also heavily investing in clean technology).121 Separate from expenditures for securing oil supply lines, a decrease in the price of oil from decreased demand would directly benefit the U.S. military budget. This effect can be quantified based on the estimated effects of the proposal on oil prices. [EPA-HQ-OAR-2021-0208-0643-A6, p. 40]

115 Stanton, E., An Analysis of EPA's Proposed Revised 2023 and Later Model Year Light-Duty Greenhouse Gas Emission Standards, Sept. 2021.

116 DRIA, p. 3-16; Oil imports and exports - U.S. Energy Information Administration (EIA), April 13, 2021.

117 Stanton, E., An Analysis of EPA's Proposed Revised 2023 and Later Model Year Light-Duty Greenhouse Gas Emission Standards, Sept. 2021, p. 7.

Commenter: Center for Biological Diversity, et al.

Energy security remains an important consideration with respect to U.S. oil consumption. Reducing U.S. reliance on oil enhances U.S. energy security, and—with energy security in mind—Congress has specifically directed the U.S. to conserve energy. Energy Policy and Conservation Act of 1975, 42 U.S.C. § 32902(f). Energy security impacts remain an important benefit of reduced domestic oil consumption, as will occur under more stringent standards. Even in the 2020 Final Rule, EPA acknowledged that energy security externalities were "paramount" (along with climate change externalities) among the various externalities "in their extent, magnitude, and economic importance." EPA & NHTSA, Final Regulatory Impact Analysis, The Safer Affordable Fuel-Efficient (SAFE) Vehicles Rule for Model Year 2021-2026 Passenger Cars and Light Trucks, EPA-HQ-OAR-2018-0283-7671, at 116 (Mar. 2020; updated July 1, 2020).

Despite the increases in domestic oil production that have made the United States an energy exporter, EPA must continue to consider the energy security impacts of standards for two key reasons, as EPA explains in the NPRM. First, U.S. refineries continue to import heavy crude oil from potentially unstable regions of the world, and sudden disruptions of supply pose a threat to U.S. financial and strategic interests. For example, EPA's Proposal assumes that for every gallon change in oil demand as a result of the new standards, oil imports will be reduced by approximately 0.91 gallons, DRIA at 3-24, meaning that most of the decline in demand would be applied to decreased oil imports. Second, as EPA notes in the Proposal, oil exporters that have a large share of global production have the ability to raise or lower the price of oil by exerting the monopoly power associated with OPEC to restrict oil supply relative to demand, which could cause oil price shocks that have greater impacts when nations are heavily reliant on oil. DRIA at 3-16. For these reasons, it remains important to consider the costs of oil imports beyond simply the market price paid for the oil.

EPA's oil import and refining assumptions that underlie the energy security benefits more accurately reflect current realities. In the 2010, 2012, and 2020 Final Rules, EPA assumed that 50% of the change in domestic fuel consumption as a result of the regulations would lead to a change in imports of refined fuel, and of the remaining 50% refined domestically, 90% would come from imported crude.

These assumptions are misguided. In particular, the assumption that 50% of a change in gasoline demand would come from a change in imports of refined oil (rather than a reduction in domestic refining) is unjustified given the already small proportion of U.S. gasoline demand that is supplied by foreign-refined oil. Because the United States already has negligible gasoline imports, the realistic result of a domestic decline in gasoline demand is that the majority of the decrease in demand will be represented in a decrease in domestic refining. EPA recognizes this, assuming in the NPRM that 93% of the decline in gasoline demand under the Proposal would lead to a decrease in domestic refining, with 7% of the decline in demand leading to a decrease in imports of refined fuel. Proposal, 86 Fed. Reg. at 43,769. The Energy Information Administration's models have found a strong positive correlation between domestic demand and domestic refining. For example, AEO 2018 data indicated that the vast majority (92%) of a change in domestic gasoline demand would be satisfied by domestic refining.99 AEO 2021 had the opportunity to observe what actually results from a decrease in demand for transportation fuels, as gasoline demand in 2020 dropped to 90% of its 2019 levels, largely due to the pandemic. AEO 2021 explained that this lower demand for transportation fuels resulted in a decrease in the amount of crude oil processed at U.S. refineries—giving a timely example of the effects of a decrease in domestic demand.100 As global oil demand "is unlikely to catch up with its pre-Covid trajectory," and "[g]asoline demand is unlikely to return to 2019 levels, as efficiency gains and the shift to electric vehicles eclipse robust mobility growth in the developing world,"101 there will not be global capacity to absorb substantial additional exports of refined gasoline. EPA's assumption that 93% of the decrease in domestic gasoline fuel consumption under the Proposal will lead to a decrease in domestic fuel refining therefore brings more accuracy to the oil import and refining assumptions. For the Final Rule, EPA should clearly explain the data underlying its new oil import and refining assumptions and values.

EPA appropriately updated the oil import reduction factor and oil security premiums from those used in the 2020 Final Rule. EPA's Proposal updates two key inputs used to calculate the energy security benefits of a decline in U.S. demand for oil: (1) the oil import reduction factor, and (2) the macroeconomic oil security premiums. DRIA at 3-18 to 3-25. In updating these inputs, EPA is able to more accurately estimate the energy security benefits of new standards.

The oil import factor appears reasonable, but EPA should make its calculation methods more transparent. The oil import reduction factor, an important input for calculating the energy security benefits of a regulation, explains what percentage of a decrease in oil demand will decrease imports of foreign oil. In the 2010, 2012, and 2020 Final Rules, EPA calculated this value to be 95%, based on its underlying assumptions regarding oil imports and refining.102

EPA explains that its new oil import reduction factor is calculated "[b]ased on a detailed analysis of differences in U.S. fuel consumption, crude oil imports/exports of petroleum products for the time frame 2023-2050, and using the AEO 2021 (Reference Case) and two alternative sensitivity cases, i.e., (Low Economic Growth) and (High Economic Growth)." DRIA at 3-23 to 3-24. Taking the ratio of the changes in U.S. net crude oil and product imports divided by the change in U.S. oil consumption in the different AEO cases, EPA concluded that the oil import factor is 91%, meaning that each gallon of petroleum reduced as a result of the Proposal would also reduce total U.S. imports of petroleum by 0.91 gallons. Id. at 3-24. EPA's method for calculating this value appears in line with EPA's underlying assumptions regarding oil imports and refining—using the same simple calculation method used in previous rulemakings results in a very similar oil import reduction factor to EPA's estimates, of 91.63%.103 For the Final Rule, EPA should clearly explain its methodology and the data that supports its calculation.

EPA's estimated oil security premiums are based on more accurate and comprehensive data than the values used in the 2020 Final Rule. Oil security premiums measure the extra cost of importing oil beyond the price paid for the oil itself (or, in the case of a reduction in demand, the extra benefit of reducing oil imports beyond the actual expenditures saved). The main input to calculating the oil security premium is the macroeconomic benefit, which measures the potential macroeconomic disruptions and increased oil import costs to the economy resulting from oil price spikes or "shocks," or the value of avoiding these costs due to less domestic reliance on oil.

In estimating the macroeconomic benefit used to calculate oil security premiums, EPA has historically relied on research conducted by Oak Ridge National Laboratory (ORNL), and EPA again takes this approach in the Proposal. EPA has estimated macroeconomic oil security premiums based on ORNL's methodology developed in 1997 and updated in 2008 for a series of past rulemakings including the 2010 and 2012 Final Rules and the heavy-duty vehicle GHG and fuel economy Phase I and Phase II standards.104 The 2020 Proposal also relies on the ORNL literature and methodologies for estimating the oil security premiums.

It was only in the 2020 Final Rule that EPA abandoned this research and methodology, relying instead on a single paper, Stephen A. Brown, New estimates of the security costs of U.S. oil consumption, 105 to drastically reduce oil security premiums. The 2020 Final Rule's reliance on Brown (2018) was inappropriate for two reasons.

First, EPA failed to provide adequate justification for departing from the established ORNL methodologies and research that had been used and updated for over 20 years to instead rely on a single study. By contrast, EPA's reliance on ORNL in the Proposal is a return to historical methods used for calculating oil security premiums and included working with ORNL "to revise the oil security premiums based upon recent energy security literature." Specifically, EPA updated the inputs for price elasticity of demand for oil and elasticity of GDP to oil price shocks. DRIA at 3-25. These updates looked at historical and recent data, and properly incorporated AEO 2018 (and will incorporate AEO 2021), making them more current and accurate than those used in the Brown paper, which relied on world oil market conditions that prevailed in 2014 and on AEO 2012 and AEO 2016, for its estimates.

The second reason that the 2020 Final Rule's sole reliance on Brown (2018) rather than the historical ORNL methodology is improper is that the 2020 Final Rule does not actually appear to have used Brown's best or most accurate estimates in setting its oil security premiums. Instead, the much lower macroeconomic oil security premiums used in the 2020 Final Rule appear to be in line with estimates that Brown (2018) suspects are inaccurate.

Brown (2018) acknowledges that while "individuals may prefer newer research to older," with respect to oil security premiums there remain many questions with regard to whether the newer research can adequately "represent how world oil markets and the U.S. economy would respond to a sizable oil supply disruption."106 In contrast to other factors for which the most recent research may be the most reliable, there are several reasons why this is not true of oil security premiums.

Specifically, Brown (2018) discusses the "lack of big oil supply disruptions in the modern era," explaining that "the differences between the current U.S. economy and that of the 1970s" means that "the effects of any oil price shocks are likely smaller than was estimated with data from the era in which the big oil price shocks occurred."107 Brown (2018) makes clear, however, that "[b]ecause we have not observed a modern economy with large oil supply disruption, we have no reliable methods to quantify the effects of these disruptions,"108 citing research "that the world has not seen a major oil supply disruption since 2003, which raises the concern that newer research, which relies on recent data, may not capture the effects of major oil supply disruptions."109 Thus, Brown (2018) estimated three different oil security premiums—one relying on the old literature, one on the new literature, and a "combined" value that integrated both bodies of data and estimations. Brown (2018) made clear which value was most appropriate for setting policy—the combined value—explaining that this "combined" value "might best reflect the uncertainty in what we know about the oil security premiums."110

The oil security premiums in Brown (2018) derived from the combined values—the estimates that study considered most reflective of reality—are in the range of $3.67 per barrel (in 2015) to $6.08 per barrel (in 2040).111 These values are very similar to the NPRM's estimates, which range from $3.63 (in 2023) to $5.57 (in 2050). Proposal, 86 Fed. Reg. at 43,792, Tbl. 49. The 2020 Final Rule, however, citing Brown (2018), estimated the macroeconomic oil security premium to range from $1.43 in 2023 to $2.61 in 2050. 85 Fed. Reg. at 24,728-29, Tbl. VI-200. These values appear closest to the estimates Brown (2018) derives from only the recent research, which the paper explains may not be the most reliable. Brown (2018)'s recent-literature-only estimations for price elasticity of demand for oil of -0.0175 and elasticity of GDP of -0.018 are significantly lower values than those indicated by any other comprehensive studies.112 In fact, Brown (2018)'s combined values relied on a price elasticity of demand for oil of -0.055, and an elasticity of GDP of -0.028, values very close to the -0.07 and -0.023 estimations arrived at through EPA's latest estimation. A thorough reading of Brown (2018), then, actually supports EPA's latest oil security premiums, as the paper's most accurate estimates are very close to EPA's values, and Brown (2018) appears to advise against using oil security premiums as low as those applied in the 2020 Final Rule.

EPA's exclusion of the military and monopsony benefits in the calculation of oil security premiums means that the energy security benefit estimates in the Proposal are conservative, and reductions in oil use as a result of more stringent GHG standards are likely to have an even greater benefit than those quantified in the NPRM.

In addition to the macroeconomic oil security premium, military and monopsony benefits are considered energy security benefits of reduced U.S. oil demand. While EPA has historically refrained from applying these values in any quantified way, it is important to recognize that energy security benefits that take into account only the macroeconomic oil security premiums could be low estimates.

EPA's Proposal correctly explains that one cost of oil use is "maintaining a military presence to help secure a stable oil supply from potentially vulnerable regions of the world," DRIA at 3-21, and therefore, reducing domestic reliance on oil has the potential to result in some form of military benefit. EPA states that the agency does not include these benefits because they are hard to quantify. Id. at 3-21 to 3-23. EPA is encouraged to consider methodologies for quantifying these benefits in the future, and to acknowledge that their existence makes EPA's current estimations of energy security benefits conservative. [EPA-HQ-OAR-2021-0208-0651-A1, p. 40-45]

Finally, EPA's failure to calculate the fuel price reductions attributable to stronger GHG standards causes EPA to further understate consumer benefits. [EPA-HQ-OAR-2021-0208-0651-A1, p. 48]

103 If calculated as in the 2020 Final Rule, the Proposal's oil import factor would be calculated as 7% (the share of reduction in refined imports) plus 91% of 93% (the share of reduction in domestically-refined oil refined from imported crude), or 7% plus 84.63%, which equals 91.63%. See DRIA 3-24 and EPA's parameters file for the underlying values.

112 Compare Brown (2018) at 174 Tbl. 5 with R. Uria-Martinez (2018) (cited in DRIA at 3-19) (finding a short-run price elasticity of demand for world oil of -0.07); Oladosu, G. et al., Impacts of Oil Price Shocks on the U.S. Economy: A Meta-Analysis of Oil Price Elasticity of GDP for Net Oil Importing Economies, 115 Energy Pol'y 523-544 (2018) (cited in DRIA at 3-20) (finding an elasticity of GDP of -0.021), attached as Exhibit 77; Krupnick, A., Oil Supply Shocks, U.S. Gross Domestic Product, and the Oil Security Problem, Resources for the Future Report (2017) (cited in DRIA at 3-18) (finding a "blended" price elasticity of demand for oil "to better capture the uncertainty involved in calculating the oil security premiums" because "the older literature has not been wholly overtaken by the new" of -0.05 and a "blended" elasticity of GDP of -0.028), attached as Exhibit 78.

Commenter: CERES

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, p. 84.]

Additionally, strong standards insulate the auto industry from oil price spikes. The Standards Act is insurance against loss of U.S. auto industry market share if fuel prices spike as happened in the 2000s, particularly as they move towards larger, less fuel-efficient vehicles which now make up 51 percent of new vehicle sales.

Commenter: Clean Fuels Development Coalition (CFDC)

A nationwide E30 'Clean Octane' Gasoline Standard would reduce U.S demand for imported oil by one billion barrels a year, which at $100 oil would free up an additional $100 billion/year for investment in the creation of quality jobs, improved infrastructure, and better health and education for our children.15 Increased supplies of unconventional oil and gas (fracking) should not be eligible contenders for displacing oil imports because of their extremely high carbon intensity and toxicity which poses substantial risk to the climate and human health.16 E30 HOLC fuels utilize 100% domestic inputs, so there is zero risk of critical material supply chain interference from foreign actors, unlike the energy transition minerals required by electric vehicle manufacturers. DOE’s Energy Information Administration (EIA) has warned of a worsening octane shortage in the U.S. as automobile manufacturers adopt advanced internal combustion engine designs such as direct injection and turbocharging in response to tighter fuel efficiency and carbon emission requirements. [EPA-HQ-OAR-2021-0208-0564-A2, p. 14]

Commenter: E2 - Environmental Entrepreneurs

Other Non-emissions Benefits: EPA has also quantified the non-emission benefits from the rebound effect (the increase in driving resulting from reduced operating costs), changes in refueling time, and energy security benefits from reduced dependence on foreign petroleum. EPA projected non-emission benefits for the Proposal to be $35 billion through 2050, while Alternative 2 would generate $53 billion—a difference of $18 billion. DRIA, Tables 6-8, 6-10. [EPA-HQ-OAR-2021-0208-0604-A1, p. 3]

Commenter: Merlotti, J.

This proposal states that EVs, powered by renewable energy, will increase the energy dependence security of the US. The actual facts oppose this position and are twofold.

First, the US was very close to a net petroleum exporter for the first time in its history. This is a remarkable achievement led by advances in hydraulic fracking. In fact, the restrictions that have been places on the US oil industry by the current Executive administration have already led to energy security issues in a very short time – highlighting the need for a more balanced energy approach. [EPA-HQ-OAR-2021-0208-0189-A1, pp. 2-3]

Second, renewable energy is complementary to fossil fuels, not a replacement. The only feasible way for the US to produce enough non-fossil fuel or 'green' electrical energy for EVs would be to develop more nuclear energy plants (which has no current momentum). Solar and wind simply cannot supply he needed energy for the current electrical demand and mass scaling of EVs. Besides electrical charging, EV batteries require significant mining of rare earth minerals Lithium and Cobalt - that create harmful environmental issues of their own.

'There is no way there’s enough raw materials being produced right now to start replacing millions of gasoline-powered motor vehicles with EVs,' said Lewis Black, CEO of Almonty Industries Inc, which mines the hardening metal tungsten in Portugal and South Korea. 3/1/21 A shift to green energy will create energy dependence for the US on foreign states – many of which are not allies of the US.

[EPA-HQ-OAR-2021-0208-0189-A1, p. 3]

Commenter: Ohio Attorney General Office, et al.

The proposed rule considers as a benefit 'reductions in energy security externalities caused by U.S. petroleum consumption and imports.'[68] On one hand, that is a concern of the Administration's own choosing, as the United States produced more energy than it consumed in 2019 for the first time in [62] years, [69] and remained a net exporter in 2020.[70]

Regardless, the proposed rule entirely fails to mention the additional risks to the transportation sector, even if certain risks are alleviated in the energy sector. China dominates the lithium-ion battery market, and is poised to capture a greater share with time.[71] China is home to three-quarters of the global manufacturing capacity for lithium-ion batteries, while the United States has only 12 percent.72 Not only does China own the final manufacturing process, but China also 'controls 80 percent of the world's raw material refining in the lithium-ion battery supply chain, 77 percent of the world's cell capacity, and [60] percent of the world's component manufacturing.'[73] This is not merely a problem of manufacturing, which through various incentives could theoretically be on-shored. China controls [90] percent of the supply of rare-earth magnets, which work to power electric vehicles.[74] Dependence on China for our transportation is a national security threat—one that cannot be overcome overnight. The EPA failed to consider whether the proposed timeframe to change our vehicle fleet will create an overreliance on China, given the current lack of manufacturing and raw materials in United States control. Such failure renders any final rule arbitrary, but more importantly, dangerous. [EPA-HQ-OAR-2021-0208-0258-A1, p.10]

Commenter: Peavler, Jean

This would also make us even more dependent on China, as around 80% of the manufacturing capacity for electric vehicle batteries is in China. A vast majority of the chemical processing and refining for the raw materials (cobalt and lithium) used in these batteries is also performed in China. We are already too dependent on China and need to decrease this, not increase it! We would also be even more dependent on the electric power grid, which is vulnerable to cyber attacks as well as power plant failures. [EPA-HQ-OAR-2021-0208-0395, p. 1]

Commenter: Securing America's Future Energy

Oil dependence is a unique strategic challenge that has undermined the nation's economic sovereignty and national security for over a century. For 17 years, SAFE has advocated for policies to address the risk posed by the United States' dependence on the global oil market. We applaud the Biden Administration for revisiting the greenhouse gas emission standards for light-duty vehicles that the Environmental Protection Agency relaxed in April 2020.

Oil is the lifeblood of the U.S. economy. The nation's transportation sector is 90 percent powered by oil, and although the transition away from oil is happening slowly, volatile crude oil and petroleum product prices still represent a continuing threat to the U.S. economy. At the same time, there is a growing global consensus that the future of transportation will be electric. In addition to being cleaner than internal combustion fueled vehicles, electrified transportation is powered by a diverse portfolio of clean domestic fuels, the sine qua non of a clean and secure energy future. Moreover, electric vehicles also are destined to become cheaper than petroleum-fueled transportation.

The shift away from internal combustion engines has provided provides countries like China with an opportunity to recalibrate its engagement in the global auto manufacturing sector in which it has not participated for much of the industry's history. Recognizing that opportunity, Beijing is investing heavily in the production of electric vehicles (EVs), and more specifically battery technology. China has adopted a whole-of-nation approach to achieve a first-mover advantage and secure a permanent lead in what will be a critical sector of the future global economy. Therefore, despite the opportunity that electrification presents for automakers to follow a path to a cleaner and more secure transportation future, it presents China and other nations an opportunity to surpass the United States' position of global leadership in the automotive sector. [EPA-HQ-OAR-2021-0208-0527-A1, p. 1]

The Importance of Fuel Economy

Oil dependence threatens U.S. national security and long-term economic vitality, and it remains a core energy security challenge facing the country today. Although robust domestic liquid fuels production has reduced some of the negative consequences of oil dependence, energy security is primarily a function of consumption, not production. U.S. energy security is determined by oil's role in the economy and the transportation sector. Mobility—the movement of people, goods, and services throughout the country— is a central component of U.S. economic competitiveness and a cornerstone of the American way of life. Today, this mobility is almost entirely powered by petroleum-based fuels, which accounted for 90 percent of the transportation energy consumed in 2020.[1]

Since oil is a globally traded commodity, prices are affected by events in all oil-producing and oil-consuming countries. The key consequence of this dynamic is that changes in oil supply or demand anywhere generally affect prices everywhere. Because there are limited substitutes to oil in the U.S. transportation sector, and the transition away from oil is happening slowly, volatile crude oil and petroleum product prices still represent a continuing threat to the U.S. economy. As we all know, the United States has faced serious challenges as a nation over the past several decades as a result of its dependence on oil. In nearly every instance, these challenges would have been more serious without the progress made in improving the fuel efficiency of light-duty vehicles.

A perception has developed that the risks posed by dependence on a global oil market are waning, as we see growing domestic production of crude oil and meaningful steps towards the electrification of the transportation system. Yet, despite the growth in domestic oil production, we remain reliant on crude oil prices set on a global market. And despite the growing consumer interest in electric vehicles, the transition to electrification remains in its infancy, with electric vehicles comprising less than 2 percent of all new car sales in 2020,[2] and forecast to remain below 8 percent by 2026 in EPA's analysis supporting this very rulemaking.[3]

Because electric powered transportation system is increasingly recognized as the technology of the future, a global competition has developed to stake a claim in the future of the auto industry, with countries around the world taking measures to encourage local investment to develop domestic electric vehicle (EV) supply chains. As reflected in pages 1 to 3 of Attachment 1 to these comments, which present analysis of the automotive sector prepared for SAFE, China and Europe are forecast to lead this race over the coming decade. Beijing, in particular, has worked to consolidate control of the important EV supply chains for more than a decade. Of the 200 lithium-ion battery gigafactories planned across the globe as of early 2021, for example, 148 are located in China and 21 are in Europe, while only 11 are in North America.4 The United States, clearly, is playing from behind. As a result, EVs are projected to account for roughly 30 percent of vehicles manufactured in China by 2030, more than three times as large a share as EPA forecasts in the United States. [EPA-HQ-OAR-2021-0208-0527-A1, pp.4-5] [Please refer to Attachment 1 at Docket number [EPA-HQ-OAR-2021-0208-0527-A1 pp. 18-26.]

As we navigate the transition to electrification, we must ensure that we do not swap our current dependence on an unstable oil market for reliance on China for our future transportation needs. Beijing has been working for over a decade to take commanding leadership on industries of emerging economic and strategic reliance, including electric vehicles. This has provided China with a tremendous comparative advantage, while threatening the U.S. automotive industry. How the EV supply chain develops over the coming years will have profound long-term implications for U.S. jobs, investment, technology leadership, and security of a major sector of the economy. As reflected in page 4 of the Attachment 1, if the entire EV supply chain is developed in the United States, for example, the number of jobs created in the EV industry can replace all jobs lost in parts related to internal combustion engine (ICE) vehicles.[5] If the United States remains complacent, we risk undermining the vibrancy and health of the domestic automobile industry. Although we are late to the competition, the nascency of the technology, still in the early stages of deployment, offers a chance for the United States to regain its leadership. An update to the fuel efficiency and GHG emissions standards can strengthen the case for private sector investment across the EV supply chain, and enable the EV market in the United States to grow more quickly. [Please refer to Attachment 1 at Docket number [EPA-HQ-OAR-2021-0208-0527-A1 pp. 18-26]]

SAFE believes that the standards being considered today can reinforce, and build on, the foundation that was laid by the Obama Administration to reduce the United States' dependence on oil, thereby enhancing our nation's economic and national security. The Environmental Protection Agency (EPA) has a momentous opportunity to place the transportation sector on a trajectory for long-term oil savings and greenhouse gas (GHG) emission reductions driven by electrification that will have clear, positive implications for U.S. energy security in the coming years. In fact, the opportunity to modernize the GHG emission standards, spur innovation in the industry, and advance the administration's manufacturing supply chain agenda has never been greater.

The federal government has provided assistance to automakers to support the transition to electrification. Yet we cannot expect them to make cars for which there is not a promising market. The government has a limited number of tools to incentivize that market, including consumer incentives and government purchasing commitments. But neither of those tools match the power of the government's regulatory authority which can be used to shape the market. This rulemaking is the singular opportunity for the federal government to exercise its regulatory authority to accelerate the growth of that market. SAFE encourages EPA to take full advantage of this opportunity and finalize standards that continue to increase the stringency of the standards in a manner that accelerates the transition from a fleet powered predominately by petroleum to one powered predominantly by electricity. [EPA-HQ-OAR-2021-0208-0527-A1 pp. 5-6]

EV Sales in the United States and Their Importance to U.S. Economic and National Security

In 2011 there were only two electric vehicle models available in the United States. Today, however, there are now nearly 20 electric vehicles available to U.S. consumers.13 Still, electric vehicles represent just one out of every 58 new vehicles sold in the United States.[14] While this sales penetration ratio is an improvement over the rates of just a decade ago, electric vehicles remain a niche product within a car market that sold more than 14.46 million units last year.[15]

Greatly expanded model availability of EVs over the last several years has helped to interest new consumers in electric vehicles. By the end of 2020, electric vehicles were available in nearly every vehicle segment—compact cars, sedans, and SUVs, with more new vehicles, including full size pickup trucks on the near horizon. Current reports show that as many as 18 new models of electric vehicles will be available for sale by 2022.[16]

Despite the progress in bringing electric vehicles to market, the transition to electrification remains in its early stages. National sales remain heavily skewed, as approximately 37 percent of the nation's electric vehicle sales have been concentrated in California,[17] a state that in 2020 represented only 11 percent of the total new vehicle market.[18] Moreover, it can be more difficult to find a selection of electric vehicles or inventory at dealers outside California or the other states that have chosen to adopt California's strict vehicle emission standards.[19]

Further, U.S. electric vehicle sales remain far behind those in China and Europe. In China and Europe, electric vehicles represent 7 and 7.6 percent of new vehicle sales respectively.[20] These rates represent far greater progress in these two giant auto markets towards electrification than we have achieved here in the United States. These sales are spurred by generous incentives for the purchase of electric vehicles, robust financial and policy support for their manufacture, and a better cost-effectiveness calculus as gasoline prices in Europe and China are greater than gasoline prices in the United States, making electric vehicles more cost competitive abroad.[21]

SAFE believes that it is important to accelerate the transition to electrification of transportation to protect our economy. Today, the transition to electrification appears inevitable. The primary questions are how fast or slowly it will occur, and which nations will secure positions of global leadership and power in the new transportation landscape. Central to China's efforts to secure its global position is consolidating control of the important supply chains for the future global transportation industry, from mineral extraction and processing, to electric vehicle battery and motor production, development of autonomous vehicles and 5G technology on which cars will communicate, the design and assembly of electric vehicles, and the deployment of charging infrastructure and battery storage. The United States is capable of competing against China and Europe in this competition and winning, but we are late to the game. As explained above, the sales of electric vehicles in the United States lags far behind China and Europe, and U.S. automakers cannot be expected to make the required investments to accelerate the transition if the market does not develop for electric vehicles.

This global competition for leadership in electric vehicles matters because the automobile industry is the manufacturing backbone of the U.S. economy. It not only supports 10 million direct and indirect jobs, but accounts for more than three percent of GDP.22 Moreover, the industry has a highly skilled workforce that our nation has turned to in times of crisis. If such manufacturing capacity is lost, or severely degraded, it would not only threaten our economy and millions of jobs, but it could also undermine our capacity to innovate, with implications extending to the military and defense industry. As the United States awakens to these risks, we must adopt a long-term comprehensive strategy—from minerals to markets—that overcomes political discord in Washington. Using the regulatory powers of the federal government is an important tool in creating the demand for electric vehicles that are the engine of that transition, and SAFE believes that the GHG emission rule should be developed in a manner to accelerate this critical transition. [EPA-HQ-OAR-2021-0208-0527-A1, pp. 7-8]

Military Costs of Oil Dependence

EPA declined to consider the military cost to protect global oil supplies in undertaking the benefit cost analysis of this proposed rule.34 In SAFE's view, this is a significant omission. In a 2018 report, SAFE found that an average of $81 billion, or approximately 16 percent of the (roughly $500 billion) U.S. base defense budget, is spent every year on protecting the worldwide free flow of oil.[35] If one distributes this cost across the 19.8 million barrels of oil consumed daily in the United States in 2017, the implicit subsidy for all petroleum consumers is approximately $11.25 per barrel of crude oil. If the Overseas Contingency Operations (OCO) funds are included, this cost rises to over $13 per barrel.[36] '$82 billion is fairly conservative and does not include the additional cost for defense of the oil and that freedom of the seas,' says General McNabb in an interview with SAFE. 'The benefit to the United States is the stability that allows for prosperity,' he said.[37]

According to SAFE's Energy Security Leadership Council (ESLC) member and former Secretary of the Navy John F. Lehman, 'more than half the Defense budget is for the security of Persian Gulf oil.' And 'defending Persian Gulf oil is a major distraction from existential defense issues. Oil dependency complicates the military equation beyond our comprehension.' Moreover, if the long term, full economic costs of fighting wars in the Middle East are included, the true costs '…may well be in the range of $4 to $6 trillion, or even higher, once the long-term budgetary and economic costs are factored in.'[38] This equates to more than $30 per barrel of crude oil.

Reducing oil use in the transportation sector can shift U.S. military priorities toward other critical strategic threats. 'If we reduced our oil consumption by half, [the United States military] would act differently,' says ESLC member Admiral Dennis C. Blair, the former Director of National

Intelligence and Commander in Chief of the U.S. Pacific Command. ‘These are not small incremental gains. You would generate huge savings.’[39] SAFE appreciates the difficulty in estimating the savings if our dependence on oil was not eliminated, but only reduced. Given the evidence presented by SAFE and other parties that the savings would be substantial, SAFE believes that they should be given some consideration in the analysis, which would enhance the cost-effectiveness of the standards, and support a more stringent standard. [EPA-HQ-OAR-2021-0208-0527-A1 p.10]

Commenter: Schrier, Paul

And to top it all off, the United States doesn’t currently have the resources or processing capability to make EV batteries -- meaning Bidens push for EVs will primarily benefit China, which is leading the race as one of the largest and fastest-growing EV markets in the world. [EPA-HQ-OAR-2021-0208-0466, p. 1]

Commenter: Valero Energy Corporation (Valero)

In addition to providing for increased production of renewable fuels and improvements in vehicle efficiency, EISA's statutory purposes include enhancing energy independence and security, consumer protection, and promotion of research and deployment of GHG capture and storage options. The proposed rule undermines each of these objectives:

By subsidizing accelerated electric vehicle adoption through the extension of multipliers and ignoring the upstream GHG emissions associated with generation of electricity and production of batteries, the rule fails to address the energy security consequences of encouraging greater dependence on electric vehicles that rely on batteries requiring rare earth and other metals sourced substantially outside of the United States and its sphere of influence.14 [EPA-HQ-OAR-2021-0208-0601-A2, pp.6-7]

EPA Response

One commenter (American Enterprise Institute) suggests that there are no energy security benefits from this rule. The absence of energy security benefits, according to the commenter, is a result of the fact that there is only one price in the international petroleum market, confronted equally by economies importing all or none of their oil. EPA disagrees with the commenter’s suggestion that there are no energy security benefits resulting from this final rule. In EPA’s energy security analysis, a reduction in U.S. oil consumption from this final rule results in a 91 percent reduction in U.S. oil imports. Thus, there is a close relationship between reductions in U.S. oil consumption and U.S. oil imports resulting from this rule. EPA’s analysis assumes that future disruptions in world oil supply over the time frame of this analysis, 2023-2050, will cause spikes in world oil prices. To the extent that the U.S. sees a reduction in both its oil consumption and imports from this rule, the effects of spikes in world oil prices will have a less significant impact on the overall U.S. economy, measured in terms of a loss in U.S. gross domestic product (i.e., GDP). The Oak Ridge National Laboratory (ORNL) model estimates the avoided losses in GDP from future world oil supply disruptions, using a GDP elasticity with respect to a change in the short-term world oil price. See the paper by Oladosu et al., Impacts of oil price shocks on the U.S. economy: a meta-analysis of oil price elasticity of GDP for net oil-importing economies, Energy Policy (2018), which provides the basis for the GDP elasticity. This elasticity has been reduced compared to analyses undertaken for previous EPA LDV GHG rules, since it is generally thought that the U.S. economy is more resilient (i.e., less sensitive) to changes in the short-term world oil price than EPA previously assumed. The avoided losses in GDP from oil supply disruption are then converted into benefits on a per barrel of reduced U.S. oil import reductions basis, which is referred to as the macroeconomic oil security premiums and are reported in Table 3-6 in Section 3.2.5, Oil Security Premiums Used for this Final Rule, in the RIA.

To summarize, even though the world oil price faced by all participants is the same regardless of how much oil they import, a reduction in U.S. oil consumption and imports is still valuable, as it helps in mitigating the macroeconomic effects resulting from exposure to that volatile world oil price where a cartel continues to play a significant role in oil price formation.

Two commenters (Center for Biological Diversity et al., California Air Resources Board) suggest that EPA is underestimating the energy security benefits of the final LDV GHG rule by not accounting for the monopsony oil security impact. EPA disagrees with the commenters' suggestion that EPA is underestimating the energy security benefits of this rule by not counting monopsony effects as a benefit. U.S. monopsony power in global oil markets means that decreases in U.S. oil consumption and U.S. oil imports cause the world price of crude oil to decline modestly. In previous LDV GHG rules when the U.S. was forecasted by the U.S. Energy Information Administration (EIA) to be a net importer of crude oil and product, monopsony impacts represented reduced payments by U.S. consumers to oil producers outside of the U.S. There is some debate in the economics literature as to whether the U.S. exercise of its monopsony power in oil markets, for example from the implementation of LDV GHG rules, was a "transfer payment" or a "benefit." Given the redistributive nature of this monopsony impact from a global perspective, and since there are no changes in resource production costs when the U.S. exercises it monopsony power, some economists argued that it is a transfer payment. Other economists argued that monopsony impacts are a benefit since they partially address, and partially offset, the market power of OPEC.

In previous EPA LDV GHG rules, after weighing both countervailing arguments, EPA concluded that the U.S.'s exercise of its monopsony power was a transfer payment, and not a benefit. In the context of this rule, the U.S.'s oil trade balance is quite a bit different than in previous LDV GHG rules. The U.S. is projected to be a net exporter of oil in the time frame of this analysis of this rule, 2023-2050. As a result, reductions in U.S. oil consumption and, in turn, U.S. oil imports, still lowers the world oil price modestly. But the net effect of the lower world oil price is now a decrease in revenue for U.S. exporters of crude oil and products, instead of a decrease in payments to foreign oil producers. The argument that monopsony impacts address the market power of OPEC is no longer appropriate. Thus, EPA continues to consider the U.S. exercise of monopsony power to be transfer payments. Therefore, EPA does not believe that excluding monopsony effects stemming from this rule results in an underestimate of the energy security benefits of this rule.

Three commenters (Center for Biological Diversity et al., Securing America's Future Energy, California Air Resources Board) suggest that EPA should include a military cost savings from this rule, since reductions in U.S. oil imports from this rule will result in military cost savings. One commenter, the American Enterprise Institute, suggests that military cost savings from this rule would be imperceptible. The ramifications of reduced U.S. oil consumption and, in turn, U.S. oil imports on U.S. military costs to protect the U.S.'s access to foreign oil supplies is an important issue. The U.S. spends significant resources to protect its access to foreign oil supplies, mainly in the Middle East. The question that arises in the context of this rule is the magnitude of military cost savings resulting from reductions in U.S. oil imports from this rule.

The twin issues of attribution and incremental analysis pose significant challenges to providing a robust estimate of the military cost component of the U.S.'s energy security. The attribution analysis challenge is to determine which military programs and expenditures can properly be attributed to oil supply protection, rather than to some other military or foreign policy objective. The Securing America's Future Energy comments quoting statements by the former Secretary of the Navy that roughly half of the U.S. defense budget is devoted to the security of Persian Gulf oil presents an interesting perspective on the attributional issue. On the other hand, the American Enterprise Institute suggests that applying estimates of the mission of specific parts of the U.S.'s military force structure would be inherently arbitrary.

The incremental analysis challenge is to estimate how much the petroleum supply protection costs might vary if U.S. oil use were to be reduced, but not eliminated. Two commenters (California Air Resources Board, Securing America's Future Energy) suggest that military cost savings from reduced U.S. oil imports from this rule would be significant. Another commenter, (American Enterprise Institute) suggests that military costs savings stemming from this rule would be imperceptible. Better methods of addressing both attribution and incremental analysis challenges are necessary in order to better estimate military cost savings attributable to this final rule. Therefore, EPA continues to believe that the military cost savings from this rule cannot be accurately quantified for this rulemaking.

Several commenters (Securing America's Future Energy, Attorney General of Missouri et al., Alliance for Automotive Innovation, an energy company, private citizens) express concern that this rule will increase the U.S. reliance on non-U.S. producers, including China, of materials and components used in electric vehicles. Since the 1970s, the topic of energy security has focused on imported oil from unstable supply sources and OPEC's ability to exert market power in oil markets. These commenters express concern that transitioning from internal combustion engine (ICE)-powered vehicles to battery electric vehicles (BEVs) will have other implications beyond decreased U.S. reliance on imported oil; in particular, commenters identified the sourcing of materials and components used in BEVs, including batteries. We note that the scope of EPA's discussion of "energy security," which is defined in RIA section 3.2 as "the continued availability of energy sources at an acceptable price," was not intended to include security risks associated with the manufacture and importation of different types of vehicles and vehicle components.

The topic of the security implications of an emerging electric vehicle global supply chain is an important issue. To help address this issue, Executive Order 14017, signed by President Biden on February 24, 2021, directed a government-wide review of U.S. supply chains and vulnerabilities.[97] As directed within the Executive Order, a report on advanced batteries, led by the Department of Energy, was submitted to the President in June 2021, and the Biden Administration subsequently announced a set of immediate actions to make the U.S. more competitive in automotive Li-ion battery manufacturing. "With the global lithium battery market expected to grow by a factor of five to ten by 2030, it is imperative that the United States invests immediately in scaling up a secure, diversified supply chain for high-capacity batteries here at home. That means seizing a critical opportunity to increase domestic battery manufacturing while investing to scale the full lithium battery supply chain, including the sustainable sourcing and processing of the critical minerals used in battery production all the way through to end-of-life battery collection and recycling."[98] The Administration has committed millions of dollars toward R&D, loan programs and a 10-year government-wide plan to "urgently develop a domestic lithium battery supply chain that creates equitable clean energy economy jobs in America."[99] The Administration also recommended that Congress make "critical investments to grow America's ability to produce high-capacity batteries and products that use batteries, like electric vehicles and stationary storage,"[100] and noted that the battery supply chain should employ sustainable and environmentally protective methods, including "sustainable sourcing and processing of the critical minerals used in battery production all the way through to end-of-life battery collection and recycling."[101]

Auto manufacturers in the U.S. are already addressing demand for domestic and European mineral and battery supply. In addition to seeking to reduce cobalt and rare earth magnet content in batteries and electric machines (see RTC 12.1), manufacturers are increasingly adopting an approach in which new manufacturing plants are to be constructed as part of joint ventures, by which the OEM may secure a supply of batteries for its products and develop a supply chain that will support their production

[97] Executive Order on America's Supply Chains. February 24th, 2022. https://www.whitehouse.gov/briefing-room/presidential-actions/2021/02/24/executive-order-on-americas-supply-chains/

[98] Department of Energy, FACT SHEET: Biden-Harris Administration 100-Day Battery Supply Chain Review (June 8, 2021), https://www.energy.gov/articles/fact-sheet-biden-harris-administration-100-day-battery-supply-chain-review.

[99] Id.

[100] Id.

[101] Id.

needs.[102,103,104,105,106,107] Auto manufacturers are also directly securing supplies of critical battery and rare-earth minerals necessary for increasing the scale of BEV production, often with a focus on U.S. sources.[108,109,110,111,112,113,114,115] EPA believes that these developments indicate that the automotive industry has recognized the need to establish a supply chain for electrified vehicles, and is taking

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[102] Voelcker, J., "Good News: Ford and GM Are Competing on EV Investments," Car and Driver, October 18, 2021. Accessed on December 9, 2021 at https://www.caranddriver.com/features/a37930458/ford-gm-ev-investments/

[103] Stellantis, "Stellantis and LG Energy Solution to Form Joint Venture for Lithium-Ion Battery Production in North America," Press Release, October 18, 2021.

[104] Toyota Motor Corporation, "Toyota Charges into Electrified Future in the U.S. with 10-year, $3.4 billion Investment," Press Release, October 18, 2021.

[105] Ford Motor Company, "Ford to Lead America's Shift To Electric Vehicles With New Mega Campus in Tennessee and Twin Battery Plants in Kentucky; $11.4B Investment to Create 11,000 Jobs and Power New Lineup of Advanced EVs," Press Release, September 27, 2021.

[106] General Motors Corporation, "GM and LG Energy Solution Investing $2.3 Billion in 2nd Ultium Cells Manufacturing Plant in U.S.," Press Release, April 16, 2021.

[107] Shepardson, D. and Lienert, P., “GM eyes investments of more than $4 billion in Michigan EV plants,” Reuters, December 10, 2021. Accessed on December 13, 2021 at https://www.reuters.com/business/autos-transportation/gm-eyes-3-billion-investment-michigan-ev-plants-source-2021-12-10/

[108] Hawkins, A.J. General Motors makes moves to source rare earth metals for EV motors in North America. The Verge, 12/09/2021. Accessed on 12/10/2021 at https://www.theverge.com/2021/12/9/22825948/gm-ev-motor-rare-earth-metal-magnet-mp-materials

[109] General Motors Press Release. GM to Source U.S.-Based Lithium for Next-Generation EV Batteries Through Closed-Loop Process with Low Carbon Emissions. Accessed on 12/10/2021 at https://media.gm.com/media/us/en/gm/home.detail.html/content/Pages/news/us/en/2021/jul/0702-ultium.html

[110] Waylund, M. GM to form new joint venture to produce crucial materials for EVs. CNBC, 12-0102021. Accessed on 12/10/2021 at https://www.cnbc.com/2021/12/01/gm-to-form-new-joint-venture-to-produce-costly-raw-materials-for-evs.html

[111] Lambert, M. Tesla secures lithium supply contract from world’s largest producer. Electrek, 11/01/2021. Accessed on 12/10/2021 at https://electrek.co/2021/11/01/tesla-secures-lithium-supply-contract-ganfeng-lithium/

[112] Lambert, M. Tesla secures large supply of nickel from New Caledonia for battery production. Electrek, 10/13/2021. Accessed on 12/10/2021 at https://electrek.co/2021/10/13/tesla-secures-large-amount-nickel-from-new-caledonia-battery-production/

[113] Lipinski, P., Steitz, C. Volkswagen secures raw materials as part of $34 billion battery push. Reuters, 12/08/2021. Accessed on 12/10/2021 at https://www.reuters.com/markets/deals/belgiums-umicore-plans-battery-material-venture-supply-volkswagen-2021-12-08/

appropriate action to address this business need. EPA also believes that this activity as well as the abovementioned federal investments and initiatives indicate that the federal government is taking appropriate actions to support its development. See 12.1 of the RTC for more discussion of comments related to supply chain development and critical minerals.

One commenter (Center for Biological Diversity et al.) asked for a more detailed explanation of how the oil import reduction factor was estimated. As described in RIA section 3.2, EPA estimates a reduction in refined oil consumption (i.e., mainly gasoline) resulting from this rule will be reflected in a 91 percent reduction in net imports of oil and refined products. To calculate the 91 percent value, EPA uses Table 11: Petroleum and Other Liquids Supply and Disposition, for two different case studies, the Reference Case and the Low Economic Growth Case from the U.S. Energy Information Administration's (EIA) latest Annual Energy Outlook (AEO) 2021. While EPA reviewed EIA's High Economic Growth Case, the Low Economic Growth Case better matches the projected impact of this rulemaking on fuel demand, since it shows reduced petroleum demand. The Low Economic Growth Case is compared with the Reference Case to calculate the average difference in net oil and refined product imports as a percentage of the reduction in U.S. refined product (i.e., mainly gasoline) consumption. Comparing the AEO 2021 Reference Case and the Low Economic Growth scenario yields an import reduction factor of 91 percent when averaging over the years 2021 through 2050, roughly the time frame of analysis of this rule. The calculations used to estimate the oil import reduction factor in this rule are in the docket to this rule in a spreadsheet entitled, "AEO 2021 Change in product demand on imports".

This commenter also stated that because U.S. gasoline imports are near zero, it would not be possible for reduced domestic U.S. gasoline demand to cause reductions in U.S. gasoline imports. This comment is somewhat unclear, but we believe the commenter is referring to net U.S. gasoline imports and is not considering the gross U.S. gasoline imports into the U.S. For example, in 2019, over 12 billion gallons of gasoline were imported into the U.S. (https://www.eia.gov/dnav/pet/pet_move_imp_dc_NUS-Z00_mbbl_a.htm), but these gasoline imports were offset by about a roughly equal volume of U.S. gasoline exports (https://www.eia.gov/dnav/pet/pet_move_exp_dc_NUS-Z00_mbbl_a.htm). Considering the volume of gasoline that the U.S. imports currently, reductions in U.S. imports of gasoline would not be constrained as the commenter suggests.

In developing oil security premium estimates for this rule, one commenter (Center for Biological Diversity et al.) supports EPA's updated inputs for the short-run price elasticity of demand for oil and the elasticity of GDP to oil price shocks based upon the ORNL meta-analyses. We agree with the commenter that the ORNL meta-analyses provide the most well supported inputs for estimating oil security premiums for this rule, since both of the ORNL studies have broad

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[114] Kilgore, T. Ford invests $50 million into EV battery supply chain company Redwood Materials. Marketwatch, 09/22/2021. Accessed on 12/10/2021 at https://www.marketwatch.com/story/ford-invests-50-million-into-ev-battery-supply-chain-company-redwood-materials-2021-09-22

[115] LaReau, J.L., "GM forms 2 new partnerships that will create new factories in US," Detroit Free Press, December 9, 2021.

coverage of the economics literature on the topics of the price responsiveness of short-run oil demand and the sensitivity of the U.S. economy to oil shocks

One commenter (Alliance for Automotive Innovation) suggests that oil use declines from this rule will result in greater impacts on U.S. oil producers and refineries than EPA's analysis estimates. This commenter suggests that EPA undertake a rigorous analysis of which oil producers/refiners in the world will be adversely impacted by an incremental decline in U.S. demand for oil. EPA disagrees with the commenter that there will be greater impacts on U.S. oil producers and refineries than estimated in this rulemaking. The import reduction and energy security analyses in this rule are based on AEO 2021, which uses Department of Energy's Energy Information Administration (EIA) modeling. This modeling balances worldwide oil supply and demand with regional detail. The AEO 2021 projects that over 93 percent of the reduced fuel demand resulting from this rule will be met by reduced production by U.S. refineries. The continued volume of U.S. gasoline imports is more than large enough for reductions to occur from U.S. gasoline imports as well.

EPA continues to believe that the use of the AEO 2021 methodology employed in this rule is appropriate to estimate aggregate oil and product import reductions as a result of this rule. We note that Oak Ridge National Lab's (ORNL) oil security premium estimation methodology represents the U.S., OPEC, and non-OPEC states, but is not disaggregated to individual countries. EPA believes it is not necessary to have country-specific changes in oil production and refinery use as a result of this rule when using the ORNL oil security premium model to estimate energy security benefits. We continue to believe that combining the oil import reduction factor modeled by EIA in its AEO 2021, along with the oil security premiums estimated using the ORNL oil security premium model, provide a reasonable estimate of the energy security impacts of this rule.

One commenter (Alliance for Automotive Innovation) expresses concern about the alignment of U.S. oil market outcomes in the development of the GREET PM2.5 benefits estimates in EPA/NHTSA's criteria air emissions analyses and EPA's energy security analysis. Comparing EPA's PM2.5 analysis and EPA's energy security analysis, both analyses are estimated from oil industry modeling output conducted by the Energy Information Administration (EIA) for its Annual Energy Outlook (AEO 2021) by taking the ratio of the changes in crude oil and product imports and domestic crude oil divided by the change in U.S. refined product consumption over roughly the analytical time frame of the LDV rule, 2021-2050. These modeling results project that of the decrease in U.S. refined product demand, 93% of that decline will be due to lower U.S. domestic refined product output and 7% will be due to lower imported petroleum product. For estimating impacts on criteria emissions, criteria air emissions factors (including PM2.5) from GREET are used.

Based on the same EIA modeling output, EPA's energy security analysis calculates changes in oil imports. Of the reduction in domestic refined product demand, approximately 85 percent is attributed to a reduction in imported crude oil, 9 percent is attributed to a reduction in domestic crude oil, and 7 percent is attributed to a reduction in U.S. net imported product. When the 85 percent reduction in imported crude is summed with the 7 percent reduction in U.S. net imported product, the value of reduced crude oil and product imports is the 91 percent oil import reduction factor value, which is identical to the 91 percent value used in EPA's criteria air emissions analyses. Thus, the results of the impacts of the LDV rule on domestic versus imported oil are identical between the two analyses.

20. Impacts of Additional Driving (i.e., rebound effect)

Commenters Included in this Section

California Air Resources Board (CARB)
Center for Biological Diversity, et al.
Consumer Federation of America
Consumer Reports (CR)
E2 - Environmental Entrepreneurs
Gillingham, Kenneth
Institute for Policy Integrity
National Association of Clean Air Agencies (NACAA)

Commenter: California Air Resources Board (CARB)

U.S. EPA Improved its Analysis of the Rebound Effect and Should Revisit the Sales Elasticity Effects. CARB appreciates the work U.S. EPA has taken to reconsider its treatment of the rebound effect from the SAFE Vehicles Rule.112 As U.S. EPA recognizes, and as Professor Gillingham, a recognized authority on energy and environmental economics whose research on transportation, energy efficiency, and the adoption of new technologies has been widely-published, further explains in his enclosed expert analysis, the Final SAFE Rule rebound effect of 20% is not defensible.113 To the contrary, a national rebound effect of 10% is defensible, although it, too, may be an overestimate. U.S. EPA should apply a rebound effect of not more than 10% to estimate the impacts of the final rule. [EPA-HQ-OAR-2021-0208-0643-A6, p. 38]

U.S. EPA should apply more reliable estimates of the rebound and sales effects of more stringent standards to provide more reliable estimates of the costs and benefits of the proposal. In both instances, it happens that the net benefits are greater than otherwise estimated. [EPA-HQ-OAR-2021-0208-0643-A6, p. 38]

Commenter: Center for Biological Diversity, et al.

EPA’s use of a 10% rebound effect, while reasonable, is clearly at the high end of estimates - leading to higher costs and lower benefits for more stringent standards. EPA has provided a thorough justification for a 10% rebound effect in several prior rulemakings.

EPA’s Proposal estimates the VMT rebound effect to be 10%. 86 Fed. Reg. at 43,769-70. The quantitative estimate of the rebound effect—which indicates the amount of additional driving that will occur as the cost of driving decreases due to fuel economy improvements—significantly influences multiple factors considered in promulgating new GHG regulations for light-duty vehicles. Additional driving leads to more accidents, road congestion, and noise, while also reducing the fuel savings and emission reductions associated with more stringent standards. Therefore, without a reasonable estimate of the rebound effect, the magnitude of a new rule’s costs and benefits cannot be properly understood.

The use of a 10% rebound effect is not new. EPA also estimated the rebound effect to be 10% in both the 2010 and 2012 Final Rules. See 75 Fed. Reg. at 25,517; 77 Fed. Reg. at 62,716. During both of these previous rulemakings, EPA considered a large body of both historical and recent literature that reported a very broad range of rebound estimates arrived at through a variety of research methods. EPA understood that simply averaging all of the rebound estimates from all of the studies was an unreasonable and inadequate method for reaching an accurate estimate of rebound for the vehicles subject to the relevant standards.76 For example, many of the studies considered old research, data from other countries with vastly different driving habits, or estimates that were not forward-looking to the years when the covered vehicles would be driven. 77 Fed. Reg. at 62,924. Historically, EPA has correctly acknowledged that rebound research should be weighted based on its relevance to GHG emissions regulations in the United States.77 In the 2010 Final Rule, EPA concluded that while the historical research dating back to the 1950s suggested higher rebound values, the most recent literature supported a 10% "or lower" rebound effect. 75 Fed. Reg. at 25,517.

In the 2012 Final Rule, EPA again valued the rebound effect at 10%, and in 2016, EPA confirmed three times that a 10% rebound effect was appropriate. In both the 2016 Draft TAR and the 2016 Final TSD, EPA cited multiple studies demonstrating that the rebound effect shrinks as incomes rise, and again explained that older studies were likely to be less reliable than more recent research.78 Also in 2016, EPA used a 10% rebound effect in adopting standards for heavy-duty pickups and vans.79

EPA's Proposal properly conducts a rigorous review of the literature in order to prioritize rebound studies, and recent research provides further support for a rebound effect estimate of 10% or less. In the NPRM, EPA builds on this well-established precedent and again uses a 10% rebound effect to calculate the relevant impacts of the proposed LDV GHG emissions standards, citing much of the same support provided in the previous rulemakings. In the Proposal, EPA provides even more clarity into the agency's approach to the broad body of rebound literature spanning many decades. EPA is correct in its belief that "it is important to critically evaluate which studies are most likely to be reflective of the rebound effect that is relevant to the Proposed Standards (2023-2026)," and that "one cannot just take the 'average' rebound estimates from literature to use for the VMT rebound effect for this proposed rule." DRIA at 3- 12. When agencies consider a range of studies, they should focus on those that are similar to the relevant policy context.80

Specifically, EPA appropriately identifies factors for weighting rebound studies that reflect their relevance to the proposed rulemaking: (1) geography/timespan relevance (priority given to U.S. studies as opposed to international estimates); (2) time period of study (priority given to recent studies, including recent studies that were excluded from the 2020 Final Rule); (3) reliability/replicability of studies (priority given to studies using odometer readings vs. household surveys such as the 2009 National Household Travel Survey); and (4) statistical/methodological basis (priority given to studies employing a strong statistical/methodological basis). DRIA at 3-12.

EPA further explains why these factors are important and why they lead to more accurate estimates of the rebound effect for the rulemaking. As a result, the agency provides a clear and well-reasoned basis for its decision to give more weight to studies based on these four key criteria, and thus to conclude that the seven papers listed in Table 3-4 of the Draft RIA should be given the most significant weight in developing the rebound estimate used in the Proposal. See DRIA at 3-13 to 3-14.

EPA should make its rebound effect estimate even more accurate by considering the best estimates provided by the authors of some of the agency's preferred studies. For some of these seven studies that report a range of estimates, EPA correctly reports and relies on what the authors identify as their best rebound estimates, when those are available. For example, EPA properly includes a rebound effect of 10% for Gillingham et al. (2015), because, while that study produced a range of estimates from 8% to 22%, the authors stated that they considered their best estimate to be 10%.[81] EPA should update the rebound effect values for two of the agency's preferred studies, however, to reflect their authors' best estimates. First, EPA should report the "best estimate" for Hymel and Small (2015) because, although the study reports a range of estimates of 4% to 18% as shown in Table 3-4 of the Draft RIA, the authors have explained that their most realistic estimate is either 4% or 4.2%.[82] Accurately considering the most relevant estimate is especially important because Hymel and Small (2015) noted that their data indicated that fuel economy rebound could be lower than fuel price rebound, meaning that even the 4.0% and 4.2% values could be too high.[83] Properly considering the most relevant best estimate from Hymel and Small (2015) would mean that the two most reliable rebound estimates based on U.S. national data are 10% and around 4%, offering even clearer support for a rebound effect of 10% at maximum.

Second, EPA should cite the most relevant estimate from Wenzel and Fujita (2018). EPA's Proposal cites a range of values for Wenzel and Fujita (2018), from 9% to 16%. DRIA at 3- 14, Tbl. 3-4. Wenzel and Fujita also found, however, that as a vehicle's fuel economy increases, the rebound effect declines. By their estimation, vehicles with "high" fuel economy[84] would have a rebound effect of only 5.2%. The vehicles subject to the Proposal would be within this "high" fuel economy category, and therefore the 5.2% rebound effect would be most applicable to this rulemaking context.

A third paper in the list of EPA's seven preferred studies, Gillingham et al. (2015), estimates the rebound effect at 10%. But the study also found that "a high percentage of vehicles are almost entirely inelastic in response to gasoline price changes" and that "the lowest fuel economy vehicles in the fleet drive the responsiveness, with higher fuel economy vehicles highly inelastic with respect to gasoline price changes."[85] While Gillingham et al. (2015) does not offer an alternative best rebound estimate for higher fuel economy vehicles (which would include all those subject to the rulemaking), it is fair to assume that the 10% estimate is at the high end of reasonable estimates for the purposes of this rulemaking.

The 2020 Final Rule's rebound effect of 20% arbitrarily doubled EPA's prior reasonable estimates and was unjustified and unsupported. When promulgating the 2020 Final Rule, EPA arbitrarily doubled the prior reasonable 10% estimate of the rebound effect to 20%, without offering any real support for the massive increase in magnitude. Moreover, despite acknowledging that the criteria used for weighting literature based on the quality of the underlying analysis could make a large difference in the rebound effect, the 2020 Final Rule made no clear effort to lay out such criteria, in contrast to the new rule proposed by EPA.

The 2020 Final Rule purported to rely on "the totality of empirical evidence, rather than restricting the available evidence," 85 Fed. Reg. at 24,674, but as EPA's Proposed Rule, along with the 2010 and 2012 Final Rules and the 2016 Midterm Evaluation make clear, not all "available" evidence is equally relevant to achieving an accurate rebound estimate. Even in the 2020 rulemaking, EPA explained that if the agency considered only studies using recent U.S. data, and if higher weight were assigned to studies that meet certain quality criteria suggested in the comments they received, the resulting set of studies would make a "reasonable case . . . to support values of the rebound effect falling in the 5-15 percent range" and in fact "more likely to lie toward the lower end of that range." Id. at 24,676. During its interagency review process for the 2020 Rule, EPA also explained that "[g]iven the broad range of values, EPA believes it is important to critically evaluate which studies are most likely to be reflective of the rebound effect" of future GHG standards, and that "[i]n other words, we can't just take the 'average' rebound estimates from literature."86 Only by ignoring their own guidance regarding the importance of properly weighting studies based on relevance and reliability could EPA increase the rebound effect to an arbitrary and unsupported 20%. In fact, the 2020 Final Rule's 20% rebound effect has been called "outside reasonable professional judgment" by leading experts in the field—many of whom authored the studies on which EPA has relied historically, in the 2020 rulemaking, and for the Proposed Rule.87

EPA is therefore correct to abandon the poorly considered and wholly unsupported 20% rebound effect used in the 2020 Final Rule and return to the more accurate and supportable estimate used in its earlier rulemakings. EPA has added value to its historical rebound analysis by defining the relevant factors for weighting studies and clearly articulating which studies satisfy these parameters and are thus given extra weight, in contrast to its vague and conclusory approach during the 2020 rulemaking.

Even the 10% rebound effect is too high, and EPA should consider using a rebound effect of a lesser magnitude. EPA has requested comment regarding alternative rebound values of 5% or 15%. EPA's weighted criteria, explained above, provide ample support that 10% is at the maximum end of appropriate rebound values, and using a 15% rebound effect would be unsupportable. EPA's set of the seven most relevant studies makes this clear. If using the preferred rebound estimates from Hymel and Small (2015) of around 4% to 4.2%, and from Wenzel and Fujita (2018) of 5.2%, as explained above, the un-weighted average of the most relevant studies would be well below 10%, as shown below: [Table # can be found on p. 35 of Docket number EPA-HQ-OAR-2021-0208-0651-A1] [EPA-HQ-OAR-2021-0208-0651-A1, p. 30-35]

A number of other factors would suggest that even these best and most relevant studies could lead to a rebound estimate that is too large. First, a substantial body of research indicates that fuel price or fuel cost rebound effects are higher than fuel economy rebound effects, meaning that rebound may be more responsive to fuel prices than fuel efficiency. Both Greene (2012) and Hymel and Small (2015)—two of EPA's seven most preferred studies—came to this conclusion. Other studies cited by EPA—Gillingham (2012), Small and Van Dender (2007), West et al. (2015), and Wang and Chen (2014)—also concluded the same. Kenneth A. Small has explained that his studies indicate that the fuel economy rebound effect "is statistically indistinguishable from zero," and that "[t]his is also true of the vast majority of other studies that have tried to measure separately these two responses."90 He further explained that "the most defensible result empirically is that people do respond to fuel prices as expected, but that they do not respond to fuel economy at all," and that "Small and Van Dender (2007) make this point explicitly, and point out that we are therefore assuming a positive [fuel economy] rebound effect when actually we cannot prove that it's greater than zero."91 Greene (2012) also found that the impact of fuel efficiency on VMT was not statistically significant, a point EPA referred to in the 2016 Draft TAR to suggest that the relevant rebound effect for policymaking purposes "could be zero." 2016 Draft TAR at 10-14. Because some of EPA's seven most preferred studies consider fuel prices rather than fuel efficiency, the most accurate rebound estimate would be no higher than—and likely lower than—the average of those studies' best estimates.

Another fact that indicates that a 10% rebound effect—and even the lower unweighted average of the preferred studies' best estimates—is too high is that the rebound effect's magnitude diminishes over time, largely due to increasing income and decreasing driving costs, a fact that EPA has historically understood.92 As incomes rise over time, any fuel efficiency improvement will have less of an effect on the total vehicle miles traveled, and thus the rebound effect will decline. In both 2010 and 2012, EPA chose to use a 10% rebound effect as "a reasonable compromise between historical estimates and projected future estimates."93 The 2012 Final Rule noted, however, that several high-quality studies indicated that the rebound effect's magnitude was significantly diminishing over time as incomes rise.94 This income effect on rebound makes clear that the projected future estimates are in fact much more accurate than historical estimates. Moreover, more than 10 years have passed since the 2010 Final Rule found a 10% rebound effect to be a good compromise, and income has continued to grow since that time, supporting a substantially diminished rebound effect.

EPA should give more weight to the fact that the rebound effect varies with income over time. The agency cites Gillingham (2014) to assert that the evidence is "mixed," but then also correctly excludes that study from its list of preferred studies. This paper specifically considers the response to the 2008 gasoline price shock in California. EPA is correct to conclude that this was "an unusual period when gasoline prices were particularly salient to consumers." DRIA at 3- 6. As EPA's Proposal notes, Gillingham explained in a follow-up paper in 2020 that the Gillingham (2014) results should not be used for developing an estimate of the VMT rebound effect for fuel economy or GHG standards. The Gillingham (2014) paper is equally irrelevant to the question of the income effect on rebound. Various papers have confirmed that the rebound effect is declining over time and one study certainly should not be used as the basis for giving this factor "less weight," especially a study whose own author acknowledges its irrelevance to this rulemaking context and to which EPA gives little to no weight otherwise. Because of this, EPA should more fully consider the impacts of the income effect on rebound, and in doing so, could support a rebound effect of a magnitude lower than 10%.

In fact, the income effect on rebound is particularly important in the context of setting LDV GHG emissions regulations for two reasons. First, even the most recent relevant studies on which rebound estimates are based consider data only from 2013 and earlier. The historical growth rate of per capita personal income was 1.4% between 2001 and 2019, and thus income growth since 2013 would indicate a declining rebound effect even in the time since the most recent data utilized were collected. Second, EPA's final standards will affect the fuel efficiency—and therefore the rebound effect—for vehicles for the next 30 years or more. Private forecasts estimate approximately 1.6% growth in real personal income per year over the next 30 years, meaning that when most vehicles subject to the regulations are retired, incomes will be 61% higher than they are today. AEO 2021 projected incomes to rise an average of 1.9% per year through 2050.95 This income growth would be expected to cause a large reduction in the magnitude of the rebound effect, supporting a rebound effect for the vehicles subject to EPA's final standards of a magnitude well below 10%. [EPA-HQ-OAR-2021-0208-0651-A1, p. 35-37]

Commenter: Consumer Federation of America

Above, we identified an unsupported and unsupportable assumption about the rebound effect as having an impact on the pocketbook benefits of a higher standard. Rebound is part and parcel, the tip of the iceberg, for a much larger issue–unrealistic assumptions about driving, and new vehicle safety (see Figure 5.1). By claiming to avoid a slew of fatalities due to consumers driving less because of increased annual fuel costs and driving in safer vehicles, the Trump rule claimed to avoid a significant negative impact on congestion, noise, and safety.

Correcting the significant flaws in the NHTSA/EPA framework, including the rebound effect and the failure to recognize technological flexibility for automakers, dramatically reduces the assumed safety benefits of the Trump SAFE 2 rule. As shown in Figure 3, these adjustments eliminate over 80 percent of the claimed reduction in accidents. We believe other technological improvements, introduced along with higher fuel economy, further reduce the impact of increased accidents. [EPA-HQ-OAR-2021-0208-0297-A1, p.15]

Commenter: Consumer Reports (CR)

Consumer Reports supports EPA's shift to a 10% rebound effect which is consistent with the existing literature when applied to increases in efficiency from conventional vehicles. However, we would ask that EPA consider doing more research prior to future rulemakings on the potential applicability of rebound effects for conventional vehicles being applied to battery electric vehicles. [EPA-HQ-OAR-2021-0208-0602-A1, p.22]

Commenter: E2 - Environmental Entrepreneurs

Other Non-emissions Benefits: EPA has also quantified the non-emission benefits from the rebound effect (the increase in driving resulting from reduced operating costs), changes in refueling time, and energy security benefits from reduced dependence on foreign petroleum. EPA projected non-emission benefits for the Proposal to be $35 billion through 2050, while

Alternative 2 would generate $53 billion—a difference of $18 billion. DRIA, Tables 6-8, 6-10. [EPA-HQ-OAR-2021-0208-0604-A1, p. 3]

Commenter: Gillingham, Kenneth

This comment focuses on the choice of the “rebound effect” parameter in the proposed U.S. Environmental Protection Agency (EPA) rulemaking “Revised 2023 and Later Model Year Light-Duty Vehicle Greenhouse Gas Emissions Standards” (86 Fed. Reg. 43,726 Aug 10, 2021). In the context of the rule, the rebound effect is defined as the increase in driving (and associated impacts) when improved vehicle energy efficiency lowers the cost per mile of driving, making driving cheaper. This commenter has performed research on the rebound effect for many years and has an extensive comment included in the SAFE rule docket (Gillingham 2018).
This commenter believes that EPA has done a thoughtful job in supporting the choice of a 10% rebound effect. As was discussed in detail in Gillingham (2020), as well as in the attached recent Amicus Brief by expert economists (the present author was not included), the best evidence available—from the United States, using odometer reading data from emissions or safety inspections, and from recent years—tends to fall in the ballpark of 10%. There have been no more recent additions to the literature since the Gillingham (2020) review article and the amicus brief, which quite fully characterize the body of work available on the subject. Most importantly, the 20% rebound effect estimate cannot be justified based on the best work available on the subject. This assessment accords with the assessment of EPA’s own Science Advisory Board. This commenter will also note that there is evidence supporting a lower rebound effect for projections into the future. Specifically, in a well-known and well-regarded series of papers, Ken Small and coauthors provide a strong case that the rebound effect converges towards zero with higher incomes, and most projections suggest that incomes will continue rising in the United States (Hymel and Small 2015, Small and van Dender 2007). Please see also Ken Small’s letter in the SAFE rule docket (Small 2018), which describes his logic for a “dynamic rebound effect” that changes over time due to improved incomes. In Ken Small’s letter, the rebound effect is 5.3% using his base model and 0.2% using his asymmetric model, and he deems his asymmetric model to likely be more valid. This evidence can be used to support a nationwide rebound effect closer to zero in the regulatory analysis projecting the rebound effect into the future.

Commenter: Institute for Policy Integrity

Notably, EPA’s return to an assumed 10% rebound effect is appropriate. [EPA-HQ-OAR-2021-0208-0299-A1, pp. 1-2]

While EPA and NHTSA previous relied on a 10% rebound estimate in the Clean Car Standards issued in 2012, the agencies used a 20% rebound estimate in the final SAFE 2 Rule in 2020.132 The agencies’ departure from prior practice in the SAFE rulemaking was arbitrary and capricious, and EPA’s return to 10% in the proposal here is more consistent with the best available evidence.

To arrive at the new estimate in the SAFE 2 Rule, the agencies in 2020 made significant changes to their assumptions about the magnitude of the rebound effect. These changes resulted in a significant increase in the costs and fatalities that the agencies attributed to the baseline standards.133 Those fatalities and costs helped serve as the agencies' justification for the misguided 2020 rollback of those standards.134 But the agencies' methodological changes in the 2018 SAFE proposal and 2020 final SAFE 2 Rule were inconsistent with the best available evidence regarding rebound.

Policy Integrity provided comments during the SAFE rulemaking demonstrating that EPA and NHTSA's selection of a 20% value for rebound effect was arbitrary and capricious.135 By restoring the value of rebound effect to 10%, consistent with the agency's practice prior to the SAFE rulemaking, EPA has improved the accuracy of the CCEMS model for this rulemaking by using a value supported by an appropriate meta-analysis of the academic literature.136

As Policy Integrity noted in comments on the SAFE proposal, EPA and NHTSA failed to adequately explain their departure from a 10% rebound effect. The agencies ignored studies that supported a lower rebound value, including studies relied upon by the agencies in the past and new studies published since the prior rulemaking.137 Overall, the agencies failed to present sufficient evidence in 2020 to support abandoning its prior use of a 10% rebound effect.138

In contrast, EPA has now conducted an updated and rigorous literature review that more fully presents the large body of academic literature on the rebound effect.139 This literature review includes studies that were previously considered by the agencies but ignored in the SAFE rulemaking, including Greene (2012),140 Wang and Chen (2014),141 and Gillingham (2016);142 studies that Policy Integrity recommended the agencies consider in the SAFE rulemaking, including Gillingham (2015)143 and Wenzel and Fujita (2018);144 and studies published after the SAFE rule was finalized, including Knittel and Sandler (2018),145 Gillingham and Munk-Nielsen (2019),146 and Gillingham (2020).147

Most importantly, EPA has now evaluated the available economic literature to determine which studies were most relevant to the proposed standards, weighting the analysis based on geographic/timespan relevance, time period of study, reliability/replicability, and strong statistical/methodological basis.148 In the SAFE rulemaking, the agencies calculated a simple average from the arbitrarily incomplete set of studies they considered—a flawed methodology, inconsistent with EPA's own guidelines for reaching conclusions using multiple studies, that led to an improperly inflated rebound effect.149 As Policy Integrity noted in previous comments, a meta-analysis focusing on closely matched studies—as EPA has done in the Proposed Rule—is a much more rigorous approach to evaluate results based on multiple studies.150

In addition, EPA has now offered several specific reasons why the agencies' prior rebound estimate of 20% are likely overstated. First, consumers' total VMT (vehicle miles traveled) may be more responsive to sharp increases in fuel prices as compared to the gradual decrease in fuel costs-per-mile that will result from these proposed standards, and therefore any rebound effect resulting from the standards may be smaller than some historical estimates of rebound based on price fluctuations.151 Second, consumers are likely to respond less to small changes in their costs per mile traveled as they become wealthier, and total U.S. GDP is projected to increase over time based on the latest projections.152 Together, these two considerations further suggest that an estimate of 10% or lower is appropriate, whereas the 20% estimate was much too high. And while EPA could not quantify the possible indirect and economy-wide rebound effects due to limited data,153 such effects are likely small and, to the extent they exist, they may be offset by the two consumer response factors discussed above. [EPA-HQ-OAR-2021-0208-0299-A1, pp. 19-20.]

Commenter: National Association of Clean Air Agencies (NACAA)

EPA also flags this issue in the NPRM: 'For on-road light duty vehicles, the proposed standards would reduce total non-GHG emissions, though we expect small increases in some non-GHG emissions in the years immediately following implementation of the proposal, followed by growing decreases in emissions in later years. This is due to our assumptions about increased 'rebound' driving' (see 86 Fed. Reg. 43,802). Among the pollutants for which these short-term tailpipe emission increases are expected are NOx and VOCs, both of which are ozone precursors (see 86 Fed. Reg. 43,780). Currently, more than 120 million people live in areas around the country that do not meet the federal, health-based standards for ozone. Millions more live in areas that are on the cusp of exceeding the ozone NAAQS and tipping into nonattainment.

While the effects from 'rebound driving' and sales responses to price changes (referred to as elasticity) are uncertain and the available evidence suggests they may be overstated by EPA, the initial NOx and VOC emission increases estimated by EPA under its assumptions are relatively small and would be outweighed by reductions within a few years. States and local areas with ozone attainment and maintenance obligations cannot afford increases in NOx and VOC emissions, particularly from a sector over which they have no regulatory authority. This is true in general and, in particular, for communities along highways and freeways, which are likely to bear a disproportionate share of adverse environmental and public health impacts. While NACAA strongly supports EPA's efforts to enact LDV GHG emission standards that are far more rigorous than the existing standards, such action should not impede public health imperatives underlying the NAAQS.

EPA Response

Several commenters (Consumer Federation of America, Consumer Reports, New York University-Institute for Policy Integrity, Center for Biological Diversity et al., California Air Resources Board/Gillingham) support a 10 percent VMT rebound value, or a lower value, for use in this LDV GHG rule. The commenters are generally highly supportive of the proposed 10 percent VMT rebound estimate and methodology used to develop the VMT rebound estimate for use in this rulemaking for a variety of reasons, including: the use of a critical factors methodology, as opposed to "averaging", in assessing various VMT rebound studies; the use of a comprehensive set of recent U.S. studies estimating the VMT rebound effect; and the relative weights given to various critical factors in developing the 10 percent VMT rebound estimate.

Two commenters (New York University-Institute for Policy Integrity, Center for Biological Diversity et al.) disagree with using an "averaging" approach used in a previous LDV GHG rulemaking, and instead support an approach that identifies critical factors for weighting rebound studies that reflect their relevance to this LDV GHG rulemaking context. One commenter (New York University-Institute for Policy Integrity) suggests that EPA has “conducted an updated and rigorous literature review that more fully presents the large body of academic literature on the rebound effect…” Another commenter (Gillingham) states “EPA has done a thoughtful job in supporting the choice of a 10% rebound effect…There have been no more recent additions to the literature since the Gillingham (2020) review article and the amicus brief…This assessment accords with the assessment of EPA’s own Science Advisory Board.”[i] In addition, one commenter (Center for Biological Diversity et al.) suggests that EPA “provides a clear and well-reasoned basis for its decision to give more weight to studies based on these four key criteria…” EPA acknowledges the general support from many commenters in its approach to developing the basis for a 10 percent VMT rebound estimate in this LDV GHG rule.

Three commenters (New York University-Institute for Policy Integrity, Center for Biological Diversity et al., Gillingham) suggest that the 10 percent VMT rebound estimates may be too high because: (1) VMT may be more responsive to increases in fuel prices as compared to the gradual decrease in fuel costs per mile that will result from the LDV GHG standards and (2) drivers are likely to respond less to small changes in their costs per mile traveled as their income rises. EPA agrees that motorists may respond more to a change in fuel prices during times of high gasoline prices and when fuel prices are “salient”, in comparison to a long-term gradual change in fuel costs from improvements in vehicle fuel economy stemming from LDV GHG standards. With respect to the use of fuel price responses to estimate the VMT response to GHG standards, it is not clear how significant the extent of overestimate of the VMT rebound effect may be due to this factor. As a result, EPA is not adjusting the VMT rebound value of 10 percent for use in this rule based upon a qualitative assessment of this factor.

Based upon economic theory, the VMT rebound effect will likely decline with income since the time costs of travel become larger with increases in income. As a result, the fuel costs of travel will become a smaller fraction of the total travel costs. Thus, drivers will likely become less responsive to changes in the fuel costs of travel. Some key aggregate, national U.S. studies, Greene (2012) and Hymel and Small (2015), find that the VMT rebound effect declines with income. Alternatively, Gillingham (2015) using cross-sectional, odometer-based data using California data finds that VMT rebound effects increase with income. Gillingham speculates that high income households have more vehicles, which could increase the VMT rebound effect, or there could switching from flying to driving. Even though the Gillingham (2015) VMT rebound study involves a “salient” price increase (as Gillingham notes), the study still suggests that other factors related to income may be influencing the VMT rebound effect. Also, De Borger (2016) using cross-sectional data from Denmark did not find that the VMT rebound declines with income. EPA is not adjusting the VMT rebound effect for income because research is not conclusive on this effect.

One commenter (Center for Biological Diversity et al.) notes that EPA cites a range of VMT rebound values of 9 to 16 percent from the Wenzel and Fujita VMT rebound study (2018) in developing a VMT rebound estimate. However, the commenter also notes that the Wenzel and Fujita study finds that vehicles with “high” fuel economy would have a rebound effect of only 5.2 percent. According to the commenter, since vehicles subject to the LDV GHG rule would be within this “high” fuel economy category, the 5.2 percent VMT rebound effect would be most applicable in developing an overall VMT estimate in this LDV GHG rulemaking context. In addition, the commenter also notes that while the Gillingham et al. (2015) study estimates an overall VMT rebound effect of 10 percent, the Gillingham et al. study also finds that “a high percentage of vehicles are almost entirely inelastic in response to gasoline price changes” and that “the lowest fuel economy vehicles in the fleet drive the responsiveness, with higher fuel economy vehicles highly inelastic with respect to gasoline price changes.”

Both the studies, Wenzel and Fujita & Gillingham et al., examine the relationship between VMT rebound & fuel economy of vehicles using odometer-based data. Though they characterize low, medium, and high fuel economy vehicles differently, they both find that drivers with high fuel economy vehicles have a lower VMT rebound effect than vehicles with low efficiency. EPA notes that in Gillingham’s comments on the SAFE rule, he recommends using a 10 percent VMT rebound from the Gillingham et al. study, instead of the high fuel economy VMT rebound estimate.[116] These results are interesting and further raise the possibility that VMT rebound effects may be lower than the 10 percent value being used in this rule. More research is needed on this topic to provide a robust conclusion about the relationship between the VMT rebound effect and high mileage vehicles using odometer-based studies.

One commenter (Center for Biological Diversity et al.) suggests that while EPA’s proposed rule reports a range of VMT rebound estimates from the Hymel and Small (2015) study of 4 to 18 percent, that only the lower value of the range, 4 percent, should be used in developing an estimate of the VMT rebound effect for use in this rule. The basis for this commenters’ suggestion is a statement by Small in the context of the SAFE rule that: “A better characterization of the most recent study would be that it finds a long-run rebound effect of 4.0 percent or 4.2 percent under two more realistic models that are supported by the data”.[117] Since Hymel and Small find asymmetric responses to fuel price and fuel cost changes, we agree with the commenter that the 4 percent VMT rebound value is more applicable than other estimates from this study for estimating a VMT rebound effect for this rule. This is because this rule results in a decline in the costs of driving by increasing vehicle fuel economy. Updating the VMT rebound estimate in the Hymel and Small study from a range, 4 to 18 percent, to a single value of 4 percent, does not change the overall VMT rebound effect estimate used in this rule. In the proposal for this rule, seven studies are used to provide a basis for the VMT rebound estimate. For this final rule, the same seven studies are being utilized. EPA believes that when considering the range of values from the seven studies including only the 4 percent value for the Hymel and Small (2015) study, a reliable estimate of the overall VMT rebound effect for use in this rule is still a 10 percent value.

[116] Gillingham, Kenneth, The Rebound Effect of Fuel Economy Standards: Comment on the Safer Affordable Fuel-Efficient Vehicle Proposed Rule for Model Years 2021-2026 Passenger Vehicles and Light Trucks. 2018.

[117] See Small, Kenneth, Comment Letter on Proposed MY 2021-2026 Standards, 2018.

One commenter (Alliance for Automotive Innovation) supports EPA's approach to undertaking sensitivity analyses as to the magnitude of this VMT rebound effect, since rebound effects are difficult to estimate with a high degree of precision. EPA agrees with the commenter that sensitivity analyses of the VMT rebound effect are important to include in an analysis of the impacts of this rule. As discussed in the proposal and for this final rule, EPA is using 5 and 15 percent VMT rebound estimates as sensitivities to bound the uncertainty of the VMT rebound effect.

One commenter (Consumer Reports) requests that EPA consider doing more research prior to future rulemakings on the potential applicability of rebound effects for conventional vehicles being applied to battery electric vehicles (BEVs). Given the limited penetration of BEVs in the U.S. passenger fleet currently, EPA has not found any available, peer reviewed studies on the VMT rebound effect of BEVs. EPA will continue to monitor the economics and transportation literature for studies on the VMT rebound effect associated with BEVs.

One commenter (National Association of Clean Air Agencies) suggests that EPA used a VMT rebound estimate in the SAFE rule, 20 percent, that was too high. The higher VMT rebound estimate resulted in too larger of a predicted increase in criteria pollutants (i.e., NOx/VOC emissions) from this rule. For this final rule, EPA is using a lower value for the VMT rebound effect, 10 percent, than in the previous SAFE rule.

21. Vehicle Safety Impacts

<u>Commenters Included in this Section</u>

Alliance For Automotive Innovation
Aluminum Association
California Air Resources Board (CARB)
Center for Biological Diversity, et al.
Competitive Enterprise Institute (CEI)
Competitive Enterprise Institute et al.
Consumer Federation of America
Consumer Reports (CR)

Commenter: Alliance For Automotive Innovation

Attribute substitution can also occur when households make decisions about which vehicle to use for specific trips.193 The Agencies' RIAs make the implicit assumption that VMT by new gasoline-powered cars will be replaced, one to one, by VMT in new electric vehicles.

In Norway, however, some households supplemented – rather than replaced – their ICE vehicles with electric vehicles. Both vehicles were used with intensity, and some uses of public transit declined.194 Thus, attribute substitution for specific trips is a complex process that the Agencies should model to supply accurate estimates of how much GHG control is accomplished during the transition to an EV-dominated fleet. Insofar as the EV transition contributes to more congested traffic in urban areas (e.g., as BEV trips substitute for public-transit trips, biking and walking), the RIAs should acknowledge this effect and quantify the ramifications for commuter travel times and other adverse effects of congestion.195

One of the rationales for comprehensive modeling of rebound effects is that such modeling underscores the importance of complementary and supporting policies during thetransition to BEVs. [EPA-HQ-OAR-2021-0208-0116]

Commenter: Aluminum Association

The conclusions reached in the NPRM regarding the ability of vehicles manufactured in compliance with the proposed standards to ensure continued passenger and societal safety are accurate. In the case of aluminum's use, nearly every aluminum-bodied vehicle ever tested has earned the highest 5-Star safety rating from NHTSA (Audi A8, Tesla Model S and Ford F-150). Other 5-star safety rated, aluminum-intensive vehicles include Ford's Navigator and Expedition, and Audi's A6. And while not crash-tested by NHTSA, the Jaguar XJ, XF, XE, F-Type, F-Pace and Range Rover aluminum-bodied vehicles have 5-Star Euro New Car Assessment Program (NCAP) ratings and are rated highly by insurance companies. Aluminum's use is particularly valuable to automakers in lightweighting heavier pickup trucks and SUVs and this use has resulted in the parallel benefit of reducing the mass differential between vehicles when vehicles collide, resulting in overall societal safety benefits [EPA-HQ-OAR-2021-0208-0233-A1, p.3]

Commenter: California Air Resources Board (CARB)

The Standards Do Not Significantly Affect Highway Fatalities. CARB agrees that the impact on highway fatalities of the Final SAFE Rule and the proposed standards are similar and the model does not provide statistically significant results irrespective of the varying stringency. The emissions standards do not significantly lead to fatalities, where the analysis does not provide statistically significant effects, and any fatalities attributed to the standards are, unfortunately, overwhelmed by total highway fatalities. Moreover, CARB supports considering risk on a per-mile traveled basis when assessing fatalities. [EPA-HQ-OAR-2021-0208-0643-A6, p.39]

Commenter: Center for Biological Diversity, et al.

EPA's safety analysis reveals that more stringent standards do not have a material impact on safety, and EPA's analysis likely overstates any safety impacts. EPA correctly focuses on fatality rate rather than total fatalities, and should not consider fatalities that occur as a result of increased driving in its safety analysis.

A new regulation's impact on fatalities can be evaluated in two ways: (1) by calculating the total change in fatalities, or (2) by calculating the change in the fatality rate, or the number of fatalities per mile. A change in the total number of fatalities can have many causes, which could be imposed by new standards or other external factors not compelled by the standards. For example, if more driving occurs over a period of time, fatalities over that period of time may also increase, but this is not necessarily imposed by the technological or other changes that are made to fulfill the requirements of new standards. Historically, therefore, EPA has taken the fatalities-per-mile approach, correctly defining vehicle safety as "societal fatality rates per vehicle miles traveled." 77 Fed. Reg. at 62,740 n.313; 2016 Draft TAR at 8-1 n.A.

Only in the 2020 Final Rule did EPA move away from this fatalities-per-mile estimate, in order to make that rule appear to have greater safety implications than it actually did. But the vast majority of the fatalities projected by both the 2020 Final Rule and the NPRM are due not to changes in the fatality rate, but to projected increased driving under the standards (i.e., "rebound" driving due to the cost of driving decreasing). In fact, approximately 85% of the estimated change in total fatalities under the Proposal would be due to the projected increases in VMT, DRIA at 5-10, and these rebound fatalities should not be the focus of the safety analysis for the rule.96 An increase in traffic accidents resulting from individuals choosing to drive more cannot be viewed as actually imposed by new standards, and these decisions to drive more are choices made by individual consumers. See also State and Local Government Petitioners' Brief at 58-61.

In addition, Congress has spoken regarding how EPA should consider the safety impacts of vehicle emission standards. Section 202(a)(4)(A) of the Clean Air Act provides that "no emission control device, system, or element of design shall be used in a new motor vehicle or new motor vehicle engine for purposes of complying with requirements prescribed under this subchapter if such device, system, or element of design will cause or contribute to an unreasonable risk to public health, welfare, or safety in its operation or function." 42 U.S.C. § 7521(a)(2). Because additional fatalities that occur due to individual voluntary choices to drive more do not stem from the “operation or function” of the technologies at issue, they should not be attributed to the standards. Consistent with Section 202(a)(4), it would be unreasonable for EPA to use a projection that individuals may drive more—and therefore might get into more traffic accidents—to undermine its statutory obligations to reduce GHG emissions. Even in the NPRM for the 2020 Rule, EPA recognized that nothing in more stringent standards “compels consumers to drive additional miles. If consumers choose to do so, they are making a decision that the utility of more driving exceeds the marginal operating costs as well as the added crash risk it entails.” 83 Fed. Reg. at 43,107.

In fact, considering the impacts of increased driving in the analysis of safety could be used to undermine many different standards. There are many government actions that lead to increases in driving, but the government does not decline to take these steps because of the increased accidents that might occur from increased driving` example, highway funding could be a government action that would increase driving, and personal income tax cuts might also put additional money in people’s pockets which could lead to increased driving. Governments do not consider the fatalities due to this increased driving in making these policies, and EPA should not do so here. In fact, increased driving is generally seen as a societal good. Had Congress intended for fatalities solely due to a possible increase in miles traveled to be a determinative factor, it would have said so. Whitman v. Am. Trucking Associations, 531 U.S. 457, 469 (2001) (stating that when a “factor is both so indirectly related to” a criterion of consideration “and so full of potential for canceling the conclusions drawn from” that consideration, “it would surely have been expressly mentioned”).

In the Proposal, therefore, EPA properly returns to the use of fatality rate rather than total fatalities as the relevant safety measure for understanding the impacts of a new regulation. Analyzing safety implications in terms of fatality rate helps focus the analysis on whether new regulations actually make driving less safe. This approach is consistent with EPA’s statutory obligations to mitigate the dangerous air pollution from vehicles.

EPA’s Proposal does not have a material impact on vehicle safety and any safety impacts of more stringent standards are likely overstated. In the NPRM, EPA shows virtually no change in the fatality rate with the Proposed Standards versus the fatality rate absent those standards. Proposal, 86 Fed. Reg. at 43,793. Specifically, EPA shows that vehicle safety “will remain almost unchanged” at 4.624 fatalities per billion miles under the Proposal, versus 4.640 fatalities per billion miles for the no-action case. DRIA at 5-10. These estimates make clear that the overwhelming majority of fatalities estimated in the Proposal are not caused by the standards, but by changes in individual driving habits.

Moreover, the bases for all of the agencies’ fatality estimates are overly conservative. As discussed elsewhere, the rebound estimate used by EPA—which is the foundation for 85% of the fatalities projected by EPA—is at the high end of relevant estimates, leading to greater projected fatalities in EPA’s modeling. In addition, the agency’s estimate of fleet turnover— another source of estimated fatalities in the model—is premised on an estimate of the impact of more stringent standards on new vehicle sales that is too high, using a price elasticity of -1 instead of something more reasonable like -0.4, as is also discussed elsewhere in these Comments. See also

State and Local Government Petitioners' Brief at 55-57. Finally, EPA acknowledges that its analysis of the fatalities from mass reduction in vehicles—the third and final source of estimated fatalities in EPA's modeling—is based on mass reduction coefficients that EPA has acknowledged are not statistically significant. Proposal, 86 Fed. Reg. at 43,793 ("the empirical analysis . . . did not produce any mass safety coefficients with a statistically significant difference from zero"); see also 83 Fed. Reg. at 43,111. In addition, recent technological developments in vehicle safety engineering and design make clear that reducing vehicle mass does not necessarily make vehicles less safe. See, e.g., State and Local Government Petitioners' Brief at 57-58. Automakers can and do use improved methods of mass reduction to minimize safety impacts, such as by replacing steel with new materials that are stronger and lighter,97 or applying mass reduction technologies to larger and heavier vehicles but not to smaller vehicles, which would actually have safety benefits rather than costs.98

The Proposal's impact on the actual safety of vehicles or driving is minimal, as reflected in the "almost unchanged" fatality rate of the fleet, and the agency's estimates of all fatalities resulting from more stringent standards (including from rebound driving) are very likely inflated. [EPA-HQ-OAR-2021-0208-0651-A1, p. 38-40]

96 As in the 2020 Final Rule, EPA has inexplicably decided to offset only 90% of rebound-driving costs, despite the substantial mobility benefits of any rebound driving, making it more appropriate to offset all rebound costs with equal benefits.

Commenter: Competitive Enterprise Institute (CEI)

EPA has also downplayed the safety risks inherent in the mass and size reductions that its regulations will cause. EPA incorrectly claims manufacturers will only consider the costs of such downsizing rather than other non-cost criteria, such as customer satisfaction. EPA claims benefits of downsizing larger vehicles that are no longer accurate. [EPA-HQ-OAR-2021-0208-0652-A1, p. 2]

EPA Is Arbitrarily Downplaying the Safety risks of Mass and Size Reductions in Vehicles. Greenhouse gas emission standards put pressure on automakers to limit average vehicle weight. Tailpipe carbon dioxide emissions comprise 94 percent of such emissions, and an automobile's carbon dioxide emissions per mile are directly proportional to its fuel consumption per mile. Reducing vehicle weight tends to reduce fuel consumption and, thus, CO_2 emissions as well. See EPA and NHTSA, Final Rule, 75 FR 25326-25327, 25332 (2010). In short, there is a clear tradeoff between vehicle weight and reduced emissions.

EPA claims that this tradeoff is not inevitable. It states that 'manufacturers can achieve the MY 2023-2026 standards while using modest levels of mass reduction as one technology option among many ….' 86 FR 43793. But even if manufacturers can use only modest downsizing, this does not mean that they necessarily will. EPA has used a least-cost approach in estimating the extent to which manufacturers may employ downsizing as one means among many of reducing emissions. But individual manufacturers may well employ non-cost criteria in some cases, such as customer satisfaction. To the extent that runs counter to EPA's approach and results in more downsizing than EPA anticipates, the adverse safety impacts will be greater.

For the downsizing that EPA admits may occur, EPA gives a 'central estimate of a 0.07 percent increase in fatalities'. Id. This appears to be questionably low, especially since a large component of that estimate rests on some alleged safety benefit from downsizing. But the size-safety relationship is too strong to be undercut by such unspecified benefits. According to the Insurance Institute for Highway Safety, 'A bigger, heavier vehicle provides better crash protection than a smaller, lighter one, assuming no other differences.' https://www.iihs.org/topics/vehicle-size-and-weight. As for the possibility that larger vehicles pose a significant danger to the occupants of smaller vehicles, the Insurance Institute finds that 'large vehicles aren't as big a threat to people in small vehicles as they used to be.' Id. [EPA-HQ-OAR-2021-0208-0652-A1, pp. 8-9]

The SAFE rulemaking indicated that the less stringent alternatives considered by the agencies had greater traffic safety benefits than the more stringent alternatives. In the agencies' words, 'Less-stringent standards remain better for safety and are projected to save thousands of lives and prevent tens of thousands of hospitalizations ….' 85 FR 25185. Similarly, '[a]nother factor weighing toward reduced stringency is safety. Reduced stringency results in less pressure on manufacturers to reduce mass in vehicles, which, for smaller passenger cars has negative safety implications when involved in accidents with heavier vehicles.' 85 FR 25119; see also 85 FR 24256 ('avoiding standards that unduly encourage safety-eroding downsizing').

But in setting the California Framework as the floor for lenient standards, EPA has arbitrarily ruled out any consideration of less stringent but safer alternatives. For example, in the SAFE rulemaking, CEI pointed out that a freeze at the 2018 level would save 2,900 more lives than the SAFE Rule, using the agencies' own modeling software. And an even more lenient rollback to 2017 would save 4,300 additional lives over the agencies' rule. CEI SAFE Comments, p. 4, see attached. In the SAFE rulemaking, EPA inappropriately dismissed these safety concerns based on an unrelated minimal increase in average car costs. SAFE Rule, 85 FR 24259 (2020). EPA continues in this rulemaking to ignore the lives saved by these reasonable alternatives.[EPA-HQ-OAR-2021-0208-0652-A1, pp. 7-8]

Commenter: Competitive Enterprise Institute et al.

Such policies (3) make the average vehicle less crashworthy than it otherwise could be.5 [EPA-HQ-OAR-2021-0208-0292-A1, p. 1]

5 GHG standards put pressure on automakers to limit average vehicle weight. Tailpipe carbon dioxide (CO2) emissions comprise 94 percent of motor vehicle GHG emissions, an automobile's CO2 emissions per mile are directly proportional to its fuel consumption per mile, and reducing vehicle weight is a common method of reducing fuel consumption and, thus, CO2 emissions as well. See EPA and National Highway Traffic Safety Administration (NHTSA), Light-Duty Vehicle Greenhouse Gas Emission Standards and Corporate Average Fuel Economy Standards; Final Rule, 75 FR 25326-25327, 25332, May 7, 2010, https://www.govinfo.gov/content/pkg/FR-

2010-05-07/pdf/2010-8159.pdf. Lighter vehicles have less mass to absorb collision forces, so they tend to provide less protection in crashes. Under the SAFE Rule, automakers are already projected to reduce average vehicle weight by 4.2-4.7 percent during model years 2023-2026. EPA 2021, DRIA, p. 4-19. GHG standards can also divert automaker R&D spending from safety to fuel efficiency, for the simple reason that automakers do not have unlimited budgets. See SAFE Rule, 85 FR 24174, 25136, April 30, 2020, https://www.govinfo.gov/content/pkg/FR-2020-04-30/pdf/2020-06967.pdf.

Commenter: Consumer Federation of America

One of the largest changes from the current SAFE 2 rule involves vehicle safety. By irrationally doubling the rebound rate, the Trump administration projected increased fatalities by 75 lives. The Administration also underestimated the increasing crashworthiness of vehicles. While the proposed SAFE 2 rule revisions do correctly establish that vehicles are becoming lighter to meet the standards, the rule rightly points out that vehicles are more crashworthy compared to just a decade ago when the standards went into effect. [EPA-HQ-OAR-2021-0208-0297-A1, p. 2]

Rebound Rate: Above, we identified an unsupported and unsupportable assumption about the rebound effect as having an impact on the pocketbook benefits of a higher standard. Rebound is part and parcel, the tip of the iceberg, for a much larger issue–unrealistic assumptions about driving, and new vehicle safety (see Figure 5.1). By claiming to avoid a slew of fatalities due to consumers driving less because of increased annual fuel costs and driving in safer vehicles, the Trump rule claimed to avoid a significant negative impact on congestion, noise, and safety.

Correcting the significant flaws in the NHTSA/EPA framework, including the rebound effect and the failure to recognize technological flexibility for automakers, dramatically reduces the assumed safety benefits of the Trump SAFE 2 rule. As shown in Figure 3, these adjustments eliminate over 80 percent of the claimed reduction in accidents. We believe other technological improvements, introduced along with higher fuel economy, further reduce the impact of increased accidents. [EPA-HQ-OAR-2021-0208-0297-A1, p.15]

Vehicle Safety By far, the largest change from previous analyses in connection with safety is the change in the rebound rate. By irrationally doubling the rebound rate, the agencies projected increased fatalities by 75. The agencies also underestimate the increasing crashworthiness of vehicles. While the agencies correctly point out that vehicles are becoming lighter to meet the standards, vehicles are also more crashworthy compared to just seven years ago when the standards went into effect. An analysis15 of all 2018 crash tests showed that 71 percent of vehicles weigh less and had better fuel economy than its previously crash-tested version. Of these vehicles, 47 percent had a better crash test rating, while the other 53 percent had the same rating. Not a single vehicle in the analysis had a worse crash test rating than its previous version. Outside of the passive nature of crashworthiness, the amount of added safety features that actively help to prevent a crash16 have increased by 60 percent since 2011. These facts can be proven by real-world driving experiences as well. The percentage of crashes that result in a fatality has steadily been decreasing with a full tenth of a percentage decline from 0.61 percent to

0.51 percent from 2011, when the standards were enacted, to 2016.17 [EPA-HQ-OAR-2021-0208-0297-A1, p. 17]

Another argument the Trump administration put forward to roll back the standards is that due to the increased cost of vehicles, the turnover rate would decrease, meaning there would be more, older, less safe vehicles on the road. The Administration ignored the fact that each year from 2014 to 2018, an average of 16.9 million new, safer and more fuel-efficient vehicles were added to the fleet, while an average of 13 million older, less safe, and less fuel-efficient vehicles were retired18.

And our national survey conducted in August 2018 revealed that over three quarters (76 percent) of Americans reject the assertion that increasing fuel economy standards would lead to more accidents.19 This rejection is widely bipartisan, with 60 percent of Republicans, 80 percent of independents, and a plurality of 90 percent among Democrats rejecting the argument. [EPA-HQ-OAR-2021-0208-0297-A1, p. 16]

Commenter: Consumer Reports (CR)

In terms of the safety impacts of the proposed rule, EPA found: "This proposal would have no adverse impact on driving safety. EPA estimates that the risk of fatal and non-fatal injuries will remain virtually unchanged by this program" [EPA-HQ-OAR-2021-0208-0602-A1, p.18]

This conclusion is consistent with the results of analysis CR performed in originally analyzing the SAFE rule proposal.50 In this analysis CR found that weakening standards resulted in a small, but negligible decrease in safety, and that strengthening standards resulted in a similarly small but negligible increase in safety. [EPA-HQ-OAR-2021-0208-0602-A1, p.18]

However, while the overall conclusion is sound, there remain significant problems with many of the assumptions used to calculate the safety impact, and the inclusion of financial costs associated with these small and uncertain risks within the cost-benefit analysis. EPA's analysis shows that the uncertainty in the analysis at the 95% confidence interval spans zero,51 indicating that strengthening standards may have no effect on, slightly increase, or slightly decrease safety. Given this fact, the scientifically appropriate conclusions to draw would be that the impact is indistinguishable from zero. [EPA-HQ-OAR-2021-0208-0602-A1, p.18]

Furthermore, EPA continues to attribute fatalities caused by rebound driving to the rule. Nothing in this rule compels anyone to drive more. Driving more is a consumer choice, and the fatalities associated with that driving should not be attributed to the rule. It is true that there are risks associated with driving, but those are risks that everyone understands and assumes when they get into a vehicle, and when they pay their monthly insurance premium. Any policy that puts more money in consumers' pockets may allow them to drive more, yet we don't attempt to estimate the traffic fatality impact of any additional driving that might be stimulated by tax cuts, and we shouldn't for consumer savings from increasing vehicle efficiency either. [EPA-HQ-OAR-2021-0208-0602-A1, p.18]

EPA Response

Several commenters (CARB, CBD, CR) supported EPA's use of societal fatality risk per mile driven as an appropriate metric for considering crash safety effects resulting from the standards. We continue to use this metric for the final rule, and have concluded that this rule will not have any adverse effect on crash safety (RIA 5.3 and Preamble VII.H.)

We disagree with CEI's assertions that our analysis underestimates the safety risk of downsizing ('downsizing' and "mass reduction" appear to be used interchangeably in the comment.) Specifically, our analysis does not conclude that the standards will result in smaller vehicles overall. On the contrary, our analysis shows a very slight increase in average vehicle footprint (from 50.55 sq. ft. in the no-action case to 50.65 sq. ft. under the final standards in MY 2026) due to a small sales shift from cars towards light trucks. Since the commenter did not provide any further detail or supporting information for their assertion of vehicle size reductions, for our responses here we are interpreting the commenter's use of the term 'downsizing' to mean mass reduction, and not a reduction in vehicle size.

CEI asserted that manufacturers have the option to use more mass reduction than the modest levels we projected in our analysis (under the final standards, 6.3% compared to 5.4% in no-action case, as shown in RIA 4.1.4), and that there are 'inherent safety risks' which arise from greater levels of mass reduction. We agree that manufacturers have many compliance pathways to meet the final standards, and that some pathways may involve higher levels of mass reduction. However, we do not agree that these choices will result in a measurable change in safety risk. As noted in the comments from the Aluminum Associations, manufacturers have achieved the highest crash safety rating while using vehicle light weighting strategies such as material substitution. Further, in addition to our central analysis in which we found no notable impacts on societal safety (RIA 5.3 and Preamble VII.H), we also conducted several sensitivity analyses (RIA 4.1.5) with manufacturers projected to apply different types of technologies under each sensitivity case, including different mass reduction levels. Among these sensitivity analyses, we projected the highest levels of additional mass reduction in the high battery cost case, increasing from 5.9% in the no-action case to 7.4% under the final standards. Yet even in this bounding case with higher levels of mass reduction, the fatality rate remains virtually unchanged at 4.920 fatalities per billion miles, compared to 4.916 under the central case.

CEI also commented that less-stringent alternatives would be preferable because the reductions in overall VMT would correspond to lower overall fatalities. EPA explains its views on safety-related impacts of the final standards in the preamble. In short, EPA finds that it would not be appropriate to give significant weight in selecting standards to traffic fatalities that are the result of voluntary choices to drive more because more stringent standards make driving less expensive. EPA does not believe the changes in vehicle attributes that may result from the standards will result in materially increased fatalities, and that it is not appropriate to attribute fatalities from increased vehicles miles traveled (but a constant rate of injury per million vehicles miles traveled) to these standards.

Some commenters observed that our estimates of fatality risk are based on mass-safety coefficients which are not statistically significant (CARB, CBD) and that because manufacturers can apply more mass reduction on larger vehicles, there may be a safety benefit in multi-vehicle crashes that arises from a reduction in mass disparity between vehicles. Our final rulemaking analysis is based on currently available statistical data which does not account for changes in mass disparity between vehicles as penetration of mass reduction technology expands more broadly across the fleet. Our decision to include mass-safety coefficients at levels below the 95^{th} percentile confidence interval in this rulemaking analysis is a conservative assumption (i.e. it tends to increase any projected safety effects of the standards.) Therefore, the exclusion of non-statistically significant findings would not change our conclusion that this rule does not adversely affect safety.

22. Employment Impacts

<u>Commenters Included in this Section</u>

Alliance For Automotive Innovation
Blue Green Alliance
Center for Biological Diversity, et al.
Center for Climate and Energy Solutions (C2ES)
CERES
District of Columbia Department of Energy and Environment
E2 - Environmental Entrepreneurs
Elders Climate Action (ECA)
Environmental Defense Fund (EDF)
Environmental Law & Policy Center (ELPC), et al.
Environmental Law and Policy Center (ELPC)
EOS at Federated Hermes (on behalf of its stewardship clients)
International Union, United Automobile, Aerospace & Agricultural Implement Workers of America (UAW)
Mass Comment Campaign sponsored by Center for Biological Diversity (77,692)
Mass Comment Campaign sponsoring organization unknown-1 (7,010)
National Coalition for Advanced Transportation (NCAT)
New Mexico Environment Department
New York State Department of Environmental Conservation
Pien, Natalie
Securing America's Future Energy
Trombetta, Nick
Volkswagen Group of America, Inc. (Volkswagen)

Commenter: Alliance For Automotive Innovation

Policies to support development of EV and battery manufacturing and domestic supply chains, including critical minerals

At present, most critical minerals necessary for the production of advanced EV motors and batteries are mined and processed outside of the United States, primarily in China. Additional domestic sources and processing capacity are needed to supply EV production and encourage domestic manufacturing and jobs. [EPA-HQ-OAR-2021-0208-0571-A1, p. 5]

EPA and NHTSA project that battery costs will learn down quickly compared to other fuel saving technologies, and the employment module uses total technology costs to help forecast job-years. Given the Agencies' assumptions, it is notable that the projected jobs related to the production of batteries will shrink (on a per unit shipped basis) in proportion to the learning rate of batteries. Employment related to the production of engine and transmission technologies (on a per unit shipped basis), are stable over time in comparison. [EPA-HQ-OAR-2021-0208-0116]

Employment Impacts of the EV Transition

The proposed GHG and CAFE standards, insofar as they boost the EV transition, will have complex impacts on employment in different sectors and different regions of the country. Auto Innovators recommends that the agencies go beyond their current rudimentary analysis (which considers only new vehicle sales and stimulus of battery manufacturing) and consider employment analysis of each of the following issues.

1. The impacts of EVs on employment at U.S. plants that produce gasoline engines and transmissions, and their supply chains.

2. The impacts of EVs on employment in the U.S. petroleum and biofuels sectors, including their supply chains.

3. The employment impacts of EV production in the U.S. and elsewhere, including effects on U.S. content, accounting for the global geographic distribution of the mining and processing of raw materials, the manufacture of cathodes, anodes, electrolytes and separators, the production of battery cells and the assembly of battery packs, and the production of electric motors and other systems/components (*e.g.*, charging networks) that are critical to EVs.

It would be useful for the agencies to present geographical maps of where in the US employment is likely to be lost, where employment gains are likely to occur, and what the net distribution of employment changes will be in different regions. The offsetting effects are challenging to model but are important to appreciate.316 Such information could be useful in guiding retraining and community assistance programs. A think tank in Germany has produced a related study on how the BEV transition might impact employment in towns throughout Germany.317 [EPA-HQ-OAR-2021-0208-0116]

Commenter: Blue Green Alliance

[The following comments were submitted as testimony at the virtual public hearing on August 26, 2021. See Hearing Testimony – 26Aug2021, p. 92.]

We know that climate change and economic injustice are the most fundamental challenges we face today—and we know they're inextricably intertwined. . . . It's visible in the disparities in access to cleaner vehicles and other mobility options across income levels and it's visible in the impact (audio glitch) that auto manufacturing communities which have seen good jobs offshored and anchor facilities shuttered due to ill-conceived industrial policies that gutted the middle-class.

[The following comments were submitted as testimony at the virtual public hearing on August 26, 2021. See Hearing Testimony – 26Aug2021, pp. 93-94.]

Research from the BlueGreen Alliance and the Natural Resources Defense Council shows that strong vehicle standards represent a critical foundation of domestic certainty for jobs supporting manufacturing investment across the United States. Over the past decade, auto parts and materials manufacturing workers rose to the challenge of building the technologies needed to meet the 2010 and 2012 vehicle standards. Those strong standards, coupled with reinvestment in domestic manufacturing, helped bring back good jobs after the last recession. They have spurred rapid investment in assembly facilities and in the supply chains building fuel economy and enhancing technology. The weakening of these standards under the past Administration put jobs at risk and threatened the health of the industry as a whole. We can't afford to fall behind, particularly as our global competitors are proactively moving to capture the gains from the shift to EVs already underway. Coupling ambitious standards with auto sector investment is key to capturing opportunities for workers and communities to partake in the equitable transition to the next generation of clean vehicles. The EPA can leverage its clean vehicle standards to drive innovation and deliver fuel savings and pollution reduction for all types of vehicles that meet all communities' needs. Vehicle standards and manufacturing investment will achieve deep GHG reductions, protect and create good auto manufacturing jobs for workers of all backgrounds, and ensure that those workers are the center of building and deploying the EV fleet of the future here in the United States.

Commenter: Center for Biological Diversity, et al.

EPA’s employment analysis of stronger GHG standards shows positive growth, but is likely an underestimate. EPA’s own modeling projects long-term employment increases due to the Proposal.

EPA’s Proposal projected two models of long-term employment impacts from the Proposal that both showed overall increases in employment when compared to the 2020 Final Rule. DRIA at 8-9 – 8-13. Under the first model assuming a -1 elasticity of demand value, EPA projected an initial decrease in employment of only 0.2%, or roughly 2,000 jobs, by 2024 when compared to the 2020 Final Rule. DRIA at 8-12, tab. 8-3. That change would soon become positive by 2026, a 0.2% increase, and reach a 1% increase in employment, or roughly 11,000 jobs, by 2035. DRIA at 8-12, tab. 8-3. EPA’s model assuming a -0.4 demand elasticity projects an even greater increase in employment. Under that model, the Proposal would increase employment immediately, 0.1% in 2022 and 1.8% by 2035, or roughly 21,000 additional jobs. DRIA at 8-12, tab. 8-4. Thus, under both of EPA’s models, the Proposal would increase employment over the 2020 Final Rule’s status quo. Moreover, as discussed below, a demand elasticity of -1 is arbitrarily high. A lower magnitude elasticity of demand such as -0.4, which projects consistent employment increases, is a more realistic projection (see infra Section 7.g).

Higher EV production will further increase employment. The Proposal undercounts increases in employment by focusing on a narrow range of the economy and by underestimating the likely increase in EV penetration and manufacturing. While EPA acknowledges that vehicle electrification “is likely to affect both the number and the nature of employment in the auto and parts sectors and related sectors, such as providers of charging infrastructure,” DRIA at 8-13, the agency focuses solely on automotive dealers, final assembly labor and parts production, and fuel saving or emissions reducing technology labor. DRIA at 8-11. However, the expansion of the EV market will involve not just EV manufacturers and charging providers, but also growth in mining materials for batteries, battery manufacturers, new technicians (or retrained existing technicians) to properly install and eventually replace battery cells, computer programmers and engineers, semiconductor technology, electricity generation, battery disposal and recycling, and other sectors more relevant to EV manufacturing than ICEVs.114 Thus, EPA's employment projections would show even larger increases if the agency had modelled impacts on a wider range of automotive and EV-related industries.

This undercounting of the Proposal's increases in employment is compounded by EPA's assumption that there will be only a modest increase in EV market penetration over the next several years. The agency assumes that EV penetration will more than double from 3.6% in MY 2023 to 7.8% in MY 2026 despite its belief that "it is likely that an even higher percentage of the industry-wide … fleet could be electrified" based on statements from numerous parties "including but not limited to the automotive manufacturers and the automotive suppliers." DRIA at xx, 2-7, Tbl. 4,12; Proposal, 86 Fed. Reg. at 43,766. Indeed the agency referenced statements by GM, Volvo, Volkswagen, Honda, and Fiat of their goals for electric vehicles to make up half or more of their sales by 2035 or sooner. DRIA at 2-14. Furthermore, the agency noted that upcoming ZEV targets from more than 3 states and 12 countries would help spur development and drive EV penetration in the global market. DRIA at 2-15. These developments are supported by recent modeling indicating higher EV penetration is likely. Thus, actual employment increases would likely be even greater than EPA estimates. [EPA-HQ-OAR-2021-0208-0651-A1, p. 51-52]

Commenter: Center for Climate and Energy Solutions (C2ES)

For manufacturers, the global electric vehicle market represented about $120 billion in 2020 and demand is projected to grow as much as 30 percent per year through 2030.8 As countries including the UK and China continue to expand commitments to phase out internal combustion engine vehicles, economic opportunities to supply zero-emission vehicles globally will grow accordingly. [EPA-HQ-OAR-2021-0208-0287-A1, p.3]

Commenter: CERES

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, pp. 82-83.]

Ceres analyses consistently show that weak standards generate fewer jobs while stronger standards support growth in the auto industry and throughout the U.S. economy. Auto parts suppliers especially stand to lose under weakened standards. They employ 2.6 times more Americans than automakers and Ceres analyses found that the suppliers sector would have stood to lose $20 billion in sales of clean vehicle technologies from 2021 to 2025 under the Trump Administration's rule.

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, pp. 83-84.]

Weak standards also undermine global competitiveness. U.S. auto industry offerings will not be aligned with global market demand without strong standards that drive investment in more efficient vehicles and electrification.

Commenter: District of Columbia Department of Energy and Environment

A multi-pollutant strategy will also allow the environmental justice issues associated with air toxics from all light- and medium-duty vehicles and fine particulate pollution from light and medium-duty diesel vehicles to be approached with more precision. This will also give EPA the opportunity to ensure a level playing field between auto makers that have committed to phasing out fossil fuel engines and those that are lagging. [EPA-HQ-OAR-2021-0208-0240-A1, p.2]

Commenter: E2 - Environmental Entrepreneurs

More than 273,600 Americans worked in the electric vehicle (EV) and plug-in vehicle sector at the beginning of 2021. These jobs are in every state. Thousands more work across electric vehicle charging companies. With bold federal standards we can protect these jobs and create more of them in the face of foreign competition. [EPA-HQ-OAR-2021-0208-0604-A1, p. 1]

Global competitiveness is another important consideration. The number of EVs on the road globally is expected to increase dramatically in the coming decades, with already more than 20 countries committed to limiting all new auto sales to Zero Emissioin Vehicles by 2035 or 2040. The competition to supply this growing market is on, but the U.S. is lagging. Europe and China have backed bold national targets and incentives to drive innovation, demand, and growth in their own EV auto sectors. Without similar bold federal initiatives in the U.S., our auto industry is in danger of falling further behind. In fact, from 2017 to 2020, the U.S. market share of global EV production dropped from 20% to 18%. [EPA-HQ-OAR-2021-0208-0604-A1, pp. 1-2]

We also recognize the tremendous economic opportunity that strong regulations will provide. A federal standard that advances clean vehicles, will ensure US auto industry is more globally competitive, it will also save money for businesses and consumers and drive private investment in not only vehicles but clean vehicle infrastructure as well all of which is a boom for the economy. [EPA-HQ-OAR-2021-0208-0604-A1, p. 3]

Commenter: Environmental Defense Fund (EDF)

Standards that eliminate tailpipe pollution from new passenger cars and light trucks by 2035 could reduce more than 11 billion tons of climate pollution by 2050, prevent nearly 100,000 premature deaths, and save consumers over $5,000 over the life of the average vehicle, and all while growing domestic, well-paying jobs.4 [EPA-HQ-OAR-2021-0208-0688-A1, p. 2]

Commenter: Environmental Law & Policy Center (ELPC), et al.

Stronger emissions standards will support clean car innovation and manufacturing.

Strong emission standards from EPA will support the auto manufacturing that is critical to the economies and well-being of Midwest states—from Michigan, Ohio, Indiana, Minnesota, and Wisconsin, to the Dakotas.

Past analysis by the Blue Green Alliance and Natural Resources Defense Council concluded that there were nearly 290,000 jobs in the advanced technology vehicle sector. These are workers making more efficient cars and trucks possible. Across the Midwest, according to that report, there were a total of 151,714 jobs in 480 facilities associated with making cleaner vehicles. Three states—Michigan, Indiana, and Ohio—topped the list.[24] [EPA-HQ-OAR-2021-0208-0567-A1, pp. 4-5]

Commenter: Environmental Law and Policy Center (ELPC)

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, p. 290.]

Third, a strong auto manufacturing base is critical to the economies and well-being of Great Lakes Midwest states where ELPC works. Past analysis by BGA and NRDC concluded that there were nearly 300,000 jobs in the advanced technology vehicle sector. Three states, Michigan, Indiana, and Ohio, top the list.

Commenter: EOS at Federated Hermes (on behalf of its stewardship clients)

We see climate change as a significant economic risk, and reducing GHG emissions by transitioning to cleaner vehicles as a major economic opportunity. Ceres analyses consistently show that stronger standards support growth both in the auto industry and throughout the U.S. economy. For example, our 2018 analysis found that auto parts suppliers, who at the time employed 2.6 times more Americans than automakers, would especially stand to lose under weakened standards; the supplier sector could have lost $20 billion in sales of clean vehicle technologies from 2021-2025 under the current rule. [EPA-HQ-OAR-2021-0208-0568-A1, p. 1]

Commenter: International Union, United Automobile, Aerospace & Agricultural Implement Workers of America (UAW)

We have learned from experience that strong standards based on broad input from key stakeholders can be good for the environment and autoworkers. Well-constructed regulations promote investment, establish certainty, create new jobs in vehicle production and advanced technology, and allow manufacturers the flexibility necessary to meet the standards. [EPA-HQ-OAR-2021-0208-0749-A1]

The auto industry is dynamic and complex, which requires flexible regulations and continual input from stakeholders. Over time, automakers have faced increasing challenges in adhering to emissions standards. And in recent years, we have seen how the auto industry can be impacted by a variety of factors, including consumer preference, fuel prices, global supply chains, and even public health. This is why the UAW has long held that emissions regulations must be responsive to conditions on the ground to ensure a robust domestic auto industry. [EPA-HQ-OAR-2021-0208-0749-A1, pp. 1-2]

The long-term health of the industry is critically important to both workers and the economy at large. A strong and vibrant industry is important for active UAW members who work in the auto industry and retirees who worked in the auto industry. Their ability to make a good living and retire in dignity is directly impacted by greenhouse gas standards. By extension, standards also impact their families and communities. UAW members continue to work on cutting-edge technology. We are proud to already be building the vehicles of the future, including hybrids, plugin hybrids, battery electric vehicles, autonomous vehicles, and increasingly efficient gasoline vehicles. The UAW represents workers at 26 final assembly plants in eight states building vehicles for a wide variety of applications – from sports cars to work-oriented pickups. Additionally, the UAW represents auto parts workers throughout the country making engines, transmissions, stampings, axles, drivelines, seats, interiors, and various other components. The domestic vehicle assembly and parts industries are vital to the nation's manufacturing base, and it is imperative that we stay strong and competitive now and into the future. [EPA-HQ-OAR-2021-0208-0749-A1, p. 2]

Commenter: Mass Comment Campaign sponsored by Center for Biological Diversity (77,692)

I urge you to write new long-term rules that: Promote justice and good electric-vehicle jobs. [EPA-HQ-OAR-2021-0208-0560-A1, p.1]

Commenter: Mass Comment Campaign sponsoring organization unknown-1 (7,010)

Stronger tailpipe emissions standards will improve the American economy along with our environment. Clean car manufacturing has the potential to bring high-quality automotive manufacturing back to the United States and provide well-paying jobs for workers. As President Biden has said many times, we have an historic opportunity to Build Back Better by putting our communities to work in the clean energy economy. [EPA-HQ-OAR-2021-0208-0545, p.1]

Commenter: National Coalition for Advanced Transportation (NCAT)

The growth in the electric vehicle industry has created jobs and will continue to do so. About 10% of the employees in the motor vehicles and component parts sector (including manufacturing, repair and maintenance, and professional services) work on alternative fuel vehicles.121 Component parts manufacturing employs nearly half a million people in jobs that work on increasing fuel economy in the United States.122 The domestic manufacturing of alternative fuels vehicles and hybrids grew from 2018 to 2019 in most technologies, with electric vehicles adding 6,200 manufacturing jobs. 123 The jump was even greater in 2020: electric and hybrid electric vehicle employment grew more than 6% from 2019, adding over 12,000 new jobs.124 This was the largest jobs increase of any clean energy category.125 One study found that the electric vehicle industry (defined broadly to include professional services, management, personal services, etc.) in California employed 275,600 people in 2018, and these jobs grew an average of 2.9% per year (2010-2018). 126 Securing America's Future Energy estimates that updating fuel economy standards and sustaining emission reductions over five years will lead to the creation of 60,378 new jobs nationwide.127 [EPA-HQ-OAR-2021-0208-0239-A1, p. 18-19]

Commenter: New Mexico Environment Department

In New Mexico, new jobs will be created to build the network to fuel the zero-emission vehicles. [EPA-HQ-OAR-2021-0208-0205-A1][p.2]

Commenter: New York State Department of Environmental Conservation

create jobs in the burgeoning clean vehicle sector. [EPA-HQ-OAR-2021-0208-0238-A1, p.3]

Commenter: Pien, Natalie

[The following comments were submitted as testimony at the virtual public hearing on August 26, 2021. See Hearing Testimony – 26Aug2021, p. 44.]

Additionally, Alternative 2 will complement President Biden's American Jobs Plan by creating distributed jobs installing charging stations nationwide.

Commenter: Securing America's Future Energy

The transition to EVs has significant economic implications. Part of the goal of established automakers, Tier 1 suppliers, and their host nations, is to retain the industry's contribution to their economy. Oftentimes, national income and employment, including in working-class communities, depend significantly on the auto industry. The manufacture of engines, transmissions, fuel systems, and exhaust systems in conventional vehicles, representing substantial value-added manufacturing and employment, will be replaced with the manufacture of batteries, electric motors, and power electronics. We must proactively work to retain these types of manufacturing jobs. The alternative would risk losing jobs to economies that are supporting a quicker and more thoughtful transition. [EPA-HQ-OAR-2021-0208-0527-A1, p. 2]

The Importance of Fuel Economy

Because electric powered transportation system is increasingly recognized as the technology of the future, a global competition has developed to stake a claim in the future of the auto industry, with countries around the world taking measures to encourage local investment to develop domestic electric vehicle (EV) supply chains. As reflected in pages 1 to 3 of Attachment 1 to these comments, which present analysis of the automotive sector prepared for SAFE, China and Europe are forecast to lead this race over the coming decade. Beijing, in particular, has worked to consolidate control of the important EV supply chains for more than a decade. Of the 200 lithium-ion battery gigafactories planned across the globe as of early 2021, for example, 148 are located in China and 21 are in Europe, while only 11 are in North America.4 The United States, clearly, is playing from behind. As a result, EVs are projected to account for roughly 30 percent of vehicles manufactured in China by 2030, more than three times as large a share as EPA forecasts in the United States. [EPA-HQ-OAR-2021-0208-0527-A1, pp.4-5] [Please refer to Attachment 1 at Docket number [EPA-HQ-OAR-2021-0208-0527-A1 pp. 18-26]]

As we navigate the transition to electrification, we must ensure that we do not swap our current dependence on an unstable oil market for reliance on China for our future transportation needs. Beijing has been working for over a decade to take commanding leadership on industries of emerging economic and strategic reliance, including electric vehicles. This has provided China with a tremendous comparative advantage, while threatening the U.S. automotive industry. How the EV supply chain develops over the coming years will have profound long-term implications for U.S. jobs, investment, technology leadership, and security of a major sector of the economy. As reflected in page 4 of the Attachment 1, if the entire EV supply chain is developed in the United States, for example, the number of jobs created in the EV industry can replace all jobs lost in parts related to internal combustion engine (ICE) vehicles.[5] If the United States remains complacent, we risk undermining the vibrancy and health of the domestic automobile industry. Although we are late to the competition, the nascency of the technology, still in the early stages of deployment, offers a chance for the United States to regain its leadership. An update to the fuel efficiency and GHG emissions standards can strengthen the case for private sector investment across the EV supply chain, and enable the EV market in the United States to grow more quickly. [Please refer to Attachment 1 at Docket number [EPA-HQ-OAR-2021-0208-0527-A1 pp. 18-26]]

EV Sales in the United States and Their Importance to U.S. Economic and National Security

Further, U.S. electric vehicle sales remain far behind those in China and Europe. In China and Europe, electric vehicles represent 7 and 7.6 percent of new vehicle sales respectively.[20] These rates represent far greater progress in these two giant auto markets towards electrification than we have achieved here in the United States. These sales are spurred by generous incentives for the purchase of electric vehicles, robust financial and policy support for their manufacture, and a better cost-effectiveness calculus as gasoline prices in Europe and China are greater than gasoline prices in the United States, making electric vehicles more cost competitive abroad.[21]

SAFE believes that it is important to accelerate the transition to electrification of transportation to protect our economy. Today, the transition to electrification appears inevitable. The primary questions are how fast or slowly it will occur, and which nations will secure positions of global leadership and power in the new transportation landscape. Central to China's efforts to secure its global position is consolidating control of the important supply chains for the future global transportation industry, from mineral extraction and processing, to electric vehicle battery and motor production, development of autonomous vehicles and 5G technology on which cars will communicate, the design and assembly of electric vehicles, and the deployment of charging infrastructure and battery storage. The United States is capable of competing against China and Europe in this competition and winning, but we are late to the game. As explained above, the sales of electric vehicles in the United States lags far behind China and Europe, and U.S.

automakers cannot be expected to make the required investments to accelerate the transition if the market does not develop for electric vehicles.

This global competition for leadership in electric vehicles matters because the automobile industry is the manufacturing backbone of the U.S. economy. It not only supports 10 million direct and indirect jobs, but accounts for more than three percent of GDP.22 Moreover, the industry has a highly skilled workforce that our nation has turned to in times of crisis. If such manufacturing capacity is lost, or severely degraded, it would not only threaten our economy and millions of jobs, but it could also undermine our capacity to innovate, with implications extending to the military and defense industry. As the United States awakens to these risks, we must adopt a long-term comprehensive strategy—from minerals to markets—that overcomes political discord in Washington. Using the regulatory powers of the federal government is an important tool in creating the demand for electric vehicles that are the engine of that transition, and SAFE believes that the GHG emission rule should be developed in a manner to accelerate this critical transition. [EPA-HQ-OAR-2021-0208-0527-A1, pp. 7-8]

Commenter: Trombetta, Nick

[The following comments were submitted as testimony at the virtual public hearing on August 26, 2021. See Hearing Testimony – 26Aug2021, p. 217.]

Furthermore, clean cars standards are a win for everyone, consumers, car manufacturers, and the environment. It will allow customers to more easily afford fuel efficient vehicles which are frequently more expensive than gas-guzzling alternatives. This will also spur greater innovation and guide car manufacturers in the correct direction, making it most profitable to invest in electric and hybrid vehicles instead of archaic cars and SUVs with poor gas mileage.

Essentially, we will be saving the car manufacturers from themselves and promoting their best interests down the line.

Commenter: Volkswagen Group of America, Inc. (Volkswagen)

Our greatest asset in helping to execute our electrification strategy is our people. The success of future electrification will be dependent on having an advanced workforce capable of developing, building and servicing the exciting new electrified vehicles Volkswagen will be bringing to the US market. Volkswagen has adopted proactive strategies in the US to help create the next generation of diverse and talented American autoworkers. We are investing in our people to ensure a sustainable future business and to help strengthen the communities in which our employees and customers live.

Electric vehicle technologies, along with other advanced connectivity and digitalization, will require an increasingly skilled and flexible future workforce. Programs like the Volkswagen Academy in Chattanooga, which is partnered with the Chattanooga State Community College, has established an apprenticeship program, which is aimed at developing next generation high-tech skills and career opportunities in the automotive sector. Apprentices in the program learn about mechatronics, robotics, electric vehicles, digitalization and other high-tech, high-demand job skills. As a testament to the success of the VW Academy apprenticeship program, Volkswagen won the inaugural Presidential Award for Workforce Development in 2020. Future production and servicing of electric vehicles in the US will need these jobs in order to be successful.

Furthermore, at our headquarters in Virginia, Volkswagen has collaborated with the Washington DC Urban League to start the Future Leaders in Mobility Program. This program introduces local high school students from minority school systems to the auto industry. In discussions led by our local leadership, the students get a behind the scenes look into the daily operations of a global auto manufacturer. Volkswagen uses this as an opportunity to encourage students to further their education and to excite them about future career prospects in the auto industry. America's automotive market is continuing to diversify with minority customers bringing more purchasing power to the market. Volkswagen recognizes and appreciates the power of diversity in our employees and the benefits this can bring in understanding and meeting the needs of our increasingly diverse customer base, and programs like the Future Leaders in Mobility helps build our talent pipeline. [EPA-HQ-OAR-2021-0208-0237-A1, p.5]

EPA Response

As discussed in Preamble Section VII.K. and RIA Chapter 8.2, EPA examines employment impacts specifically in the auto manufacturing and dealer sectors and estimates roughly a 2 percent increase in employment in those sectors. This approach is based on the costs of technologies, because labor is a part of those technology costs. The proportion of labor in technology costs is likely to change over time. EPA agrees that, by focusing on employment in the regulated sector, we may underestimate the employment impacts associated with the standards by not addressing increased employment associated with growing production of EVs, such as development of charging infrastructure or materials supply chains specific to EV components. We have also not fully examined shifts in employment associated with the transition from gasoline vehicles to EVs, nor have we conducted a geographic analysis of these impacts. As discussed in those sections, EPA has focused on the regulated sector because wider economic impacts depend on the state of the macroeconomy, which are difficult to predict. In addition, it is difficult to predict changes in where production may locate, and how much current automotive employees will transition into EV production. EPA agrees that developing supply chains within the U.S. would both provide additional employment in those sectors and improve the U.S. position to compete in world markets. Further, EPA agrees that developing EVs domestically will help the domestic auto industry to maintain and improve its competitive position in world markets, and thus to continue employment opportunities in the automotive sector.

23. Environmental Justice

Commenters Included in this Section

Alliance of Nurses for Health Environments
American Council for an Energy-Efficient Economy (ACEEE)
American Lung Association
Asthma and Allergy Foundation of America (AAFA)
Bay Area Air Quality Management District
Begley, Amanda
Blue Green Alliance
California Air Resources Board (CARB)
California Attorney General Office, et al.
Caudill, Gregory
Center for Biological Diversity, et al.
Chicago Metropolitan Agency for Planning
City of Albuquerque, NM
City of San Antonio, Texas
Climate Group EV100
Collins, Molly
Connecticut Department of Energy and Environmental Protection
Cooper, Almeta
Dang, Vinh
Davis, Darien
District of Columbia Department of Energy and Environment
Dream Corp Green for All
Dream Corps Green for All et al.
Elders Climate Action (ECA)
Energy Innovation Policy and Technology LLC
Environmental Defense Fund (EDF)
Environmental Protection Network (EPN)
Filippelli, Garbirel
Gersten, Dana
Gillet, Victoria
GreenLatinos
High Octane-Low Carbon Fuel Alliance (HOLC)
Institute for Policy Integrity
Klein, Stephanie
Manufacturers of Emission Controls Association (MECA)
Marcot, Nicole
Mass Comment Campaign sponsored by Center for Biological Diversity (77,692)
Mass Comment Campaign sponsored by Interfaith Power and Light et al. (1,599)
Mass Comment Campaign sponsored by National Religious Partnership for the Environment-GA (563)

Mass Comment Campaign sponsored by National Religious Partnership for the Environment-MN (92)
Mass Comment Campaign sponsored by National Religious Partnership for the Environment-PA (142)
Mass Comment Campaign sponsoring organization unknown-1 (7,010)
Metropolitan Washington Air Quality Committee (MWAQC)
Mid-America Regional Council (MARC)
Minnesota Pollution Control Agency (MPCA) and Minnesota Department of Transportation (MnDOT)
Moore, Cinthia
Moore, Kenneth
Muller, Melinda
National Association of Clean Air Agencies (NACAA)
National Coalition for Advanced Transportation (NCAT)
National Parks Conservation Association (NPCA)
Nebraska Ethanol Board (NEB)
Oliver, Shaina
Pien, Natalie
Richards, Claire
Sabetta, Tracy
Sainz, Columba
San Joaquin Valley Air Pollution Control District
Scholar, Reverend
Smith, Rita L.
South Coast Air Quality Management District
Southern Environmental Law Center
Spencer, Sam
Spirit of the Sun
Sturza, Taisia
Terwilliger, Phyllis
Tesla
Trombetta, Nick
UGA Climate and Society Club
Union of Concerned Scientists (UCS)
United Methodist Women
Valero Energy Corporation (Valero)
Verdin, Langston
Zero Emission Transportation Association (ZETA) and EVHybridNoire (EVHN)
Zewadski-Bricker, Edith

Commenter: Alliance of Nurses for Health Environments

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, p. 22.]

The Administration has also expressed its priority of promoting environmental justice. Communities of color and low-income communities are disproportionately exposed and harmed by exposure to air pollution, including pollution from the transportation sector. Clean air pollution from this sector is a critical step in achieving that priority.

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

These impacts are particularly bad in low-income communities and communities of color, which bear a disproportionate air pollution burden (American Lung Association 2020). [EPA-HQ-OAR-2021-0208-0251-A1, p.2]

Commenter: American Lung Association

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, pp.17-18]

Air pollution is a major threat to public health and air pollution discriminates against black and brown communities and low-income communities.

Our report also found that people of color are much more likely to live in counties with failing grades for air pollution than white Americans.

We know that people who live near roadways and oil and gas operations, including refineries, bear a disproportionate burden of air pollution and that climate change is making that pollution worse.

Commenter: Asthma and Allergy Foundation of America (AAFA)

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, pp. 216-217.]

Measures to reduce vehicle emissions will address the burden of air pollution on two fronts. First, the populations near highways will benefit from reduced pollution in their immediate outdoor environments and, second, other communities will benefit from the upstream pollution reductions associated with the extraction, transportation, and refinement of petroleum products.

As we know, the communities most impacted on both fronts are disproportionately low-income, largely racial and ethnic minority populations, making this proposal an environmental justice imperative.

We support clean and safe air for everyone bur especially for vulnerable populations, like those with asthma and other chronic respiratory diseases. EPA's proposal is a good start to addressing the previous Administration's rollbacks but that's just it. It's a start.

Commenter: Bay Area Air Quality Management District

Moreover, innovation-inducing regulations are also an important tool to help better protect communities that suffer from climate change and localized air pollution more than others. A recent report by EPA found that socially vulnerable populations, already disproportionately burdened, may also be more exposed to the highest impacts of climate change.[1] Without strong greenhouse gas standards, it is inevitable that these community-level challenges will worsen, further jeopardizing public health. [EPA-HQ-OAR-2021-0208-0283-A1, p.3]

As the Bay Area Air District strives to make progress to address disparate air pollution impacts that can harm local communities, particularly low income and communities of color in the San Francisco Bay Area, it is essential that efforts to control pollution and foster clean technologies proceed. [EPA-HQ-OAR-2021-0208-0283-A1, p.3]

Commenter: Begley, Amanda

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, p. 248.]

The environmental justice concerns of this are immense. Our communities of color suffer from higher rates of asthma and respiratory disease.

Commenter: Blue Green Alliance

[The following comments were submitted as testimony at the virtual public hearing on August 26, 2021. See Hearing Testimony – 26Aug2021, pp. 91-92.]

In the transportation sector, which accounts for nearly 30 percent of U.S. greenhouse gas emissions, this intersection is visible in the disproportionate impact of vehicle emissions on low-income and non-white communities.

Commenter: California Air Resources Board (CARB)

America's most vulnerable communities, especially in California, face very serious public health and economic threats without swift action. [EPA-HQ-OAR-2021-0208-0643-A6, p.6]

Reducing this pollution will deliver a range of important public health benefits, especially for communities that have been disproportionately impacted by pollution. [EPA-HQ-OAR-2021-0208-0643-A6, pp. 8-9]

Stringent Standards Will Reduce Disparate Pollution Impacts.

U.S. EPA's proposal acknowledges the pollution disparities faced by communities with EJ concerns generally.24 CARB appreciates U.S. EPA's review of disproportionate emission impacts faced by minority and low-income communities. While comprehensive air quality and health risk modeling is critical to fully understanding the impacts of the proposal on impacted populations, proximity to emissions sources is a useful indicator of potential exposure and a reasonable screening metric to emphasize and evaluate the disproportionate impacts faced by communities near roadways and the property lines of stationary sources whose operations may be affected by the proposal, like petroleum refineries. In many over-burdened communities, the pollution and public health impacts from on-road vehicle emissions are especially significant and greater than in other communities. These impacts are often compounded by the congregation of nearby industrial sources, including upstream, mid-stream, and downstream fuel production sources. Recognizing and underscoring the cumulative effects of socio-economic and environmental burdens in these communities is a critical first step. [EPA-HQ-OAR-2021-0208-0643-A6, pp. 14-15]

The Los Angeles Area Illustrates the Importance of Stringent Standards

The community of Wilmington, Carson, and West Long Beach in the greater Los Angeles region is an example of an overburdened community. It is impacted by a variety of sources including freight, freeway traffic, port and rail operations, oil and gas production, and five petroleum refineries – petroleum refining and related activities are one of the major sources of emissions in this region. Major freeways bisecting the community include California Highways 1, 47, 91, and 60, and Interstates 110, 405, and 710, resulting in six major freeway junctions and increased pollution exposures for the populations living and working in this community as compared to Los Angeles County as a whole. With more than 40 miles of freeways within its approximately 48 square mile community boundary area and an aggregation of major industrial sources25 (Figure 1), on-road vehicle and industrial emissions are a significant contributor to the community's air pollution exposure, and its population shows a greater degree of health impacts from air pollution than other California communities. The community has a high cumulative air pollution exposure burden, a significant number of sensitive receptors, and includes census tracts that have been designated as disadvantaged communities by California law.26 [EPA-HQ-OAR-2021-0208-0643-A6, p.15] [Figure 1 can be found at docket number EPA-HQ-OAR-2021-0208-0643-A6, p. 16]

Based on the 2018 American Community Survey (ACS) data from the Census Bureau,27 more than 310,600 people live within the Wilmington, Carson, West Long Beach community boundary. Approximately 67 percent of the population in this community is Latino and African American compared to a statewide average of 44 percent (Figure 2), nearly 13 percent are children under the age of 10 years, and 13 percent of the population is elderly (over the age of 65 years) (Figure 3). These population characteristics are important indicators of disparities in existing pollution burden, exposure to air pollution, and health vulnerabilities - especially for children and the elderly. [EPA-HQ-OAR-2021-0208-0643-A6, p.16] [Figure 2 and 3 can be found at docket number EPA-HQ-OAR-2021-0208-0643-A6, p. 17]

Certain groups of the general population are more vulnerable to air pollution by virtue of their age and health, including children, elderly, pregnant women, and health compromised individuals. Places where these sensitive populations gather, called sensitive receptor locations, can include schools, day-care providers, hospitals, nursing homes, and senior care facilities. There are numerous sensitive receptor locations in the Wilmington, Carson, West Long Beach community, including 83 schools, 110 licensed daycare facilities, and 53 healthcare facilities including hospitals, nursing homes and dialysis and community clinics and they are concentrated along the major freeway routes. (Figure 4). [EPA-HQ-OAR-2021-0208-0643-A6, p.17] [Figure 4 can be found at docket number EPA-HQ-OAR-2021-0208-0643-A6, p. 18]

Most of the census tracts in this community are considered disadvantaged under California law.29 Approximately 80 percent of the census tracts in this community are in the top 25 percent (75-100th percentile) of the Draft CalEnviroScreen 4.030 (CES) scores within the State (Figure 5). The California Office of Environmental Health Hazard Assessment's (OEHHA) CES is a screening method that can be used to help identify California communities that are disproportionately burdened by multiple sources of pollution. [EPA-HQ-OAR-2021-0208-0643-A6, pp. 18-19] [Figure 5, which can be found at docket number EPA-HQ-OAR-2021-0208-0643-A6, p. 19]

Figure 6 compares the average scores for exposure (e.g., ozone, PM2.5, diesel PM, traffic impacts), health status (asthma, cardiovascular disease, low birth weight), and socio-economic (education, linguistic isolation, poverty, unemployment, and housing burden) indicators in the community against statewide averages - the community scores for these key indicators are generally higher compared to the statewide averages. [EPA-HQ-OAR-2021-0208-0643-A6, p.19] [Figure 6 can be found at docket number EPA-HQ-OAR-2021-0208-0643-A6, p. 20]

The indicators discussed above explain the disparate effects of air pollution faced by many communities in California, which extends to numerous other communities across the nation. Figure 7 presents the average scores for PM2.5 concentrations and diesel PM emissions relative to statewide averages for a few communities across the State; vehicle emissions contribute predominantly to the particulate matter and diesel PM impacts in these communities. The chart includes asthma related emergency room visits and linguistic isolation (i.e., limited English speaking) as proxies for demographic and socio-economic disadvantages faced by these communities. [EPA-HQ-OAR-2021-0208-0643-A6, p.20] [Figure 7 can be found at docket number EPA-HQ-OAR-2021-0208-0643-A6, p. 21]

Existing scientific literature conclusively links air pollution to adverse health outcomes, including pre-mature mortality, and the disproportionate pollution and health burden on poor and socially disadvantaged communities. OEHHA's draft CES 4.0 report provides an exhaustive review of existing literature connecting each of the indicators used in the CES method to pollution burden and population sensitivities.32 A 2019 CARB research study revealed on-road vehicles and industrial activity to be the top two sources of exposure in California, each contributing to 24 percent of the total PM2.5 exposure, and disproportionately impacting non-white and low-income populations.33

Additionally, several occupational studies of refineries, petroleum storage, and distribution facilities have found that benzene exposure can increase the risk of hematological malignancies (i.e., cancers affecting the blood, bone marrow, lymph, and lymphatic system) among workers, even at low daily concentrations below 0.1 ppm. Hazardous releases from these facilities are also believed to increase the risk of cancer incidences in fence line communities.34 The research report 'A systematic review and meta-analysis of hematological malignancies in residents living near petrochemical facilities' referenced 16 studies that recorded the incidences of hematological malignancies across 187,585 residents living within five kilometers of petrochemical sites (upstream, midstream and downstream), across varied geographical locations, between 1960 and 2011. Findings showed that those living within five kilometers of a petrochemical facility have a 30% higher risk of developing leukemia than residents from communities with no petrochemical activity.

The 2019 report 'Chemical exposures, health and environmental justice in communities living on the fenceline of industry' compared emergency department visits and hospital admissions 4 weeks after and 4 weeks prior to the 2012 major chemical release event at the Chevron refinery in Richmond, California. Results showed a 3.7-fold increase in the number of people seeking care at emergency departments within the zip codes closest to the refinery. The visits were for treatment of sensory/nervous system conditions (migraine headaches, eye conditions, and dizziness), asthma, upper and lower respiratory conditions, and chest pain.35

Research has also shown that refineries are more likely to be located in low-income communities of color who likely experience greater social stressors that may make them more vulnerable than others to the health impacts of such exposure. This is presented in the 2017 report, 'Fumes Across the Fence-Line the Health Impacts of Air Pollution from Oil & Gas Facilities on African American Communities.' The report discussed a case study based out of the City of Richmond, which houses five petroleum refineries within a condensed region. The case study presents the fact that residents of color disproportionately live near the refineries and chemical plants and acknowledges that while there have been many strides to clean up these major sources of air pollution, health impacts in the region, including cancer rates, are still disproportionately high.36

In conclusion, many overburdened communities experience significantly higher levels of both regional and near-source air pollution; and the demographic and socio-economic characteristics of these communities exacerbate their susceptibility and vulnerability to the adverse effects of air pollution. The Wilmington, Carson, Long Beach community is just one example of many such communities across the nation that bear the consequences of multiple sources of air pollution. For these fence-line communities, reducing emissions from concentrated mobile and stationary sources is a priority. [EPA-HQ-OAR-2021-0208-0643-A6, pp. 21-23]

Stringent Standards Redress Disparate Impacts of Pollution.

Environmental equity means that no group or community bears a larger, unfair share of harmful effects from pollution or environmental hazards, or the equitable distribution of environmental benefits and burdens. The people suffering the impacts of social, economic, and environmental burdens are also often those closest to the solutions. Continual, meaningful engagement and capacity building within priority communities is key to ensuring that regulatory measures provide direct and assured benefits to those most impacted by poor air quality and lack of access to clean mobility and high-road jobs.

Achieving environmental justice is about recognizing past injustices and taking steps to address them and avoid their proliferation. Historic policies, like redlining, forced certain communities to be nearer highways, trains, factories, and other major pollutant-emitting sources. To remedy the continuing impacts, environmental equity considerations and specific principles, such as community inclusion and collaborative decision making, must be embedded in governmental decision-making from the inception.

Federal authorities and both longstanding and recent Presidential Executive Orders (E.O.) underscore the necessity of environmental justice and increasing environmental equity through federal actions. Title VI of the Civil Rights Act of 1964 prohibits discrimination based on race, color, or national origin by programs and activities that receive federal assistance.38 E.O. 12898, 'Federal Actions To Address Environmental Justice in Minority Populations and Low-Income Populations,' directs 'each Federal agency [to] make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations[.]

President Biden has issued several E.O.s that underscore the need to remedy environmental inequity and direct the federal government to prioritize environmental justice. E.O. 14008, 'Tackling the Climate Crisis at Home and Abroad,' provides, 'Agencies shall make achieving environmental justice part of their missions by developing programs, policies, and activities to address the disproportionately high and adverse human health, environmental, climate-related and other cumulative impacts on disadvantaged communities[.]' It establishes a White House Environmental Justice Interagency Council and directs EPA to 'strengthen enforcement of environmental violations with disproportionate impact on underserved communities' and create a community notification program. Perhaps most significantly, it creates a government-wide 'Justice40 Initiative,' establishing a goal that 40 percent of the overall benefits of relevant federal funding flow to disadvantaged communities.

E.O. 14030 directs the federal government to take action on climate-related financial risk 'while accounting for and addressing disparate impacts on disadvantaged communities and communities of color' and using climate finance to advance 'environmental mitigation, especially in disadvantaged communities and communities of color[.]'43 E.O. 13985, 'Advancing Racial Equity and Support for Underserved Communities Through the Federal Government,' acknowledges, 'Our country faces converging economic, health, and climate crises that have exposed and exacerbated inequities,' and directs the federal government to 'pursue a comprehensive approach to advancing equity for all, including people of color and others who have been historically underserved, marginalized, and adversely affected by persistent poverty and inequality.' U.S. EPA should act within its statutory authority consistent with these further obligations, which it plainly has discretion to do. Indeed, it would be improper for it to overlook these considerations, given the clear evidence of public health needs in many communities these authorities require it to serve. The Clean Air Act's core public health mandates are entirely consistent with setting standards stringently enough to ameliorate public health concerns in these communities.

Such action would also help California meet its own public health obligations – an important consideration in light of the Act's direction to U.S. EPA to partner with states to improve public health. Similar to the EPA definition of environmental justice, 45 California state law defines environmental justice as ‘the fair treatment and meaningful involvement of people of all races, cultures, and incomes with respect to the development, adoption, implementation, and enforcement of environmental laws, regulations, and policies.’46 Equity is one of CARB’s core values and fundamental to achieving its mission.47 CARB offers the following comments about its efforts in this regard for U.S. EPA to consider in meeting its obligations and demonstrate the importance of these efforts.

The Board approved its Environmental Justice Policies and Actions in 2001 to establish a framework for incorporating environmental justice into CARB's programs consistent with state law. These policies and actions apply to all communities in California but are intended to address the disproportionate environmental exposure burden borne by low-income communities and communities of color. Most recently, on October 22, 2020, the California Air Resources Board adopted Resolution 20-33 'A Commitment to Racial Equity and Social Justice.’

As defined in California’s Zero-Emission Vehicle Market Development Strategy, priority communities include neighborhoods of California that disproportionately suffer from historic environmental, health, and other social burdens.48 These burdens include, but are not limited to, air and water pollution, presence of hazardous wastes, poverty, high unemployment, inadequate access to educational resources and training opportunities to secure high-road jobs, and high incidence of asthma, heart disease, and other chronic illnesses. Priority communities include disadvantaged communities, low-income communities, and underserved communities, which are terms defined in many of California’s statutes and regulations.49 Due to historic discrimination, these communities often include households with people of color, low-wealth status, working families, immigrants, seniors, people with disabilities, California Native American Tribes, and others who have limited awareness of or access to clean mobility options and who are more likely to bear disproportionate impacts of climate change. 56

As EPA has noted, environmental justice populations of concern are especially vulnerable to the economic impacts and health burdens associated with climate change effects.57 58 59 60 61 62 63 64 65 Racial and ethnic minority communities are particularly vulnerable to the greatest impacts of climate change. 66 67 Climate change increasingly impacts places, foods, and lifestyles of American Indians. In Alaska—home to 40 percent of federally recognized tribes—reduced sea ice and warming temperatures threaten traditional livelihoods and critical infrastructure. 68 69 70 71 72 Furthermore, a new US EPA analysis, Climate Change and Social Vulnerability in the United States: A Focus on Six Impact Sectors, also indicates that the most severe harms from climate change fall disproportionately upon underserved communities who are least able to prepare for and recover from associated impacts.

Reducing transportation emissions is critical in meeting health-based air quality standards and reducing the risk of dangerous climate change, especially in areas that most vulnerable and have been disproportionately impacted. As discussed above, more stringent pollution control standards are likely to deliver greater health benefits to the communities that suffer the most from pollution from motor vehicles and the fossil fuels that power them. [EPA-HQ-OAR-2021-0208-0643-A6, pp. 23-27]

38 § 601, 42 U.S.C. § 2000d et seq. (‘No person in the United States shall, on the ground of race, color, or national origin, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any program or activity receiving Federal financial assistance.’). But see Alexander v. Sandoval, 532 U.S. 275 (2001) (private right of action to enforce § 601 is limited to intentional discrimination).

56 Rural communities are highly dependent upon natural resources that are affected by climate change. These communities also face obstacles in responding to climate change that increase their vulnerability to its impacts. See IPCC, Third National Climate Assessment, https://nca2014.globalchange.gov/highlights/regions/rural-communities

Commenter: California Attorney General Office, et al.

Socially-vulnerable populations—including children, the elderly, low income, and minority populations—experience greater impacts from higher temperatures.15 For instance, ‘the average person of color lives in a census tract with higher summer daytime surface urban heat island (SUHI) intensity than non-Hispanic whites in all but 6 of the 175 largest urbanized areas in the continental United States.’16 [EPA-HQ-OAR-2021-0208-0245-A1, p,4]

And, as with rising average temperatures, the effects of extreme heat are not evenly distributed: ‘Black and African American individuals are 40% more likely than non- Black and non-African American individuals to live in areas with the highest projected increases in extreme temperature related mortality with 2°C of global warming.’68 ‘With 4°C of global warming, this estimate increases to 59%.’69 [EPA-HQ-OAR-2021-0208-0245-A1, p.10]

In Philadelphia, for example, some of the most polluted areas are along major highways or zones with heavy traffic, and the most polluted zip codes also have the largest number of lung cancer patients.87 [EPA-HQ-OAR-2021-0208-0245-A1, p.12]

The projected short- and long-term impacts of EPA’s proposed standards are likely to be magnified in communities with higher percentages of Black, Asian American, and Latinx residents because refineries and other upstream sources of emissions, as well as major roadways, are often located in those communities.90 In the Northeast and Mid-Atlantic Region, average concentrations of exposures to PM2.5 are 75%, 73%, and 61% higher for Latinx residents, Asian-American residents, and African American residents, respectively, than they are for white residents.91 PM2.5 and NO2 concentrations are also highest for Black and Latinx communities in Massachusetts, in part because of their proximity to industrial facilities and highways, and these concentrations have increased over time even though overall exposure to those pollutants has decreased in the Commonwealth.92 [EPA-HQ-OAR-2021-0208-0245-A1, p.13]

More stringent standards will reduce the air pollution dangers faced by communities near refineries and roadways

Decreasing the criteria pollution and benzene and other hazardous air emissions associated with refining—as more stringent standards will do, 86 Fed. Reg. at 43,779, 43,790-91, 43,802—will benefit communities proximate to refineries. Nearly 700,000 people live within three miles of the seventeen refineries that reported actual annual benzene fenceline concentrations in 2020 above the level set by EPA that requires the refinery to take action to clean up emissions. Of these 700,000 people, 62% are African-American, Hispanic, Asian/Pacific Islander, or American Indian residents, and nearly 45% have incomes below the poverty level.119 The City of Richmond, California, with five petroleum refineries nearby and residents facing disproportionately high rates of cancer and other health impacts from air pollution, serves as a localized example of these national trends. See CARB Comments at 22-23.

Communities near major roadways will also benefit greatly from even slight improvements in air quality. EPA has long acknowledged that people living, working, and attending school near major roadways face greater air pollution exposure. 77 Fed. Reg. 62,624, 62,907 (Oct. 15, 2012); 75 Fed. Reg. 25,324, 25,504 (May 7, 2010). The pollution and public health impacts from on-road vehicle emissions are especially significant and greater in disadvantaged communities.120 For example, the community of Wilmington, Carson, and West Long Beach in Los Angeles, California is affected by six major freeway junctions, as well as freight, port, and rail operations, oil and gas production, and five petroleum refineries. CARB Comments at 15. A majority of this community is considered disadvantaged under California law, scoring higher than the state average on key indicators of vulnerability, including criteria pollutant exposure, health status, and socio-economic criteria. [EPA-HQ-OAR-2021-0208-0245-A1, pp.23-24]

5 See U.S. Environmental Protection Agency, Climate Change and Social Vulnerability in the United States: A Focus on Six Impacts 32-36 (2021), available at www.epa.gov/cira/social-vulnerability-report; U.S. Global Change Research Program, supra note 14, at 45; Angel Hsu et al., Disproportionate exposure to urban heat island intensity across major U.S. cities, Nature Communications 8 (2021), available at https://doi.org/10.1038/s41467-021-22799-5 ('Currently disadvantaged groups suffer more from greater heat exposure that can further exacerbate existing inequities in health outcomes and associated economic burdens, leaving them with fewer resources to adapt to increasing temperature.').

Commenter: Caudill, Gregory

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, p. 312.]

Additionally, we are failing our low-wealth and people of color communities by not achieving environmental justice to mitigate the impact that climate change is causing.

Commenter: Center for Biological Diversity, et al.

Stronger GHG Standards Promote Environmental Justice and Equity.

EPA's Proposal will provide benefits to environmental justice communities by reducing harm from climate change and pollution exposure, and Alternative 2 plus would bring even greater benefits to vulnerable populations that suffer the brunt of pollution and climate change harms.

EPA appropriately recognizes that environmental justice communities are disproportionately affected by climate change and pollution impacts related to light duty vehicles and upstream emissions, and addressing these harms by providing these communities relief more quickly—a priority for this Administration—is another compelling reason that EPA should adopt Alternative 2 plus.

More Stringent Standards Would Bring Greater Benefits to Environmental Justice Communities.

Reduction in greenhouse gas emissions would bring climate change benefits to environmental justice communities.

Reducing greenhouse gas emissions from light duty vehicles will help reduce the significant harm that climate change inflicts on environmental justice communities. By 2050 the Proposed Standards would reduce CO2 by 1.2 billion metric tons compared to the status quo, Proposal, 86 Fed. Reg. at 43,778, and EPA's calculations show the Proposal would produce climate benefits of $91 billion in 2018 dollars by 2050. DRIA at 3-39, Tbl. 3-14 (using a 3 % discount rate). Adopting Alternative 2, increasing the stringency by 10 g/mile in MY2025, and/or eliminating some credits would bring even more climate change benefits to environmental justice communities. See supra section 1.b (EPA must adopt stronger standards than its preferred alternative). As compared to the Proposal, by 2050 Alternative 2 will achieve an additional 293 MMT of CO2 savings (110 MMT of upstream CO2 and 183 MMT of tailpipe CO2) and increasing climate benefits by $9 billion. See Section 1.b, supra.

These reductions are significant on a national and global scale because greenhouse gas emissions from cars are a consequential portion of national and also international greenhouse gas emissions. Emissions from the transportation sector are the largest source (29%) of greenhouse gas in the country, and light duty vehicles are the largest portion of that, contributing 17 percent of all United States' greenhouse gas emissions. Proposal, 86 Fed. Reg. at 43,779. The United States is responsible for a large portion - approximately 15% - of global CO2 emissions, and is the second largest emitter in the world.156 Reducing greenhouse gas emissions from light duty vehicles is therefore one of the most consequential steps, EPA - or the United States - can take to mitigate climate change harm. And, as the Supreme Court found in Massachusetts v. EPA, "A reduction in domestic emissions would slow the pace of global emissions increases, no matter what happens elsewhere." 549 U.S. 497, 500 (2007).

Reducing climate harm will benefit environmental justice communities because, as EPA has aptly described, climate change disproportionately affects these communities. Proposal, 86 Fed. Reg. at 43,800. EPA recognized in the 2009 Endangerment Finding that vulnerable populations including economically and socially disadvantaged communities and Indigenous or minority populations are especially vulnerable to climate change. Id. Reports from the U.S. and international climate bodies over the last decade add evidence to the conclusion that climate change disproportionately impacts environmental justice communities including by "altering exposures to heat waves, floods, droughts, and other extreme events; vector-, food- and waterborne infectious diseases; changes in the quality and safety of air, food, and water; and stresses to mental health and well-being.'' Id. Notably the 2016 scientific assessment on the

Impacts of Climate Change on Human Health predicts people of color will suffer a disproportionate impact of climate exacerbations of air pollution. Id. at 43,801. It also describes unique vulnerabilities of Native American communities because of expected impacts to their cultural resources, customs and to traditional subsistence lifestyles, including expected decrease in food security for Alaskan Indigenous Peoples. Id.

Since the publication of EPA's Proposal, EPA published an important new analysis of the disproportionate climate impacts on vulnerable populations. The study quantifies the increased risks of climate change on socially vulnerable populations in six categories: Air Quality and Health; Extreme Temperature and Health; Extreme Temperature and Labor; Coastal Flooding and Traffic; Coastal Flooding and Property; and Inland Flooding and Property, using data on where people live as an indicator of exposure.157 The report concludes that Black and African American individuals will likely face higher impacts of climate change for all six impacts analyzed compared to all other demographic groups. Black and African Americans are 40% more likely to live in communities with the highest increase in premature mortality from extreme temperatures, and 34% are more likely to live in areas with the highest increases in asthma diagnoses with 2°C (3.6°F) of global warming.158 Hispanic and Latinos are also significantly more likely to live in areas where impacts are projected to be highest.159 Lowincome individuals and those without a high school diploma have 25-26% greater risk of living in areas with the highest extreme temperature labor hours lost.160

And as we witness time and again with each unfolding disaster, the most vulnerable populations suffer from climate change fueled extreme events. Taking recent events in this country as illustrative examples, it is economically disadvantaged, low-wage outdoor workers, homeless and elderly people who died from heat stroke in the Northwest heat wave,161 an event that researchers found would have been "virtually impossible without human-caused climate change."162 In New Orleans, the people who could not evacuate before disastrous Hurricanes Katrina or Ida struck land are those who do not have the means or ability to.163 In New York City, people who could only afford to live in illegal basement apartments died as a result of the flooding.164 During the western wildfire season, those without homes or means do not have the luxury of filtered air to protect their lungs.165 To help address the urgency of the climate crisis on vulnerable populations, EPA must adopt the more stringent Alternative 2 plus.

Significant decreases in vehicle and upstream non-GHG emissions over time will provide benefits to environmental justice communities.

In addition to GHG reductions, the Proposal will reduce tailpipe emissions over time as well as upstream emissions from refineries, Proposal, 86 Fed. Reg. at 43,779, both of which will benefit environmental justice communities. Id. at 43,802. Alternative 2 would result in increased health benefits from reduced emissions and exposure to pollutants of at least $7.2 billion,166 and adding 10 g/mile to Alternative 2 would bring even greater benefits.167 Importantly, the new standards will be a necessary stepping stone for the next phase of standards where EPA "expects that [air] impacts may be considerably larger." Proposal, 86 Fed. Reg. at 43,781. EPA should adopt Alternative 2 plus to bring more relief more quickly to environmental justice communities.

Notably, the immediate benefits more stringent standards will provide from reductions in upstream refining and over time from tailpipes vastly outweigh any potentially small nonGHG emissions increases from rebound driving and upstream electric generation. See Proposal, 86 Fed. Reg. at 43,802. By one measure, reducing refinery emissions may be more beneficial to environmental justice communities as a whole than reducing emissions from electric generation. EPA has concluded that refineries have far higher health benefits per ton of emission reductions than do electric generating units due in part to greater proximity to population.168

EPA correctly concludes that environmental justice communities are disproportionately harmed by the non-GHG emissions associated with this Proposal. Proposal, 86 Fed. Reg. at 43,802. As EPA recognizes, PM2.5 disproportionately harms people of color. Id. And the agency recognizes that higher percentages of communities of color and low-income communities live near electric generating units and refineries, and live or attend school near major roadways, suffering the largest share of their emissions and adverse health impacts. Id. EPA should, however, strengthen its statement that "Vulnerable populations near upstream refineries may experience potential disparities in pollution-related health risk from that source." Id. (emphasis added). The study of socioeconomic factors near refineries cited by EPA itself concludes that "Minority and African American percentages are approximately twice as high as nationwide percentages" for cancer risk as a result of petroleum refineries emissions.169 That study alone is enough evidence to warrant a conclusion that such populations do experience disparities in health risk. For further evidence, please see NGO coalition comments on Proposed SAFE Vehicles Rule for Model Years 2021-2026.170 [EPA-HQ-OAR-2021-0208-0651-A1, p. 69-73]

Upstream electric generation emissions will continue to decrease as clean energy generation continues to increase and fossil fuel sources shut down.

As EPA recognizes, although increasing stringency of the standards may result in small increases in upstream emissions from electric generating units that disproportionately harm environmental justice communities in the near term, these impacts will decrease over time as clean energy generation continues to increase. Proposal, 86 Fed. Reg. at 43,802. We encourage EPA to consider the expected impacts of its clean energy and power plant policies and rulemakings as it evaluates the environmental justice implications of non-GHG emissions in future rulemaking. See Proposal, 86 Fed. Reg. at 43,803.

President Biden's Climate Executive Order 14008 commits to achieve a carbon-free electricity sector no later than 2035, and to "deploy the full capacity of its agencies to combat the climate crisis to implement a Government-wide approach that reduces climate pollution in every sector of the economy; . . . and spurs well-paying union jobs and economic growth, especially through innovation, commercialization, and deployment of clean energy technologies and infrastructure."171

Relatedly, EPA is or soon will be reconsidering at least two major rules regarding electric generating units that may further increase the already-comparatively expensive operating costs of coal plants. EPA is reconsidering revised CO2 standards for existing fossil fuel-fired power plants under Clean Air Act section 111(d) after the Court of Appeals for the D.C. Circuit's remand in Am. Lung Ass'n v. EPA. 985 F.3d 914, 995 (D.C. Cir. 2021) (holding that "the ACE Rule must be vacated and remanded to the EPA so that the Agency may 'consider the question afresh in light of the ambiguity we see.'"). Continued operation of coal-fired power plants may also be affected by EPA's review of the Mercury and Air Toxics Standards hazardous air pollutant rules172 and possibly the national ambient air quality standards for PM2.5.

Even without new policies and rules requiring coal plants to internalize pollution costs, clean energy generation continues to increase while fossil fuel use is declining. The cost of clean energy generation technologies has fallen dramatically over the previous decade and is increasingly below the cost of conventional fossil fuel generation.173 The U.S. Energy Information Administration has predicted that electricity generation from renewable sources will soon surpass coal and will continue to rapidly increase in share of U.S. electricity generation.174

Commenter: Chicago Metropolitan Agency for Planning

Enacting the proposed rule would also lower emissions of other pollutants, resulting in better public health, especially among our environmental justice and vulnerable communities. [EPA-HQ-OAR-2021-0208-0219-A1, p.2]

Commenter: City of Albuquerque, NM

Low-income communities of color suffer increased exposure to air pollution, especially along roadways,[6] and asthma disproportionally impacts these communities.[7] For these reasons, the City supports EPA's Proposed Emission Standards to help protect our local vulnerable communities which experience disparate health outcomes.

Commenter: City of San Antonio, Texas

While climate change is addressed through the mention of impacts on vulnerable populations such as children as stated in the Fourth National Climate Assessment (2018) and The Impacts of Climate Change on Human Health in the United States (2016), there is a need for additional impact analysis on these populations within this proposed revision. Therefore, the City of San Antonio also recommends a comprehensive study into health equity and environmental justice impacts on marginalized populations. [EPA-HQ-OAR-2021-0208-0236-A1, p.1]

Commenter: Climate Group EV100

Removing complex credit schemes and loopholes will drive automakers to accelerate vehicle emission improvements and significantly boost the EV market beyond existing automaker plans. By implementing the strongest possible clean car standards, President Biden would follow through on his commitment to environmental justice and address key health impacts in low-income and BIPOC (Black, Indigenous, People of Color) communities that experience disproportionate harm from dirty vehicle pollution. [EPA-HQ-OAR-2021-0208-0200-A1, p. 1]

Commenter: Collins, Molly

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, pp. 231-232.]

It's past time we take action and start to meaningfully work towards environmental justice.

Commenter: Connecticut Department of Energy and Environmental Protection

Additionally, EPA and the federal government need to adopt policies to improve access to clean forms of transportation in underserved and highly impacted environmental justice communities. [EPA-HQ-OAR-2021-0208-0264-A1, p.2]

Commenter: Cooper, Almeta

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, p. 76.]

As a mom, as an African American woman, and a member of my community, I care deeply about environmental justice, especially the connection between climate change and health equity for our nation's most vulnerable populations.

I encourage the EPA to frequently consult with front line communities and environmental justice leaders to provide their input into decisions related to the design and implementation of EPA rules.

As a Georgian, I am witnessing my own state government trying to suppress the voice and vote of many Georgians by imposing rules that will have disparate adverse impact on communities of color.

Commenter: Dang, Vinh

[The following comments were submitted as testimony at the virtual public hearing on August 26, 2021. See Hearing Testimony – 26Aug2021, p. 220.]

Homeless individuals are on the front lines of ongoing climate crisis and are repeatedly exposed to toxic air pollution.

[The following comments were submitted as testimony at the virtual public hearing on August 26, 2021. See Hearing Testimony – 26Aug2021, p. 221.]

The homeless community members that we work with in Philadelphia have been diagnosed with pollution-induced asthma from panhandling along busy roads and intersections where toxic pollution is spewing into their communities.

While they panhandle for hours outside, they're slowly being killed from the vehicle pollutants from vehicles owned by the very individuals they're trying to earn a dollar or two from to feed themselves. The homeless individuals that I've met with and supported on the ground have mentioned how they're suffering not just from pollution-induced respiratory diseases but how rising temperatures have caused them heat exhaustion, heat strokes, and immense fatigue to the point of delirium. We need to take strong action to help everyone in this country, including the homeless

Commenter: Davis, Darien

[The following comments were submitted as testimony at the virtual public hearing on August 26, 2021. See Hearing Testimony – 26Aug2021, p. 161.]

In addition to fighting climate change, robust regulations would protect communities from vehicle pollution and save drivers money at the pump.

This is especially critical because black and brown communities and low-wealth communities experience disproportionate harm from dirty vehicle pollution. This environmental injustice leads to increased rates of asthma and other respiratory illnesses.

Commenter: District of Columbia Department of Energy and Environment

A multi-pollutant strategy will also allow the environmental justice issues associated with air toxics from all light- and medium-duty vehicles and fine particulate pollution from light and medium-duty diesel vehicles to be approached with more precision. This will also give EPA the opportunity to ensure a level playing field between auto makers that have committed to phasing out fossil fuel engines and those that are lagging. [EPA-HQ-OAR-2021-0208-0240-A1, p.2]

Commenter: Dream Corp Green for All

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, p. 305.]

In a short time I'd like to focus on two main points. First, strong greenhouse gas emissions standards for passenger vehicles are essential to meet climate and racial equity goals,

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, p. 306.]

Racial inequalities and wealth, health, and risks from a changing climate means that every improvement to addressing climate change is especially beneficial to people in communities of color.

The big impact and a marginal difference in emission abatement is especially true for the most vulnerable. People who live in floodplains or red-line neighborhoods, low-income households who may be uninsured or underinsured for health or property coverage, people who don't have the means to move or improve the resiliency of their homes, and people exposed to air pollution or have pre-existing health conditions are all more vulnerable to the effects of climate change.

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, pp. 308-309.]

In conclusion, the status quo even before the COVID-19 pandemic made far too many people of color sick and died too early from issues directly related to inequity in economic and environmental injustice. We can build prosperity for all Americans by adopting pollution standards that are strong enough to protect the health of the most vulnerable and to encourage innovation and deployment of clean transportation solutions.

Commenter: Dream Corps Green for All et al.

Strong GHG emission standards for passenger vehicles are essential to meet climate and racial equity goals.

Racial inequalities in wealth, health, and risks from a changing climate based on where we live mean that every improvement to addressing climate change is especially beneficial to people and communities of color.[2] We may be beyond the point of being able to truly 'fix' the climate disaster that burning fossil fuels has wreaked, but every fraction of a degree matters. The big impact of a marginal difference in emission abatement is especially felt by the most vulnerable--people who live in floodplains or heat islands (often redlined neighborhoods), low-income households who may be uninsured or underinsured for health or property coverage, people who don't have the means to move or improve the resiliency of their homes, and people exposed to air pollution or who have pre-existing health conditions are all more vulnerable to the effects of climate change.[3] [EPA-HQ-OAR-2021-0208-0285-A1, pp.1-2]

In addition, the losses of low-wealth households are inherently underestimated in cost-benefit analyses from climate change because their assets are statistically undervalued compared to those of high-wealth households.[7] For example, the loss of a home due to flooding is calculated by the market value, which would assess a home in a high-wealth neighborhood as a greater loss than a home in a lower-wealth neighborhood, but it is still the loss of a family's home. This inherent bias in cost-benefit analysis that undervalues the quality of life and public health impacts for low-wealth- (disproportionately BIPOC) held assets is beyond the scope of this one rulemaking, but the presence and direction of this bias further supports adopting the strongest feasible emission standard that shows positive net benefits. [EPA-HQ-OAR-2021-0208-0285-A1, p.3]

Cleaner vehicles reduce health burdens.

Low-wealth and BIPOC (Black, Indigenous, People of Color) communities experience disproportionate harm from vehicle pollution, which compounds exposure with other sources of pollution and disproportionate stressors, leading to increased rates of illness and premature death.[13] In addition, localized pollution hotspots are often overlooked in EPA's air quality monitoring,[14[so the benefits of reducing emissions from passenger vehicles in heavily polluted areas or highly trafficked corridors may be underestimated. [EPA-HQ-OAR-2021-0208-0285-A1, p.4]

Neglecting the most vulnerable among us has exacerbated the current pandemic and propped up a fossil-fuel based economy, which as we know, puts everyone at risk. We can build prosperity for all Americans by adopting pollution standards that are strong enough to protect the health of the most vulnerable and to encourage innovation and deployment of clean transportation solutions. [EPA-HQ-OAR-2021-0208-0285-A1, p.5]

Commenter: Elders Climate Action (ECA)

The CDC reports that 'About 1 in 10 of all children have asthma, and about 1 in 6 (17%) of non-Hispanic black children had asthma in 2009.' Given the greater presence of BIPOC populations in most urban counties compared to the nation as a whole, urban smog is likely a major contributor to the elevated incidence of childhood asthma among Black children and children in other communities of color. [EPA-HQ-OAR-2021-0208-0521-A1, p. 14]

Commenter: Energy Innovation Policy and Technology LLC

Finally, we concur with the EPA's assertion that 'mitigating the impacts of climate change by achieving significant GHG emission reductions…would benefit populations that may be especially vulnerable to various forms of damages associated with climate change' [vii] and reducing pollution will similarly address disproportionate impacts on BIPOC populations and people of low socioeconomic status. [viii] [EPA-HQ-OAR-2021-0208-0605-A1, pp. 2]

Commenter: Environmental Defense Fund (EDF)

those that live closest to our nation's roads and highways face the greatest harms. 9 [EPA-HQ-OAR-2021-0208-0688-A1, p. 5]

Rapidly ensuring all light, medium- and heavy-duty vehicles are zero-emitting is one of the most important actions that the United States can take to reduce climate pollution and provide healthier and longer lives for millions of Americans, especially communities of color and low-income communities that are more likely to be harmed by pollution from the transportation sector. It is critical that EPA consider the beneficial equity impacts of robust standards, listening to and working closely with impacted communities to help ensure the standards are designed in a manner that reduces inequities.

As a result of housing discrimination and other unjust policies, communities of color suffer disproportionately from harmful vehicle pollution. 14 And these communities already face health disparities, including higher rates of chronic disease and premature death.15 A recent report by Moving Forward Network found that, on average, Asian and Black Americans bear a PM2.5 pollution burden from cars, trucks and buses that is 56 and 44 percent higher, respectively, than white Americans.16 According to the American Lung Association's 2021 State of the Air report, people of color are more than three times more likely to breathe the most polluted air when compared to white people.17 Another recent study found that Black Americans are exposed to 21 percent more fine particle pollution compared to average concentrations, while white Americans, by contrast, have 8 percent less pollution exposure than the average.18 The study concludes that highway vehicles are often among the largest sources of this disparity and that the disparity is systemic, holding for nearly all major sectors, as well as across states and urban and rural areas, income levels, and exposure levels. The study also found that because of a legacy of racist housing policy and other factors, racial-ethnic exposure disparities have persisted even as overall pollution exposure has decreased.

An EDF analysis of the Bay Area study data referenced above found that neighborhoods with higher percentages of residents of color experienced double the rate of asthma from NO2 – a pollutant often used as a marker for transportation-related pollution.19 Another study found satellite-observed levels of NO2 in the least white census tracts of the United States were double the levels in the most white tracts prior to the COVID-19 lockdown in 2020. And even though COVID-19 lockdowns led to sharp reductions in NO2 across all areas, the racial disparities were so large before the pandemic that the least white tracts continued to face even higher NO2 levels during the lockdown than the most white tracts experienced before the lockdowns.20 Similarly, another study tracking NO2 levels in cities across the nation during the COVID lockdown found that Levels of NO2 and VMT reduction in March and April compared to January 2020 ranged between 11–65% and 11–89%, consistent with a sharp drop in vehicular traffic from shutdown related travel restrictions.21 [EPA-HQ-OAR-2021-0208-0688-A1, p. 5-6]

Eliminating harmful pollution from the transportation sector is a critical measure that can help to protect public health, particularly for the communities that disproportionately bear the burdens of this pollution. [EPA-HQ-OAR-2021-0208-0688-A1, p. 7]

Commenter: Environmental Protection Network (EPN)

The burden of living with unhealthy air is not shared equally, of course. Of the 20.7 million people who lived in counties with unhealthy levels of ozone, short-term particle pollution,and year-round particle pollution, 14 million are people of color. People of color were 61% more likely than white people to live in a county with a failing grade for at least one pollutant, and over three times as likely to live in a county with a failing grade for all three pollutants.

Cars and light trucks (and heavy-duty trucks and buses) are major emitters of ozone precursors (volatile organic compounds and NOx) and fine PM (carbon soot and NOx that form particles in the atmosphere). Transportation-related emissions often disproportionately affect vulnerable communities that are in close proximity to urban freeways and oil refineries. [EPA-HQ-OAR-2021-0208-0213-A1, pp.3-4]

These emissions benefits would be especially valuable to vulnerable communities who are the most at risk to high pollution levels from urban freeways and oil refineries, as well as to climate-related extreme weather events. [EPA-HQ-OAR-2021-0208-0213-A1, p. 8]

Commenter: Filippelli, Garbirel

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, p. 42.]

Now air pollution from transportation has severe impacts on urban populations and as stated earlier, it really does disproportionately impact our lower-income brown and black communities and we have research ongoing that shows just that.

Commenter: Gersten, Dana

[The following comments were submitted as testimony at the virtual public hearing on August 26, 2021. See Hearing Testimony – 26Aug2021, p. 281.]

Many of the people most at risk for lung conditions are already the most vulnerable: the working poor and people of color. The failure to have the strongest possible clean air standards entrench the cycle of poverty that is profound and increasingly difficult to escape.

Commenter: Gillet, Victoria

[The following comments were submitted as testimony at the virtual public hearing on August 26, 2021. See Hearing Testimony – 26Aug2021, pp. 287-288.] I had patients start to come in as vehicles got back on the road with asthma exacerbations. Those patients who are coming in more frequently for those exacerbations were those who lived in those areas next to the vehicles, and it probably comes as no surprise that those patients were also more likely to be people of color and low-income. We know that these people are more likely to be located in areas and cities where they're exposed to more air pollution. We also know that they are more likely to suffer the negative consequences of rising greenhouse gas emissions as well as that particle pollution that decreases their health outcomes and will be more susceptible to increasing heat and other negative consequences.

Commenter: GreenLatinos

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, pp. 46-47.]

I'm here today because I'm very concerned on behalf of my organization about the urgent need to create and support the implementation of stringent clean vehicle standards in order to mitigate the impacts of tailpipe emissions for Latino communities.

As you may know, a recent nationwide study found that Latino children are three times more likely than non-Hispanic white children to live in counties where air quality standards are poor and nearly one-third of Latino children live in counties where hazardous air pollutant concentrations exceed the one-in-10,000 cancer risk level. Emissions from cars are literally killing children.

A year-long study of 756 asthmatic Latino children from inner city urban areas showed that participants who live near a freeway were significantly more likely to have asthma that was not well controlled and it is well known that Latinos are twice as likely to visit the emergency room for asthma than whites, and Latino children are twice as likely to die from asthma as their white counterparts.

Commenter: High Octane-Low Carbon Fuel Alliance (HOLC)

Low-Income Communities and Communities of Color Face a Disproportionate Burden from Gasoline Emissions

Indeed, EPA notes in the Proposed Rule scientific reports by the U.S. Global Change Research Program (USGCRP), the Intergovernmental Panel on Climate Change (IPCC), and the National Academies of Science, Engineering, and Medicine that have provided evidence of environmental justice concerns. Importantly, these reports have concluded that 'poorer or predominantly non-White communities can be especially vulnerable to climate change impacts because they tend to have limited adaptive capacities and are more dependent on climate-sensitive resources such as local water and food supplies, or have less access to social and information resources.'98 Further, '[s]ome communities of color, specifically populations defined jointly by ethnic/racial characteristics and geographic location, may be uniquely vulnerable to climate change health impacts in the [U.S.]'99

In addition to these reports highlighted in the Proposed Rule, a recent study found that Black people are exposed to higher concentrations of PM2.5 emissions, the most significant environmental cause of death.100 PM2.5 is responsible for an estimated 85,000 to 200,000 excess deaths each year in the U.S. Meanwhile people of color generally are exposed more to almost every source of pollution as compared to white people. Equally concerning was an April 2021 Environmental Integrity Project report, which found that thirteen oil refineries across the country released elevated and reportable levels of benzene into predominantly minority and low-income communities in 2020.101

Given the direction of Executive Order 12898 to make achieving environmental justice part of each agency's mission, it's imperative that EPA do more than recognize the historical impact of GHG emissions on low-income and minority communities. [EPA-HQ-OAR-2021-0208-0262-A1, pp. 18-19]

Commenter: Institute for Policy Integrity

EPA should consider the economic effects to lower-income households as well as the environmental justice effects from changes to criteria and toxic pollution, and the environmental justice gains associated with the increased climate benefits from more stringent alternatives.15 If Alternative 2 plus the 5–10 g/mile increase for MY 2026 is consistent with equity goals as well as with EPA's statutory mandates and with maximizing net benefits, that would further strengthen the case for selecting that combination of policy options. [EPA-HQ-OAR-2021-0208-0299-A1, p. 3]

Commenter: Klein, Stephanie

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, p. 280.]

One in 10 kids in D.C. suffers from asthma which is exacerbated by ground level ozone pollution, and in some parts of the city, particularly our low-wealth and BIPOC communities, the childhood asthma rate is as high as one in three.

Commenter: Manufacturers of Emission Controls Association (MECA)

In closing, MECA believes that EPA should continue to set performance-based standards that assess technology pathways based on delivering the intended emission reductions in all neighborhoods and communities. [EPA-HQ-OAR-2021-0208-0261-A1, p.5]

Commenter: Marcot, Nicole

[The following comments were submitted as testimony at the virtual public hearing on August 26, 2021. See Hearing Testimony – 26Aug2021, pp. 157-158.]

My community in Detroit is a low-wealth community near a major highway system and my parents, who live in the same neighborhood as us, suffer from asthma as do many other people in my neighborhood. As many as 15 percent of adults and 11 percent of children in Detroit suffer from asthma.

As an educator, I've frequently witnessed children missing school because of asthma. In addition to asthma, heart disease is also a major health concern. In the past year and a half, three of my neighbors have passed away from health issues related to heart disease.

According to Yale University, vehicles are the leading cause of air pollution and this pollution causes a variety of health issues in humans, including asthma and heart disease. Residents of my community are predominantly people of color and studies have shown that low-wealth and black and Indigenous, people of color communities experience disproportionate harm from dirty vehicle pollution, leading to racial disparities in rates of asthma and heart disease.

Aside from the direct impacts of air pollution, here in Detroit we've been hit with drastically increasing amounts of extreme weather. Just last week we were without electricity for six days due to a storm that swept through Southeast Michigan and left close to a million customers without power. Please note that once again it is low-income communities that suffer the most from extreme weather. Wealthy communities and the suburbs had their electricity restored much sooner than we did.

Commenter: Mass Comment Campaign sponsored by Center for Biological Diversity (77,692)

I urge you to write new long-term rules that:

Promote justice and good electric-vehicle jobs. [EPA-HQ-OAR-2021-0208-0560-A1, p.1]

Commenter: Mass Comment Campaign sponsored by Interfaith Power and Light et al. (1,599)

The climate crisis is a challenge of racial, economic, and generational justice, and we call on the Biden administration to meet it with an eye towards the most vulnerable in our communities. Choosing to make less efficient vehicles isn't just wasteful—it is a moral travesty. Children, our elders, low wealth and Black and Brown communities are all suffering disproportionately due to increased pollution and climate-fueled disasters. [EPA-HQ-OAR-2021-0208-0192-A1,p.2]

Commenter: Mass Comment Campaign sponsored by National Religious Partnership for the Environment-GA (563)

As a Christian I am called to protect God's creation and care for God's people. This means stopping pollution that is harming our communities and families and fighting climate change that is creating an unequal burden on communities of color. [EPA-HQ-OAR-2021-0208-0554-A1, p.1]

Black communities are disproportionally harmed from vehicle pollution since our neighborhoods are often located closest to highways and other sources of vehicle pollution. This has resulted tragically in higher rates of asthma and other respiratory illnesses. In order for attend to this injustice, we need stronger vehicle emission standards. [EPA-HQ-OAR-2021-0208-0554-A1, p.1]

I urge the EPA to make clean car standards as strong as possible in order to protect Black communities and all communities from vehicle pollution. [EPA-HQ-OAR-2021-0208-0554-A1, p.1]

Commenter: Mass Comment Campaign sponsored by National Religious Partnership for the Environment-MN (92)

As a Christian I am called to protect God's creation and care for God's people. This means stopping pollution that is harming our communities and families and fighting climate change that is creating an unequal burden on communities of color. [EPA-HQ-OAR-2021-0208-0556-A1, p.1]

Black communities are disproportionally harmed from vehicle pollution since our neighborhoods are often located closest to highways and other sources of vehicle pollution. This has resulted tragically in higher rates of asthma and other respiratory illnesses. In order for attend to this injustice, we need stronger vehicle emission standards. [EPA-HQ-OAR-2021-0208-0556-A1, p.1]

I urge the EPA to make clean car standards as strong as possible in order to protect Black communities and all communities from vehicle pollution. [EPA-HQ-OAR-2021-0208-0556-A1, p.1]

Commenter: Mass Comment Campaign sponsored by National Religious Partnership for the Environment-PA (142)

As a Christian I am called to protect God's creation and care for God's people. This means stopping pollution that is harming our communities and families and fighting climate change that is creating an unequal burden on communities of color. [EPA-HQ-OAR-2021-0208-0555-A1, p.1]

Black communities are disproportionally harmed from vehicle pollution since our neighborhoods are often located closest to highways and other sources of vehicle pollution. This has resulted tragically in higher rates of asthma and other respiratory illnesses. In order for attend to this injustice, we need stronger vehicle emission standards. [EPA-HQ-OAR-2021-0208-0555-A1, p.1]

I urge the EPA to make clean car standards as strong as possible in order to protect Black communities and all communities from vehicle pollution. [EPA-HQ-OAR-2021-0208-0555-A1, p.1]

Commenter: Mass Comment Campaign sponsoring organization unknown-1 (7,010)

Curbing tailpipe emissions will also help to combat racial injustice in the United States. Communities of color and low-wealth communities currently experience disproportionate harm from vehicle pollution, leading to higher rates of asthma and other respiratory illnesses. During the COVID-19 pandemic, these communities have experienced higher rates of severe illness as a result of exposure to these harmful pollutants. Strong federal clean cars standards will create improved health outcomes for communities currently at disproportionate risk from vehicle emissions. [EPA-HQ-OAR-2021-0208-0545, p.1]

Commenter: Metropolitan Washington Air Quality Committee (MWAQC)

As noted in the Metropolitan Washington 2030 Climate and Energy Action Plan, underserved communities have been disproportionately affected by environmental exposures, such as ambient air pollution and climate-change-related health impacts; therefore, more stringent universal GHG emissions standards and subsequent emissions reductions have the potential to help the most vulnerable populations. [EPA-HQ-OAR-2021-0208-0208-A1][p.2]

Commenter: Mid-America Regional Council (MARC)

The benefits of this proposed rule support the Air Quality Forum’s mission to maintain the health-based National Ambient Air Quality Standards for the Kansas City region and make progress in decreasing criteria pollutants from passenger cars and trucks that disproportionately impact people of color and low-income communities in the Kansas City region. The Air Quality Forum encourages EPA to address equity in the accessibility of low- and zero-emissions vehicles ensuring that environmental justice communities with a greater burden of pollution can participate in solutions that will meaningfully impact health outcomes [EPA-HQ-OAR-2021-0208-0265-A1, p.1]

Commenter: Minnesota Pollution Control Agency (MPCA) and Minnesota Department of Transportation (MnDOT)

We know, too, that communities of color, lower-income communities, and Tribal communities are disproportionately feeling the effects of climate change and that climate change exacerbates existing disparities.5 [EPA-HQ-OAR-2021-0208-0211-A1, p.2]

Environmental justice

Transportation is the largest source of GHG emissions in Minnesota and light-duty vehicles are the largest source of emissions within that sector. Communities of color and lower income communities are disproportionately impacted by climate change and have fewer resources to adapt to our changing climate. Vehicle emissions also account for almost a quarter of Minnesota's overall emissions and are one of the primary sources of risk from outdoor air pollution. Further, we know that air pollution from vehicles disproportionately harms communities of color and individuals with lower incomes in Minnesota.9 For these reasons, it is critical that EPA act quickly and aggressively to reduce pollution from vehicles.

The MPCA and MnDOT also challenge EPA to pursue more robust environmental justice analysis in future rulemakings, including the quantification of damages and benefits. As part of the Clean Car Minnesota rulemaking, the MPCA began an effort to quantify emissions impacts on communities of concern for environmental justice.10 The MPCA sees the methodology we used for this analysis as a starting point for future equity analyses. We look forward to opportunities to learn from and collaborate with EPA on the topic of equity analysis into the future. [EPA-HQ-OAR-2021-0208-0211-A1, p.4]

Commenter: Moore, Cinthia

[The following comments were submitted as testimony at the virtual public hearing on August 26, 2021. See Hearing Testimony – 26Aug2021, pp. 117.]

Improving our air quality is important for vulnerable 22 groups, like older Nevadans, and for children who lungs are still developing, and for Latino families who are more likely to be exposed to air pollution.

Latino children are 60 percent more at risk of having asthma attacks exacerbated by air pollution and 40 percent more likely to die from an asthma attack.

Efforts to improve our air quality are particularly important to me as the mother of a four-year-old who has breathing problems and the parents of over 40,000 children who have asthma in Clark County.

President Biden has promised to address climate change and fight for environmental justice. By acting swiftly on clean cars, the Administration has taken an important first step in tackling climate pollution for our transportation.

[The following comments were submitted as testimony at the virtual public hearing on August 26, 2021. See Hearing Testimony – 26Aug2021, p. 118.]

This proposal is a step in the right direction to address the climate emergency. Improving our air quality is an environmental justice issue. Everyone has a right to breathe clean air.

Commenter: Moore, Kenneth

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, pp. 323.]

I'm thankful for the EPA's commitment to environmental justice because pollution has had its greatest impacts on the most vulnerable in our communities.

Commenter: Muller, Melinda

Air pollution from cars and trucks harms people's health — especially in low-income communities and communities of color that border major roads and freeways. Vehicle emissions cause thousands of premature deaths and billions in health care costs every year. In my city of Seattle, the city's geography magnifies this issue, with two major freeways east/west and north/south running through the heart of the city and its lowest-income and most densely populated neighborhoods. [EPA-HQ-OAR-2021-0208-0500, p. 1]

Commenter: National Association of Clean Air Agencies (NACAA)

Impact of This Rule on Environmental Justice

NACAA also challenges EPA to more fully embrace its charge on environmental justice. Across many jurisdictions, air pollution from vehicles disproportionately harms communities of color and lower income communities. For SIP planning, states need the support of strong federal standards to reduce emissions associated with light-duty vehicles. This final rule should deliver stringent federal standards needed to reduce emissions, including in environmental justice communities that have been disproportionately impacted for far too long. Emission standards for LDVs consistent with the recommendations NACAA makes in these comments will also support state and local work towards achieving just environmental outcomes. EPA should provide more specific information about, if not an actual quantification of, the emissions impacts on disadvantaged communities. [EPA-HQ-OAR-2021-0208-0255-A1, pp. 8-9]

Commenter: National Coalition for Advanced Transportation (NCAT)

Further, PM2.5 and other transportation emissions are not evenly distributed and raise environmental justice concerns. Studies have shown that low-income and historically marginalized communities live disproportionately close high-traffic roads and highways, exposing these communities to greater levels of transportation emissions and associated impacts. [EPA-HQ-OAR-2021-0208-0239-A1, p. 15-16]

Commenter: National Parks Conservation Association (NPCA)

Beyond our parks and environment, we need a bold clean cars strategy that strongly considers the outsized role that environmental justice and public health play in this crisis. Communities of color and low-income individuals far too often bear disproportionate levels of economic and health consequences from air pollution and climate instability. [EPA-HQ-OAR-2021-0208-0291-A1, p. 2]

Commenter: Nebraska Ethanol Board (NEB)

This serves EPA's important interest in protecting health; and, as EPA has separately stated in its September 2021 'Social Vulnerability Report,' the negative effects of climate change are going to be felt most by the poor and racial minorities.8 [EPA-HQ-OAR-2021-0208-0248-A1, p. 4]

Commenter: Oliver, Shaina

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, p. 71.]

Most importantly, I'm an Indigenous mother of four and we are the descendants of the genocide known as the Indian Removal Act and known as the Long Walk of the Navajo. These types of policy violations have had a historic impact on Indigenous People's communities, health, wealth, and environmental well-being. Its impacts continue to be felt today in the form of lack of Indigenous representation and extractive capitalism, decisions made about resource extraction continue to hurt our communities of color, often as low-income community members.

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, pp. 72-73.]

It is the Indigenous, black, Latino, and low-income communities who bear the disproportionate burden of air pollution and segregation has led to our communities being located by highways and industrial zones that impact our health.

Many people like myself bear the health burdens of pollution, such as asthma, diabetes, heart disease, respiratory illness, cancer, adverse birth outcomes, and COVID-19 has become one more health burden our communities disproportionately bear.

Commenter: Pien, Natalie

[The following comments were submitted as testimony at the virtual public hearing on August 26, 2021. See Hearing Testimony – 26Aug2021, p. 44]

Zero emission vehicles would eliminate this experience and restore clean air and improved health to our communities, especially communities of color disproportionately exposed to air pollution.

Commenter: Richards, Claire

[The following comments were submitted as testimony at the virtual public hearing on August 26, 2021. See Hearing Testimony – 26Aug2021, p. 269.]

Given structural inequity and the history of redlining in the United States, this disproportionately affects low-income communities and black, indigenous, and people of color. This means that to achieve the environmental justice agenda of the Biden Administration, a rapid transition to clean transportation is necessary.

Commenter: Sabetta, Tracy

[The following comments were submitted as testimony at the virtual public hearing on August 26, 2021. See Hearing Testimony – 26Aug2021, p. 100.]

We see racial disparities in these asthma rates as low-wealth and BIPOC communities experience disproportionate harm from vehicle pollution.

Adopting strong clean car standards that will limit pollution from dirty vehicles would subsequently help advance environmental justice, addressing inequitable transportation-related health impacts and protecting our most vulnerable.

Commenter: Sainz, Columba

[The following comments were submitted as testimony at the virtual public hearing on August 26, 2021. See Hearing Testimony – 26Aug2021, p. 226.]

It is a step in the right direction to address the climate emergency. Pollution from cars not only causes climate change, it harms my family's health and my community's. It threatens our health without mentioning families with no insurance, undocumented immigrants with no health access, low-wealth, and BIPOC communities experience disproportionate harm from dirty vehicle pollution, living through racial disparities in rates of asthma and other respiratory illnesses.

Commenter: San Joaquin Valley Air Pollution Control District

As such, emissions reductions from mobile sources are considered critical to attain the federal air quality standards and associated benefits to public health, particularly given that the San Joaquin Valley is home to many of the most disadvantaged communities in the state and nation.[EPA-HQ-OAR-2021-0208-0566-A1, p.1]

Commenter: Scholar, Reverend

Beyond this, the transportation sector contributes significantly to health-harming particulates and smog-forming nitrogen oxides, exacerbating respiratory illnesses like asthma and resulting in premature deaths. These health impacts are felt disproportionately by low-income communities and communities of color. [EPA-HQ-OAR-2021-0208-0724-A1, p. 1]

Commenter: Smith, Rita L.

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, p. 104.]

The health of low-income families and communities of color disproportionately damaged by tailpipe pollution and rolling back fuel economy standards means denying them the promise of cleaner air and a healthy community.

Compared to non-Hispanic white children, Latino children are twice as likely to die from asthma. African American (audio glitch.)

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, p. 105.]

With cleaner transportation vehicles, African American children like my granddaughter would not miss school due to respiratory problems.

Commenter: South Coast Air Quality Management District

Regarding non-GHG emissions under the proposal, EPA can recognize environmental justice benefits will accrue and materialize faster in areas with greater prevalence of electric vehicles in local vehicle fleets. EPA states it expects the proposed rule 'would result in both small reductions and small increases of non-GHG emissions.' 86 FR at 43737 and 43803. The District agrees with EPA that caution is needed in 'interpreting these broad, qualitative observations.' Id [EPA-HQ-OAR-2021-0208-0215-A1, p.4]

EPA further states it is seeking comment on how to conduct an environmental justice (EJ) analysis on the non-GHG impacts associated with mobile source rulemakings, including how EV penetration in the future fleet would affect these impacts. The current proposal, which scarcely mentions near-roadway pollution, does not give occasion for any such EJ analysis, but EPA can still refine its own qualitative observations. Whatever might be said of unknowns in differential distribution of effects or differential exposure to pollutants, it is at least knowable that a major intersection or a school parking lot with 50% zero emission vehicle traffic should have roughly 50% less emissions from the area's light duty vehicles. This would not be any kind of farfetched scenario for the Los Angeles area, where year-to-date sales of electric vehicles are nearly 11% (and likely higher since 11% is a statewide figure) and growing. In the South Coast Air Basin that is designated nonattainment for fine particulates and extreme nonattainment for multiple ozone standards, these trends point to meaningful reductions in pollution exposure; moreover, this area has relatively clean sources of electrical generation as compared to the national generation mix. In other words, here, the benefits of increased stringency are not such a mixed picture as the proposal suggests. Instead, the realistic EJ benefits of greater zero emissions vehicle prevalence are tangible, and the projected or potential benefits should far exceed anything envisioned by the proposed rule's aggregated, nationwide calculations for an 8 percent market share for plug-in vehicles by MY2026. The District agrees that increased granularity of study for EJ impacts as affected by EV penetration in the future fleet will be warranted. Moreover, some of EPA's existing analytical approaches, e.g., reliance on FHA noise costs that are likely based on internal combustion engine vehicles, may warrant revisiting. [EPA-HQ-OAR-2021-0208-0215-A1, pp.4-5]

Commenter: Southern Environmental Law Center

Poor air quality can lead to or exacerbate asthma and other serious health conditions, and has been shown to disproportionately impact low-income communities and communities of color.[15] [EPA-HQ-OAR-2021-0208-0244-A1, p. 3]

Stronger standards that hasten the transition to cleaner and zero-emissions vehicles will also help reduce health impacts and costs associated with transportation pollution, which often disproportionately impact low-income communities and communities of color.[37]

[28] EPA's current proposal is projected to result in about a 2,205 MMT reduction in CO_2 emissions as compared to the no-action scenario through 2050. Id. at 43783; U.S. ENV'T PROT. AGENCY, supra note 23, at 5-1. In comparison, Alternative 2 would result in in approximately a 2,498 MMT reduction in CO_2 emissions over that same period. Id. at 5-3.

Commenter: Spencer, Sam

[The following comments were submitted as testimony at the virtual public hearing on August 26, 2021. See Hearing Testimony – 26Aug2021, pp. 150-151.]

Low-income, black, and immigrant communities experience disproportionate harm from dirty vehicle pollution leading to increased rates of asthma and other respiratory illnesses.

It's one of the main reasons I'm testifying today because it is so important to our growing city for the EPA to implement the strongest possible vehicle pollution standards.

Issuing stronger clean car standards will not only address these transportation-related impacts but also help the EPA follow through on its commitment to environmental justice.

Commenter: Spirit of the Sun

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, pp. 135-136.]

We helped define last year what is disproportionately-impacted communities starting with Indigenous communities and that means if there has been any degradation to our quality of life, our health and safety, and ultimately endangerment when there is no regulations and true forceful and enforceable protections for our future generations.

We need to strengthen proposals from the EPA and we need clean car standards now. In all honesty, President Biden has promised to address climate change and fight for environmental justice, but that needs to have radical and revolutionary actions now.

EV is a technology that we can help in disproportionately-impacted communities now. We need to have some form of reparations from the harm done by corporations, especially extractive industries, but ultimately we need to build true transformative transition for disproportionately-impacted communities and future generations first. That does have to start with some support of convertible energy and this proposal to honestly safeguard standards and forcible protections.

What is the use of having regulations if we do not have corporations able to be regulated when they cause harm and, most of all, have protections to communities that we know are already harmed by disproportionate disparities of respiratory? This is asthma, anemia, heart disease, and death by COVID for Indigenous communities which has wreaked havoc in our communities, urban and rural.

Commenter: Sturza, Taisia

[The following comments were submitted as testimony at the virtual public hearing on August 26, 2021. See Hearing Testimony – 26Aug2021, pp. 169-170.]

In my experience working as an EMT in the Houston 22 region, we would serve lower-income communities that overwhelmingly suffered from chronic conditions that are exacerbated by environmental factors like poor air quality due to the vehicle emissions.

[The following comments were submitted as testimony at the virtual public hearing on August 26, 2021. See Hearing Testimony – 26Aug2021, p. 170.]

By implementing the strongest possible fuel economy standards, the EPA would also be following through on its stated commitment to environmental justice because issuing stronger clean car standards will help address key transportation-related impacts, like social determinants of health, which impact low-wealth and black, Indigenous, people of color communities that experience disproportionate harm from dirty vehicle pollution, leading to increased rates of asthma and other respiratory illnesses and cancer.

Commenter: Terwilliger, Phyllis

[The following comments were submitted as testimony at the virtual public hearing on August 26, 2021. See Hearing Testimony – 26Aug2021, p. 34.]

The American Lung Association states, ‘An estimated 30 to 45 percent of the people in North American cities live or work near enough to a busy road to experience significantly higher levels of pollution.’ This, of course, leads to increased rates of asthma and other respiratory illnesses.

Low-income people and communities of color are often closest to highways and bear the greatest burden from vehicle pollution.

Commenter: Tesla

Similarly, EPA Administrator Regan said in a speech in Michigan, 'Today, COVID-19 has magnified the daily injustices facing our communities of color – the same communities who suffer disproportionately from the impacts of climate change, who face higher rates of heart and lung disease, and whose children are more likely to develop asthma.' The Administrator is absolutely right that our nation must accelerate its efforts on behalf of communities most impacted by a changing climate. We remain optimistic that the agency, upon further review of the scientific literature and updated industry cost/deployment modeling, will strengthen the GHG standards in line with Administrator Regan and President Biden’s call to accelerate climate action for all communities. [EPA-HQ-OAR-2021-0208-0278-A1][p.2]

Commenter: Trombetta, Nick

[The following comments were submitted as testimony at the virtual public hearing on August 26, 2021. See Hearing Testimony – 26Aug2021, pp. 217-218.]

Cleaner car standards are a true win for all parties. It will be a positive for long-term profits of car manufacturers, a strong step towards addressing climate change, importantly protect vulnerable communities. This will be important in terms of environmental justice of low-income and minority communities who suffer the most from excess air pollution who are generally positioned closest to highways leading to increased rates of asthma and respiratory disease.

This is an important issue in North Carolina, particularly where I live in Chapel Hill. The University of North Carolina where I went to school operates a coal-powered plant right by Northside, a predominantly African American community.

The other day, an activist was telling me about a factory that operated near the HBCU she went to for college and how the foul smell reached her every time the wind blew in her direction.

Environmental racism is persistent in North Carolina and clean cars standards can at the very least serve as a step towards righting these historic wrongs.

Commenter: UGA Climate and Society Club

Air pollution from cars negatively impacts all communities living near major roads and highways. These populations tend to be minorities making a lack of EPA regulation unacceptable for everyone's health and especially for a disproportionately large number of minority persons. [EPA-HQ-OAR-2021-0208-0412, p. 1]

Commenter: Union of Concerned Scientists (UCS)

Improved benefits for increasing stringency Importantly, not only does our modeling show that compliance with more stringent standards is possible, but it shows that the public is better off with stronger standards (Tables 1 and 2). [Table 1 can be found at docket number EPA-HQ-OAR-2021-0208-0277-A1, p. 21 and Table 2 can be found at docket number EPA-HQ-OAR-2021-0208-0277-A1, p. 22]

In addition to the consumer and climate benefits, there are clear public health outcomes from EPA strengthening the standards for MY2023-2026 (Tables 3 and 4). As the agency notes, the tailpipe and upstream emissions affected by this rule have the potential to disproportionately affect vulnerable communities, as communities who live in close proximity to roads and refineries are more likely to be of a racial minority, Hispanic ethnicity, and/or low socioeconomic status.40 [Tables 3 and 4 can be found at docket number EPA-HQ-OAR-2021-0208-0277-A1, p. 22]

The spatial extent of these pollution impacts are a critical component of understanding the environmental justice element of this rule, particularly if the agency moves forward with finalizing a rule much stronger than the one it proposed, which will inevitably drive greater EV adoption and could yield even more complex variations between local pollution from tailpipe and upstream sources. At the same time, previous air quality analysis of the MY2017-2025 rules found only a handful of areas that would experience a negative shift in PM or ozone levels,41 and coal-fired power plants continue to be retired,42 helping to clean up some of the dirtiest local sources of upstream emissions. Moreover, as EPA also notes, the public health impacts of these rules extend well beyond immediate proximity as a result of the complex atmospheric chemistry involving these pollutants, and the estimated public health impacts based on average emissions shows in general a small but positive trend (Tables 3 and 4). While we support EPA's effort to better assess local exposure impacts, we concur that it is more appropriate for a future rule and not a critical component of assessing the benefits of the proposal. [EPA-HQ-OAR-2021-0208-0277-A1, pp. 21-22]

Commenter: United Methodist Women

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, pp. 131-132.]

Women, children, and youth are already being disproportionately affected. The UN reports that 80 percent of people being displaced by climate change are women and when natural disasters hit, women and children have been 14 times more likely than men to die, more vulnerable to gender-based violence, and afterwards there has been as much as 20 to 30 percent increase in trafficking.

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, p. 132.]

It was unsurprising when I read that the 2019 Union of Concerned Scientists Report found that Asian American residents are exposed to twice as much PM 2.5 pollution as were white residents in New York. Our roads are heavily trafficked by cars and buses and our air is heavily polluted from tailpipe emissions.

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, p. 133.]

Implementing the strongest fuel economy standards that exceeds Obama's standards will address the climate crisis, protect women, protect communities of color, and protect the health of all our families.

Commenter: Valero Energy Corporation (Valero)

Further, while EPA's assessment of environmental justice impacts recognizes that increased electrical generation is likely to result in higher criteria pollutant emissions near EJ communities, the proposal does not address the impacts on disadvantaged communities of increased exposure to heavy metals and other toxins as a result of increased battery disposal and recycling,4 nor does it acknowledge the energy independence or mineral extraction concerns associated with large-scale electric vehicle battery production. A lifecycle analysis by Arthur D. Little concluded that "...the ultimate environmental and economic reality of electric vehicles is far more complicated than their promise...Combined with the greater financial burden [battery electric vehicles] place on the consumer, the complex environmental reality of BEVs will continue to present challenges for the sustainability-minded consumer."5 [EPA-HQ-OAR-2021-0208-0601-A2, p.2]

Commenter: Verdin, Langston

[The following comments were submitted as testimony at the virtual public hearing on August 26, 2021. See Hearing Testimony – 26Aug2021, p. 265.]

I was analyzing asthma data from the Department of Health Services, I found that asthma-related health care utilization wasn't equally distributed across Milwaukee. Instead, it's heavily concentrated among high-traffic corridors in the city's black and Latinx communities.

Commenter: Zero Emission Transportation Association (ZETA) and EVHybridNoire (EVHN)

Strong emissions standards can help move the industry toward a more equitable and just transportation system. Socioeconomic status is intimately linked to a neighborhood's air quality. Studies show that in the United States, approximately 80% of marginalized and socioeconomically disadvantaged communities experience higher levels of air pollution.9 Fine particulate matter pollution, mainly from the transportation sector, has been found to disproportionately and systemically negatively impact the health of people of color.10 Therefore, we must ensure that the EPA deters the further deployment of combustion-engine vehicles and instead promotes EV development. These policies would improve air quality in the communities facing the worst impacts from pollution. [EPA-HQ-OAR-2021-0208-0275-A1, p.4]

Commenter: Zewadski-Bricker, Edith

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, pp. 227-228.]

We are in a moment where our policy choices will impact the present and the future, harming those that are poor the most.

EPA Response

As discussed in Preamble Section VII.L, EPA acknowledges and agrees with comments in this RTC section stating that communities of color and low wealth communities may be disproportionately impacted by climate change and by air pollutants and that communities with EJ concerns could be affected by the emissions associated with this rule, onroad transportation emissions and refinery and EGU emissions.

The commenters supported the projected emissions reductions from this rulemaking and noted that this is a step towards meeting the Administrator's goal of prioritizing environmental justice but there is more to be done. For example, commenters stated that a comprehensive study into health equity and environmental justice impacts on marginalized populations would be useful, there are potential methods for quantifying emissions impacts on EJ communities, and additional impacts could be included in future analyses such as environmental impacts of battery production, disposal and recycling.

As discussed in Section III.C of this preamble, future EPA regulatory actions that would result in increased zero-emission vehicles and cleaner energy generation may have greater non-GHG impacts for transportation and electricity generation, and those impacts will be analyzed in more detail in those future actions.

24. Statutory Provisions and Executive Orders

Commenters Included in this Section

Alliance For Automotive Innovation
Americans for Prosperity
Consumer Federation of America

Commenter: Alliance For Automotive Innovation

The comment period on the GHG NPRM is abnormally short.

Executive Order 12866 states in part, "…each agency should afford the public a meaningful opportunity to comment on any proposed regulation, which in most cases should include a comment period of not less than 60 days."167

As a "significant regulatory action" as defined in EO 12866, Auto Innovators anticipated at least a 60-day comment period. In contrast, EPA only provided a 53-day comment period based on the public release of the proposed rule (August 5, 2021), and only 48 days based on the proposed rule's publication in the Federal Register (August 10, 2021), the official means of publishing such notices.

Historically, EPA has provided more than 60 days for public comment on proposed light-duty vehicle GHG rules. For the SAFE Vehicles proposal, 86 days were provided from its public release and 63 days from its publication in the Federal Register.168,169 For the 2012 Rule, 74 days were provided from the proposed rule's publication in the Federal Register. 170,171 EPA provided 60 days for public comment on its first proposed light-duty vehicle GHG rulemaking from its publication in the Federal Register, plus the additional time between its public release and formal publication.172

The shorter comment period is particularly constraining when one considers that past EPA and NHTSA rulemakings were done as a single set of coordinated documents with joint hearings, And a single comment deadline. In the case of the present EPA rulemaking, the regulated stakeholders (and other interested parties) must respond to two related regulatory proposals from EPA and NHTSA with separate, uncoordinated technical inputs and analysis, non-harmonized standards, and separate hearings, all on significantly overlapping, but separate timelines. In addition, a third related rulemaking to revise CAFE civil penalties was also on a concurrent timeline, further consuming the same engineering and human resources to evaluate and respond to GHG and CAFE proposals.

Although we recognize that EPA is on an accelerated rulemaking timeline to finalize MY 2023 standards prior to its start on January 2, 2022, it is more important to get the standards done right than it is to get them done fast.

EPA should consider supplemental comments to the extent possible for this rulemaking, and in the context of future rulemaking actions for later model years.

Auto Innovators anticipates submitting additional comments following the official closure of the comment period on the GHG NPRM. To the extent possible, such comments should be considered as informative to the present rulemaking. EPA should also consider such supplemental comments as it prepares to undertake a post-model year 2026 rulemaking. [EPA-HQ-OAR-2021-0208-0571-A1, p. 62-64]

EPA Response

EPA appreciates the comments of the Alliance and believes that the time for public comment allowed a meaningful opportunity for comment, as illustrated by the numerous and detailed comments submitted by the Alliance and hundreds of thousands of members of the public. EPA believes the schedule allowed for commenters to adequately consider the proposal and for EPA to properly consider public comments in selecting standards for the final rule. As suggested by the Alliance, EPA considered comments received after the close of the comment period to the extent practicable, including supplemental comments submitted by the Alliance.

Commenter: Americans for Prosperity

The Proposed Rule Violates the Environmental Research, Development, and Demonstration Authorization Act of 1978 (ERDDAA) for Science Advisory Board Advice

Despite intense and repeated interest from EPA's Congressionally mandated Science Advisory Board in the scientific and technical underpinnings of previous Clean Air Act standards for greenhouse gases from light-duty vehicles over the last decade, EPA has clearly violated peer review and scientific advice requirements under ERDDAA. ERDDAA directs the EPA Administrator to establish a standing Science Advisory Board. Congress further required that '[t]he Administrator, at the time any proposed criteria document, standard, limitation, or regulation under the Clean Air Act…, or under any other authority of the Administrator, is provided to any other federal agency for formal review and comment, shall make available to the Board such proposed criteria document, standard, limitation, or regulation, together with relevant scientific and technical information in the possession of the Environmental Protection Agency on which the proposed action is based.' Providing this information at the stage of interagency review and comment facilitates the Board providing 'its advice and comments on the adequacy of the scientific and technical basis of the… regulation, together with any pertinent information in the Board's possession.'25

EPA violated this requirement with the Proposed Rule. On June 24, 2021, the Proposed Rule began formal review and comment by other federal agencies through the Office of Information and Regulatory Affairs Executive Order 12866 process. It completed the interagency process on July 29, 2021.26 There is no evidence in the docket, the Science Advisory Board's website, or elsewhere that EPA provided the Proposed Rule or any relevant scientific and technical information to the Board at any time.27 Any claim by EPA that the interagency process under

Executive Order 12866 does not constitute 'formal review and comment' ignores the context of ERDDAA and CAA Section 307 and would eviscerate this clear direction from Congress. In addition, the failure to provide the Proposed Rule to the Board even after interagency review had been completed, including through the full public comment period, is a compounding violation that eliminates the Board's role under ERDDAA as well as its potential role as an interested stakeholder in the notice-and-comment process. These violations are particularly egregious for three reasons:

First, on March 31, 2021, three months before the Proposed Rule had been provided to other agencies for review and comment, EPA announced it was 'resetting' the entire membership of its Science Advisory Board, removing the several dozen sitting members before the end of their membership terms for the first time in the Board's history.28 On August 2, EPA announced the new members, including appointments to several new or relevant subpanels focused on climate science, economic analysis, and environmental justice analysis.29 The Board was disbanded for the duration of the interagency review period and, for the six weeks that the charter SAB has been reconstituted, EPA has not provided the proposed rule to the Board for review and comment underscores the harm of this violation of ERDDAA, actions that undermine the dual goals of independent scientific advice and transparency. 25

Second, the Science Advisory Board has been extremely interested in prior rulemaking in this area, offering individual and/or Board advice and comment on rulemaking activities over the last decade. More recently, this has included a variety of methodological, modeling, economic, scientific, and technical feedback in mid-2019,30 October 2019,31 January 2020,32 and February 2020.33 In the background for the January 2020 meeting, the full SAB considered a workgroup's recommendation and 'decided that the SAB should provide advice and comment on the science supporting the proposed rule.' In its October 201934 and January 202035 comments, which numbered dozens of pages, the Board highlighted 'significant weaknesses that should be addressed in the regulatory analysis,' as well as 'analytic concerns' with 'strong policy ramifications.' EPA's proposed rule has not included a request, let alone meaningful feedback, for the statutorily required role of the independent Science Advisory Board.

Third, inconsistencies and a lack of meaningful engagement with peer review bodies like the Science Advisory Board have resulted in litigation36 and significant reports from EPA's Office of the Inspector General37 when EPA has previously sidestepped these procedural requirements related to the scientific determinations underpinning this rule, including the so-called 'endangerment finding.' [EPA-HQ-OAR-2021-0208-0226-A1, pp. 6-7]

EPA Response

EPA notes, as the commenter points out, that the Science Advisory Board (SAB) was in the process of being reconstituted when the proposed rule was submitted to OIRA, and thus there was not a quorum of the SAB available to consider the proposed rule at that time. The decision to reconstitute the SAB was made to correct deficiencies and procedural irregularities, including not following the standard process for appointing committee members, as noted in a July 2019 Government Accountability Office report on EPA Advisory Committees. The proposed rule, and all the data and information underlying the proposed rule, was available to the SAB through the public docket when it regained a quorum in October 2021.

Furthermore, in preparing the proposal, EPA considered SAB's February 27, 2020 Report entitled, "Science Advisory Board (SAB) Consideration of the Scientific and Technical Basis of the EPA's Proposed Rule titled The Safer Affordable Fuel-Efficient (SAFE) Vehicles Rule for Model Years 2021–2026 Passenger Cars and Light Trucks," as well as reports from the National Academies of Sciences, and made changes consistent with many of the recommendations of the SAB and the National Academies to the modeling used for the SAFE rulemaking. For example, EPA modified the VMT rebound estimate and updated the new vehicle demand elasticity in CCEMS based in part on a peer-reviewed study of new and used vehicle market demand. Thus, EPA benefited from prior SAB engagement on light duty greenhouse gas standards, but does not believe that prior engagement supports the conclusion that the SAB would recommend further changes to EPA's use of modeling.

Finally, in November 2021, after the SAB reached a quorum, the Principal Deputy Assistant Administrator of the Office of Air and Radiation wrote to the Director of the Science Advisory Board Staff Office to ensure that the newly constituted SAB had sufficient information about the rulemaking and the use of science and modeling for the rulemaking. For all of these reasons, EPA strongly disagrees that it has not meaningfully engaged with peer review bodies, including the SAB.

Commenter: Consumer Federation of America

The Trump administration unjustly rolled back the previous 2011 standard, which was in good compliance with both the Administrative Procedures Act principles and required by Congressional statute. In fact, the continuous advancement of standards, which the Trump administration rejected, was mandated by the statutes. [EPA-HQ-OAR-2021-0208-0297-A1, p. 2]

<u>EPA Response</u>

EPA acknowledges this comment.

25. Comments Regarding Coordination or Harmonization between EPA's Proposed GHG Standards and the CAFE Standards Proposed by NHTSA

<u>Commenters Included in this Section</u>

Alliance For Automotive Innovation
Alliance for Vehicle Efficiency (AVE)
Aluminum Association
BorgWarner Inc.
Center for Biological Diversity, et al.
Environmental Protection Network (EPN)
General Motors LLC (GM)
Hyundai America Technical Center, Inc. (Hyundai)
International Union, United Automobile, Aerospace & Agricultural Implement Workers of America (UAW)
Jaguar Land Rover North America, LLC (JLRNA)
Kreucher, Walter
Lucid USA, Inc. (Lucid)
Motor & Equipment Manufacturers Association (MEMA)
National Automobile Dealers Association (NADA)
Nissan North America, Inc.
Stellantis
Toyota Motor North America, Inc. (Toyota)
U.S. Chamber of Commerce ('the Chamber')
Volkswagen Group of America, Inc. (Volkswagen)
Volvo Car Corporation
Wisconsin DNR

Commenter: Alliance For Automotive Innovation

Additionally, it is essential for EPA and NHTSA (collectively "the Agencies") to coordinate with each other in preparing their respective rules through MY 2026 and to set harmonized standards. The Agencies should make every effort to reduce and avoid unnecessary burdens associated with multiple regulations set under the authority of differing statutes that ultimately affect light-duty vehicle design in the same ways. Therefore, we also refer these comments to NHTSA for their consideration in revising CAFE standards. We anticipate submitting additional comments to NHTSA specific to the CAFE NPRM. [EPA-HQ-OAR-2021-0208-0571-A1, p. 2]

Coordination between EPA and NHTSA, and harmonization of the stringency of their respective GHG and CAFE standards, is critical to reducing unnecessary burdens that distract from the common goals of reduced GHG emissions and fuel consumption. [EPA-HQ-OAR-2021-0208-0571-A1, p. 7]

Comments on Coordination and Harmonization Between the EPA and NHTSA Proposals

In 2010, EPA, NHTSA, and CARB created the first "National Program" for regulation of fuel economy and GHG emissions. For their part, EPA and NHTSA issued a joint final rule with separate standards that generally accounted for statutory differences, resulting in roughly equivalent required fuel economy improvements under both programs. CARB, for its part, adopted a "deemed-to-comply" provision in its GHG regulation that allowed manufacturers to demonstrate compliance by meeting the EPA's GHG regulation. In the words of the Agencies, the National Program allowed "automakers to produce and sell a single fleet nationally, mitigating the additional costs the manufacturers would otherwise face in having to comply with multiple sets of Federal and State standards."

Coordination among the regulatory agencies can create public and private benefits. Harmonized regulations allow manufacturers to focus their planning and investments to achieve fuel economy and GHG improvements while reducing the added challenge of meeting three differing federal and state regulations. The same environmental and energy-saving benefits can be achieved at a lower cost to consumers while supporting jobs in automobile manufacturing. Lower costs also result in faster fleet turnover by encouraging more new vehicle sales, replacing older vehicles with more efficient, cleaner, and safer new vehicles.

In 2007, the Supreme Court noted that although EPA's obligation to protect the public health and welfare may overlap with NHTSA's obligation to promote energy efficiency, "there is no reason to think the two agencies cannot both administer their obligations and yet avoid inconsistency." It is our belief that, for the subject GHG and CAFE rulemakings, such inconsistency is best avoided by coordination between the agencies and harmonization of stringency to the fullest extent possible.

Coordination and harmonization between EPA and NHTSA should result in GHG and CAFE regulations that allow manufacturers to build a single fleet of vehicles that complies with both regulations, and that does not interfere with the other agency's policy goals and statutory obligations. Developing such harmonized regulations requires the Agencies to assess their policies in the context of the other's proposal. [EPA-HQ-OAR-2021-0208-0571-A1, p. 14]

Coordination

Coordination between the Agencies should be improved in the development of final GHG and CAFE rules for model years 2023-2026.

It is clear from the Agencies' proposals and supporting analyses that coordination in preparing the proposals was minimal. The Agencies use different versions of the CAFE Compliance and Effects Modeling System ("CCEMS"), begin their analysis with different model year vehicles, and even use different assumptions for what the future mix of vehicles will look like. More importantly, the Agencies both fail to analyze how automakers would comply with the other's proposal, increasing the risk that one agency's proposal may be inconsistent with the other's.

This topic is explored more thoroughly in our assessment of the Agencies' technical modeling, below.

Harmonization

Key differences between the Agencies' regulations and governing statutes should be considered when developing harmonized regulations.

Auto Innovators previously identified regulatory and statutory differences between the Agencies that affect harmonization of the stringency of their respective standards. The Agencies should consider these differences and finalize regulations that are harmonized by MY 2026. Of particular concern is the treatment of EVs given the larger role they are expected to play through MY 2026 and beyond. Also, constraints on credit transfers (between compliance fleets) and trades (between manufacturers) have played a significant and growing role in the challenges manufacturers face in planning a single fleet that complies with CAFE, GHG, and other regulations such as the California zero emission vehicle mandate. [EPA-HQ-OAR-2021-0208-0571-A1, p. 15]

Auto Innovators also noticed that there are large variations in the ratio of climate-related benefits to air-quality benefits in the two RIAs and in the peer-reviewed scientific literature. As a quality-control check, Auto Innovators recommends that the Agencies compare the four different studies below (Table VII-1) and isolate the major factors that explain the huge variation in the ratio of climate benefits to local air-quality benefits. In the process of performing this comparison, the Agencies may learn about analytic inputs or procedures that can be updated or harmonized to reduce the huge variation. The Agencies should certainly explain the eight-fold difference in their own estimates of the ratio. Moreover, the Agencies might present some additional sensitivity analyses to reveal how the ratio of climate benefits to air-quality benefits might vary under alternative yet plausible assumptions. Each entry in the table below is based on a 3% discount rate, so differences in the discount rate should not be contributing to the huge variation. Factors to investigate are the tailpipe emissions rates of PM2.5 and its precursors for the relevant model years, rebound rates, upstream emissions from electric power plants due to the charging of BEVs, emissions during the manufacturing of BEVs and batteries, PM2.5 dose-response assumptions, the Social Cost of Carbon and value of a statistical life ("VSL") values.

Table VII-1: Ratio of Climate Benefits to Air Quality Benefits in the RIAs and in Selected Studies in the PeerReviewed Scientific Literature

Study	Ratio of Climate to Air Quality Benefits
NHTSA RIA (2021)	80 [185]
EPA RIA (2021)	10.3 [186]
Choma, et al. (2020)	0.2 [187]
Tong and Azevedo (2020)	Climate Benefits > 0; Air Quality Benefits < 0 [188]

Neither the two RIAs nor the two cited scientific papers include some important reasons for giving less weight to local air quality as a rationale for the revised standards. We summarize those reasons below and encourage the Agencies to address them.

Commenter: Alliance for Vehicle Efficiency (AVE)

Following EPA's issuance of emission standards over a decade ago, automotive suppliers invested billions of dollars in innovative technologies needed to meet the vehicle standards promulgated in 2010 and 2012. Those standards, drafted in conjunction with the National Highway Transportation Safety Administration (NHTSA) and the State of California, set out to provide industry with over a decade of regulatory certainty with the objective of creating One National Program. This decade-long regulatory certainty spurred an unprecedented reinvestment in domestic manufacturing by creating tens of thousands of new manufacturing jobs, investment in new facilities, and the ability for manufacturers to develop and expand new supply chains for the advanced technologies needed to meet the new standards.2 As EPA and NHTSA look to enact standards for vehicles produced after model year 2027, AVE strongly urges the agencies to proceed with a joint rulemaking that provides industry with a unified approach to test cycles and compliance targets and timelines. [EPA-HQ-OAR-2021-0208-0256-A1, pp. 1-2]

Commenter: Aluminum Association

The Association favors a single national standard for light duty GHG emission targets based on EPA's regulation rather than a patchwork of shifting state standards overlaid on top of EPA's standards. Regulatory certainty across a long-time horizon is critical for industries, including the aluminum industry, in making capital allocation and investment decisions and the lack of a single national standard hinders that certainty. Toward that end, the Association believes that the stringency of the national standards as proposed is sufficient to pre-empt the need for any state specific standards [EPA-HQ-OAR-2021-0208-0233-A1, p.4]

For the first time, with this proposal EPA has delinked its rulemaking process from that of NHTSA's – which will now put GHG emissions and fuel economy regulations in separate rulemakings. The Association encourages the two agencies to work together to ensure alignment of their standards in such a way to minimize automaker burden and ensure vehicles remain affordable and provide consumers with value [EPA-HQ-OAR-2021-0208-0233-A1, p.4]

Commenter: BorgWarner Inc.

Coordinated Standards

We encourage EPA, National Highway Transportation Safety Administration (NHTSA), and the California Air Resources Board (CARB) to coordinate standards. Vehicle efficiencies and CO_2 emissions are determined by fundamental vehicle architectures that do not change from state to state. Decisions regarding long-term investment in R&D, capital and tooling are challenging for suppliers like BorgWarner, who support all major automakers, and therefore need to invest in multiple technology solutions to meet our customers' needs. Synchronization of the CO_2 and

Corporate Average Fuel Economy (CAFE) standards are necessary to provide industry with certainty for investments and efficiencies in product development and manufacturing. [EPA-HQ-OAR-2021-0208-0260-A1, p. 2]

Commenter: Center for Biological Diversity, et al.

EPA Need Not and Should Not Await NHTSA's Revised Fuel-economy Standards before Finalizing Revised GHG Emission Standards.

As explained in Part II, supra, automakers' compliance with EPA's preferred alternative and Alternative 2 for MY2023-2026 is achievable considering costs. Commenters urge EPA to finalize its revised standards promptly, without awaiting NHTSA's consideration of revising corporate average fuel economy (CAFE) standards under the Energy Policy and Conservation Act of 1975 (EPCA) for MY2024-2026. EPA need not, and ought not, delay finalizing revised emission standards until NHTSA is prepared to finalize its own rulemaking in early 2022.

First, no statute or regulation mandates that EPA and NHTSA conduct joint rulemakings. In particular, Section 202(a) of the Clean Air Act has no such mandate. NHTSA, like other federal agencies, may comment on EPA's Proposal along with the public, see 42 U.S.C. § 7607(d)(4)(B)(i), and also during the interagency review process for EPA's rule, see id. § 7607(d)(4)(B)(ii). And EPA must consider any "significant comments, criticisms, and new data" NHTSA offers in comments. Id. § 7607(d)(6)(B). But EPA has no special obligation to consult, much less proceed in lockstep, with NHTSA.

As the Supreme Court has observed, EPA's duty to prescribe and revise greenhouse gas standards is "wholly independent" of NHTSA's duty to impose CAFE standards. Massachusetts v. EPA, 549 U.S. 497, 532 (2007). Whatever NHTSA's standards might be or become, EPA must not "shirk its environmental responsibilities" and must act to "protect[ ] the public's 'health' and 'welfare.'" Id. (quoting 42 U.S.C. § 7521(a)); see also Coal. for Responsible Regulation v. EPA, 684 F.3d 102, 127 (D.C. Cir. 2012) (rejecting argument that EPA could defer GHG regulation due to NHTSA's authority or treat NHTSA's proposed regulations as a baseline), rev'd in part on other grounds sub nom. Util. Air Regulatory Grp. v. EPA, 573 U.S. 302 (2014). EPA therefore retains "significant latitude as to the … coordination of its regulations with those of other agencies," NHTSA included. Massachusetts, 549 U.S. at 533.

EPA previously has conducted joint rulemakings with NHTSA at the President's urging, see Presidential Memorandum, Improving Energy Security, American Competitiveness and Job Creation, and Environmental Protection Through a Transformation of Our Nation's Fleet of Cars and Trucks, 75 Fed. Reg. 29,399, 29,399 (May 26, 2010); Exec. Order 13,432 § 3(a), reprinted at 72 Fed. Reg. 27,717, 27,717 (May 16, 2007), or as an exercise of discretion. But neither agency has suggested that joint rulemaking is required by statute or regulation, and past practice is not binding.

Second, whereas EPCA bars NHTSA from strengthening CAFE standards fewer than 18 months before a model year begins, 49 U.S.C. § 32902(g)(2), the CAA contains no such explicit lead-time requirement. Rather, the CAA vests EPA with discretion to strengthen emission standards with whatever lead-time is appropriate under the statutory test. See Section 5, supra; 42 U.S.C. § 7521(a)(2). If EPA finalizes its (correct) finding that automakers require “relatively limited lead time” to comply with stronger GHG emission standards for MY2023, Proposal, 86 Fed. Reg. at 43,753, the prudent course is for EPA to finalize its new standards promptly rather than erode that lead time solely to await NHTSA’s possible revision to its CAFE standards, which is unlikely to conclude until April 2022, see Corporate Average Fuel Economy Standards for Model Years 2024-2026 Passenger Cars and Light Trucks, 86 Fed. Reg. 49,602, 49,610 (Sept. 3, 2021) (NHTSA 2021 NPRM).

Third, there is no possibility that EPA will finalize stronger GHG standards that are “inconsisten[t],” Massachusetts, 549 U.S. at 532, with NHTSA’s CAFE standards. The latter standards “specify[ ] the minimum level of average fuel economy applicable to a manufacturer in a model year,” 49 U.S.C. § 32901(a)(6) (emphasis added), and no GHG standard in the range EPA is considering in this rulemaking would render it infeasible for any automaker to attain that statutory minimum. Further, any subsequent NHTSA rulemaking must account for EPA’s emission standards as “other motor vehicle standards of the Government.” 49 U.S.C. § 32902(f); see NHTSA 2021 NPRM, 86 Fed. Reg. at 49,793 (noting that, since EPA first set standards for vehicular GHG emissions, “NHTSA has considered [them]" under this provision); 2020 Final Rule, 85 Fed. Reg. at 25,137 (NHTSA considering fuel-economy effects of EPA’s GHG standards before prescribing MY2021-2026 CAFE standards). Put differently, Congress put EPA’s emission standards in pole position and assigned NHTSA chief responsibility for “avoid[ing] inconsistency” between the two agencies’ respective standards. Massachusetts, 549 U.S. at 532; see also Cent. Valley Chrysler-Jeep v. Goldstene, 529 F. Supp. 2d 1151, 1168 (E.D. Cal. 2007). NHTSA will be no less able (in fact, it will be better able) to consider EPA’s revised “other motor vehicle standards of the Government,” 49 U.S.C. § 32902(f), if those standards have already taken effect than if EPA pauses its own rulemaking to await NHTSA’s.

Fourth, given the present and projected state of emissions-reduction technologies, EPA’s GHG standards will increasingly diverge from NHTSA’s CAFE standards, making joint rulemaking increasingly the wrong choice. As Commenters have detailed elsewhere, see Br. of State & Local Gov’t Pet’rs & Pub. Interest Pet’rs 96–101, No. 19-1230 (D.C. Cir. Oct. 27, 2020), EPCA artificially constrains NHTSA from considering fuel economy of vehicles powered by “alternative fuel” like electricity, 49 U.S.C. §§ 32901(a), 32902(h), 32904(a)(2)(B), which make up an increasing portion of the new-vehicle fleet. EPA, unshackled by those statutory constraints, is far better positioned than NHTSA to set standards responsive to the vehicle fleets of MY2023 and beyond. Thus, not only is it not “necessary,” 42 U.S.C. § 7521(a)(2), for EPA to await NHTSA’s rulemaking process, it is not prudent for EPA to do so. [EPA-HQ-OAR-2021-0208-0651-A1, p. 28-29]

Commenter: Environmental Protection Network (EPN)

Separate EPA Rulemaking

EPA and the National Highway Traffic Safety Administration (NHTSA) have separate and differing responsibilities under the Clean Air Act and the Energy Policy and Conservation Act. The agencies have previously exercised their authorities through a joint GHG and Corporate Average Fuel Economy (CAFE) standard-setting rulemaking, and in general this has been an appropriate and effective approach to rulemaking. However, the Safer Affordable Fuel-Efficient (SAFE) 2 rulemaking inappropriately used this approach to limit and push to the side EPA's long experience and expertise in motor vehicle emissions control.

There is no legal requirement that the agencies use a joint rulemaking process. EPA can pursue a separate rulemaking and appropriately consult and coordinate with NHTSA, and vice versa. EPA can use its deep technical and policy expertise to achieve well-coordinated federal GHG and CAFE programs. In addition, separate EPA and NHTSA rulemakings make increasing sense as EVs become a greater share of the market, given the various limitations on NHTSA's authority when it sets CAFE standards. These limitations include the number of model years NHTSA can address, its inability to consider credits and credit transfers, and its statutory prohibition on considering EVs when setting CAFE standards. It is imperative that future EPA rulemakings not be constrained by NHTSA's statutory limitations. [EPA-HQ-OAR-2021-0208-0213-A1, p. 14]

Commenter: General Motors LLC (GM)

GM supports one national program for all 50 states that will reduce regulatory uncertainty and enable all stakeholders to focus cooperatively on reducing greenhouse gas emissions, conserving energy, and growing the economy. The ability to sell the same fleet in all 50 states will also reduce manufacturer burden and consumer price, enabling quicker fleet turnover with sales of newer, more efficient vehicles. [EPA-HQ-OAR-2021-0208-0234-A1] [p.2]

Harmonization between EPA and CARB's GHG Programs and NHTSA's CAFE Program

In 2012, when the Obama Administration developed the initial 2017-2025 model year standards, attempts were made to harmonize the various programs as fully as possible. In fact, the Administration said in its regulatory announcement that 'Continuing the National Program ensures that auto manufacturers can build a single fleet of U.S. vehicles that satisfy requirements of both federal programs as well as California's program.' However, the 'One National Program' still amounts to three separate regulatory programs, created under three separate regulations, managed by three separate regulatory agencies. As a result, the mechanics of the three programs and the regulatory incentives permitted in each are different. Resulting from an extensive list of differences2 and acknowledged by NHTSA in its recent CAFE NPRM,3 compliance with one program does not guarantee compliance with all.

EPA's proposed GHG program is historically stringent. It is aligned with GM's and the nation's Paris Agreement commitments, and it achieves greater overall emission reductions than the Settlement Agreements entered into by California and several OEMs. Accordingly, GM believes that the Federal government should take all appropriate action to ensure that compliance with EPA's program for the 2021-2026 model years is deemed compliant with both the NHTSA and CARB programs for those years. GM further stresses that if an OEM complies with the EPA program, it should not be subject to civil penalties in the NHTSA program that may arise from the geographic location of its supply chain, or from the distinct requirements in California's program.

The certainty that EPA's proposed standards will serve as harmonized 50-state standards will enable industry to focus on innovation and investment in tailpipe-free solutions, and enable all three regulatory agencies and other stakeholders to put the nation's precious resources toward the complementary policies that are critical to achieving the low-carbon transportation future that we all desire. It will also help ensure that investments are focused on tailpipe-free solutions rather than marginal internal combustion engine improvements that divert resources from innovations needed to achieve the goals of the Paris Agreement. [EPA-HQ-OAR-2021-0208-0234-A1][pp.5-6]

Commenter: Hyundai America Technical Center, Inc. (Hyundai)

Harmonization is key

GHG emissions and fuel economy are highly correlated and we appreciate EPA's statement that 'it remains committed to ensuring that GHG emissions standards for light duty vehicles are coordinated with fuel economy standards'.8 Hyundai believes this coordination is critical to avoid unnecessary inefficiencies and reduce reporting redundancies from conflicting requirements, and we support the Alliance for Automotive Innovation's comments on this topic. [EPA-HQ-OAR-2021-0208-0603-A1 p.7]

Commenter: International Union, United Automobile, Aerospace & Agricultural Implement Workers of America (UAW)

In the next phase of finalizing the regulations, it will be important to harmonize standards between the Environmental Protection Agency (EPA), the National Highway Traffic Safety Administration (NHTSA), and the California Air Resources Board (CARB) as much as possible to avoid unnecessary regulatory burdens. We support a national standard. Additional flexibilities should be explored within this process. [EPA-HQ-OAR-2021-0208-0749-A1, p. 2]

In the next phase of finalizing the regulations, it will be important to harmonize standards between the Environmental Protection Agency (EPA), the National Highway Traffic Safety Administration (NHTSA), and the California Air Resources Board (CARB) as much as possible to avoid unnecessary regulatory burdens. We support a national standard. Additional flexibilities should be explored within this process.

Commenter: Jaguar Land Rover North America, LLC (JLRNA)

Finally, we would like EPA to consider long-term harmonization between its GHG standards and NHTSA's CAFE standards due to the complications for a manufacturer having to comply with two differing sets of targets. We propose that any targets should be designed to be of equal measure when considering the differences between the regulations. This allows us as a manufacturer to design our US fleet to one set of targets. [EPA-HQ-OAR-2021-0208-0269-A1, p.8]

Organization: Kreucher, Walter

49 U.S.C. 32902 prohibits consideration of the fuel economy of dedicated and dual fueled alternative fuel vehicle (AFV) models when NHTSA determines what levels of CAFE standards are maximum feasible. Once these vehicles are excluded from consideration, the Agencies own CAFE Model and assumptions demonstrates that the proposed standards ARE NOT technologically feasible. [EPA-HQ-OAR-2021-0208-0199-A1, p. 5]

Commenter: Lucid USA, Inc. (Lucid)

Due to the flexibility afforded under the Clean Air Act, EPA is the appropriate agency to take the lead on regulating EVs. Allowing EPA to pursue a National ZEV program while NHTSA focuses on pursuing the maximum feasible improvements in fuel economy of internal combustion engines is consistent with each agency's statutory authority and will bolster the legitimacy and defensibility of each program. [EPA-HQ-OAR-2021-0208-0528-A1, p. 6]

Commenter: Motor & Equipment Manufacturers Association (MEMA)

MEMA Supports Coordinated Programs - MEMA continues to support the long-standing goal of a One National Program where EPA, NHTSA, and the California Air Resources Board (CARB) work together to coordinate regulations, strive to align stringency, and reduce burden. Closely coordinated programs will provide the stability and predictability that vehicle suppliers need for controlling capital costs and driving significant domestic technological investments. This stability is critical as technology investments become more diversified. [EPA-HQ-OAR-2021-0208-0249-A1, p. 3]

MEMA Continues to Support Coordinated Programs

MEMA continues to support the goal of a One National Program as much as possible between EPA's GHG program, NHTSA's CAFE program and CARB's program. Since 2009, the industry has worked under a principle of a One National Program that NHTSA, EPA and CARB will work together to coordinate these regulations, striving to align stringency and reducing unnecessary compliance burden where possible. MEMA urges the agencies to focus on providing a clear, streamlined compliance pathway for the industry. Harmonization and consistency are even more critical as technology investments become more diversified into a broader spectrum of propulsion technologies.

A coordinated program between the agencies is of the utmost importance to suppliers because the industry needs an aligned set of unified test cycles, targets, and timelines. Suppliers plan technology deployments according to production cycles and emissions standards to avoid stranded investments. A consistent approach is important for suppliers as the industry makes important long-term business decisions and the necessary investments to drive toward meeting the nation's goals.

Closely coordinated programs will provide the stability and predictability that vehicle suppliers need for controlling capital costs and driving significant domestic technological investments. This stability will provide vehicle manufacturers with improved market availability and optimal economies of scale for technologies, which will ensure the lowest possible compliance cost is achieved. This certainty will sustain U.S. innovation, enhance global competitiveness, and support jobs in the vehicle parts supplier sector. [EPA-HQ-OAR-2021-0208-0249-A1, p. 6]

Commenter: National Automobile Dealers Association (NADA)

EPA and NHTSA Should Harmonize Their Programs and Establish a Single National Program.

Although EPA and the National Highway Traffic Safety Administration (NHTSA) have adopted fuel economy and GHG standards in joint rulemakings since 2010, EPA states that it is unnecessary to do so in this instance and proposes to revise its GHG standards in a rulemaking separate from that NHTSA has initiated.39

NADA disputes EPA's assertion and contends, as it has in response to prior EPA GHG regulatory actions, that a single national light-duty vehicle fuel-economy/GHG program administered principally by one federal regulator is not only needed, but consistent with the structure designed by Congress in EISA. The regulation of both light-duty motor vehicle fuel economy and tailpipe GHG emissions is largely duplicative.

The physics and chemistry involved establish a direct relationship; controlling fuel economy controls GHG emissions and vice versa. Two Federal agencies regulating essentially the same thing raises government inefficiency and waste concerns, and results in unnecessary regulatory burdens and complexities, which inevitably increase vehicle costs for dealers and their customers.

Moreover, EPA's proposal only appears to adopt the standards equivalent to those established in the "framework" agreements for MY 2023, proposing much stricter standards for MYs 2024-2026. As articulated above and in prior submissions, NADA supports a harmonized set of federal light-duty vehicle GHG/fuel economy standards that are technologically feasible, economically practicable, and thus will result in vehicles that will be attractive and affordable to prospective new light duty motor vehicle for consumers. Again, regulatory benefits will not be achieved unless and until vehicles subject to new mandates are sold or leased to end-users. [EPA-HQ-OAR-2021-0208-0290-A1, p. 10-11]

Commenter: Nissan North America, Inc.

Moreover, Nissan encourages EPA and NHTSA to continue their efforts to coordinate the federal GHG emission and CAFE standards with the GHG and ZEV standards set by the California Air Resources Board ("CARB"), to develop a harmonized national program for automotive certification. In particular, Nissan believes it is important for EPA to work with CARB to clarify the relationship between the federal GHG standards, the California GHG standards, and the Framework Agreements between CARB and several automakers. Close coordination between these three regulatory entities would ensure that manufacturers can focus on developing the cleanest, most fuel efficient, and most affordable vehicles rather than on compliance with uncertain and unnecessarily fragmented regulatory programs. [EPA-HQ-OAR-2021-0208-0529-A1, p. 2]

Continued Support for a Unified National Approach

Nissan strongly encourages EPA, NHTSA, and CARB to develop a unified national approach to automotive regulation. In particular, Nissan echoes the points made in the letter submitted by the Alliance for Automotive Innovation ("Alliance") to Secretary Buttigieg and Administrator Regan on June 28, 2021, regarding harmonization of CAFE and GHG light-duty vehicle standards.

A patchwork of different federal and state GHG and CAFE programs is neither effective nor efficient. In contrast, a harmonized national program maximizes both GHG and CAFE benefits on a nationwide basis while also providing regulatory certainty and minimizing unnecessary compliance burdens for the industry. Such an approach allows automakers to develop a single, unified fleet that meets all federal and state requirements while maintaining a full range of vehicle options for consumers. More importantly, a harmonized approach allows manufacturers to focus their planning and investments on achieving fuel economy improvements and emissions reductions rather than on compliance with unnecessarily fragmented regulatory standards and programs. Under a harmonized approach, environmental benefits can be achieved at a lower cost to manufacturers and consumers. Lower costs help address social equity concerns related to EV accessibility and also encourage faster fleet turnover, replacing older vehicles with more efficient, cleaner, and safer vehicles.

As EPA and NHTSA consider potential changes to the federal GHG and CAFE programs, Nissan believes it is essential that the agencies work together to maximize compatibility and coordination of the programs. Nissan understands that, due to statutory limitations, certain programmatic elements of the GHG and CAFE programs may not be identical. Nissan encourages EPA and NHTSA to make the standards as equivalent and complementary as possible, however, by adopting appropriate regulatory adjustments where available.

Nissan also urges the Administration to work with California regulators to harmonize the federal and CARB programs to the fullest extent possible. This could be accomplished by reinstating California's "deemed-to-comply" measures, under which vehicles that meet federal standards are "deemed-to-comply" with CARB standards. Nissan is also open to new alternative approaches for harmonizing federal and California standards, as well. Nissan encourages EPA to work proactively with CARB to clarify the relationship between federal and California standards, including between OEMs that signed on to California's Framework Agreements and those that did not. In particular, harmonization amongst all three agencies (EPA, NHTSA, and CARB) will be critical if EPA restores California's Clean Air Act Waiver covering model years 2021 through 2025 California GHG standards and ZEV requirements.

For its part, EPA has self-characterized the Proposed GHG Rule as: “equivalent to the stringency of the California Framework Agreements emission reduction targets in MY 2023 and increasingly more stringent than the Framework Agreements from MY 2024 through 2026.” It is critical for the industry to have a clear understanding of how EPA’s Proposed GHG Rule and California’s enforcement of its standards will be implemented going forward (e.g., whether a “deemed-to-comply” option will be available for compliance with California GHG requirements). [EPA-HQ-OAR-2021-0208-0529-A1, p. 5-6]

Commenter: Stellantis

Stellantis Supports One National Program

Stellantis supports One National Program for regulating automotive greenhouse gases and fuel economy. As part of his Build Back Better platform, then-Candidate Biden pledged to ‘negotiate fuel economy standards with all stakeholders, workers and their unions, environmentalists, industry and states that achieve new ambition by integrating… [and] accelerate the adoption of zero-emissions light- and medium duty vehicles, provide long-term certainty for workers and the industry and save consumers money through avoided fuel costs.’ Stellantis has stated our public support for the President’s electrification targets, and we also support the inclusive approach to setting standards in the U.S.

The U.S. is the only major market with multiple regulatory programs for light-duty vehicles. Navigating three sets of standards introduces significant complexity to compliance and adds unnecessary costs to a resource-intensive transition to electric vehicles. Manufacturers will be looking for every possible efficiency and cost containment strategy to deliver affordable, electrified vehicles to our customers. We urge EPA, NHTSA and CARB to do the same. [EPA-HQ-OAR-2021-0208-0532-A1, p. 5]

Commenter: Toyota Motor North America, Inc. (Toyota)

Finally, we remain concerned that EPA and NHTSA appear to be moving further away from a coordinated One National Program (ONP) rather than closer to unified approach that could reduce consumer costs and provide optimal environmental and fuel saving benefits. While we will comment separately on NHTSA’s proposed CAFE regulations, these comments include an overview of key areas of concern regarding regulatory harmonization. [EPA-HQ-OAR-2021-0208-0531-A1, p. 2]

Success Can be Aided by Harmonized GHG and CAFE Requirements

One National Program More Important Now Than Ever T

he purpose of the National Program for GHG and CAFE standards has always been “establishing consistent, harmonized, and streamlined requirements that would reduce GHG emissions and improve fuel economy for all new cars and light-duty trucks sold in the United States.”22 The preamble of the 2012 Final Rule states the “National Program will deliver additional environmental and energy benefits, cost savings, and administrative efficiencies on a nationwide basis that would likely not be available under a less coordinated approach and that it will "allow automakers to produce and sell a single fleet nationally, mitigating the additional costs that manufacturers would otherwise face in having to comply with multiple sets of federal and state standards."23 These core principles become paramount as the automotive industry embarks on significant investments toward the most significant technology transition in the past 100 years.

While we are still reviewing both the GHG and CAFE proposals given the short comment period, we remain concerned that the proposals were issued as two separate regulations and seem to be moving further away from a unified federal approach. Our early analysis finds an erosion of harmonization between the proposed GHG and CAFE programs that breaks from recent regulatory history.

Our preliminary analysis shows several reasons for this, but a significant one appears to be that the GHG proposal overestimates the performance contribution of gasoline-only powertrains and the CAFE proposal underestimates the cost of electrification required to comply.

Toyota's upcoming comments on the proposed CAFE standards will address concerns specific to that program in greater depth. For now, we highlight several areas of disharmony, primarily involving compliance modeling and assumptions, that cause the agencies to draw different conclusions on fundamental issues such as the level of electrification needed for compliance. Toyota can provide further information to EPA and NHTSA if requested.

Adjustments for Equivalent GHG-CAFE Stringency

NHSTA has not adequately adjusted the CAFE standards to account for the flexibility and fleet credit transfer restrictions relative to the GHG program. The result is the proposed CAFE standards become more stringent than the proposed GHG standards. Greater detail is forthcoming in Toyota comments on the CAFE standards proposal.

CA/177 State ZEV Compliance

In determining the feasibility of the proposed standards, NHTSA has incorporated assumed manufacturer compliance with the CA/177 State ZEV program as input to the CAFE Model without considering ZEV compliance costs. Including ZEV compliance as a given ignores ZEV compliance uncertainties, double counts regulatory benefits while ignoring all costs, and discards NHTSA's long-standing compliance modeling process where the least expensive improvement technologies are assumed to be deployed into the fleet first. This dubious approach masks the cost of electrification to consumers as well as the overall cost of the regulation. Toyota will address this concern in the upcoming CAFE comments.

Advanced Gasoline Technologies

For compliance modeling of gasoline powertrains, EPA is extensively relying on the HCR2 classification of Atkinson engine technology for which the assumed efficacy remains unproven and highly unlikely as previously explained. NHTSA effectively deploys only to the HCR1 level of Atkinson engines which better reflects the state of technology in the fleet today and identifies HCR1D24 as a more advanced future pathway that while not cost-effective has a considerably more reasonable assumed technology effectiveness than HCR2.

CAFE Model Versions

EPA and NHTSA are using different versions of the CAFE Model. We appreciate EPA using Autonomie simulation to determine technology effectiveness and the CAFE Model to determine compliance pathways for the proposed standards. However, EPA is relying on an outdated version of the CAFE model and several input assumptions “for the purpose of enabling direct comparison to the SAFE FRM analysis”. NHTSA is using the latest version of the CAFE model that incorporates many recommendations highlighted in the peer review of modeling tools for GHG/CAFE policy analysis. Toyota believes it is important for both agencies to use the same version of the most recent model with the same and most recent input assumptions where possible.

Baseline Fleets

The baseline fleet represent a snapshot of performance and the starting point from which technologies are “added” to the fleet to demonstrate compliance pathways using the CAFE Model. EPA is starting with a 2017 baseline fleet whereas NHTSA uses a more appropriate 2020 baseline fleet. EPA’s older baseline fleet is missing the latest, cleanest, and most efficient technologies in vehicles on the road today. Instead, EPA must rely on more assumed or simulated technology effectiveness for these very same technologies where errors propagate through the fleet over a longer period (2017 to 2026 model year) as explained previously. The 2017 fleet excludes important recent market trends that have real impact on overall fleet performance such as the ongoing shift in vehicle mix.

Deployment of Off-Cycle Technologies

EPA is adding off-cycle technologies to the fleet more rapidly than being deployed by manufacturers. Compliance modeling assumes many manufacturers have earned upwards of 10 g/mi to 15 g/mi of credits by the 2020 model year while manufacturer compliance data over the same period shows significantly fewer credits being earned. Further, the pool of available credits over the 2023 through 2026 model years will be reduced by the proposed revised definitions for passive cabin ventilation, engine warm-up, and transmission warm-up technologies. NHTSA more realistically assumes manufacturers will not reach maximum credit values until the 2026 model year and that some companies will not attain the maximum. EPA’s inflated off-cycle credit assumptions factor into the artificially low the reliance on electrification for compliance. [EPA-HQ-OAR-2021-0208-0531-A1, p. 12-14]

Commenter: U.S. Chamber of Commerce ('the Chamber')

Durable standards are needed to provide stability for long-term business planning and investment

The automobile industry is an enormously important economic sector, historically contributing 3.0 – 3.5 percent of overall U.S. gross domestic product (GDP) and directly employing an estimated 1.5 million people in the design, manufacturing, sales, and service of motor vehicles.12 Additionally, the industry is a very large consumer of materials and services from other sectors, from machinery and computing to advertising, finance, and more. Together, these direct and indirect activities amount to a net employment contribution in the U.S. economy of more than 7 million jobs, and state and federal tax revenue generation of $206 billion.13

According to the Alliance for Automotive Innovation, the industry is investing $330 billion on electrification through 2025 alone, with additional significant investment anticipated beyond this timeline. Concomitant with this level of investment is the need for regulatory agencies to work with the industry and other stakeholders to ensure the full and adequate consideration of relevant factors and objectives that is needed to achieve sound and effective regulatory policy.

Maximizing alignment of EPA's greenhouse gas (GHG) and NHTSA's Corporate Average Fuel Economy (CAFE) programs will allow for a more efficient compliance process and reduced costs under which automobile manufacturers can sell new vehicles across every state in U.S. that meets the state and federal standards. This significantly reduces vehicle design, supply chain, and distribution costs.

It is imperative that all sides work together to identify a flexible, achievable path to continued fuel economy gains. As a practical matter, any scenario that results in two sets of standards—whether via continuation of California's waiver authority while NHTSA and EPA modify federal standards, or via some other mechanism—is sure to result in added costs to the industry that will inevitably be passed along to consumers. It also has the potential for increased litigation risk, injecting even more uncertainty into markets and disrupting efforts to plan, invest, and deliver continued fuel economy and emissions gains. [EPA-HQ-OAR-2021-0208-0524-A1, p. 7]

Commenter: Volkswagen Group of America, Inc. (Volkswagen)

Aligning Federal Standards and Coordinating into the Future

Volkswagen will comment separately on the parallel rulemaking being conducted by the National Highway Traffic Safety Administration (NHTSA) to update the 2024-2026 model year Corporate Average Fuel Economy (CAFE) standards. Volkswagen supports the national policies of energy security and greenhouse gas reductions and the decade long history of the two agencies coordinating on standards. Volkswagen urges EPA and NHTSA to continue their engagement to ensure that their final rules provide aligned pathways that will continue to ensure that compliance with both regulatory programs can be achieved with one single National fleet of vehicles. [EPA-HQ-OAR-2021-0208-0237-A1, p.2]

We are encouraged by the cooperation between EPA and NHTSA in working to ensure that through 2026 manufacturers should have a pathway for equal compliance under both regulations. Furthermore, as outlined in the Presidents Executive Order on Strengthening American Leadership in Clean Cars and Trucks, we are supportive of the direction for EPA and NHTSA to coordinate with the State of California in consideration of longer-term standards through 2030MY. Volkswagen continues to support the idea of future standards that are aligned between Federal and State authorities. We believe that harmonized standards can help reduce complexity and costs and efficiently achieve long-term environmental, climate, and energy objectives. [EPA-HQ-OAR-2021-0208-0237-A1, p.7]

Commenter: Volvo Car Corporation

Volvo Cars has consistently stated that the goal of achieving one single national harmonized program (California, EPA and NHTSA) is the preferred path forward to increase fuel economy and lower emissions year over year. However, in 2020 a harmonized national program consistent with Volvo Cars global electrification strategy and climate neutrality goal was not in place. In 2020, Volvo Cars signed onto the California Voluntary Agreement and Volvo Cars is pleased that this framework has now served as a national path forward for the current federal proposed rule.

However, Volvo Cars believes regulatory consistency, and a clear federal framework are necessary to effectively and efficiently enable the auto industry to develop more efficient vehicles and to advance the market for advanced technology vehicles. Multiple vehicle regulatory programs at the Federal and State level that require separate and duplicative reporting, accounting, and testing are inefficient and increase uncertainty in the market. [EPA-HQ-OAR-2021-0208-0253-A1, p.2]

The US should work to minimize disparities between EPA (GHG) and NHTSA (CAFE) regulations and California regulations. The program should reduce reporting requirements by allowing manufacturers to demonstrate compliance at the end of the year for all programs. The current multi-agency credit programs ends up rewarding automakers moving slowly to electrify their fleet verses automakers that are moving more rapidly to electrify. There seems to be a disparity in the agency programs and this maybe an unintended consequence of multiple programs, but we urge EPA to look into this further. Compliance reporting should be consolidated so that it is one report for one agency and that agency determines compliance (so reciprocal recognition). Currently, there are separate assessments for each program, and this is unnecessary and especially burdensome for smaller manufacturers like Volvo Cars. [EPA-HQ-OAR-2021-0208-0253-A1, p.2]

Organization: Wisconsin DNR

In a departure from the 2012 and 2020 light-duty vehicle rulemakings, EPA and NHTSA are not undertaking a joint rulemaking, but are instead proposing separate regulations under each agency's individual legal authority. While the two proposals generally align in their requirements by MY 2026, they contain differences significant enough that assessing the combined impact of the rules on GHGs and criteria pollutants is challenging.9 As such, WDNR strongly recommends that, in the future, the agencies return to the joint rulemaking model. [EPA-HQ-OAR-2021-0208-0223-A1, p.4]

9 For example, EPA and NHTSA employ different methods to estimate the GHG and criteria pollutant impacts of their rules resulting in directionally consistent, yet quantitatively different, results.

EPA Response

We discuss in Section II.A.8 of the preamble comments relating to consultation and alignment between the EPA and NHTSA programs and the decision to issue separate and not joint rulemakings and the relationship between the EPA and California programs.

Regarding comments requesting that testing and reporting be consolidated across the EPA and NHTSA programs, we note that since the beginning of the LD GHG program the agencies have worked to harmonize testing and reporting requirements where appropriate (e.g., emissions and fuel economy testing) We also note there have been differences between certain features of the two programs, stemming from different statutory authorities for the two agencies. For example, EPA's program allows credits for air conditioning leakage which impacts GHGs but not fuel economy.,. As discussed in the preamble, we will continue to coordinate with NHTSA going forward.

GM requested that EPA and NHTSA "take all appropriate action to ensure that compliance with EPA's program for the 2021-2026 model years is deemed compliant with both the NHTSA and CARB programs for those years." As discussed in Sections II.A.8.i and II.A.8.ii, EPA   will continue to coordinate with NHTSA and CARB, subject to limitations due to different statutory authorities, as EPA implements the GHG final standards.

Toyota points to several areas of our proposed rulemaking that are different from NHTSA's proposed rulemaking that they believe will "cause the agencies to draw different conclusions on fundamental issues such as level of electrification needed for compliance." Although NHTSA has not yet completed its fuel economy rulemaking, we believe that any ultimate differences in in the agencies' respective modeling platforms, approaches and estimated impacts will not interfere with each agency's ability to meet our separate statutory requirements.

EPA's responses to the items that Toyota listed that apply to EPA's rulemaking follow:

- Regarding Toyota's comment about how EPA applies "HCR2" engine technology in our modeling, we do not use that technology in our primary modeling for the final rule. See Chapters 2.3.2 and 4.1.1.3 of the RIA for an analysis of the sensitivity of our modeling results to this parameter.
- Regarding Toyota's comment about the base fleet EPA uses in our modeling, we have updated our analysis for this final rule to use a 2020 base fleet, as described in Section III of the preamble and Chapter 4 of the RIA.
- Regarding Toyota's comment about EPA and NHTSA using different versions of the CAFE model, we describe in Section III of the preamble and Chapter 4 of the RIA our rationale for why and how we have used a specific version of the CAFE model

(CCEMS). We note that EPA and NHTSA have in the past used different models in support of our respective GHG and fuel economy rules.

- Regarding Toyota's comment about EPA's modeling of off-cycle technologies, we have updated our modeling approach for this final rule, as we discuss in Chapter 4.1.1.1 of the RIA.

Comments about EPA's statutory authority to issue greenhouse gas standards are addressed in section 16 of this RTC. Comments about NHTSA's statutory authority are beyond the scope of this action.

26. Comments Outside the Scope of the Proposal

26.1. Comments Regarding Ethanol and Other Fuels

Commenters Included in this Section

25x '25 Alliance
Alliance For Automotive Innovation
Alliance for Vehicle Efficiency (AVE)
American Coalition for Ethanol (ACE)
American Petroleum Institute
City of Albuquerque, NM
Clean Fuels Development Coalition (CFDC)
Defour Group (Defour)
Exxon Mobil
Fuels Freedom Foundation
Growth Energy
High Octane-Low Carbon Fuel Alliance (HOLC)
Hyundai America Technical Center, Inc. (Hyundai)
Illinois et al. Corn Growers Associations
International Union, United Automobile, Aerospace & Agricultural Implement Workers of America (UAW)
Kansas Corn Growers Association
Minnesota Corn Growers Association (MCGA)
Minnesota Farmers Union (MFU)
Modlin, R.R. and Detchon, B. Reid
National Corn Growers Association (NCGA)
National Farmers Union (NFU)
National Propane Gas Association (NPGA)
NATSO, Representing America's Travel Centers and Truck Stops et al.
Nebraska Ethanol Board (NEB)
NGVAmerica
North Dakota Farmers Union (NDFU)
Noyes, James
Ohio Corn & Wheat Growers Association (OCWGA)
Pearson Fuels
Piper, Edward
Price, Heather
Renewable Fuels Association (RFA)
Scholar, Reverend
South Dakota Farmers Union (SDFU)
Stellantis
Valero
West, Brian

Commenter: 25x '25 Alliance

While we recognize that increasing emissions standards is an important pathway to addressing climate change, so too is increasing the stringency of standards for fuel quality. Unfortunately, while the proposal includes incentives for the production of vehicles with zero or near-zero emissions technology, it does not include any provisions that could significantly reduce GHG emissions from gasoline powered vehicles. Matching increased octane with improved engines could nearly double the emissions reduction claimed for the SAFE rule proposal – an enormous, missed opportunity.

While the transition to electric mobility is steadily advancing, we are decades away from the disappearance of the internal combustion engine, so the rationale for lowering emissions from new and legacy vehicles is paramount. The situation created by the inventory shortages also means that fewer new vehicles will be hitting the road during the current and probably next couple model years, therefore older, fuel inefficient vehicles stay in use. Fuel with lower emissions addresses this challenge. Research by Steffen Mueller, principal economist at the University of Illinois at Chicago's Energy Resources Center, shows that greenhouse gas cuts that could be achieved by using higher-octane midlevel blends with ethanol equal those that EPA thinks are available from electrification. EPA is thus ignoring a very cost-effective way of achieving its desired improvements to the detriment of environmental quality, consumers, farmers, and industry.1

While the research shows that the GHG cuts achieved by using higher-octane, midlevel ethanol blends are equal to the emission reductions that the EPA thinks are available from electrification, the agency is ignoring a duty to consider a very cost-effective way of achieving desired improvements, to the detriment of environmental quality, public health, consumers, farmers and industry.

We recommend that EPA take action to increase the minimum octane standard of gasoline and phasing out today's low-octane blends, as new vehicles are available to take advantage of the efficiency benefits of midlevel ethanol blends. EPA should also correct its inaccurate fuel economy formula to allow the use of midlevel ethanol blends. The agency has admitted that the formula is erroneous and that it unfairly penalizes fuel containing ethanol but has yet to fix the problem. The erroneous formula discourages automakers from proposing use of higher-octane gasoline that uses ethanol as the octane enhancer.

High-octane midlevel ethanol blends would offer cost effective GHG reduction for gasoline powered vehicles for several decades. The current option for high octane gasoline is to use 'premium' gasoline. Only about 10 percent of the market chooses to buy this more expensive product. Considering the historical cost of ethanol, using ethanol to increase octane would encourage adoption of more efficient engines by the whole ICE market because the high-octane product would cost about the same as current 'regular.' This companion program would add to the GHG reductions considered as portions of the vehicle fleet gradually shifts to electric.

In closing, the EPA needs to take this opportunity to open the door for the use of high-octane, low-carbon fuels made with ethanol. It is clear that the blends would enable more efficient vehicles, reduce greenhouse gas emissions and reduce pollution. The EPA's duty under the

Clean Air Act is to protect the health of all Americans by use of commercially available methods. The agency would be irresponsible to ignore this option in regulating greenhouse gas emissions from cars and trucks. An improved gasoline blended with 25-30-percent ethanol is an immediate, low-cost pathway that offers substantial carbon and health risk reductions that will have the greatest impact in poor, urban areas. We urge you to include this important option in those considered for adoption in the new rule, with an immediate effective point of no later than 2025. [EPA-HQ-OAR-2021-0208-0228-A1, pp. 1-2]

An improved gasoline blended with 25-30-percent ethanol is an immediate, low-cost pathway that offers substantial carbon and health risk reductions that will have the greatest impact in poor, urban areas [EPA-HQ-OAR-2021-0208-0228-A1, p. 2]

Commenter: Alliance For Automotive Innovation

A nationwide low carbon fuel standard program Low carbon fuel standards are a market-based approach to decarbonizing transportation fuel and driving funds toward incentivizing EVs. [EPA-HQ-OAR-2021-0208-0571-A1, p. 6]

Comments on Fuels

Action on Liquid Fuels Will Help During the Transition to Vehicle Electrification

Given the timespan over which ICE technology will continue to be available to new vehicle purchasers, and the years that those vehicles will remain in the field, improved liquid fuels are a critically important technology pathway. The largely ignored improved liquid fuels pathway will facilitate increased fuel efficiency, and reduced GHG and non-GHG emissions while the EV market continues to grow.

EPA Should Undertake a Comprehensive Fuels Rulemaking

EPA should consider actions to:

• Transition to a higher minimum-octane gasoline (i.e., minimum 95–98 research octane number) to facilitate higher engine efficiency;

• Implement a nationwide low carbon fuel standard to lower GHG emissions;

• Immediately eliminate sub-87 anti-knock index (“AKI”) octane fuels from the market to increase fuel efficiency and reduce GHG emissions;

• Lower the sulfur cap of gasoline from 80 ppm to 20 ppm at the refinery gate to further reduce non-GHG emissions from ICE-equipped vehicles and engines to improve air quality;

• Cap summer vapor pressure of gasoline at 9.0 psi or less, regardless of ethanol content, to further reduce evaporative emissions as E10 fuel is ubiquitous in the market;

• Regulate the particulate forming tendency of market gasoline by eliminating the heavy aromatic fraction of gasoline, thereby reducing PM emissions from all ICE vehicles, equipment, and engines to improve air quality for all; and

• Limit air toxics, e.g., olefins and aromatics, and their precursors from the fuel to improve air quality for all.

Legacy and New ICE-Equipped Vehicles Will Continue in the Fleet for a Significant Time

There are nearly 290 million light-duty cars and trucks in the United States,113 and nearly 99 percent of those vehicles operate on gasoline or diesel fuel.114 Looking forward, after meeting the Administration’s goal of 50% EV new vehicle market share by 2030,115 it is clear that substantial numbers of liquid-fueled vehicles will be produced well through this decade and into the next. In addition, the average age of a vehicle in the U.S. has grown to over 12 years.116 The car parc will continue to rely on liquid fuels for years to come, and gasoline will continue to play a significant role in transportation. If EPA does not undertake a comprehensive fuels rulemaking, it is missing an opportunity to implement a low-cost approach to improving fuel economy and reducing GHG and criteria pollutant emissions.

EPA Should Adopt a High-Octane Fuel Standard for the ICE Vehicle Market

Automobile and engine manufacturers from around the world publish the Worldwide Fuel Charter (“WWFC”). The WWFC outlines the fuel properties needed for vehicles and engines to achieve a desired level of fuel efficiency and exhaust emissions. In 2019, the Sixth Edition of the WWFC outlined the use of a minimum 95 and higher Research Octane Number (“RON”) for markets with advanced requirements for emission control and fuel efficiency.117 Many developed markets including Europe already have mandatory 95 RON minimum.

Higher-octane gasoline enables opportunities for the use of key energy-efficient technologies, including higher compression-ratio engines, lighter and smaller engines, improved turbocharging, and optimized engine combustion phasing and timing. All of these technologies, when paired with higheroctane gasoline, permit smaller engines to meet the demands of the consumer while at the same time providing higher efficiencies and thus reducing GHG emissions during vehicle use. Furthermore, depending on its composition, high-octane fuel is safe to use in many existing vehicles.

The relative efficiency gain enabled by higher octane rated gasoline is well documented. A literature review published by Leone et al. shows that increasing fuel octane rating from 91 RON to 95 RON facilitates an increase in efficiency by three to five percent.118 Figure 3 [Figure 3 can be found on p. 39 of Docket number EPA-HQ-OAR-2021-0208-0571-A1] shows the correlation of efficiency gain enabled by higher octane rated fuels with higher compression ratio engines. [EPA-HQ-OAR-2021-0208-0571-A1, p. 37-38]

Auto Innovators and its predecessor associations have long advocated that EPA should require a transition to a higher minimum-octane gasoline (minimum 95–98 RON). There are several ways to produce higher octane-grade gasoline. Increasing the ethanol content of gasoline is one approach. Hydrocarbon composition changes are another. Reducing the proportion of low octane naphtha or increasing the proportion of higher-octane streams such as alkylate or reformate will result in higher octane fuels. Ethanol blends higher than E10, with misfuelling mitigation measures in place, have been suggested by some to provide better value to consumers to achieve higher octane numbers and reduce carbon emissions. Auto Innovators does not promote any sole or particular pathway.

Producing higher octane fuel for the future ICE fleet will not impose any significant burdens on the refining and retail sectors. Hirshfeld et al. analyzed the refining economics of raising the average octane rating of the U.S. gasoline pool by increasing the octane rating of refinery produced blendstocks for oxygenated blending and/or the ethanol content of the finished gasoline.119,120 These studies found a transition to higher-octane (95 RON, E10) gasoline was technically feasible and could be made without considerable increases in cost or CO2 emissions for refineries.121 The implementation of higher octane-rated gasoline in the marketplace would be a cost-effective means of improving fuel economy and therefore should be encouraged as soon as possible to maximize environmental benefits across the new car fleet.

EPA has the ability to enable the ICE to achieve increased fuel efficiency by requiring higher minimum octane rated gasoline in the marketplace. Research, data, and evidence confirms the ability to increase ICE efficiencies as the octane rating of gasoline increases. EPA, in the past, has recognized its authority to alter fuel quality to increase efficiencies. Specifically, as the criteria emission standards have increased in stringency, the allowable sulfur concentration decreased in recognition of sulfur’s deleterious effects on emission control systems. Today, the GHG regulation has achieved such levels that the minimum market gasoline octane rating is limiting the ability to advance ICE technology. It is now necessary to adjust the gasoline octane rating (higher) commensurate with required decreases in GHG emissions. The new minimum octane rating needs to be set immediately to 95 RON and then increased to 98 RON as new GHG standards are implemented. The new gasoline octane levels are backwards compatible, and a subset of the vehicles in the legacy fleet have the ability to also increase efficiency in response to higher octane. Being able to leverage the legacy fleet in assisting in the reduction in transportation carbon emissions can significantly benefit the portfolio of technology solutions in achieving the collective goals associated with the climate.

The implementation of higher octane-rated gasoline in new vehicles would be a cost-effective means of improving fuel economy and reducing GHG emissions for the light-duty vehicle fleet.

EPA Has the Authority to Regulate Fuels to Improve GHG Emissions

The Clean Air Act provides statutory authority for the EPA to regulate GHG emissions, which can “cause, or contribute to, air pollution which may reasonably be anticipated to endanger the public health or welfare” (Massachusetts v. EPA, 549 U.S. 497 (2007)). Section 211 of the Clean Air Act provides EPA with the authority to regulate motor vehicle fuels in furtherance of the Act’s goals. Specifically, Section 211(c) of the Act grants EPA the authority to set new national fuel standards, including octane rating, under the following circumstances:

• (1)(A) "if in the judgment of the Administrator, any fuel or fuel additive or any emission product of such fuel or fuel additive causes or contributes to air pollution or water pollution… that may reasonably be anticipated to endanger the public health or welfare," or

• (1)(B) "if emission products of such fuel or fuel additive will impair to a significant degree the performance of any emission control device or system which is in general use, or has been developed to a point where in a reasonable time it would be in general use were such regulations to be promulgated."

It is important to note that the addition of GHGs to the list of Clean Air Act "pollutants" is changing how one thinks of emissions control. For purposes of considering EPA's authority under 211(c)(1)(B), it is important to realize that the term "any emission control device or system" must be understood more broadly than it once was. With this realization, it is easy to see that engine efficiency improvements offer emission control benefits. However, low-octane fuel acts as a barrier to these efficiency benefits. EPA has the authority and must stand firmly on the side of removing these barriers and providing manufacturers with a full menu of options for striving to meet the future GHG standards.

In light of increasing GHG and CAFE requirements, it continues to be essential for vehicles and the fuels they operate on to be treated as a system and developed in tandem. Prospective fuels should enable greater vehicle efficiency and lower emissions, optimize the consumer experience, and fulfill societal values. Technology is in place to produce advanced engines. However, without a promulgated higher-octane fuel standard, the advanced engines cannot optimize their potential operational efficiency. It is now timely for EPA to undertake an accelerated process to implement and synchronize the market introduction of higher-octane gasoline that will enable the benefits of advanced technologies and support manufacturer investments. EPA has the authority to regulate national commercial gasoline octane specifications under the Clean Air Act. EPA should initiate a fast-track process to assure higher octane gasoline that meets the market and timing needs of new vehicle technologies for the U.S. commercial supply.

EPA Should Implement a Nationwide Low Carbon Fuel Standard ("LCFS")

EPA should take actions to support lower or net-zero carbon liquid fuels. Although automobile manufacturers are focused on electrification, actions on liquid fuels can provide benefits to legacy vehicles, would support even lower GHG emissions from PHEVs, and could provide much-needed GHG reduction pathways. EPA should leverage a new national LCFS and/or modified renewable fuel standard (RFS) to incentivize low carbon fuel use in legacy and future ICE vehicles and engines. A properly structured nationwide LCFS, while providing GHG reductions, can also create new revenue sources to incentivize market adoption of EVs.

EPA Should Take Further Action on Fuels to Reduce Emissions and Improve Air Quality

Use of improved liquid fuels supports ongoing efforts to improve air quality and can provide an important bridge in reducing emissions in low-income communities during the transition to expanded vehicle electrification. While today's vehicles emit near-zero levels of tailpipe and evaporative emissions, more can be done to support lower emissions and air toxics exposure, especially in disadvantaged communities.

EPA states:

EPA recognizes that in addition to substantially reducing GHG emissions, a longer-term rulemaking could also address criteria pollutant and air toxics emissions from the new light-duty vehicle fleet—especially important considerations during the transition to zero-emission vehicles. EPA expects that a future longer-term rulemaking will take critical steps to continue the trajectory of transportation emission reductions needed to protect public health and welfare.122

Auto Innovators agrees that "… a longer-term rulemaking could also address criteria pollutant and air toxics emissions from the new light-duty vehicle fleet…" Auto Innovators would add that in many cases gasoline improvements would improve emissions from virtually all of the 290 million vehicles on the road today in addition to other liquid-fueled equipment. Given that these vehicles are on the road today and that benefits would accrue immediately upon introduction, we see no reason for EPA to delay in implementing a rulemaking. Auto Innovators has commented extensively in the past on the fuel improvements needed to address criteria pollutant and air toxics emissions.

Several improvements to market fuels can be made:

1. Reduce sulfur

When EPA finalized the Tier 3 rules governing gasoline, it lowered the maximum average sulfur level from 30 ppm to 10 ppm. This change was essential to facilitating the lower tailpipe emissions standards that are part of the Tier 3 standards because, as EPA points out, "any amount of gasoline sulfur will deteriorate catalyst efficiency."123 However, EPA continues to allow 80 ppm sulfur at the refinery gate and has a 95 ppm downstream cap. Auto Innovators continues to stand behind previous industry comments on sulfur as detailed in the Auto Alliance Tier 3 comments.124 Refiners and the distribution system have had many years to adjust to lower sulfur standards. We urge EPA to reduce the refinery gate and downstream caps to 20 and 25 ppm, respectively, perhaps with a phase-in period, and at the same time to develop a pathway toward a retail cap of 10 ppm per gallon. EPA can then provide ad hoc relief, with a notice and comment process, for refiners and downstream distributors that can show evidence of reasons they actually need it.

2. Cap vapor pressure

The EPA must cap summer gasoline vapor pressure at 9.0 psi or less regardless of ethanol level. From a vehicle operability perspective, there is no need for fuel vapor pressure to be even as high as 9.0 psi. California summer fuel is capped at 7 psi, and in Japan (JIS K 2202), the summer maximum is 6.4 psi. No operability issues with on-specification fuel are experienced in either place. Lower vapor pressure will reduce evaporative emissions across the fleet, particularly in older vehicles and off-road and handheld equipment. Since the beneficial effects of lower vapor pressure are enhanced by progressively lowering it and applying it to all gasoline fueled equipment from day one, there is no reason for EPA not to follow the California or Japanese examples for summer fuels and cap other seasons at ASTM D4814 maxima.

3. Eliminate sub-87 AKI market fuels

Vehicles sold in the U.S. require fuel octane of 87 AKI or higher. Tier 3 regular grade certification fuel has closely controlled octane and is specified at 87-88.4 AKI. In the majority of the U.S., the minimum market octane is 87 AKI by regulation or custom. However, in the Rocky Mountain states sub-octane fuel continues to be marketed. This was justified in the past by high altitude effects on engine knock. However, as ASTM D4814 section X1.6 points out:

New vehicles have sensors to measure [sic] and engine management computers, which take into account such conditions as air charge temperature and barometric pressure. These vehicles are designed to have the same antiknock requirement at all altitudes and a reduced sensitivity to changes in ambient temperature. This more sophisticated control technology began to be used extensively in 1984. This technology, while constantly evolving and improving, is used on almost all new vehicles. This means that many vehicles in today's fleet require fuel having the same antiknock index regardless of changes in altitude or ambient temperatures.

This text implies that the vehicles produced in the last 37 years require the same fuel as the rest of the country. More recently, automakers have produced increasing proportions of vehicles with turbocharged engines. These engines boost manifold pressure using turbochargers and are insensitive to altitude.

The result of misfuelling these vehicles, whether they have sensors and engine management computers dating from 1984 or more advanced technologies, is that the vehicle will knock on the suboctane fuel resulting in spark retard and enrichment to protect the engine from damage. Spark retard will reduce fuel economy and increase GHG emissions, while fuel enrichment will increase CO and HC emissions. The solution to these issues is easy: EPA must mandate that all market fuels meet or exceed the octane of Tier 3 certification fuel.

4. Remove heavy aromatic compounds

Both EPA and CARB recognize the deleterious effects of vehicle particulate emissions. This is demonstrated by their regulations limiting tailpipe emissions of particulate matter (“PM”). The European Union (“EU”) and China also regulate particulate emissions.125,126 While establishing and tightening particulate emissions standards for prospective vehicles may lower emissions in future, there is a way to lower emissions today from all gasoline-powered equipment. Many studies have linked fuel properties, especially heavy aromatics, to tailpipe PM; some of particular importance were published by Honda and include the development of a PM index for fuels.127,128 While the Honda-developed PM index correlates well with tailpipe PM, other methods of measuring PM forming tendency beyond the detailed hydrocarbon analysis method used may be more effective.129,130,131,132 The hard-to-identify heaviest fraction of the fuel harbors the molecules with the highest contribution to PM.133

There have been several Coordinating Research Council ("CRC") projects to investigate the impacts of ethanol, PM index and octane.134,135 The data showed that there is a direct correlation between increased fuel PM index to increased tailpipe PM. Detailed hydrocarbon analysis of the fuels showed that the high molecular weight aromatics fractions of the fuel, C10+ hydrocarbons, are the main contributors to increased tailpipe PM. The more C10+ hydrocarbons there are, the greater the increase in PM formation.

Therefore, EPA should proceed with controlling the particulate forming tendency of market gasoline by requiring the removal of the heavy aromatic components to lower PM emissions throughout the fleet and improve air quality for all, especially those who live and work in close proximity to major highways.

5. Limit air toxics

The emissions from an average light duty vehicle have been reduced by over 99% since the introduction of emissions control technology. The reduction has been such that, according to CARB, in the California south coast air basin, lawn and garden equipment is a greater contributor to poor air quality than light-duty vehicles.136 Nonetheless, toxic emissions continue, especially from older vehicles and off-road equipment. The best approach to limiting toxic emissions is to remove toxics from the fuel prior to distribution. EPA recognized and applied this approach to limiting benzene emissions. Going forward, EPA must broaden its approach and limit air toxics, e.g., olefins and aromatics, and their precursors from the fuel prior to distribution.

E10 Test Procedure Adjustment

In May 2020, EPA proposed an adjustment to laboratory-measured CO2 when tested on Tier 3 certification fuel.137 This proposed adjustment effectively revises the stringency of GHG standards and sets a policy precedent that is not supportive of the potential of future low carbon fuels to contribute to reductions in transportation carbon emissions. If an adjustment is necessary, we continue to encourage EPA to account for such adjustment in a full GHG standard-setting rulemaking under Section 202(a) of the Clean Air Act.138

As was stated in comments submitted on the E10 Test Procedure Adjustment NPRM, "the goal of Auto Innovators is to ensure that this rulemaking helps set a positive policy foundation that values the potential of low carbon fuels in contributing toward our shared climate goals. Auto Innovators proposes that making adjustments to laboratory results is not the optimal path forward and that the effect of E10, and other future low carbon fuels, is best handled within the context of future iterations of fleet average GHG standards."139 [EPA-HQ-OAR-2021-0208-0571-A1, p. 39-45]

Commenter: Alliance for Vehicle Efficiency (AVE)

AVE recommends that EPA's regulatory programs link the GHG reduction of vehicles to the cleaner fuels that now power them. [EPA-HQ-OAR-2021-0208-0256-A1, p. 2]

A Pathway to Cleaner Fuels:

To further help the U.S. reach our carbon reduction goals, AVE recommends EPA's regulatory programs link the GHG reduction of vehicles with the cleaner fuels that now power them.

Applying LCA to the vehicle certification process could lead to more investments in, and the expanded use of, renewable fuels and low carbon fuels (eFuels). Unlike with EVs, the EPA's GHG emissions analysis for certification/compliance of ICE vehicles is not representative of the actual emissions from the country's in-use fuels pool. Using LCA, EPA's GHG rules (and NHTSA's CAFE rules) could be modified to enable automakers to certify gasoline/diesel vehicles with compliance values reflective of the projected in-use carbon intensity of national fuels.

For example, the national fuel pool currently contains approximately 10% ethanol. California's published estimates for carbon intensities of ethanol pathways average 35.1%, and the average carbon intensity of the ethanol pool is 57-61%.18 The national average E10 carbon intensity has a factor of 96 and is approximately 4% below the compliance value used by automakers toward their fleet average GHG and fuel economy.

Another example is the significant growth and development of renewable natural gas (RNG). According to data from the California Air Resources Board (CARB), the annual average carbon intensity score of RNG was -5.845 gCO2e/MJ,19 with 92% of all on-road fuels used in natural gas vehicles in 2020 being RNG.20 While the majority of this RNG is currently used in heavy-duty fleets, the current GHG regulations restrict development of innovative technologies for light-duty vehicles to be fueled by RNG.

The EPA's current and proposed GHG regulations include no mechanism to account for the lower carbon intensity of fuels to stimulate OEM investment in technologies that could utilize these fuels. There is also no incentive to further reduce the carbon intensity of fuels irrespective of any investments made by producers. AVE recommends EPA adjust compliance values for the actual carbon intensity of in-use fuels. Doing so will positively impact the annual certification compliance values of the OEMs' ICE vehicles and would likely incentivize fuel producers and OEMs to monetize future carbon reductions.

Applying upstream energy-based GHG accounting measures that consider the projected in-use carbon intensity to all vehicles could have several benefits:

• Create a market-based incentive for investment to expand the use of renewable fuels and to lower the carbon intensity of manufacturing petroleum-based fuels.

• When coupled with a national Low Carbon Fuel Standard, would provide certainty that GHG reductions would be met in-use and provide significant environmental benefits. [EPA-HQ-OAR-2021-0208-0256-A1, p. 8]

Commenter: American Coalition for Ethanol (ACE)

We stand ready to support the fulfilment of these goals but need to make it clear the U.S. will not succeed in this endeavor unless steps are taken to reward farmers and biofuel producers for their ability to be part of the solution to mitigate climate change.

While it may be an inconvenient truth for some to accept, corn ethanol is a proven and cost-effective low carbon fuel playing an important role in reducing GHG emissions and air pollution from the transportation sector, evidenced by the fact the Renewable Fuel Standard (RFS) has cut GHG emissions by nearly 600 million metric tons since 2007, exceeding EPA's original expectation of 444 million metric tons.1

ACE members believe ethanol can and should be an even bigger part of the solution to climate change, but this depends upon the Administration's willingness to engage us on ethanol's role as a low carbon fuel through policies such as the RFS and the topic of this request for comments; how to reduce GHG emissions from future vehicles.

A recent study published by Harvard University, Tufts University and Environmental Health & Engineering Inc. scientists reinforces the fact that the GHG reduction benefits of corn ethanol have been significantly undervalued because some regulatory bodies refuse to apply or use the latest lifecycle science. The Harvard/Tufts study found that average corn ethanol reduces GHGs by 46 percent compared to gasoline and given improvements occurring in corn farming and within ethanol facilities, corn ethanol's carbon footprint will continue to decline over time.2

Nevertheless, there is a disconnect between this reality and the proposal by EPA to reduce GHGs from 2023 and later model year vehicles. Since nearly all the 270 million light-duty vehicles on U.S. roads today run on liquid fuel, it would seem reasonable that to significantly cut CO2 emissions from their tailpipes, consideration must be given to the fuel powering the engines, including steps to replace fossil fuel with a lower carbon and higher octane fuel, such as ethanol. Unfortunately, and unbelievably, EPA's proposal fails to adequately address these important issues.

Instead, EPA impractically suggests vehicle GHG emissions can be reduced merely by plugging more cars into the grid, without much attention to how the electricity powering those cars is generated. When electric vehicles (EVs) are actually charged by low carbon power sources, they will play a role in reducing GHG emissions, but EVs comprise just 2 percent of all light-duty vehicles on the road today, and most of them are hybrid models that also operate on liquid fuels. In other words, even as EV sales increase, Americans will continue to rely on billions upon billions of gallons of liquid fuels for decades to come. Therefore, this proposal must place much greater emphasis on improving the quality of liquid fuel and the role low carbon, high octane ethanol can play in making significant GHG reductions in the near-term. [EPA-HQ-OAR-2021-0208-0221-A1, p. 1-2]

In January, the Rhodium Group released a compelling report indicating even under the most aggressive sales projections, EVs alone will not achieve net-zero transportation emissions by 2050.3 Rhodium explained meeting this goal also depends upon decarbonizing liquid fuels and more stringent CAFE-GHG standards. [EPA-HQ-OAR-2021-0208-0221-A1, p. 2]

Many leading ethanol producers are on a trajectory to both net-zero and net-negative lifecycle emissions in the not-too-distant future. If the overarching goal is net-zero emissions by mid-century, let's start making progress right now by taking full advantage of the 15 billion gallons of domestically-produced ethanol available today as an affordable way to boost octane and meaningfully reduce GHG emissions from gasoline powered engines.

While it is regrettable EPA's proposal does not invite comments on the role high octane and low carbon fuels such as ethanol can play in helping automakers comply with GHG standards, it does invite comments on what should be done to promote more fuel efficient vehicles.

We have already discussed the incredible lifecycle GHG benefits of corn ethanol, but ethanol also delivers the highest octane rating for fuel at the lowest cost, allowing automakers to benefit by continuing to develop high-compression and fuel efficient engine technologies to reduce vehicle GHG emissions. We believe high octane, low carbon blends comprised of 25 to 30 percent ethanol would enable more fuel efficient vehicles, reduce GHG emissions, and reduce other pollutants.

It is in that spirit we urge EPA to use this rulemaking to establish a minimum Research Octane Number (RON) rating for fuel in the range of 98 to 100 RON with 25 to 30 percent ethanol and provide automakers with a corresponding certification fuel for engine testing purposes. As part of this action, the Agency should finally phase-out the use of sub-octane blends (85 AKI) because automakers indicate this inferior low octane fuel can harm the engines in their vehicles. EPA has acknowledged that Section 211 of the Clean Air Act provides authority to control gasoline octane levels. EPA can set a minimum octane rating for fuel because low octane gasoline impairs engine manufacturer's ability to further increase compression ratios to reduce CO_2 emissions to meet the GHG standards and increases CO_2 emissions in legacy vehicles.

If the final rule does not establish minimum octane standard for fuel, EPA should immediately proceed to initiate a separate rulemaking on this issue.

Automakers have wanted EPA to increase the octane rating of gasoline for several years. Consider the following statements from automaker representatives and research findings from fuel and engine experts:

• In an October 6, 2011, letter to EPA from Mitch Bainwol, the President and CEO of the Alliance of Automobile Manufacturers at the time: "Furthermore, to help achieve future requirements for the reduction of greenhouse gas emissions, we also recommend increasing the minimum market gasoline octane rating, commensurate with increased use of ethanol. Adding ethanol to gasoline increases its octane rating. To attain necessary octane levels, it is important that refiners not be permitted to reduce base gasoline octane ratings in light of the additional octane contribution from higher ethanol."4

• Dan Nicholson, Vice President of Global Propulsion Systems for General Motors (GM), said the following about high octane fuel at the 2016 CAR Management Briefing Seminars. "Higher octane fuels are the cheapest CO_2 reduction on a well-to-wheels analysis…Fuels and engines must be designed as a total system. It makes absolutely no sense to have fuel out of the mix of engine technology discussions."5

• Oak Ridge National Laboratory (ORNL) has found the use of 100 RON E25 and E40 in high-compression engines reduce well-to-wheel GHG emissions by 4 and 8 percent per mile, respectively, compared to E10. Total GHG emissions per mile were 8 percent lower for E25 and 17 percent lower for E40 when ethanol's upstream lifecycle GHG benefits were added.6

• According to a study by Jim Anderson of Ford Motor Company, "It appears that substantial benefits may be associated with capitalizing on the high octane rating of ethanol. We estimate large increases (4 to 7 points) in the RON of U.S. gasoline are possible by blending 10 to 20 percent by volume ethanol above the E10 already present."7

• Ford and General Motors experts indicate 98 to 100 RON fuel would result in a 7 to 8 percent efficiency gain in turbocharged port-fuel injected engines, a 5 to 6 percent efficiency gain in turbocharged direct injection engines, a 4 to 5 percent gain in naturally-aspirated port-fuel injected engines, and 3 to 4 percent gain in naturally-aspirated direct-injection engines. The same study found the maximum efficiency gain from 95 RON is merely 4 percent and limited strictly to turbocharged port-fuel injected engines.8 [EPA-HQ-OAR-2021-0208-0221-A1, p. 2-4]

In addition to establishing a minimum octane rating for fuel, ACE encourages EPA to take a technology-neutral approach to the incentives and multipliers offered by the Agency with respect to low carbon fuel use in various vehicle technology. Unfortunately, EPA's proposal is considerably biased in favor of EVs over other vehicle/engine technologies. For example, under existing GHG standards the value of the multiplier used by the Agency to encourage the production of EVs falls from 2 (for model years 2017 through 2019) to 1.5 for model year 2021 and thereafter. But EPA's proposal would increase the EV multiplier to 2 again for model years 2022 through 2024. Instead of putting its thumb on the scale to favor EVs through multipliers and compliance credits, EPA should establish a technology-neutral approach that also provides automakers with incentives to produce flexible fuel vehicles (FFVs) and vehicles designed to achieve optimal efficiency and reduced emissions on high octane ethanol blends. [EPA-HQ-OAR-2021-0208-0221-A1, p. 4]

There are approximately 25 million FFVs in the U.S. today. The ideal way to transition from today's legacy fleet of internal combustion engines to new vehicles with advanced engine technologies designed to run optimally on a high octane fuel is to utilize FFVs as bridge vehicles that can provide immediate demand for midlevel ethanol blends. As a matter of fact, ORNL has investigated the use of high octane ethanol blends such as E25 and E30 in FFVs that are designed and compatible with ethanol blend levels from 0 to 85 percent and can therefore seamlessly and with OEM approval utilize midlevel ethanol blends.9 Key findings from Oak Ridge include: "Experiments were performed with four FFVs using an E10 (92 RON) and E30 (100 RON) fuel. The two direct-injection FFVs demonstrated performance improvements for E30 compared to E10 of 2.5 to 3 percent, based on the 15-80 wide-open throttle acceleration time. Three of the four FFVs showed performance improvement with high-octane E30 compared to regular E10. (…) Marketing E25 or E30 to FFV owners as a performance fuel may enable greater utilization of ethanol in the near term and could help establish the refueling infrastructure to enable manufacturers to build dedicated vehicles designed for a high-octane midlevel ethanol blend."

FFVs using E85 significantly reduce lifecycle GHG emissions because the carbon emissions produced during the combustion of ethanol are largely recycled back in the growing of corn and other biofuel crops. Until 2015, EPA allowed automakers to use a 0.15 multiplier to account for this carbon regeneration and comply with CAFE-GHG standards. We encourage EPA to reinstate this FFV multiplier or establish an incentive that is on equal footing with the EV credits in its proposal and establish a similar credit for vehicles designed to run optimally on midlevel blends of ethanol such as E25/30.

Vehicle incentives/credits are not the only area in which EPA seems to penalize technologies designed to operate efficiently on ethanol-blended fuel, indeed another inequity exists with the Agency's outdated fuel economy formula. In previous statements, EPA has acknowledged part of the fuel economy formula (the R-factor) unfairly penalizes fuel containing ethanol. Consequently, EPA is discouraging automakers from developing efficient engines that require higher octane ratings and higher ethanol content. EPA has previously said the 0.6 R-factor is erroneous and fails to achieve the statutory purpose of evaluating the fuel economy of fuels containing ethanol The auto industry has asked EPA for an R-factor of 1.0. In response, EPA has suggested the correct value may lie "between 0.8 and 0.9." While ACE supports an R-factor of 1.0, an increase to 0.8 or 0.9 would represent an improvement.

In the spirit of helping inform future EPA decision-making regarding the RFS and the lifecycle GHG emissions of corn ethanol generally, we feel compelled to once again point out that the approach the Agency takes regarding corn ethanol's lifecycle analysis is wildly outdated and fails to include the continuing advancements in this science documented by the Department of Energy's Greenhouse gas and Regulated Emissions and Energy use in Transportation (GREET) model. One of the most glaring discrepancies between EPA's outdated approach to lifecycle modeling and more recent versions of the GREET model is assumptions about the impact of land use change from ethanol production.[EPA-HQ-OAR-2021-0208-0221-A1, pp.4-5] [Figure 1 can be found on p. 5 of Docket number EPA-HQ-OAR-2021-0208-0221-A1]

EPA's outdated modeling included in the final RFS (in 2010) assigns a 29-gram penalty to the overall carbon intensity (CI) of corn ethanol. Subsequent research on this topic, in addition to the fact that the U.S. has produced more than 15 billion gallons of corn ethanol (so actual land use changes can be observed), indicates a more accurate land use factor of between 4 and 8 grams. Even the California Air Resources Board (CARB), in its implementation of the Low Carbon Fuel Standard, has reduced the corn ethanol land use change assumption from the 30-gram penalty it originally applied in 2011 to a 19.8-gram factor today. While that is still inexplicably higher than what most research suggests should be the case, the fact remains CARB has at least tried to update their lifecycle analysis of corn ethanol while EPA has not. [EPA-HQ-OAR-2021-0208-0221-A1, p.5]

Nearly three decades ago, Dr. Michael Wang at the Department of Energy's Argonne National Laboratory developed the GREET model. It is considered the gold-standard for calculating energy use, GHGs, and other regulated emissions that occur during the full lifecycle production and combustion of all transportation fuels. The assumptions used by Argonne scientists in GREET are under constant review and updates to the model occur frequently. GREET is used by the California Low Carbon Fuel Standard program and the Oregon Clean Fuels program and has more than 40,000 registered users worldwide. Like the results found in the recent Harvard/Tufts study, the latest (2020) version of the GREET model indicates that average dry mill corn ethanol production reduces lifecycle GHG emissions by 45 percent compared to gasoline.10 ACE has repeatedly asked EPA to adopt the latest GREET model to make all GHG determinations for the RFS and we echo that recommendation in these comments. [EPA-HQ-OAR-2021-0208-0221-A1,pp.5-6]

Emerging scientific research indicates the GHG carbon intensity for corn ethanol will continue to improve through advancements on-the-farm and in ethanol facilities. We would strongly encourage EPA to engage us on this topic. [EPA-HQ-OAR-2021-0208-0221-A1, p. 6]

In the near-term, a properly implemented RFS and year-round availability of E15 will meaningfully reduce the carbon intensity of the U.S. transportation sector by capitalizing on the existing vehicle fleet's ability to use lower-carbon biofuels. [EPA-HQ-OAR-2021-0208-0221-A1, p. 6]

Commenter: American Petroleum Institute (API)

Systems Approach to Evaluating Transportation Emissions

Liquid fuels can provide near-term and ongoing GHG reductions from the on-road vehicle fleet when evaluated within an analytical systems-based framework that comprehends technology neutral, performance-based standards for fuels, vehicles, and infrastructure. To achieve this goal, it is critical that EPA link fuel and vehicle standards to ensure consistent CO2 accounting across all fuel/vehicle technology options. Current vehicle greenhouse gas emissions standards consider only tailpipe emissions. A well-to-wheels approach provides a systems-based analytical framework for evaluating the GHG impacts of various fuel-vehicle pathways, including internal combustion engines (i.e., gasoline, diesel, or natural gas), battery electric, hydrogen, and hybrid technologies.

API also supports federal policy that improves fuel carbon intensity to drive CO2 reductions from transportation. Liquid fuels can provide GHG emissions improvements using feedstock and process technologies that reduce fuel carbon intensity. Existing federal programs, including the current Renewable Fuel Standard, do not adequately incentivize the deployment of available technologies to produce lower carbon fuels.

There are significant benefits to developing a holistic, systems approach to regulating greenhouse gas emissions from transportation. Establishing a carbon intensity standard for the motor fuel pool that declines over time and is reflected in the evolution of the EPA test fuel properties used for emissions standard certification purposes would not only benefit new vehicles, but also could achieve emissions reductions across the entire existing vehicle fleet. A well-to-wheels approach would allow the market to drive carbon reductions at the lowest abatement cost, while preserving consumer choice. Vehicle manufacturers benefit with the ability to demonstrate the overall emissions reductions that are achieved as the carbon intensities of the fuel pool, electric grid and vehicle fleet improve over time. And consumers will benefit through market competition that results in a variety of innovative technologies that help to reduce the cost of carbon abatement for each fuel/vehicle technology pathway. Adopting a well-to-wheels approach, combined with fuel carbon intensity reductions, provides a broad spectrum of industries that power the transportation system (e.g., automakers, engine and equipment makers, petroleum refiners, power generators, and biofuels manufacturers) with incentives to reduce GHGs. [EPA-HQ-OAR-2021-0208-0247-A1, pp. 1-2]

Commenter: City of Albuquerque, NM

Furthermore, AQP is in the process of updating our gasoline vehicle emissions inspection program and creating a diesel vehicle emissions inspection program. [EPA-HQ-OAR-2021-0208-0535-A1, p.2]

Commenter: Clean Fuels Development Coalition (CFDC)

Over the past 15 years the CFDC has made dozens of submissions and comments to the U.S. Environmental Protection Agency (EPA) concerning the value of HOLC fuels as replacements for carbon-intensive, carcinogenic, and costly gasoline aromatics. Without exception, the EPA has rejected these comments as ‘outside the scope’ despite having requested comments on how ethanol’s superior octane properties can be used to meet the objectives of various EPA rulemakings such as the Tier 3 Rule and more recently, the SAFE Rule that is currently being revised. In addition to providing information on how HOLC Fuels can increase vehicle efficiency, we showed how high octane ethanol can protect public health by cost effectively replacing gasoline aromatics. Frequently, it seemed to us that two different sets of authors had been involved in the NPRMs and final rules.

CFDC had hoped this rule would turn out differently. Immediately upon taking office, President Biden singled out the SAFE-2 Rule as one of his Administration’s top priorities in the fight against climate change and promotion of environmental justice. The U.S. gasoline market is the world’s largest. Americans consume more than half of all the gasoline burned on earth. Gasoline is the primary source of U.S. carbon emissions and the most harmful urban toxics emissions. Consequently, CFDC assumed that President Biden’s EPA would recognize the opportunity the fuel economy rule presented and pay special attention to decarbonizing U.S. gasoline by substantially reducing its most carbon-intensive components: the carcinogenic aromatics petroleum refiners use to increase gasoline octane ratings. In fact, EPA is legally required to take such action by a mandatory provision first enacted in Section 202(l) of the 1990 Clean Air Act Amendments (CAAA).

CFDC was greatly disappointed when EPA in its proposed rule did not even request comments on how the US light-duty fleet's fuel efficiency could be improved and its carbon emissions could be reduced. We met with EPA staff, provided preliminary information, and requested that at a minimum EPA solicit comments on octane, just as the agency did in formulating the 2018 Final SAFE Rule. While EPA took no action on octane in that rule, as we testified in the August 2021 public hearing, we do not understand how the agency could acknowledge a potential role for high octane fuels then, but not now.

EPA Invokes Section 202(a) and 'Places Greater Weight on Reducing Emissions that Endanger Public Health and Welfare.' After years of disappointment, CFDC had feared the flawed analyses and anti-ethanol biases displayed by EPA's Office of Transportation and Air Quality (OTAQ) would once again prevent EPA's acknowledgment that HOLC fuels are a superior substitute for gasoline aromatics. However, the NPRM contained an obscure statement on p. 43729 in the Federal Register that rekindled CFDC's hope that Administrator Regan will honor his pledge to 'be driven by science and the rule of law' and direct OTAQ to comply with mandatory language in section 202(l) of the Clean Air Act that requires EPA to reduce gasoline aromatics to the 'greatest achievable extent'.

Specifically, the NPRM announced that EPA is 'revising decisions made in the SAFE final rule in accordance with Supreme Court decisions' based upon 'statutory purposes…in particular of section 202(a)'. EPA further explained that 'it is more appropriate to place greater weight on the magnitude and benefits of reducing emissions that endanger public health and welfare…'.

Section 202(a)(1) of the CAA states that 'The Administrator shall by regulation prescribe (and from time to time revise) * * * standards applicable to the emission of any air pollutant from any class or classes of new motor vehicles or new motor vehicle engines, which in the Administrator's judgment cause, or contribute to, air pollution which may reasonably be anticipated to endanger public health or welfare.'

Before the Administrator may issue standards addressing emissions of greenhouse gases from new motor vehicles or engines under section 202(a), the Administrator must satisfy a two-step test. First, the Administrator must decide whether the air pollution under consideration may reasonably be anticipated to endanger public health or welfare. Second, the Administrator must decide whether emissions of an air pollutant from new motor vehicles or engines cause or contribute to this air pollution. If the Administrator answers both questions in the affirmative, he/she must issue standards under section 202(a). Massachusetts v. EPA, 549 U.S. at 533.

However, Congress Made Its Own Endangerment Finding for Gasoline Aromatics When It Enacted Section 202(l).

Section 202(l) is a unique provision of the Clean Air Act in that it constitutes a Congressional endangerment finding—there is no need to wait for EPA to make one under section 202(a) because the MSAT provisions of CAA section 202 are not like most EPA provisions. including the climate endangerment sections, which ask for or authorize studies of possible harm as a necessary predicate to action.

According to C. Boyden Gray, Counsel to President George H.W. Bush during the CAAA deliberations, 'The MSAT provisions by contrast constitute a legislative finding of harm and command a correction--- an elimination of air toxics to the extent technology permits with attention to cost factors. There is no need to find harm---that having already been established by Congress.'

9th Circuit Ruled EPA Can't Selectively Choose Which Parts of a Statute to Enforce.

In the United States National Bank of Oregon v. Independent Insurance Agents of America, Inc. [508 U.S. 439---] decided in 1993, the DC Circuit found that the 'court must not be guided by a single sentence of a statute but must look to the provisions of the whole law and to its object and policy.' The court ruled that EPA could not uncouple one sentence of a section from the rest of the section in order to expand its authority beyond the aims and limits of the section as a whole.

Consequently, CFDC believes if EPA is going to justify its proposed revisions to the 2020 ruling upon the statutory objectives of section 202(a), it is also bound by the statutory requirements of section 202(l). As we noted above, this requires EPA/OTAQ to recognize that Congress has made a legislative endangerment finding as technologies present themselves.

U.S.C. 7545 Guidelines Support CFDC Position on 'Substantially Similar' and Legacy Vehicles. In the 1995 API v. EPA ROR ruling, the DC Circuit Court cited 42 U.S.C. section 7545, which authorizes EPA to control or prohibit the manufacture or sale of fuels or fuel additives if the agency finds that such fuels or fuel additives cause or contribute to air pollution or impair the performance of emission Control devices. However, before it can prohibit a fuel or fuel additive, EPA must do several things, including publish a finding that such prohibition will not cause the use of any other fuel or fuel additive which will produce emissions to endanger the public health to the same or greater degree than use of the fuel or additive to be prohibited.

CFDC believes that EPA is in violation of this legal principle because it has unlawfully blocked the use of higher ethanol blends as octane substitutes for highly toxic gasoline aromatics in defiance of the aforementioned Congressional endangerment finding. EPA's prohibition against the use of HOLC fuels such as E30 has led to the continued or expanded use of aromatics which Congress has directed EPA to reduce to the greatest achievable extent in section 202(l). EPA has known for many years that gasoline aromatics are the predominant source of highly toxic SOA-bound PAHs that its defective MOVES Model is unable to predict. Furthermore, PAHs formed in the presence of SOAs have a synergetic effect in which PN (particle number) concentrations are amplified by a factor of 100 or greater, and the particles are insulated and preserved, enabling long-range transport. EPA's failure to come clean on its models' deficiencies—and the grave consequences that has for public health—borders on professional malpractice.

Fuel Additive 'Already in Commerce'. In American Methyl Corp. v. EPA [749 F.2d at 943-836], the court determined that EPA must comply with this section to ban or control a fuel additive that is already in commerce. The Court wrote: 'This suggests that EPA's power to control a…fuel additive already in commerce is controlled by section 7545(c) and that EPA does not have an independent source of authority to control or prohibit nonrenewable oxygenates springing from the considerations enumerated in section 7545(k)(1).'

EPA Has Signaled its Intention to Avoid 202(l) Compliance by Claiming Excessive 'Lead Times' for E30 and HOLC Fuels to be used in Standard Vehicles.

In the NPRM [p. 43279], EPA states the following:

'We are revising decisions made in the SAFE final rule in accordance with Supreme Court decisions affirming that agencies are free to reconsider and revise their prior decisions where they provide a reasonable explanation for their revised decisions. In this rulemaking, the agency is changing its 2020 position and restoring its previous approach by proposing to find, in light of the statutory purposes of the Clean Air Act and in particular of section 202(a), that it is more appropriate to place greater weight on the magnitude and benefits of reducing emissions that endanger public health and welfare, while continuing to consider compliance costs, lead time and other relevant factors.'

CFDC challenges EPA's historical position as set forth in its 2018 Preliminary Regulatory Impact Analysis, where it gravely distorted the facts at pp. 256, 257:

' 6.3.2.2.17.3 Potential of higher octane fuels. Automakers and advocacy groups have expressed support for increases to fuel octane levels for the US market and are actively participating in Department of Energy research programs on the potential of higher octane fuel usage. Some positions for potential future octane levels include advocacy for today's premium grade becoming the base grade of fuel available, which could enable low cost design changes that would improve fuel economy and CO2. Challenges associated with this approach include the increased fuel cost to consumers who drive vehicles designed for current regular octane grade fuel that would not benefit from the use of the higher cost higher octane fuel. The net costs for a shift to higher octane fuel would persist well into the future. Net benefits for the transition would not be achieved until current regular octane fuel is not available in the North American market, and manufacturers then redesign all engines to operate the higher octane fuel, and then after those vehicles have been in production a sufficient number of model years to largely replace the current on-road vehicle fleet. The transition to net positive benefits could take many years.' (Emphasis supplied)

EPA's Assertion on High Octane Fuels, and specifically the use of E30 Clean Octane Fuels in Legacy Vehicles Is Insupportable on Technical, Commercial, and Legal Grounds.

Over the years, CFDC provided detailed information on the benefits from transitioning to a nationwide E30 Clean Octane standard. We rebutted EPA's assertions in its 2018 Preliminary RIA, which misstated the facts as noted above. EPA did not respond to CFDC's arguments, once again claiming them to be 'outside the scope' even though it had requested comment on that very issue.

In fact, the opposite is true. E30 can be safely used in, and benefit, standard (non-flex fuel) vehicles on the road today.1 Light-duty vehicles (LDVs) would operate more efficiently and with more power, the most dangerous tailpipe emissions would be substantially reduced, and consumers would save billions of dollars by paying less for a higher quality fuel. For example, between 2008 and 2014 U.S. gasoline prices remained well above the $3 per gallon mark. Without ethanol's contribution to the finished gasoline pool, Merrill Lynch estimated gasoline prices could have been 50¢ per gallon higher. The Department of Energy also concluded that ethanol reduces retail gasoline prices and reduces crude oil demand, which makes crude oil cheaper for the entire world.2 Other studies show using E30 would save consumers 20 cents per gallon. Consequently, this language should be deleted from the final SAFE Rule RIA.3

Ethanol Blends' Unique 'Time to Market' Strengths Are Critical to Success of the Biden Carbon Reduction Plan and its Role in Environmental Justice.

Even in a best-case scenario for transport sector electrification, literally TRILLIONS of gasoline-powered miles will be driven by Americans over the next several decades. In 2021, approximately 270 million light-duty vehicles (LDVs) will consume 120 billion gallons of gasoline containing 25% aromatics. U.S. LDVs are typically in service for 12 or more years. Every year, billions of gallons of aromatics will be emitted in the form of millions of tons of ultrafine particles (UFPs), secondary organic aerosol (SOA)-bound PAHs and other potent toxics, and black carbon (BC). Americans—especially infants, children, and other vulnerable citizens—will be exposed to billions of invisible nanoparticles on a 24/7 basis with no means of escape.

Unfortunately, unless EPA acts quickly, things will get worse. As gasoline direct injection (GDI) engines dominate the US fleet, the most dangerous emissions will get increase exponentially. GDI engines increase particle number (PN) and UFP-bound toxic emissions by a factor of 100 or more. Their associated, highly potent PAH toxics cause harm in the parts-per-trillion according to experts like Dr. Frederica Perera (Columbia University) and former NIEHS Director Linda Birnbaum.

Again, in the context of information that has already been submitted to EPA, a recent letter from the Alliance of Automotive Innovation (AAI) to former Senate Majority Leader Tom Daschle, chair of the High Octane Low Carbon (HOLC) Alliance, provides new information that we believe has been ignored. AAI's membership includes the manufacturers of 99% of all new LDVs sold in the U.S. There can be no more credible source of information about vehicle performance, the importance of fuel quality and octane, and the connection between emissions and human health. AAI stated high octane low carbon fuels can provide benefits 'in new and existing internal combustion engines and therefore should be encouraged … as soon as possible'.

This is not a new position for automakers—they have always recognized the importance of linking fuel quality to vehicle performance and emissions. In October 2011, the automakers' alliance wrote then-EPA Administrator Lisa Jackson: 'EPA has long recognized that vehicle technology and the fuel employed with that technology need to work in concert as an integrated 'system' so that vehicles can operate efficiently and achieve the lowest technologically and economically feasible emissions targets.'

They concluded the letter by saying: 'Furthermore, to help achieve future requirements for the reduction of greenhouse gas emissions, we also recommend increasing the minimum market gasoline octane rating, commensurate with increased use of ethanol. Adding ethanol to gasoline increases its octane rating. To attain necessary octane levels, it is important that refiners not be permitted to reduce base gasoline octane ratings in light of the additional octane contribution from higher ethanol.' This again is further justification for our rejection of any suggestion by EPA that octane is a 'new issue', or that octane is beyond the jurisdiction of EPA regulation.

Ten years ago, the AAM letter was written as EPA was considering its Tier 3 sulfur reduction rules. Despite requesting comment on how it could encourage widespread use of E30 (30% ethanol) high octane blends in the Tier 3 NPRM, EPA ultimately rejected CFDC's comments as being 'outside the scope'. Instead of complying with Congressional directives, for the past ten years EPA has covertly encouraged refiners to increase their use of aromatics and unlawfully blocked the use of HOLC Fuels.

Please see Attachment B for Relevant Automaker Documentation [Attachment B can be found in at docket number EPA-HQ-OAR-2021-0208-0564-A2, pp 16-17]

Background on the Potential and Appropriateness of High Octane Low Carbon Fuels.

On the first day of his new Administration, President Biden identified correction of the Trump SAFE rule as a top priority for new EPA Administrator Regan. President Biden announced that the EPA would expeditiously release a new fuel efficiency rule, the primary goal of which would be to reduce transportation sector carbon emissions 50% by the year 2030. President Biden also emphasized that environmental justice issues would receive paramount attention as his agencies develop plans to reduce transportation sector carbon emissions.

In its NPRM EPA stated that 'in addition to substantially reducing GHG emissions, a longer-term rulemaking could also address criteria pollutant and air toxics emissions from the new light-duty vehicle fleet'.

CFDC and others worked in good faith with EPA officials in recent months to develop a near term carbon mitigation plan that would be consistent with the President's 2030 goals as well as his emphasis on promoting environmental justice. CFDC pointed out to EPA that trillions of miles will be driven on gasoline in the United States for the next several decades as the transition to an electrified transportation sector occurs. This means that the 25% aromatics fraction of US gasoline which petroleum refiners use to boost gasoline octane levels will emit literally billions of highly toxic nanoparticles that will seriously damage Americans' health for years to come.

Oil interests prefer to use crude oil-derived, benzene-based aromatics even though Congress has required EPA to replace them with HOLC Fuel blends. And even though gasoline aromatics are the primary source of urban carbon emissions (especially potent Short-Lived Climate Pollutants such as black carbon) and highly pathogenic toxics such as SOA-bound PAHs, the career bureaucrats at OTAQ inexplicably block the use of HOLC Fuels to displace gasoline aromatics.

Congress knew that gasoline aromatics were a predominant source of both carbon and toxics emissions when it banned leaded gasoline in the 1990 Clean Air Act amendments. At that time Congress was determined to avoid the horrendous social and economic costs imposed on America and the world by the poisonous leaded gasoline. After months of exhaustive debates, Congress overwhelmingly approved mandatory language that requires EPA to reduce gasoline aromatics to the greatest achievable extent as technologies present themselves. Despite repeated directives over the years OTAQ continues to stonewall and erect unlawful barriers to aromatics' Congressionally-preferred replacement—HOLC Fuel blends made with ethanol.

Critical to Understand Importance of Legal Authorities Created by the 1990 Clean Air Act Amendments. CFDC was actively involved in the 1990 CAAA floor debates and the passage of the Daschle – Dole 'clean octane' provision. which catalyzed the Title II provisions including sections 202(a) and 202(l). Many view this as 'miraculous' because the Senate passed that controversial—and hugely consequential—amendment by the lopsided margin of 69-30, unimaginable in today's gridlocked Congress. A primary catalyst of the Senate floor vote was EPA's 1987 proposal to approve a new certification fuel with 45% aromatics, which the agency said was necessary to compensate for the ban on leaded gasoline. Oil interests pulled out all the stops to defeat the amendment (which would impose a 25% aromatics cap and require periodic reductions as 'technologies presented themselves'). The debate raged for months, with the oil industry spending millions of dollars in national media.

Ambassador C. Boyden Gray—who was White House Counsel to President George H. W. Bush during the 1990 CAAA debates—has noted that the Section 202(l) Mobile Source Air Toxics (MSAT) provision is unique in that it represents a 'Congressional endangerment finding' which 'pinpointed gasoline aromatics as a major human health threat that demands correction.

The Congressional Record debates prove beyond a shadow of a doubt that Congress was determined to prevent a repeat of the tragic human and economic costs the nation suffered under decades of lead poisoning (which Henry Ford had warned against in 1921 when he pushed for E30 high octane fuels). The Environmental and Energy Study Institute has since stated 'Aromatics Are the New Lead.'

Behind the scenes, OTAQ officials opposed the 1990 MSAT provision—we believe they resented having Congress tell them what to do about gasoline composition. Once it passed, they refused to enforce it and years went by with little or no action. When Senators Daschle and Lugar introduced the first Renewable Fuel Standard (RFS) bill, OTAQ also covertly opposed it. When RFS1 finally became law, some within OTAQ supported oil industry efforts to have Section 202(l) repealed during the 2005 EPACT conference negotiations. However, Congress did not forget the enormous threat aromatics posed to public health, and it doubled down, requiring EPA to promulgate the 2007 MSAT Rule eighteen months later.

In a slide deck presented on January 28, 2013, OTAQ's director of fuels policy contended that 'octane' has 'historically had no effect' on air toxics. 'CAA 211(c)(1)(A) – Cause or Contribute • EPA endangerment finding and regulation of GHG emissions from motor vehicles raises the issue of considering fuel controls that might reduce GHG emissions – Octane historically has had little or no effect on criteria pollutants or air toxics but could affect GHG emissions.' [Slide 13]

CFDC and others asked EPA how a veteran OTAQ fuels expert could make such an outrageous statement, but received no satisfaction until two years later, when in May 2015 a revised version deleted this erroneous assertion:

May 2015: 'CAA 211(c)(1)(A) – Cause or Contribute • First requires an EPA finding that emissions from a F/FA causes or contributes to air pollution that endangers public health and welfare – To date we have not done so for GHG under 211(c) - fuels – Only for motor vehicles under 202(a).'

We wonder why this statement was stricken from OTAQ presentations. Apparently, someone realized that it was indefensible yet took no affirmative action to correct the record.

One likely answer can be found in Senator Daschle's letter to Acting Office of Air and Radiation Director Joe Goffman, footnote #5, which referenced the Baldauf et al. 'Ultrafine Particle Metrics and Research Considerations: Review of the 2015 UFP Workshop' peer-reviewed report published in the International Journal of Environmental Research and Public Health. Here EPA's own scientists were finally forced to admit that their atmospheric models were hopelessly defective and that an entirely new paradigm must be developed for the synergetic relationship between PAHs and SOAs generated by the combustion of gasoline aromatics.

This OTAQ 'smoking gun' was clearly explained by Reid Detchon, Senior Advisor for Climate Solutions at the U.N. Foundation, at the February 2020 Clean Fuels Forum in Washington, DC.

As noted in a July 9, 2021, Inside EPA article, featuring an interview with former Senator Daschle, Stuart Parker wrote 'The agency has long studied octane issues in relation to the vehicle rules. For example, EPA fuel programs chief Paul Machiele told a 2015 event that the agency likely has authority to require higher octane levels but that the issue is 'complicated' and that it would not occur until after MY25, the original end date of the Obama rules.'

It is time EPA answered a serious question that lies at the heart of this rulemaking: Why is OTAQ so insistent that the gasoline aromatics issue cannot be taken up until 2025 and cannot be resolved until 2035 at the earliest—45 years after Congress directed EPA to urgently address the problem and five years after President Biden wants to see 50% reductions in transport sector carbon emissions?

CFDC's confusion is further compounded by the fact former OTAQ Director Chris Grundler has confirmed EPA's ongoing legal obligations under Section 202(l). Extensive correspondence between then-OTAQ Director Grundler (who was shortly thereafter transferred to EPA's Climate Office without explanation after 30+ years at OTAQ) and Doug Sombke, South Dakota Farmers

Union president, reinforces CFDC's concerns about OTAQ's failure to comply with Congressional directives.

Notably, in his March 15, 2018, letter to Sombke, Grundler acknowledged the importance of light-duty vehicle fine particle and associated emissions:

'We agree that ambient levels of PM are a result of secondarily formed particles in addition to direct PM emissions, and that light-duty gasoline vehicles are important sources of the precursors to PM formation.'4

As noted previously, EPA has asked for comment on 'if and how EPA could support the production and use of higher octane gasoline consistent with Title II of the Clean Air Act.' In the same letter, Grundler responded to Sombke's question about why EPA has not enforced the MSAT provision in Title II:

'With respect to Clean Air Act section 202(l), the EPA has acted twice under this specific authority, including the February 2007 rule that addresses the aromatic content of gasoline through required limits on benzene (72 FR 8428, February 26, 2007). … While the EPA continues to look for opportunities to further reduce air toxics, as required by Clean Air Act section 202(l), we must also consider technological feasibility and costs, among other factors.'5

In his April 9, 2018, response, Sombke pointed out to Grundler that EPA used obsolete and fallacious factual predicates in its 2007 MSAT CBA to conclude that it would not be cost effective to substitute E30 'clean octane' fuels for BTEX/aromatic hydrocarbons to replace lost octane.

EPA's 2007 MSAT Final Rule was an uninspired distortion of science and market rationale. However, there was one very important positive aspect directly germane to this rule in that EPA admitted '…there may be compelling reasons to consider aromatics control in the future, especially regarding reduction in secondary PM2.5 emissions, to the extent that evidence supports a role for secondary PM2.5 formation'. [Federal Register/Vol. 72, No. 27/Monday, Feb. 26, 2007/Rules and Regulations, p. 8479.]

EPA Has Failed Time and Again to Control Gasoline Aromatics with 'Clean Octane'.

Over the past ten years CFDC and its affiliated organizations have communicated with OTAQ and EPA dozens of times about to clean octane issues. In every case EPA has refused to recognize the best available science and the rule of law as it pertains to the displacement of gasoline aromatics by high octane ethanol. Below is a partial list of the EPA rulemakings and other official communications between it and CFDC that clearly prove that the 'clean octane' issue is not 'new' and should be squarely addressed in this final rulemaking.

- 2005 EPACT and 2007 Final MSAT Rule.
- 2011 EPA report to Congress.
- 2011 GHG rule.

• 2013 PM rule.
• 2013 CARB Short-Lived Climate Pollutant Rule (critical importance of black carbon).
• EFC/UAI letter to EPA Administrator Gina McCarthy regarding defective MOVES Model.
• 2014 Tier 3 Rule and EPA's discredited factual predicates.
• 2014 EFC and NIEHS toxics workshop.
• 2015 EPA UFP workshop.
• 2016 greenhouse gas rule mid-term evaluation review.
• 2017 REGS rule and E15 RVP waiver.
• 2018 Trump SAFE Rule.
• 2020 UN Foundation clean fuels forum.
• 2021 HOLCA SAFE-2 rule interactions (US LDV fuel efficiency declines prove 87 AKI gasoline insufficient, contrary to EPA assertions). [EPA-HQ-OAR-2021-0208-0564-A2, pp. 1-9]

Comments Specific to NPRM Section 8.3 on Environmental Justice Concerns

In Section 8.3 of the NPRM, EPA noted the importance of environmental justice considerations, including President Biden's February 1, 2021, Executive Order 14008 (86 FR 7619), which directed federal agencies to 'develop programs, policies, and activities to address the disproportionately high and adverse human health, environmental, climate-related, and other cumulative impacts on disadvantaged communities, as well as the accompanying economic challenges of such impacts'.

There are few environmental justice challenges that demand immediate attention more than the adverse impact pre-term births (PTBs) have on communities of color. CFDC believes that EPA's models' failure to account for gasoline aromatics' substantial contribution to the United States' terrible PTB performance demands attention in this final rule as part of EPA's revised section 202(a) emphasis on the public health and welfare.

http://www.nytimes.com/2012/05/03/health/us-lags-in-global-measure-of-preterm-births.html

Best Available Science Directly Connects Gasoline Aromatics' PAH Emissions to PTBs and IQ Loss.

The 2018 Perera et al. study on PM and PAHs established a causal link to numerous adverse health endpoints for children, including preterm births. That study reviewed 205 peer reviewed studies over a course of 15 years and concluded that significant economic benefits could be achieved by reducing fossil fuel related pollutants including gasoline exhaust emissions. A recent EPA study estimates economic benefits that can be achieved by reducing fine particle matter by 10% in urban areas with an estimated benefits range of $339 million to $1 billion.

The World Health Organization has given the United States a very bad report card with regard to global comparisons of premature births. A New York Times article noted that the rate of preterm births in the United States has risen 30% since 1981. The US preterm birth rate of 12% is in the same range as Kenya, Turkey, Thailand, East Timor, and Honduras and means that one in 9 births in the U.S. is early PTB increases the risk of both mortalities and long-term morbidities in infants.

In a study of immigrants from Mexico experts found that the longer a woman lived in the U.S. the greater her chances of giving birth prematurely. Even after controlling for risk factors like age, poverty, smoking, obesity and diabetes experts really don't have an explanation. However, experts were quoted as saying that ‘whatever it is it's not genetic. It is something they acquire here.’

Policy Implications

EPA economists recently published a report that attempted to do a preliminary benefit – cost analysis of reducing PTBs of a 10% reduction in PM and related toxics emissions. It concluded that such a reduction could yield annual savings of $1 billion.

To date, EPA has not included PTB in any BCA. However, at some point EPA is expected to update its most recent integrated science assessment (ISA) for PM which was last published in 2009. Experts believe that because of emerging new science this ISA will be changed to causal or likely causal meaning that EPA will be required to conduct a BCA for PBT economic costs imposed by PM and its associated toxics.

In October of 2001, the California Office of Health and Environmental Assessment (OEHHA) explained why the state had passed the Children's Environmental Health Protection Act in October 2001: ‘…this evaluation of POM as a toxic air contaminant causing health effects in infants and children was primarily based on the known health effects of PAHs. Prenatal exposure to PAHs results in serious or irreversible effects in the fetus. PAH are transplacental carcinogens, and the effect of fetal exposure is irreversible. There is greater exposure of children to environmental PAH compared to adults. Children's daily doses of PAH were generally higher from all routes of exposure than those of adults in the same household.’

The OEHHA concluded: ‘In view of this range of evidence for differential sensitivity of the fetus, infants and children to health effects induced to POM, OEHHA has placed PAH in Tier One of the priority list.’

Consequently, it is extremely significant that EPA has recently admitted that its models fail to predict substantial quantities of SOA-bound PAHs in the urban environment (see 2015 EPA UFP Workshop). This means that the benefit cost estimates presented here are significantly understated because the models upon which they rely are vastly underestimating the amount of PM and associated toxics that urban children and pregnant women cannot escape. If EPA were to update and correct its modeling, the benefit cost of reducing gasoline aromatics for not only PTB but other childhood adverse health conditions would be far greater than the billion dollars per year estimated here.

The authors note that the seriousness of the relationship between these toxic pollutants and PTB is especially concerning because by nature of the common presence of these pollutants, exposure is effectively unavoidable. Similarly, a disproportionate burden of exposure may be placed on individuals and disadvantaged communities, who are already subjected to multiple social economic and health iniquities.

Clean Air Act regulations promulgated to limit or reduce exposure to criteria pollutants including mobile source air toxics typically require benefit cost analyses. Economically significant regulations—those with an annual effect on the economy of $100 million or more—are required by a series of executive orders dating back to 1981. Consequently, this novel methodology, which was developed by EPA policy staffers at the National Center for Environmental Economics, may offer guidance for EPA as it considers reduction of gasoline aromatics under section 202(l). [EPA-HQ-OAR-2021-0208-0564-A2, pp. 9-10]

This Rule Demands an Accurate Cost Benefit Analysis on Reducing High Carbon, Toxic Octane Additives

EPA Has Relied on Five Major Flaws in its Policies to Improve Gasoline Quality

1: EPA claims its regulatory policies have been successful at reducing U.S. transportation sector's most prevalent and harmful source of carbon and toxics emissions. Fact: The opposite is true, as the agency has focused on diesel while gasoline direct injection (GDI) engines increase particulates and their toxics by orders of magnitude unless gasoline aromatics are reduced.

2: EPA has stated decarbonizing gasoline's 'octane' is a 'new issue' that must be addressed 'outside the scope' of this rule. Fact: Ethanol's 'clean octane' has been central to every major EPA transportation sector-related rulemaking since Congress banned the use of leaded gasoline in the 1990 CAAA.

3: EPA has stated high octane low carbon (HOLC) ethanol blends such as E30 are unsuitable substitutes for carcinogenic aromatics that petroleum refiners synthesize from crude oil and use to increase market gasoline octane ratings. Fact: HOLC fuel blends are superior in terms of octane and vehicle performance, substantially reduce carbon and the most dangerous toxics emissions, and cost less than the gasoline aromatics they would replace.

4: OTAQ's regulatory schemes as they relate to gasoline emissions seem to assume that ground level ozone poses a greater threat to human health than fine/ultrafine particulate matter (PM) and its associated toxics. Fact: Fine/Ultrafine PM accounts for 90% of the human health threat, ozone less than 10% (2011 EPA Report to Congress).

5: EPA's defective atmospheric models underestimate the degree to which gasoline aromatics produce fine/ultrafine PM, and incorrectly assume that their associated toxics dissipate after 300 meters. Fact: Gasoline aromatics are the predominant source of urban fine/ultrafine PM, and their potent toxics are transported long distances, where they penetrate into the lungs, brains, and organs of infants, children, and other vulnerable Americans.

CFDC has previously noted that in its 2016 TAR, EPA conceded that:

'It is important to quantify the co-pollutant-related health and environmental impacts associated with the GHG standards because a failure to adequately consider these ancillary impacts could lead to an incorrect assessment of the standards' cost and benefits. Moreover, the health and other impacts of exposure to criteria air pollutant and airborne toxics tend to occur in the near term, while most effects from reduced climate change are likely to occur only over a time frame of several decades or longer.'6

Unfortunately, when it comes to transportation fuels-related policy, EPA does not follow its own advice—it consistently fails to conduct the necessary cost-benefit analyses as required by law.

'However, there are several health benefit categories that EPA was unable to quantify due to limitations associated with using benefits-per-ton estimates, several of which could be substantial. For example, we have not quantified a number of known or suspected health benefits linked to reduction in ozone and other criteria pollutants, as well as health benefits linked to reductions in air toxics.'7

Now that EPA/OTAQ have admitted that their atmospheric models are defective and that gasoline aromatics are a predominant contributor to SOA-bound toxics and secondary PM2.5 emissions, it must act expeditiously to comply with Congressional directives by substantially reducing gasoline aromatics content.

EPA's Office of Transportation and Air Quality (OTAQ) used obsolete and faulty data for its 2007 MSAT CBA comparative economics model. The underlying economics and technologies have undergone radical changes during that period, all of which inure to the benefit of ethanol's cleaner octane. Consequently, as emphasized earlier, we respectfully urge EPA to use the pending rule to encourage a thorough but timely update to its 2007 MSAT CBA which includes current and accurate pricing, octane values, and ethanol production rate data. Most importantly, EPA needs to ensure the use of updated and accurate octane equivalency factors by the U.S. Department of Energy national laboratory data (e.g., Oak Ridge National Laboratory, Argonne National Laboratory, etc.), and incorporate the dramatic progress that has been made in the nation's ethanol blending infrastructure, including terminals, wholesale price differentials, and legacy fleet compatibility.8

Federal law requires agencies to justify major rules like the SAFE proposal with thorough cost–benefit analyses (CBAs). CBAs include assessments of societal costs associated with harmful emissions. Recent media reports have cited economists' criticism of EPA's attempt to redefine PM2.5 health effects to justify its proposed changes to the previous administrations carbon rule.

One prominent reporter noted 'The authors of the rule had counted the health benefits from reducing particles in their justification for why the benefits of regulating greenhouse gases outweighed the costs of implementing it. The health benefits of cutting CO2 become even more evident when paired with the 'co-benefits' of cutting fine particles.'

Recognition of E30's ability to substantially reduce gasoline exhaust PM and SOA-bound toxics is especially appropriate, because failure to reduce gasoline BTEX content will substantially

INCREASE such emissions as advanced engine technologies dominate the fleet.9 As Ambassador Gray pointed out, EPA should not be allowed to ignore the Title II section 202(l) mandates to control MSAT emissions in the same rule they are relying on section 202(a) statutory authorities to improve fuel efficiency and reduce carbon emissions.

In other words, the MSAT emission reductions from a nationwide E30 HOLC Fuels ‘clean octane’ standard will not be merely ‘co-benefits’. They will be primary, direct, and mandated benefits that address national climate and health priorities, while also providing enormous energy security/trade balance, farm sector, and economic benefits.

If EPA does a proper job in conducting such an updated Cost Benefit Analysis as part of this proposed rule it will confirm the following:

Climate, Health, Economic, and Environmental Justice Benefits

• The benefits of moving to High Octane Low Carbon E30 fuels are clear and substantial with regard to their impact on greenhouse gas emissions – potentially reducing U.S. emissions by more than 100 million tons a year before 2030, accounting for a significant share of the Biden Administration’s goal of 50% carbon reduction by 2030.

• E30 HOLC fuels have important ‘time to market’ advantages over competing carbon reduction strategies. Specifically, E30 HOLC fuels dramatically reduce black carbon (BC) emissions, a short-lived climate pollutant (SLCP) with a GWP (global warming potential) 3,200 more potent than CO2.10

• Effective January 1, 2017, EPA adopted E10 (10% ethanol/90% gasoline) blends as the nation’s ‘certification fuel’. This means that ethanol is ‘substantially similar’ under Section 211(f) of the Clean Air Act. EPA should correct its misinterpretation of that provision and remove its regulatory barriers so that E30 high-octane fuels may be legally used in non-flex fuel (standard) vehicles.

• In addition to its carbon benefits and central to EPA’s primary mission, E30 HOLC fuels offer substantial public health benefits, with the strongest impact being seen in urban communities, a priority of the administration’s environmental justice concerns. A 2021 assessment in the journal Environmental Research11 concluded that the fossil-fuel component of PM2.5 alone is responsible for more than 8 million premature deaths annually, amounting to nearly one-fifth of all global deaths. In other words, it is the leading cause of premature death from environmental pollution.

• The smallest particles are the most dangerous to human health. A 2019 report from the International Council on Clean Transportation, ‘Recommendations for Post-Euro 6 Standards for Light-Duty Vehicles in the European Union,’12 noted that the ability of inhaled particles to be captured within the human body, called the deposition efficiency, is a function of particle size. Vehicle exhaust, in particular that of gasoline direct injection (GDI) engines, contains copious amounts of particles in the size ranges with high deposition efficiency.’ ICCT experts have noted that ‘Compared to other octane-boosting alternatives, ethanol has unique octane properties. Properly blended E30-E40 HOFs used in optimized engines could double GDI particulate-borne toxics emission reductions (John German, ICCT, Health Effects Institute PM Workshop, www.healtheffects.org/meeting/workshop-effects-fuel-composition-pm).

• A research team which included the late Nobel Prize winner, Mario Molina, reported last year that ‘Photooxidation of vehicular exhaust yields abundant [UFP] precursors, and organics, rather than sulfuric acid or base species, dominate formation of UFPs under urban conditions. Recognition of this source of UFPs is essential to assessing their impacts and developing mitigation policies. Our results imply that reduction of primary particles or removal of existing particles without simultaneously limiting organics from automobile emissions is ineffective and can even exacerbate this problem.’13 Thus, given the role of aromatic hydrocarbons in PM formation, and given the propensity of GDI engines to increase emissions of UFPs, EPA’s strategies for regulating fine particle pollution in urban areas are doomed to failure unless they significantly reduce gasoline aromatics.

• ‘…almost 96% of contribution to the PMI is from aromatics.’14

• Oak Ridge National Laboratories (ORNL) singled out E30 HOLC fuels for their unique ability to facilitate EPA compliance with the Renewable Fuel Standard, the GHG – CAFE Rule, the Tier 3 Rule, and the MSAT provision (Section 202(l) of the Clean Air Act). [EPA-HQ-OAR-2021-0208-0564-A2, pp. 11-14]

Trade Deficit, Energy Security, & Critical Material Supply Chain Benefits

• A nationwide E30 'Clean Octane' Gasoline Standard would reduce U.S demand for imported oil by one billion barrels a year, which at $100 oil would free up an additional $100 billion/year for investment in the creation of quality jobs, improved infrastructure, and better health and education for our children.15

• Increased supplies of unconventional oil and gas (fracking) should not be eligible contenders for displacing oil imports because of their extremely high carbon intensity and toxicity which poses substantial risk to the climate and human health.16

• E30 HOLC fuels utilize 100% domestic inputs, so there is zero risk of critical material supply chain interference from foreign actors, unlike the energy transition minerals required by electric vehicle manufacturers.

• DOE’s Energy Information Administration (EIA) has warned of a worsening octane shortage in the U.S. as automobile manufacturers adopt advanced internal combustion engine designs such as direct injection and turbocharging in response to tighter fuel efficiency and carbon emission requirements. [EPA-HQ-OAR-2021-0208-0564-A2, p. 14]

Farm Sector Benefits

• A nationwide E30 'Clean Octane' Gasoline Standard would re-energize the U.S. farm economy without need for taxpayer subsidies.

• Nationwide E30 would increase U.S. Gross Domestic Product (GDP) by more than $100 billion/year and save motorists billions more at the pump for a cleaner-burning, higher octane, better performing fuel.

• Ethanol's high-quality concentrated protein co-products would benefit the nation's livestock producers and enable significant reductions in ruminant animal methane emissions. [EPA-HQ-OAR-2021-0208-0564-A2, p. 14]

Conclusion:

In the NPRM, EPA states the following:

We are revising decisions made in the SAFE final rule in accordance with Supreme Court decisions affirming that agencies are free to reconsider and revise their prior decisions where they provide a reasonable explanation for their revised decisions.5 In this rulemaking, the agency is changing its 2020 position and restoring its previous approach by proposing to find, in light of the statutory purposes of the Clean Air Act and in particular of section 202(a), that it is more appropriate to place greater weight on the magnitude and benefits of reducing emissions that endanger public health and welfare, while continuing to consider compliance costs, lead time and other relevant factors.

CFDC respectfully urges EPA to in fact 'revise its position'. It is EPA's duty to account for the health impacts, the legal obligations, and all the other factors identified in these comments as the agency finalizes this rulemaking.

Ambassador C. Boyden Gray, former White House Counsel to President George H.W. Bush during enactment of the 1990 CAAA, identified the fatal flaw in EPA's 2011 GHG – CAFE rule when he said:

'If EPA is going to rely on the CAAA to reduce mobile CO2, it cannot ignore the same statute's requirements to reduce mobile source air toxics, especially if that reduction also reduces CO2… EPA cannot under the CAA cause an increase of one form of regulated pollution that causes serious health problems by reducing another that does not.'17

Increasing gasoline octane now, while enforcing toxic controls, would provide significant efficiency gains and pollution reduction. As stated by the automakers themselves, the existing LDV fleet—and the environment and public health—would see immediate benefits from an orderly transition to 'clean octane' HOLC fuels such as E30. And the benefits would increase exponentially as optimized, higher compression vehicles dominate the LDV fleet.

At a minimum we ask, in the strongest terms, for a commitment in writing in this final rule to acknowledge the factual data we have provided and work with all stakeholders to recognize the need to focus on improving gasoline octane quality as a near-term priority to protect the public health and welfare, promote environmental justice, substantially reduce transport sector carbon and toxics emissions, advance the nation's energy security, and stimulate the agricultural economy without need for taxpayer outlays. [EPA-HQ-OAR-2021-0208-0564-A2, p. 15]

Appendix A

A Regulatory Roadmap to Ensure EPA Compliance with SAFE Rule Objectives: Enforce CAA Section 202(a) and Section 202(l) Requirements, Protect Public Health and Welfare, Reduce Transportation Sector Carbon Emissions, Strengthen the Nation's Energy Security, and Stimulate the Agricultural Economy

EPA/OTAQ have all the legal and scientific tools necessary to justify each of the action steps proposed below. EPA's implementation of this roadmap will stimulate and protect free market competition; dismantle unlawful regulatory barriers that have enabled the continued use of the most carbon intensive, costly, and carcinogenic gasoline components; and restore integrity to the oversight of programs designed to protect the nation's public health and welfare, consistent with the Administration's environmental justice priorities.

Encourage an Orderly Transition to a Nationwide 100 RON Higher Octane Gasoline Standard: Consistent with Title II of the Clean Air Act, transitioning to a nationwide 100 RON market gasoline octane standard using High Octane Low Carbon (HOLC) Fuels such as E30 would achieve multiple national priorities simultaneously with no need for taxpayer outlays. EPA should emulate the successful transitions from leaded to unleaded gasoline and the Reformulated Gasoline with Minimum Oxygen programs.

Comply with the Mandatory Mobile Source Air Toxics (MSAT) Reduction Provisions in Section 202(l) of the CAAA: Similar to the transition from leaded to unleaded gasoline and then RFG, Congressional intent was clear -- the CAAA was designed to spur technological innovation and force the development and advancement of both fuels and automotive technologies. Proper enforcement of Section 202(l) will ensure compliance with the Biden Administration's transportation sector carbon and air toxics reduction goals, consistent with environmental justice priorities and existing law.

Correct the Agency's Misinterpretation of 211(f) Substantially Similar Rule: As of January 1, 2017, E10 became the nation's certification fuel. At that time, ethanol became an additive used in certification of new vehicles and is therefore not subject to control under section 211(f). If EPA wishes to control the use of HOLC Fuels such as E30 in standard (non-FFV) vehicles, the legal burden of proof is on EPA under section 211c to prove that such fuels damage emissions control systems and/or contribute to harmful tailpipe emissions.

Update The Agency's Corn Ethanol Life Cycle Analysis (LCA): Bringing EPA's woefully outdated corn ethanol carbon footprint lifecycle assessment into line with the updated and more widely accepted Argonne National Laboratory GREET model is necessary to ensure EPA's reliance on best available science. Among other changes, EPA's LCA model should recognize the ability of high-yield corn to restore soil organic matter, which transforms corn acres into substantial carbon sinks. As precision agriculture advances are adopted, the corn ethanol carbon footprint should approach ‘net zero’.

Update the Agency’s 2007 Mobile Source Air Toxics (MSAT) Cost-Benefit Analysis (CBA): EPA’s obsolete and wildly inaccurate factual predicates used in its 2007 MSAT rule (e.g., $19/barrel crude oil, $.85 gasoline, and a 2:1 ethanol’s octane replacement value for toluene/BTEX/aromatics) were used to support EPA’s conclusion that replacing toxic aromatic hydrocarbons with higher octane lower cost ethanol could not be economically justified. A properly done CBA will confirm that HOLC Fuel blends would cost effectively reduce the most harmful mobile source air toxics and ultrafine particulates.

Approve a Mid-Level Ethanol Blend Certification Fuel: EPA should expeditiously approve the use of a mid-level ethanol certification fuel (e.g., E30) to provide automakers with a clear pathway to design optimized, higher compression vehicles optimized to use 98–100 RON gasoline.

Update and Reform the Agency’s MOVES2014 Model: EPA has admitted that its atmospheric models—especially and including MOVES2014—are defective and in need of significant repair. OTAQ should immediately suspend the use of its defective and outdated MOVES2014 model which was built upon manipulated fuel samples provided by oil interests. Samples provided for the model contained the deliberate addition of ‘high boiler’ aromatics ‘to match blend’ and designed to produce negative results for ethanol blends. The results unfairly and inaccurately attribute higher emissions to ethanol rather than added aromatics.

Accelerate and Ensure Completion of the HOLC Fuel Infrastructure Buildout. Most of the nation’s terminals, underground storage tanks, and retail dispensers have been approved and readied to accept HOLC Fuels such as E30. EPA should encourage rapid completion of the infrastructure buildout, similar to the expeditious and effective transition to E10 blends as a result of the first Renewable Fuels Standard.

Reinstate Credits for Automakers Producing Engines Optimized for HOLC Fuels Such as E30: EPA should provide the regulatory roadmap and supporting data to help stakeholders interested in establishing meaningful CAFE/GHG credits, financial incentives to cover the cost of certification, or other ideas that would incentivize automakers to produce engines that utilize high octane low carbon fuels (e.g. E30).

Extend the 1 psi RVP Waiver for E10 to E15 and all Higher Blends: EPA’s longstanding misinterpretation of the Reid Vapor Pressure (RVP) prevents a timely transition to higher octane fuels. It must be rectified without delay. [EPA-HQ-OAR-2021-0208-0564-A2, pp. 16-17]

10 Black carbon is considered the second most important human emission in terms of its climate forcing; only carbon dioxide (CO2) has a greater overall effect. Because black carbon is rapidly removed from the atmosphere by deposition, its atmospheric concentrations respond quickly to reductions in emissions. Such reductions are thus an attractive near-term mitigation strategy to

slow the rate of climate change – especially as the short-term (20-year) global warming potential per ton of black carbon is 3200 times that of CO2.

Commenter: Defour Group (Defour)

Recognizing the increased urgency of reversing the trend of ever-increasing CO2 emissions, Executive Order 13990 was issued that instructed all Federal agencies including EPA to ‘immediately review all existing regulations, orders, guidance documents, policies, and any other similar agency actions promulgated, issued, or adopted between January 20, 2017, and January 20, 2021,that are or may be inconsistent with, or present obstacles to,, the policy set forth in section 1 of this order [to mitigate climate change]. For any such actions identified by the agencies, the heads of agencies shall, as appropriate and consistent with applicable law, consider suspending, revising, or rescinding the agency actions.’

Under various pieces of legislation, EPA regulates both vehicles and the fuels that power these vehicles. Yet in response to Executive Order 13990, EPA considered only area under their purview to review: vehicle tailpipe CO2 standards. We urge that the agency consider the fuel-related regulations under its authority in this rulemaking or a timely future one.

Various agencies including EPA have tried to reduce greenhouse gas emissions from gasoline use through rate-based regulatory mechanisms. Yet in the 40 years such standards have been employed1, gasoline use has increased 32%. Since 2005, when ethanol began to be mixed into gasoline, the total gasoline use remained constant but the amount of fossil fuels in that gasoline declined as fossil fuels were replaced by ethanol: a replacement that went largely unnoticed by the motoring public.

If EPA, in addition to the standards being proposed in this rulemaking, were to adopt regulations under the Clean Air Act and the Renewable Fuel Standard (RFS) to facilitate the introduction of high octane low carbon fuels like E30 and the vehicles optimized for those fuels, substantial reductions could be made in reducing fossil fuel use between now and 2050. This would provide substantial CO2 reductions while the national effort to electrify the transportation sector expands and further brings down greenhouse gas emissions. [EPA-HQ-OAR-2021-0208-0257-A1, pp. 1-2]

On August 10, 2021, the U.S. Environmental Protection Agency (EPA) published ‘Revised 2023 and Later Model Year Light-Duty Vehicle Greenhouse Gas Emissions Standards’ in the Federal Register. This rulemaking was being undertaken by EPA in response to President Biden’s Executive Order 13990, ‘‘Protecting Public Health and the Environment and Restoring Science To Tackle the Climate Crisis’’ to, according to EPA, ‘consider whether to propose suspending, revising, or rescinding the standards previously revised under the ‘The Safer Affordable Fuel-Efficient (SAFE) Vehicles Rule for Model Years 2021– 2026 Passenger Cars and Light Trucks,’’ promulgated in April 2020.’

This, however, is a very limited interpretation of what the Executive Order asked agencies within the Federal Government, including EPA, to do. This Executive Order clearly framed the purpose of this order by stating: ‘the policy of my Administration to listen to the science; … to reduce greenhouse gas emissions; [and] to bolster resilience to the impacts of climate change. … To that end, this order directs all executive departments and agencies to immediately review and, as appropriate and consistent with applicable law, take action to address the promulgation of Federal regulations and other actions during the last 4 years that conflict with these important national objectives, and to immediately commence work to confront the climate crisis. ‘

What the agencies were being tasked with was also clearly stated. ‘The heads of all agencies shall immediately review all existing regulations, orders, guidance documents, policies, and any other similar agency actions promulgated, issued, or adopted between January 20, 2017, and January 20, 2021, that are or may be inconsistent with, or present obstacles to, the policy set forth in section 1 of this order [to mitigate climate change]. For any such actions identified by the agencies, the heads of agencies shall, as appropriate and consistent with applicable law, consider suspending, revising, or rescinding the agency actions.’

In other words, the Executive Order calls for a review of all agency actions taken in the last four years that could have adversely impacted this nation’s efforts to reduce greenhouse gas emissions and, once identified, consider revising or reversing these actions. In some specific areas, however, the Executive Order required agencies to complete this inquiry by certain dates.

EPA is responsible for a number of regulations relating to the impact of motor vehicles on climate change. Based on a common sense reading of Executive Order 13990, it should be expected that some discussion of all of the regulations, including fuel-related regulations, should have been reviewed and discussed in this rulemaking. This, however, did not happen.

One of the most obvious omissions was the failure of EPA to acknowledge or address regulations under the agencies’ control that impact the content of motor fuel, and more specifically, the role of biofuels in reducing greenhouse gas emissions. [EPA-HQ-OAR-2021-0208-0257-A1, pp. 2-3]

Biofuels and Electrification

By EPA’s own admission, the proposed CO2 standards in this rulemaking are only modest steps to achieve the meaningful reductions in fossil fuel use required to stabilize atmospheric CO2 levels5. Rather, to achieve that goal in some distant future time, the agency believes that extensive electrification of the transportation sector will be required. EPA states in their Regulatory Impact Analysis:

‘While we anticipate that the proposed standards will be met primarily through the continued penetration of conventional powertrain (e.g., internal combustion engine, transmission) improvements … we anticipate … long-term GHG reduction goals will require a far greater penetration of ZEVs than this proposal would require through MY2026. The need for substantial increases in fleet penetration of ZEVs over the long term is supported by the recommendations of the National Academy of Sciences, which states in its 2021 Light-duty Vehicle Technology Assessment: ‘The agencies should use all their delegated authority to drive the development and deployment of ZEVs, because they represent the long term future of energy efficiency, petroleum reduction, and greenhouse gas emissions reduction in the light-duty fleet'.'6

This proposal represents a modest reduction in fossil fuel use while electric vehicles are the plan for eventual elimination of gasoline as a transportation fuel. What if anything is being done to decarbonize the transportation sector in the meantime?

The Limits to Electrification of the Transportation Sector. As early as the late 1980s, electricity was identified as one of the obvious replacements for petroleum in the transportation sector. For instance:

• Electric vehicles are much more efficient that internal combustion engines. The average gasoline powertrain converts about 20% of the energy in the gasoline into useful energy at the wheels while electric drivetrains convert about 75% of the energy in the battery into useful energy.

• Electricity can be made from a variety of low and non-carbon sources. Of the ten electric generating plants with the highest capacity in the US, only two use fossil fuels while the others – seven nuclear and one hydroelectric – produce electricity with little or no carbon emissions. In addition, the use of solar and wind to generate electricity is increasing and other forms of low carbon energy, such as geothermal and tidal are being explored.

• Electric vehicles have low local emissions. Electric vehicles produce minimal local pollution and noise which make them ideal for crowded urban areas.

In spite of these advantages, there are significant limits to how much of the fleet can be electrified in the next half century. These include vehicle, infrastructure and material limitations.

• Vehicle Limitations. Electric vehicles also have some serious limitations that have over the last century limited their usefulness. Nearly all of these limitations – such as low range (especially in extremely hot or cold temperatures), high cost, high weight, limited towing capacity and slow recharge time are a function of battery itself. While great advancements have been made in battery technology since the first modern EV was introduced in 1996 (the GM EV-1), electric vehicles still cannot match the overall utility of liquid fueled vehicles in many applications. Vehicle not amenable to electrification will still require some form of liquid fuel well into the 21st century.

While some of these limits can be overcome by adding more batteries to increase range and power, this strategy is limited by the carrying capacity of the nation's roads and bridges. One example of this is the Hummer electric pickup, which has one model with a gross vehicle weight of 9,500 lbs. – nearly 5 tons. This exceeds the load capacity on some smaller local bridges.

• Infrastructure. The first most obvious infrastructure issue is the requirement for more electric generating capacity. Using EIA data, replacing the energy in BTU provided by gasoline in 2050 with electricity would require the construction of over 80 nuclear power plants or their equivalent in other low carbon sources. Even the much more conservative estimate of EPA in their Regulatory Impact Assessment suggests electric vehicles in 2050 would use the equivalent of one additional nuclear power plant for power.

Getting the power from the source to the vehicle is another issue. The nation has over 6 million miles of power lines, many of which are antiquated and in need of replacement. At the vehicle level, home rechargers would require extensive upgrades in wiring and the installation of home chargers. Public chargers would be needed for those without garages and people in transit. Finally, much of the vehicle manufacturing infrastructure would need to be replaced.

• Materials. Vehicle manufacturing is one of the most material intensive businesses in the world. Each vehicle weights at least 1½ ton; each year about 70 million are produced. This is possible because vehicles are made from materials that are readily recyclable. The average gasoline tank weights about 20 pounds and is made of steel or plastic. Its counterpart in an electric vehicle – the battery – can weigh over 1,000 pounds and in made up of rare materials like lithium and rare earth compounds that will largely have to be extracted from the earth rather than recycled. How fast the supply of these raw materials can be expanded may determine the growth rate of electric vehicles.

Some of these limitations, such as range and power may never be totally overcome. Others like infrastructure may be overcome with enough time and money. But it is clear that the likely scenario is that liquid fuels and electricity will coexist throughout the remainder of the 21st century. This then leaves a gap between what EPA is doing to reduce petroleum use in the transportation sector now and what can be accomplished with electrification in the long term. [EPA-HQ-OAR-2021-0208-0257-A1, pp. 11-13]

Biofuel as an Additional Mid-Term Option

The proposed tailpipe CO2 emission standards proposed by EPA beginning in 2023 will in effect be a midterm solution, not becoming fully effective until the middle of the century. Even then, the proposed standards would only reduce petroleum use to the levels when fuel economy standards were first in effect.

The ever rising levels of CO2 in the atmosphere, however, demands that more be done than just compensate for the historical shortcoming of rate-based standards. Fortunately, tailpipe emissions are not the only tool at EPA’s disposal: the agency also has considerable power under both the Clean Air Act and the Renewable Fuel Standards to regulate the fuels used in those vehicles as well.

Biofuels such as ethanol have been used to power motor vehicles since the invention of the internal combustion engine. Gasoline – ethanol blends have been on the market since the early 20th century, and expanded with the enactment of the RFS. Today, virtually all gasoline sold in the U.S. contains at least 10% ethanol.

When ethanol is added to gasoline, it directly substitutes for fossil fuel and boosts the octane rating of the fuel. When ethanol was first added to regular gasoline to comply with the RFS, the octane of the resulting fuel was that of a mid-grade fuel (89 AKI octane). Retailers often marketed it as such, thereby creating a mid-grade gasoline that cost the same or less than ethanol-free regular. Rather than allow consumers to benefit from the additional octane that ethanol provides, refiners created a cheaper special sub-octane gasoline7 to be used only as a blend stock for mixing with ethanol, and the resulting blend became a 87 AKI octane regular grade gasoline.

Over the last decade, the U.S. Department of Energy (DOE) has been investigating the potential of biofuels to significantly both improve the efficiency of internal combustion engines and displace the use of fossil fuels as an energy source. As stated in a recent DOE report,

'New engine architectures and combustion strategies can provide higher thermodynamic efficiencies than those that are currently delivered by commercially available internal combustion engines, but new fuels are required to maximize efficiency and operability across a wide range of speeds and loads.8'

One of the most promising of these potential fuels is a mixture of 30% ethanol and 70% gasoline blend stock, or E30.

Using the same blend stock as today's regular grade fuel, an E30 fuel could be made that had higher octane than today's premium grade fuel (thus allowing automakers to build higher efficiency internal combustion engines). In addition, this fuel would cost consumers about the same as regular grade gasoline.

Using this fuel's higher octane, automakers could build liquid fueled vehicles with more efficient engines that would compensate for the lower energy content of ethanol. Most importantly for reducing atmospheric levels of CO2, the additional ethanol would displace a significant amount of petroleum. Mid-level ethanol blend fuel like E30, when fully phased in, would reduce petroleum use to a level not seen since 1969 as illustrated in Figure 8 [Figure 8 can be found at docket number EPA-HQ-OAR-2021-0208-0257-A1, pp. 13-14].

As a complement to the rate-based standards established by this proposal, EPA should use its regulatory authority to facilitate the rollout of a new fuel and the vehicles optimized to use them. At the very minimum, EPA should:

• Mandate a minimum fuel octane standard. EPA has the authority under existing to establish fuel specifications such as octane. Just as lead in gasoline made it impossible to use catalytic converters on vehicles, the low octane of today's regular grade gasoline impairs the ability of automakers' to increase an engine's compression ratio to make the engine more efficient, As explained above, such a standard would help pave the way for significant reductions in petroleum use.

• Revise existing regulations to allow the advantages of this new fuel to be reflected in regulatory compliance. Some of EPA's regulations related to fuel economy testing, such as the formula for calculating fuel economy do not reflect the environmental advantages of ethanol. Another regulation that calculated the R-factor, which EPA acknowledges needs changed, has yet to be updated.

• Use their authority under the RFS to gradually raise ethanol blending requirements beyond 2022 to reach the congressionally mandated level for 2022 in 2050. Obviously, to phase-in a new fuel like E30 that would eventually replace today's gasoline would require more ethanol. The total amount required, however, is not excessive. It appears that the ethanol required would, peak at 33 billion gallons in 2050 – slightly less than Congress mandated to be blended into vehicle fuel for 2022. Enabling this gradual conversion in liquid fuels, when compared to the cost of electrification, is modest and could result in a significant reduction of fossil fuel in the mid-term period as electric vehicles enter the fleet. The Clean Air Act give EPA the regulatory power to establish high octane low carbon fuel standards and other related vehicle standards to facilitate the transition. The Renewable Fuel program gives EPA the power to ensure that this new fuel will actually replace fossil fuels. Done correctly, this transition could be largely transparent to the motoring public. [EPA-HQ-OAR-2021-0208-0257-A1, p. 14]

1 For analytical purposes, the years 1979 through 2019 were used except where noted. Although passenger car standards were in effect for the 1978 model year, 1979 was the first year both passenger cars and trucks were subject to standards. Similarly, the analysis ended at 2019, the last full year in which the COVID 19 pandemic was not a factor.

5 According the EPA in their Regulatory Impact Analysis, this proposal would not have its maximum impact until 2050, and then would reduce gasoline consumption by only 9.9%.

Commenter: Exxon Mobil

ExxonMobil believes that existing transportation sector-based federal policies (fuel and vehicle standards) could be improved to achieve meaningful GHG emissions reductions through complementary standards that transition the vehicle fleet to a lower GHG emissions mix of vehicles and incentivize lower carbon intensity fuels (liquid, compressed/liquefied gas, electricity, hydrogen) used to power the vehicles.

For the policies to be clear and quantifiable, we list the following framework:

1. A well-designed, technology neutral, lifecycle, carbon intensity fuel standard measured in gCO2e per MJ of fuel energy (gCO2e/MJ) will establish reasonable and achievable targets and provide a long-term market signal for the production and use of lower carbon fuels. The standard will help reduce carbon across the entire vehicle fleet (currently comprising mainly of internal combustion engines) and can be expanded beyond road transportation to the marine and aviation sectors in the future.

2. A GHG emissions standard for new vehicles based on well-to-wheels (WTW) lifecycle emissions accounting methodology will drive lower CO2e emissions per mile driven (gCO2e/mile) complementing the above mentioned carbon-intensity based standards for the energy used by the vehicles.

3. Power grid carbon intensity measured in gCO2e per unit of energy (gCO2e/MJ) for electricity available for use in electric vehicles.

A WTW approach for new vehicle certification will incentivize both more efficient vehicles and those which use lower carbon intensity fuels.

The performance metric for new vehicles will be gCO2e/mile, similar to today. Vehicle manufacturers will continue to drive improvements in vehicle efficiency (mile/MJ), but vehicle certification will recognize the lifecycle GHG emissions reductions using up-to date fuel pool and electricity carbon intensities:

gCO2e/mile = Certification Fuel CI (gCO2e/MJ) / Vehicle Efficiency (mile/MJ)

In the case of liquid fuels,

gCO2e/mile = Cert. Fuel CI (gCO2e/MJ) x Energy Density (MJ/gallon) / Vehicle Efficiency (mile/gallon)

For example, as the electricity grid and liquid fuels reduce carbon, the policy recognizes lower GHG emissions for both an electric and an internal combustion vehicle.

Current vehicle GHG standards account for fuel combustion or tank-to-wheels (TTW) emissions vs. a WTW approach which accounts for lifecycle emissions. The graph below provides an illustrative example comparing four vehicle types (internal combustion engine, hybrid, plug-in-electric, and battery-electric). The analysis uses data from the most recent EPA Automotive Trends report4 and for PHEV and BEV vehicles compares EPA-reported carbon intensities of U.S., Rockies and California electricity grids. [EPA-HQ-OAR-2021-0208-0734-A1, pp. 1-2] [The table can be found on p.3 of Docket number [EPA-HQ-OAR-2021-0208-0734-A1]]

Comparing all vehicles on a WTW methodology enables consistent GHG accounting. This provides the greatest degree of advancement of all technologies that can reduce GHG emissions and results in policy which is more effective at transportation carbon reductions.

As EPA finalizes the rulemaking on 'Revised 2023 and Later Model Year Light-Duty Vehicle Greenhouse Gas Emissions Standards', ExxonMobil respectfully recommends that the Agency includes description of the WTW methodology in the preamble of the final rule and considers this approach in future vehicle GHG standards rulemakings. [EPA-HQ-OAR-2021-0208-0734-A1, p. 3]

Commenter: Fuels Freedom Foundation

To maximize GHG reductions from light-duty transportation, the EPA must look upstream. Recognizing that a more holistic approach is outside the scope of the GHG standards that will be established by this rulemaking, the comments below recommend that in the Final Rule, the EPA commit to concrete actions to incorporate a full fuel cycle perspective to support and facilitate aggressive GHG reductions for the period under review and the longer term. [EPA-HQ-OAR-2021-0208-0231-A1, p. 1]

Benefits and Costs of High Octane Fuels

Higher-octane fuel was proffered by the EPA in Tier 3 to help automakers meet light-duty GHG standards,6 and recommended as a low-cost option in Phase II of the NHTSA-commissioned National Research Council study.7 The EPA acknowledged OEM and stakeholder support for high octane and requested comment on high-octane in the SAFE proposal. 8 The Department of Energy’s (DOE) CoOptimization of Fuel and Engines (Co-Optima) Phase 1 provided a valuable guide to the synergistic GHG benefits of spark-ignition vehicle technologies powered by fuels with the optimal properties to power them. An additional trove of peer-reviewed research from universities, automakers, petroleum companies, national labs and others bolsters the case. Appendix A to these comments provides a summary of research evaluating the impacts of high-octane fuel on fuel efficiency, GHG and criteria emissions, and costs.

Despite being a premium offering today, high-octane fuels need not increase driving costs. A study found that high compression engines coupled with high-octane fuels could reduce costs compared to other vehicle technologies.9 The National Renewable Energy Lab (NREL) found that high-octane fuels made with increasing levels of ethanol “are sufficiently competitive” with the current fuel to achieve “substantial market share.”10 Oakridge National Lab (ORNL) found “significant benefits for the United States” in that “automotive OEMs, consumers, fuel retailers, and ethanol producers all stand to benefit to varying degrees as HOF [high-octane fuels] increases its market share.”11 Even the petroleum industry has recognized the benefits of high octane in general, and ethanol in particular.12,13 From an economic perspective, studies differ on the ideal octane number, but have found ethanol to be the most cost-effective source of octane. 14,15,16 From an auto engineering perspective, there is consensus for 98-100 RON to maximize efficiency and/or performance gains regardless of the fuel formulation, but with additional marginal benefit if ethanol is the octane source.17 Consequently, Fuel Freedom joins automakers and other stakeholders18,19 and others in urging EPA to consider fuels and vehicles as an interconnected system, and to formally recognize that the system is currently limited in GHG reduction potential by 85-87 AKI gasoline.

Potential Role of Octane in MY2023-2026

The MY2023-2026 timeframe is critical not only as a gateway to greater GHG emissions reductions beyond MY 2026, but to fully capitalize on the recent increase in support for E15 and significant investments in fueling infrastructure to support higher ethanol blends. The E10 experience clearly indicates that, in the absence of an octane requirement, the social benefit (consumer, economic, environmental) will be lost if refiners again lower the octane level of the base gasoline product. Raising the national minimum octane will ensure the value of additional octane provided by E15 and higher blends up to E85 accrues to American consumers and U.S. national interests.

Even without optimization or new engine technology, premium fuel can provide a 1-2% efficiency benefit for existing ICE vehicles.20 However, to maximize cost effectiveness, higher-octane fuels must be the base offering, rather than a premium-priced niche product.

Much of the current gasoline infrastructure could be modified to deliver either petroleum-derived high-octane fuels or higher ethanol blends such as a mid-level E25-E40 and in many cases, up to E85.21 High-octane fuels with a maximum of 15% ethanol have been approved for vehicles MY2001 or newer. Market adoption of high-octane ethanol blends can also be expedited by 20+ million Flex-Fuel Vehicles (FFVs) on the road today22, as well as optimized future FFVs that may be produced in response to a commitment from EPA to ensure that high-octane fuels are generally available.

As designated by Congress, FFVs were intended to interchangeably use either gasoline or ethanol blends up to 85%, explicitly to assist a transition from petroleum-based to renewable fuels. 23 If lowcarbon midlevel blends of 20-40% ethanol are introduced, FFVs provide a ready source of demand for the fuels, in advance of the introduction of new models of compatible or dedicated high-octane vehicles. Critically, greater use of ethanol or other low-carbon octane sources can decrease not only tailpipe CO_2, but full fuel cycle GHG emissions relative to gasoline. Consequently, Fuel Freedom believes that FFVs should receive full credit for their GHG reductions. The same is true for future vehicles dedicated for use with midlevel ethanol blends.

A new minimum octane number is necessary to enable and advance low-cost GHG reductions; however, the new minimum must not preclude higher-octane formulations. The EPA should commit to exercising its recognized authority to reduce GHG emissions in light-duty transportation in order to facilitate a national transition to a higher minimum octane, and ensure that no regulatory barriers bar the market from determining the blend levels and/or source of octane. 24,25,26

Fuel Freedom recognizes that this recommendation is outside the scope of the GHG standards that will be established by this rulemaking. However, a more holistic perspective ultimately will be necessary for the EPA to maximize lifecycle GHG emissions in light-duty transportation. The EPA should commit to initiating the full technical, environmental and economic analyses for regulatory approval of highoctane ethanol blends in the Final Rule, to maximize the potential lifecycle GHG reduction potential for advanced ICE engine technologies produced in MY2023-2026, and provide a strong market signal for additional improvements into MY2027 and beyond.

Long-term GHG Reductions in Light-duty Transportation

Regardless of the octane source, high-octane fuels can enable significant reductions in fuel cycle CO_2 emissions. Argonne National Lab's comprehensive study on the well-to-wheels GHG emissions of various high-octane fuels found a 6% reduction using high-octane RON 100 E10 compared to RON 92 E10. When using higher ethanol blends of E20 and E40 to achieve a RON 100, the GHG emissions decreased by 17% and 27%, respectively.27

The relationship between vehicle energy efficiency and fuel carbon intensity, and the necessity to consider fuels and vehicles as a holistic system, are described in detail in an NREL paper. 28 In evaluating ICE, hybrid electric vehicles (HEV), battery electric vehicles (BEV) and fuel-cell electric vehicles (FCEV), the study found that, without a decrease in the carbon intensity of the fuel, all fall short of reducing GHG emissions by 80% by 2050, as needed to limit global temperature rises to 2°C or less per the United Nations Framework Convention on Climate Change (Paris Agreement).

Fuel Freedom funded a study to evaluate possible scenarios for achieving an 80% fuel cycle reduction in light-duty vehicle GHG emissions for the U.S. and for California by 2050.29 The analysis used government estimates30 of fuel carbon intensity, vehicle efficiency improvements (including those contained in the SAFE proposal), and incremental costs for each fuel-vehicle combination, to develop feasible market penetrations for various pathways. Pathways include gasoline technologies (including high-octane fuels with high-compression-ratio ICEs coupled with electrification), biofuels used in ICEs with and without hybridization, HEVs, plug-in hybrid electric vehicles (PHEVs), FCEVs, and BEVs in order to compare both feasibility and relative cost effectiveness for carbon reductions.31 Long-term results to 2050 indicate that it is critical to provide market flexibility in the near term. Regulations should therefore encourage or facilitate all feasible vehicle-fuel pathways that can maximize GHG reductions for the long term by a transition to renewable sources, including electricity, hydrogen, and biofuels.

Another key finding of this analysis is that policies that accelerate a decrease in the carbon intensity of fuels could reduce total GHGs sooner. As EPA has noted, “future [GHG] emissions are expected to produce larger incremental damages as physical and economic systems become more stressed in response to greater climatic change.”32 Given the uncertainties in measuring the long-term impacts of GHG emissions, 33 and the accumulated impacts of carbon emissions,34 EPA should not discount the benefits of pathways with significant promise to reduce emissions faster in the near-term.

Therefore, Fuel Freedom recommends that EPA investigate measures to ensure that all potential pathways to reduce GHG emissions in the light-duty transportation sector, including those that foster demand for low carbon intensity fuels, are considered on equal footing with other technologies in the Final Rule.

Summary and Recommendations

As noted in the Proposed Rule, the MY2023-2026 period is a vital gateway to the future of light-duty transportation. This Rule comes at a critical juncture for not only the future of light-duty transportation, but for the U.S. contribution to global efforts to reduce the possibility of catastrophic effects due to climate change.

Real world experience shows that consumer response cannot be either forced or taken for granted. Even optimistic estimates project that spark-ignition ICEs will dominate U.S. light-duty sales for many years, not to mention the total on-road fleet of hundreds of millions of legacy vehicles. Consequently, it is vital that EPA initiate actions to maximize GHG reductions from these vehicles. This means looking not just to vehicle technologies as in the past, but to the liquid fuels that enable them. EPA actions in conjunction with the Final Rule have the potential to ensure that no feasible pathway to dramatically and cost-effectively reduce GHG emissions and carbon intensity of the sector is foreclosed.

In this context, Fuel Freedom respectfully submits the following recommendations:

• Commit to initiating approval of higher-octane fuel(s) including midlevel ethanol blends and prepare for an expedient and minimally disruptive nationwide transition to raise the minimum octane in the marketplace.

• Commit to initiating as soon as possible, a full technical, economic and environmental analysis in preparation to raise the national minimum octane level in the U.S. fuel supply.

• Commit to incorporating a full fuel-cycle perspective to thoroughly analyze and compare the GHG emissions and total costs and benefits of fuel-vehicle systems, and develop policies and regulations according to this holistic approach.

• Fully credit vehicle technologies for the GHG reductions, including those vehicles that are designed to use low-carbon liquid fuels [EPA-HQ-OAR-2021-0208-0231-A1, p. 2-6]

21 Market forces are already moving toward higher ethanol blends. All underground fuel storage tanks manufactured since 2005 are compatible with 100% ethanol. The ethanol industry continues its Prime and Pump initiative to install blending pumps at retail fueling stations. And major fuel pump manufacturers have incorporated higher ethanol compatibility into their standard offerings.

23 Congress provided a statutory goal of encouraging “the development of widespread use of…ethanol…as transportation fuel by consumers” and “the production of…ethanol…powered motor vehicles.” Alternative Motor Fuels Act of 1988, Pub. L. 100-494 § 2, 102 Stat. 2441, 2442 (1988)

26 Legal experts assert that the EPA could rely on the CAA 211(c)(1) authority given the findings in CRC Final Report for CRC Project No. E108 that “consistent with the loss of FE, the fleet CO2 results correspondingly increased for the 85 AKI test fuel

31 Each pathway centered on a dominant vehicle technology, constrained by practical limitations and the attributes of cars versus trucks or SUVs. Vehicles not suitable for battery electric propulsion were assumed to be ICEs.

Commenter: Growth Energy

it is imperative to consider the vital role that environmentally sustainable fuel options such as ethanol will play in further reducing greenhouse gas emissions from the current and future vehicle fleet. It is also imperative to consider the full lifecycle emissions of all vehicle and fuel technologies to accurately evaluate the profiles and benefits of vehicles using different fuels and energy sources.

Ethanol is the most available and affordable means to immediately clean up our liquid fuel supply. Recent data from Environment Health and Engineering show today's corn ethanol reduces greenhouse gas emissions by an average of 46% compared to gasoline and can provide reductions of up to 70% with the use of readily available technologies.1 Ethanol's other environmental benefits are also noteworthy. As has been researched, the use of more ethanol and ethanol-blended fuel reduces air toxics such as carbon monoxide, benzene, and other harmful particulates.2

With a stable policy and access to drivers, our industry can deliver low-carbon, low-cost, high-performing, sustainable vehicle fuel solutions that reduce greenhouse gas emissions now and well into the future.

EPA must recognize the full lifecycle net greenhouse gas emission reduction benefits of vehicles that use ethanol and other low-carbon fuel alternatives to gasoline.

The proposal overlooks ethanol's benefits as a key means to reduce greenhouse gas emissions. Notably, the notice of proposed rulemaking (NPRM) doesn't contain any discussion of ethanol, other than passing reference (without discussion) such as to "Ethanol-E85" in a table. The NPRM's failure to fully evaluate the greenhouse gas emissions reduction benefits of ethanol use in vehicles is a critical error, and undermines the rule's analytical foundation, for two reasons. First, ethanol fuels the vast majority of vehicles addressed by the rule, which have internal combustion engines (ICE) that run on at least 10% ethanol.3 In fact, more than 95% of vehicles on the road today can run on up to 15% ethanol.4 Second, the entire purpose of this rulemaking is to reduce greenhouse gas emissions, yet this rulemaking overlooks the key role of ethanol in reducing vehicle greenhouse gas emissions. Ethanol can reduce vehicle greenhouse gas emissions on average 46% compared to gasoline with further reductions using readily available technologies.5 [EPA-HQ-OAR-2021-0208-0279-A1, pp. 1-2]

The proposal ignores ethanol as a key greenhouse gas emissions reduction strategy for the vast majority of the vehicle fleet. The NPRM concedes that over 92% of new light-duty vehicles will continue to use internal combustion engines through model year 2026. Specifically, EPA finds that electric vehicles (EV) and plug-in hybrid electric vehicles (PHEV) represent only 2% of the model year 2019 market, growing to 7.8% by model year 2026. (NPRM at 43,775). This means that the vast majority of vehicles addressed by the rulemaking will rely on varying blends of ethanol and gasoline. All gasoline light duty vehicles on the road today are approved for use with a 10% ethanol blend and 98% of the gasoline used in the US is blended with at least 10% ethanol.6 Furthermore, almost all gasoline light duty vehicles on the road today can run on up to 15% ethanol.7 EPA also ignores the key greenhouse gas-reducing role of flex-fuel vehicles (FFVs), which can run on up to 85% ethanol and were 20% of all vehicles produced for the U.S.

market as recently as 2014.8 Moreover, various next generation engines, including downsized and turbo-charged engines, may be particularly well suited to run on mid-level ethanol blends, which provide a clean, renewable source of octane.9 [EPA-HQ-OAR-2021-0208-0279-A1, p. 2-3]

Regarding EPA's extensive knowledge of and experience with life cycle greenhouse gas emissions analysis, the Renewable Fuel Standard (RFS) program administered by EPA is predicated on biofuels reaching certain thresholds of lifecycle greenhouse gas reductions to qualify for programmatic benefits. In its past 2012 rulemaking on EPA vehicle GHG standards, EPA asserted the existence of the RFS as an excuse not to consider life cycle emissions in its vehicle greenhouse gas program.19 However, the RFS only addresses fuel incentives, and alternative fuel vehicle incentives in this current 2021 NPRM are critical to ensure that both low carbon fuels and vehicles are available to work synergistically to reduce greenhouse gas emissions. Furthermore, the RFS just establishes a floor for biofuels use. Incentives for vehicles that can use high levels of biofuels (such as FFVs) are necessary to promote the higher use of biofuels and the corollary greenhouse gas emission reductions of doing so. Incentives for FFVs under EPA's vehicle greenhouse program can facilitate compliance with both the vehicle greenhouse gas program and the RFS, enabling far greater greenhouse gas emissions reductions than the floors established by those programs. [EPA-HQ-OAR-2021-0208-0279-A1, p. 5]

EPA should take action to encourage the use of higher biofuel blends such as E15 and E85 in today's vehicle fleet including providing year-round access with vapor pressure parity.

Today, E15 is approved for all 2001 and newer vehicles, more than 95% of today's vehicle fleet and more than 97% of the vehicle miles traveled. Two recent studies found that by moving to E15 nationwide, we can immediately reduce greenhouse gas emissions by more than 17 million tons, the equivalent of taking nearly 4 million cars off the road while also creating an additional 183,000 U.S. jobs.20 21 In order to facilitate the use of E15 nationwide and gain these important GHG and economic benefits, EPA must provide US consumers with greater access to the fuel. Given the oil refiners' recent court victory to deny American consumers year-round access to E15, it is imperative that EPA take all actions to restore RVP parity for E15. E15 remains available for year-round sale in reformulated gasoline markets as well as other lowvapor pressure areas that also give parity between E10 and E15. EPA should embark immediately under its existing authority to regulate vapor pressure to extend this parity in other conventional fuel markets as well. Not only will the sale of E15 deliver greenhouse gas and economic benefits, providing parity by lowering the vapor pressure of fuel in the conventional markets will result in considerable emission benefits as has been noted and seen in RFG and other vapor control markets. Additionally, EPA should finalize the pending regulation that would broaden the use of existing fueling infrastructure for use with E15 as well as to simplify the label for American consumers.22 By broadening availability and use of existing infrastructure, EPA will provide consumers access to these higher biofuel blends that deliver meaningful GHG and other emissions benefits.

In addition to E15, it is also important to consider the use of E85 in the sizeable flex-fuel vehicle fleet. Today, there are more than 20 million FFVs on the road and more than 5,000 fueling locations across the country. In California alone, the use of E85 has more than tripled since 2014 (see table below, “Annual E85 Volumes”).23 Given the considerable GHG benefits, EPA should take additional actions to ensure the continued production of FFVs in conjunction with the growing use of E85. Further below, we will provide additional considerations to encourage and promote the continued production of flex-fuel vehicles. [EPA-HQ-OAR-2021-0208-0279-A1, p. 5-6] [Prime the Pump Figure can be found on p. 6 of Docket number EPA-HQ-OAR-2021-0208-0279-A1] [Annual E85 Volumes Table can be found on p. 7 of Docket number EPA-HQ-OAR-2021-0208-0279-A1]

EPA should require a minimum octane standard and approve a high-octane, low-carbon mid-level ethanol blend.

It is imperative to consider the benefits of using high-octane, low carbon fuels to make engines more efficient. Growth Energy has been a leader on the need for higher octane, mid-level ethanol blends, first submitting a proposal for a 100 RON, E30 fuel nearly a decade ago. The science supporting the benefits of a high-octane, low carbon midlevel blend in conjunction with a high compression ratio engine is not new, and has been well-explored by the national labs, automobile manufacturers, and other scientific institutions.24 Ethanol has a very high-octane number, has a lower carbon content than the gasoline components it replaces, and has myriad other benefits that assist in combustion to increase engine efficiency and reduce both greenhouse gas and tailpipe criteria pollutant emissions. We are attaching our previous submission and related comments for your review. We urge EPA to move quickly to require a minimum octane standard as well as to approve a high-octane, mid-level ethanol blend such as that first proposed by Growth Energy for vehicle certification as well as for consumer use. By moving towards higher octane, lower carbon mid-level blend, automakers can optimize engines to further improve efficiency and further reduce both greenhouse gas and tailpipe emissions.

EPA should establish strong renewable volume obligations (RVO) for 2021, 2022, and well into the future to encourage the production and use of lower carbon biofuels.

The RFS has been one of our nation’s most effective climate programs. In fact, Argonne National Laboratory recently found that with the advent of the RFS, the carbon intensity of corn ethanol has fallen by 23 percent.25 ecause of ethanol’s use in fuel, EPA must continue to advance the goals of the RFS and provide access to and a foundation for these lower carbon biofuels. To that end, the agency must establish clear and strong RVOs for 2021, 2022, and set strong volumes under the RFS “Set” well into the future. EPA must also move expeditiously to approve pending pathways and pathway registrations including those for cellulosic biofuels from kernel fiber and other technologies that have languished at the agency for years. In many cases, these fuels are already certified to cellulosic carbon intensities under California’s LCFS but have yet to receive approval as such by EPA for the RFS.26 EPA must move quickly to approve these pathways and give certainty to the renewable fuel market by establishing strong volumes so that the vehicles of today and tomorrow can reduce their climate footprint through the increased use of lower carbon biofuels. [EPA-HQ-OAR-2021-0208-0279-A1, p. 7-8]

EPA must make technical adjustments to further incentivize production and use of flex-fuel vehicles (FFVs).

EPA must re-instate the volumetric conversion factor (VCF) for FFVs. Doing so provides incentives for all the main types of alternative fuel, low-carbon vehicles, not just a subset of preferred technologies.

By way of background, a statutorily derived volumetric conversion factor (VCF) of .15 is specified for calculating CAFE compliance for ethanol FFVs. The statutory provisions at 49 U.S.C. 32905(a) establishing the .15 VCF are incorporated into EPA regulations at 40 CFR 600.510-12(j)(2)(iv)(B) for FFV greenhouse gas calculations through model year 2015. FFV fuel ("E85") nominally contains up to 85% ethanol and only 15% gasoline, parallel to the .15 factor.27 Under EPA regulations, the .15 VCF is still used to increase the fuel economy compliance value of FFVs, to reflect the CAFE program's goal to reduce petroleum consumption.28 [EPA-HQ-OAR-2021-0208-0279-A1, p. 8]

EPA must re-instate the VCF for FFVs based on the significant greenhouse gas emission reductions benefits of these FFVs.

EPA has emphasized the desire to move to "near-zero emissions" technology, and FFVs can be a "near-zero emission technology."29 RFS calculations have generally found no tailpipe CO2 emissions for ethanol when calculating lifecycle emissions.30 This is because tailpipe CO2 is regenerated by crops used as fuel feedstock. This biogenic carbon uptake and EPA approach merit use of the VCF for the ethanol component of E85. This "zero emissions" ethanol (as found by EPA) can be matched with renewable naphtha for a 100% renewable, "zero carbon" fuel. Additional innovations at biorefineries and on the farm, along with cellulosic biofuels can also get to zero greenhouse gas emissions on a lifecycle basis. [EPA-HQ-OAR-2021-0208-0279-A1, p. 9]

Cost considerations also dictate EPA fully considering incentivizing FFVs. The NPRM states standards under Clean Air Act section 202(a), which provides the statutory authority for this rulemaking take effect "after such period … necessary to permit the development and application of the requisite technology, giving appropriate consideration to the cost of compliance within such period." (NPRM at 43,728). Importantly, FFVs are a lower-cost compliance option compared to other more expensive technologies. It is imperative that EPA consider these lower-cost, highly effective solutions in its rulemaking analysis.

The VCF is also justified under EPA criteria in the NPRM to "to accelerate the introduction of zero and near-zero emissions vehicles and maintaining momentum for that market transition." (NPRM at 43,757). The NPRM references these criteria regarding the need for EV/PHEV/FCV incentives, but these criteria also apply to FFVs. Notably, the same needs of "maintaining momentum" apply to FFVs. Without reestablishing the VCF, automakers will stop making FFVs, eliminating a key compliance option for the vehicle greenhouse gas and CAFE programs. After EPA stopped allowing the VCF for vehicle greenhouse gas program compliance calculations, FFV production dropped from almost 20% of all 2014 light-duty vehicles to only about 8% of 2016 vehicles.31 FFV production for 2019 was down by almost 75% relative to 2014.32 Clearly, this is a loss in "momentum," and the VCF is needed to accelerate use of FFVs as a critical greenhouse gas reduction technology. [EPA-HQ-OAR-2021-0208-0279-A1, p. 9]

FFVs meet other EPA criteria for vehicle incentives under EPA's vehicle greenhouse gas program. For instance, EPA identifies the need for "significant" greenhouse gas emission reductions from incentivized technologies.34 Still elsewhere, EPA emphasizes the need for lowemissions technologies that create "opportunities for achieving the more stringent later year standards."35 FFVs can achieve "significant" greenhouse gas emission reductions and create "opportunities for achieving the more stringent later year standards." nder various aspects of the NPRM's stated logic, FFVs should receive the VCF incentives to fully reflect the greenhouse gas benefits of FFVs. [EPA-HQ-OAR-2021-0208-0279-A1, p. 10]

The VCF avoids the adverse programmatic consequences of multipliers.

Once FFVs are also appropriately incentivized, based on their significant lifecycle greenhouse gas emissions benefits, all the main kinds of alternative fuel vehicles (FFVs, EVs, PHEVs, and fuel cell vehicles) would be covered by at least some vehicle greenhouse gas program incentive. This would avoid EPA focusing on any one or subset of alternative fuel technologies. Technology-neutral, performance-based standards are broadly preferred. For instance, the NPRM interagency review raised questions about the "necessity of multiplier credits" which "are not technologically neutral" and could be "counterproductive."36 EPA should follow this technology-neutral approach by providing appropriate incentives for all the major types of alternative fuel vehicles, based on their ability to reduce lifecycle greenhouse gas emissions.

The VCF avoids the adverse programmatic consequences of multipliers. EPA recognizes multipliers "reduce the effective stringency of the standards" by counting more than once (multiplying) benefits from a single vehicle. (See e.g., NPRM at 43,733). Also problematic regarding EPA's use of multipliers, EVs and PHEVs are not truly a near-zero emission technology because, regarding their fuel, EVs and PHEVs rely on electric generation which broadly is not "near zero" emissions. The NPRM finds the electric generating sector will rely on fossil fuels through 2050.37 Because EVs and PHEVs rely on fossil fuel electricity well into the future, these EVs and PHEVs are not "near zero" greenhouse gas emissions vehicles. y contrast, a VCF for FFVs based on lifecycle greenhouse gas emission reductions does not have the detrimental effect of "reducing the effective stringency of the standards" because all these FFV emissions reductions are (a) "real-world" and (b) not counted more than once. It is arbitrary and capricious for EPA to fail to incentivize FFVs with a VCF that can meet the metrics that EPA uses for other vehicle incentive technologies without the detrimental impacts of the EV/PHEV multipliers. [EPA-HQ-OAR-2021-0208-0279-A1, p. 10]

The VCF must be reinstated in the GHG program for FFVs in a manner similar to how it currently appears in the regulations for FFVs through model year 2015, which is a relatively straightforward regulatory fix.

The VCF must be reinstated for FFVs in EPA's vehicle greenhouse gas program (in a manner similar to how it currently appears in 40 CFR 600.510-12(j)(2)(iv)(B) for FFVs through model year 2015), to reflect the lifecycle greenhouse benefits of ethanol. Under these existing EPA regulations as currently stated in the CFR applicable through model year 2015, the tailpipe carbon emissions of FFVs are multiplied by the VCF to reflect the lifecycle greenhouse gas benefits of ethanol use. The desired, restored formula would be as follows, when assessing FFV carbon emissions (formally referred to as Carbon Related Exhaust Emissions or "CREE"):

CREE = (F × CREEE85 x VCF) + ((1 − F) × CREEgas).38

Through model year 2015, the VCF was established at .15. This is appropriate where, under certain EPA approaches to calculating greenhouse gas emissions, the ethanol portion of E85 (nominally 85% of the fuel) can be considered "zero carbon." As noted above, RFS calculations have generally found no tailpipe CO2 emissions for ethanol when calculating lifecycle emissions.39 EPA should use a VCF of .15 (based on the Congressional level set under the CAFE standards) or such other level as EPA considers reflects the lifecycle greenhouse gas benefits of ethanol. For EPA's greenhouse gas vehicle program, a VCF of at least is .5 (perhaps also multiplied by .85 to reflect the nominal ethanol content of E85) is appropriate based on ethanol averaging approximately 50% lower greenhouse gas emissions than gasoline on a full lifecycle basis.40

To put the VCF in the CREE formula into perspective, for a selected FFV based on a popular model type (a Ford F-150), E85 has had about a 10% lower CREE based on the FFV's tailpipe emissions alone. This improves that FFV's overall CREE around 1.4% without the VCF.41 Applying the VCF to account for ethanol's lifecycle carbon benefits improves that FFV's CREE about 10% to 6% (if a VCF of .15 or .5, respectively, is used in the above CREE formula). [EPA-HQ-OAR-2021-0208-0279-A1, p. 11]

In summary, for all the reasons stated above, EPA must provide the VCF for FFVs, established at a level of .15 or some other figure that accurately reflects the lifecycle greenhouse gas emissions reduction benefits of E85 used in FFVs. If the VCF is reinstated, the rule would be appropriately technology neutral with the EV/PHEV/FCV multipliers continuing on at the levels and limits proposed in the NPRM. EPA's best option is simply to restore the VCF for FFVs which should be re-instated under any circumstances. [EPA-HQ-OAR-2021-0208-0279-A1, p. 12]

Reestablishing the VCF is appropriate under the EPA vehicle greenhouse gas program's statutory authority, as the VCF has previously been in place under the regulations through model year 2015.42 The NPRM's own goals for reducing greenhouse gas emissions from light duty vehicles, for all the reasons stated above, dictate that EPA should reestablish the VCF for FFVs within the EPA vehicle GHG program. [EPA-HQ-OAR-2021-0208-0279-A1, p. 12]

3 The NPRM finds that electric vehicles will have limited market deployment (less than 8%) over the time period covered by this rulemaking. (NPRM at 43,775).

33 Potential EPA concerns regarding less-than-optimal E85 use by FFVs during this time period are misplaced, because EPA failed to enforce the Renewable Fuel Standards during this time frame, which undercut an important source of improved E85 pricing during this timeframe. Now, with increasing desires by EPA to reduce greenhouse gas emissions, and the use of a real-world F factor in EPA regulations reflecting E85 use, FFVs are primed to be an important compliance option based on real-world greenhouse gas emission reductions.

34 See e.g., NPRM at 43,760, noting the NPRM's proposed elimination of multiplier incentives for natural gas vehicles because "EPA does not view NGVs as a pathway for significant vehicle GHG emissions reductions" (emphasis added).

39 See RFS final rule at 75 FR 14,788 (2010) and accompanying regulatory impact analysis, supra. As mentioned above, the RFS provides only a "floor" of demand for fuels that meet minimum lifecycle reduction thresholds; using a VCF in EPA's vehicle GHG program is essential to maintaining FFV production to promote vehicles that can use those lower carbon fuels and achieve higher levels of biofuel use.

41 These figures are based on a Ford 150 FFV that has CREE of 468 grams/mile using E85 and 522 grams/mile using gasoline. This calculation is based on using E85 instead of gasoline for 14% of fueling per the above "F" factor. The real-world greenhouse gas reductions of this and other FFVs would increase significantly as E85 fueling is used more often, including under strong Renewable Fuel Standards, which would increase the F factor.

Commenter: High Octane-Low Carbon Fuel Alliance (HOLC)

As stakeholders with considerable experience and expertise in areas relating to the interaction of fuel properties and vehicle performance, fuel cycle carbon intensity, and light-duty transportation policy, we are deeply disappointed by the EPA's failure to at least reference high octane, low carbon fuels as one tool for advancing the reduction of GHG emissions and improving the fuel efficiency of light-duty passenger vehicles. For as long as internal combustion engines remain on the road during the next 30 years, high octane, low carbon fuels will be needed, delivering significant reductions in carbon emissions today and providing a critical bridge to an electrified future. [EPA-HQ-OAR-2021-0208-0262-A1, p. 1]

Our comments highlight the mounting body of evidence confirming that higher octane, lower carbon fuels have the ability to contribute significantly to achieving the Biden-Harris Administration's goals of reducing carbon emissions by half by 2030 and reaching a net zero economy by 2050. Indeed, such fuels would achieve greater emissions reduction at less cost than the standards in the Proposed Rule. [EPA-HQ-OAR-2021-0208-0262-A1, p. 2]

As noted by the EPA in the Proposed Rule, the transportation sector is the largest contributor to U.S. GHG emissions. For that reason, the EPA has focused its attention on the growing shift to electric vehicles (EVs) to achieve the administration's goal of cutting carbon emissions in half by 2030 and reaching a net zero economy by 2050. Both the administration and automakers have committed to significant investments to transition from widely available internal combustion engines to electrification. However, automakers also acknowledge that 'the average age of a vehicle in the U.S. is now roughly 12 years',2 and, therefore, a large portion of vehicles will rely on liquid fuels in the coming decades. In 2021 alone, approximately 270 million light-duty vehicles will consume 120 billion gallons of gasoline containing 25 percent aromatics. Therefore, automakers are 'continuing to invest in vehicle improvements that increase fuel economy and reduce [GHG] in internal combustion engine vehicles' – many of which 'can be enhanced or complemented with the use of high octane, low carbon liquid fuels.'3 Liquid fuel will continue to be the predominant source of transportation energy, along with its GHG emissions and toxic byproducts, for years to come.

Reducing GHG emissions and improving the fuel efficiency of vehicles, therefore, requires a more immediate clean fuel solution, such as higher octane, lower carbon fuels. While EVs offer tremendous potential for helping reach net zero emissions, decarbonizing liquid fuels would deliver immediate emissions reductions in the meantime. Making today's engines and fuels as efficient, low carbon, and clean as possible now will have significant near-term benefits.

Increasing the use of biofuels such as ethanol with a lower carbon footprint than gasoline would unlock direct and indirect benefits for the climate. Specifically, increasing the ethanol fraction in our transportation fuel would reduce GHG emissions from light-duty vehicles by more than 12 percent, roughly 123 million metric tons annually, principally by enabling vehicles to operate more efficiently – a greater reduction than would be achieved by the new vehicle standards in the Proposed Rule. Enabling the wider use of mid-level ethanol blends would also support the more stringent vehicle standards for MY 2026 contemplated in the Proposed Rule and enable automakers more easily to comply.

Higher Ethanol Blends are Critical to Reducing GHG Emissions in Half by 2030

A 2017 assessment by the consulting firm ICF concluded that life-cycle GHG emissions associated with producing corn-based ethanol in the U.S., using today's practices in a typical natural gaspowered refinery, are almost 43 percent lower than those of gasoline on an energy-equivalent basis.4,5 This estimate is consistent with more than 15 years of life-cycle analysis at Argonne National Laboratory, recently reaffirmed in a retrospective analysis.6,7 It is also more than twice as large as the 21 percent reduction predicted by the EPA for an average natural gas-fired plant in 2022 in the agency's 2010 life-cycle analysis for ethanol.8 Argonne senior scientist Michael Wang estimates that the use of corn ethanol resulted in a total GHG reduction in the U.S. of more than 500 million metric tons between 2005 and 2019.9

In contrast, for electric and plug-in hybrid vehicles EPA has used 'tailpipe-only values to determine vehicle GHG emissions, without accounting for upstream emissions' in the Proposed Rule.10 This is misleading: EPA notes on its website that the power used to charge EVs may create carbon pollution. Further, EPA and the U.S. Department of Energy's (DOE's) 'Beyond Tailpipe Emissions Calculator' is offered to help individuals 'estimate the greenhouse gas emissions associated with charging and driving an EV or a plug-in hybrid electric vehicle.'11

The benefits of increased ethanol use can be achieved quickly. The proven technology used by today's ethanol industry enables rapid scale-up. The industry tripled its production capacity in just four years – from 4.4 billion gallons a year in 2005 to 14.5 billion in 2009.12 U.S. ethanol production capacity today is 17.4 billion gallons.13 The transportation fuel infrastructure has also adapted to the increased use of ethanol in cars and light trucks. New gas pumps are now certified for mid-level ethanol blends.14

The Energy Information Administration projects that demand for gasoline will decline from 137.5 billion gallons per year in 2021 to 127 billion gallons in 2050, due to increased vehicle efficiency and greater use of electric vehicles.15 Fueling the 2050 fleet with higher-level blends such as 30 percent ethanol blends (E30) would, therefore, require little more than a doubling of today's ethanol capacity. Demand will fall further if EVs are adopted more rapidly than currently envisioned.

Additionally, increased use of ethanol would bring a national security benefit. U.S. ethanol production in recent years has averaged more than 1 million barrels per day. Increasing that level to support an E30 market would displace more oil than the standards in the EPA and U.S. National Highway Transportation Safety Administration (NHTSA) Proposed Rules would save – producing an oil security premium valued at more than $1 billion per year.16,17

Higher Ethanol Blends Provide Clean, Affordable Octane to Improve Fuel Efficiency of Light-Duty Vehicles

Octane is needed in gasoline to prevent premature combustion of the fuel mixture ('knock'), which can damage engines.18 Higher octane enables greater engine efficiency and improved vehicle performance through higher compression ratios and/or more aggressive turbocharging and downsizing – also facilitated by ethanol's cylinder 'charge cooling' effect due to its high heat of vaporization.19 Raising the engine's compression ratio from 10:1 to 12:1 could increase vehicle efficiency by 5 to 7 percent.20,21

To increase octane enough to achieve these efficiency gains (i.e., to a 'premium' rating of 94 AKI (anti-knock index) at the gas pump), there are two principal options – aromatics or alcohols.22 Both have much higher octane ratings than base refinery gasoline.

Since 2016, researchers at nine National Laboratories participating in the DOE's Co-Optimization of Fuels & Engines initiative (known as Co-Optima) have explored how simultaneous innovations in fuels and engines can boost fuel economy and vehicle performance, while reducing emissions.23 The initiative identified 10 candidate fuels from four chemical families – alcohols, olefins, furans, and ketones – with the greatest potential to increase vehicle efficiency. Seven of them were alcohols.24

A team at Oak Ridge National Laboratory found that intermediate alcohol-gasoline blends, particularly E30, 'exhibit exceptional antiknock properties and performance beyond that indicated by the octane number tests,'25 and that engine and vehicle optimization could offset the reduced fuel energy content of such blends and likely reduce vehicle fuel consumption and tailpipe carbon dioxide (CO2) emissions.26,27 The use of E30 in one test vehicle enabled a 13:1 compression ratio, reducing CO2 emissions by 6 to 9 percent.28

Enabling use of high octane, mid-level ethanol blends would significantly reduce the cost of stronger fuel economy standards, a 2016 analysis by AIR, Inc., found.29 In a recent letter, the Alliance for Automotive Innovation, a group of automakers that produce nearly 99 percent of the new light-duty vehicles sold in the U.S., said:

[A]s automakers invest significantly in the transition to expanded vehicle electrification, the auto industry is also continuing to invest in vehicle improvements that increase fuel economy and reduce greenhouse gases in internal combustion engine vehicles. Many of the technologies being used to make these improvements can be enhanced or complemented with the use of high octane, low carbon liquid fuels. These fuels would simultaneously support vehicle performance, including fuel economy, and further reduce greenhouse gas emissions during vehicle use. Such benefits would be realized by new and existing internal combustion engines and therefore should be encouraged as additional solutions as soon as possible to maximize environmental benefits across the fleet. Given the timespan over which combustion technology will continue to be sought by new car shoppers, and the timespan that those vehicles will remain in the field, low carbon liquid fuels are an increasingly important technology pathway to help achieve carbon reductions while the electric vehicle market continues to grow.30 (emphasis added)

U.S. consumption of gasoline adds roughly 1 billion metric tons of CO2 to the atmosphere each year.31 Based on current consumption rates of gasoline, increasing vehicle fuel economy by 7 percent with the higher octane of an E30 blend would reduce annual U.S. emissions by 70 million metric tons per year.32 Reducing the share of aromatics in gasoline by 40 percent – with E30 fuel that is 40 percent less emitting – would reduce U.S. emissions by another 32 million metric tons per year.33 GHG emissions from oil refineries would also fall, due to reduced demand for their most intensively refined products. Lower throughput and intensity would reduce refinery CO2 emissions and crude oil consumption, at a modest additional cost of 1-2 cents per gallon.34 One assessment found that refinery GHG emissions would decline by 12 percent to 27 percent for various E30 cases, due to both lower crude oil throughput and differences in the severity of refining operations.35 Since the refinery sector emits 180 million metric tons per year,36 that would mean a further reduction in U.S. GHG emissions of at least 21 million metric tons per year.

Thus, the total reduction in U.S. GHG emissions from adoption of E30 blends – combining fuel economy gains, the replacement of aromatics with a lower-carbon substitute, and the change in refinery operations – would total 123 million metric tons per year. That would be a cut of more than 12 percent in emissions from light-duty vehicles, which comprise 58 percent of the emissions from the transportation sector.37 It would also exceed the GHG reductions from the Proposed Rule for new cars, which reach only 117 million tons in 2050.38

Valuing the social cost of those avoided emissions at $25 per ton would imply a benefit of more than $3 billion per year. Using the ‘interim’ rate of $51 per ton put forward by the administration in 2021, the benefits would come to more than $6 billion per year.39 At the rate of $76 per ton used in the NHTSA Proposed Rule, the benefits would exceed $9 billion per year.40

California is in the vanguard of the transition to electric vehicles in the U.S., with a goal of limiting new-car sales in 2035 to zero-emission vehicles.41 But under the state's Low Carbon Fuel Standard (LCFS) program to date (since 2011), ethanol has reduced GHG emissions nearly three times more than electricity. As more electric vehicles enter the market, that ratio is dropping sharply, but even last year, ethanol reduced GHG emissions by one third more than electricity – despite being limited mostly to E10 blends.42

Higher Ethanol Blends Can Replace the Toxic Aromatics in Gasoline to Improve Public Health and its Impact on Communities of Color

Toxic Aromatics in Gasoline are Harming Our Environment and Health

A shift from the standard formulation of gasoline today (E10) to a higher-level blend (E30) would displace an estimated 40 percent of the toxic aromatics in the fuel43 – also the most carbonintensive fraction of gasoline.44 Aromatics are hydrocarbons built around one or more benzene rings. Often referred to by the acronym BTEX, they include not just benzene itself, a known carcinogen, but also toluene, ethylbenzene, xylenes, and other compounds similar to benzene in their behavior in the environment.45 Aromatics are derived from petroleum during the refining process and blended into gasoline to increase octane. The use of aromatics increased dramatically during the 1980s when the previously used additive, tetraethyl lead, was phased out due to health concerns.46,47

The level of aromatics in gasoline is capped at 25 percent in regions required to use reformulated gasoline (areas that have high levels of ozone pollution, roughly 30 percent of the U.S. market).48 From 1997 to 2006, aromatics made up roughly 25 percent of the U.S. gasoline pool. That level fell to 20 percent over the next 10 years49 as ethanol's share of the market rose from 3 percent to nearly 10 percent. This 20 percent level equates to 25.3 billion gallons of aromatics used in cars and light-duty vehicles per year.50

The BTEX chemicals are characterized as hazardous air pollutants 'known or suspected to cause cancer or other serious health or environmental effects.'51 They are identified as mobile source air toxics and formed in four ways, of which the first two are most pertinent. According to the EPA:

'First, some air toxics are present in fuel and are emitted to the air when it evaporates or passes through the engine as unburned fuel. Benzene, for example, is a component of gasoline. Cars emit small quantities of benzene in unburned fuel, or as vapor when gasoline evaporates.

'Second, mobile source air toxics are formed through engine combustion processes. A significant amount of automotive benzene comes from the incomplete combustion of compounds in gasoline such as toluene and xylene that are chemically very similar to benzene.'52 (emphasis added)

According to a review of the literature by the Health Effects Institute: 'It is estimated that about 50 [percent] of the benzene produced in the exhaust is the result of decomposition of aromatic hydrocarbons in the fuel. … [Two] studies showed that lowering aromatic levels in gasoline significantly reduces toxic benzene emissions from vehicle exhausts.'53

A recent General Motors study found that nearly 96 percent of the PM emissions from gasoline are caused by the aromatics in the fuel. Due to an increase in heavy aromatics in the U.S. gasoline pool in the last three years, the gasoline particulate index has increased by more than 30 [percent] since 2016 and now is worse than in the EU and China. The authors observed: 'Fuel quality improvements are not only important for new vehicles, which are designed for it, but also will benefit the whole fleet of legacy vehicles in the market and off-highway engines.'54

Aromatics contribute about 10 percent of global anthropogenic emissions of non-methane organic gases (NMOG), the major source being car exhaust from gasoline-powered vehicles.55 Aromatics are also responsible for an estimated 30-40 percent of the ozone and other photooxidants in urban atmospheres, making them the most important class of hydrocarbons with regard to photochemical ozone formation.56

Toxic Emissions from Gasoline are Causing Premature Deaths and Long-Lasting Health Effects

Organic aerosol is a major component of fine particle pollution. Primary organic aerosol (POA) is directly emitted from fossil fuel combustion and other sources, while secondary organic aerosol (SOA) is formed from the oxidation of these emissions in the air.57 Tailpipe emissions from onroad gasoline vehicles are an important source of SOA in urban environments, where SOA concentrations often exceed POA levels. For most vehicles, SOA formation exceeds POA emissions after a few hours of atmospheric oxidation. Controlling SOA precursor emissions is necessary to reduce human exposure to fine particulate matter.58 A study of SOA formation during a severe photochemical smog event in Los Angeles found that exhaust from gasoline engines represented the single-largest anthropogenic source of SOA, and SOA in turn has been shown to be a large fraction, if not the largest, of gasoline vehicular PM.59

According to EPA's 2011 National Air Toxics Assessment, secondary formation is the largest contributor to cancer risks nationwide, accounting for 47 percent of the risk. On-road mobile sources contribute the most cancer risk from directly emitted pollutants (about 18 percent) and the most to non-cancer risks (34 percent).60 A recent study found higher toxicity in combustion aerosols than non-combustion aerosols, with emissions from vehicle engine exhaust scoring higher on overall toxicity than even those from coal combustion.61

In 2005, EPA said that '[a]romatic compounds … are considered to be the most significant anthropogenic SOA precursors and have been estimated to be responsible for 50 to 70 [percent] of total SOA in some airsheds. … The experimental work of Odum and others showed that the secondary organic aerosol formation potential of gasoline could be accounted for solely in terms of its aromatic fraction.'62 (emphasis added). One study estimated that SOA from aromatics in gasoline is responsible for 3,800 annual premature deaths and annual social costs of $28.2 billion in 2006 dollars.63

Additionally, the effect of aromatics on SOA is not linear. Increasing the level of aromatics in test fuels by less than 30 percent (from 28.5 percent to 36.7 percent) was shown to cause a 3- to 6-fold increase in SOA formation.64 Reducing aromatics would have a similarly disproportionate effect.

Further, there is a growing concern in the public health community about the contribution of ultrafine particles (UFPs) to human health. Despite their modest mass and size, they dominate in terms of the number of particles in the ambient air. UFPs contain large amounts of toxic components, and their adverse health effects potential would not be predicted from their mass alone. Particle number, surface area, and chemical composition are more important than mass as a health-relevant metric.65

A particular concern about UFPs is their ability to reach the most distal lung regions (alveoli) and circumvent primary airway defenses. Moreover, UFPs have a high surface area and a capacity to adsorb a substantial amount of toxic organic compounds. Harmful systemic health effects of PM10 or PM2.5 are often due to the UFP fraction.66 High levels of aromatic components in fuel have been conclusively shown to increase PM emissions measured by particle number, an aromatic ring being an early stage of the fundamental particulate formation process.67 The ability of inhaled particles to be captured within the human body, called the deposition efficiency, is a function of particle size, with the particle deposition efficiency rapidly increasing as the particles become smaller and smaller.68 UFPs can cross biological membranes, and their mobility within the body is thought to be high. There is considerable evidence to show that inhaled UFPs can gain access to the bloodstream and are then distributed to other organs in the body. They can even cross the placental barrier.69

An important recent study co-authored by Nobel Prize winner Mario Molina found ‘remarkable formation of UFPs from urban traffic emissions’70 – which have a disproportionate effect on communities of color: ‘Photooxidation of vehicular exhaust yields abundant UFP precursors, and organics dominate formation of UFPs under urban conditions.’ Chamber studies showed high levels of aromatics, including toluene and C8 and C9 aromatics.71 The authors concluded: ‘Recognition of this source of UFPs is essential to assessing their impacts and developing mitigation policies. Our results imply that reduction of primary particles or removal of existing particles without simultaneously limiting organics from automobile emissions is ineffective and can even exacerbate this problem.’72 (emphasis added)

Polycyclic aromatic hydrocarbons (PAHs) are among the worst of the UFPs. The EPA has classified seven PAHs as probable human carcinogens.73 A subset of polycyclic organic matter (POM), PAHs consist of three to seven benzene rings. Among all sources, vehicular exhaust is the major source for PAH air pollution in most urban areas, the product of incomplete combustion of aromatic hydrocarbons in gasoline.74,75 More than 95 percent of the lung deposition of PAHs is due to fine particles, and ultrafine particles are responsible for 10 times more PAH deposition in the alveolar region than their share of PM mass.76

PAHs are commonly divided into two categories based on their size. PAHs with two to three fused aromatic rings are considered low molecular weight PAHs, while those with four and more fused rings are high molecular weight PAHs, including the most carcinogenic PAH, benzo[a]pyrene (BaP).77 The larger PAHs are of greatest concern for human health due to their recalcitrance to degradation, persistence, bioaccumulation, carcinogenicity, genotoxicity and mutagenicity.78 Since these high molecular weight PAHs exist almost exclusively on fine particles, they travel deep into the human respiratory system and pose a serious health risk.79 Combustion of vehicle fuels appears to be the principal source of inhalation exposure for the larger PAHs, such as BaP, that are associated with particulate matter.80 Motor vehicles account for as much as 90 percent of the particle-bound PAH mass in the urban air of major metropolitan areas.81

Fetal exposure to PAHs, as measured by prenatal air monitoring for the marker PAH benzo[a]pyrene during the third trimester of pregnancy, was assessed in a long-term observational epidemiological study in New York. Exposure levels were characterized relative to a median of 2.66 nanograms per cubic meter (ng/m3) – 100,000 times less than the OSHA air standard of 0.2 mg/m3.82 Fetal exposure above the median was associated with developmental delay at age 3 years and reduced IQ at age 5 years, as well as increased anxiety and depression, possibly by interfering with knowledge acquisition or slowing cognitive processing.83 The observed decrease in full-scale IQ is similar to that reported for children with elevated concentrations of lead in their blood.84

DNA adducts are a form of DNA damage caused by attachment of a chemical entity to DNA. Adducts that are not removed by the cell can cause mutations that may give rise to cancer.85 The formation of PAH-DNA adducts has been widely studied in experimental models and has been documented in human tissues.86 Higher levels of PAH-DNA adducts found in umbilical cord blood were associated with reduced scores on neurocognitive tests.87

A long-term study in California also found an association between exposure to airborne PAHs during the last 6 weeks of pregnancy and early preterm birth – with median exposure at the extremely low level of 3.6 ng/m3.88 Preterm birth is a predictor of infant mortality and later-life morbidity. Despite recent declines, the rate of preterm birth remains high in the U.S. Research increasingly suggests a possible relationship between a mother's exposure to common air pollutants, including PM2.5 and preterm birth of her baby. 89

Based on numerous experimental studies, PAHs are also widely accepted to be precursors for soot, or black carbon – a major contributor to climate change.90,91 Products of toluene combustion (one of the BTEX aromatics) are known precursors of PAHs that are involved in soot formation.92 Black carbon is considered the second most important human emission in terms of climate forcing; only CO2 has a greater overall effect. The short-term (20-year) global warming potential per ton of black carbon is 3200 times that of CO2.

Unfortunately, new engine technology is not coming to the rescue: Most of the light-duty vehicles sold today have switched to gasoline direct injection technology (GDI) – for the laudable reason of increased engine efficiency and thus fuel economy – but with the unintended side effect of increasing the volume of UFPs, including PAHs, coming out of the exhaust pipe.93 GDI was used in fewer than 3 percent of vehicles as recently as model year 2008 but was projected to be used in more than 55 percent of vehicles in model year 2020.94 GDI engines emit UFPs and PM at levels comparable to diesel engines that do not use diesel particulate filters.95,96 Uncontrolled GDI engines have been found to emit 10 times more particles (by mass) than previous engines and more than 100 times the number of particles.97 [EPA-HQ-OAR-2021-0208-0262-A1, pp. 3-18]

Low-Income Communities and Communities of Color Face a Disproportionate Burden from Gasoline Emissions

Beyond the overall impact of gasoline emissions on the public's health, it is also worth noting the disproportionate effect on urban and low-income communities. Higher octane, lower carbon fuels have the ability to substantially increase fuel efficiency, while substantially reducing carbon emissions and the particulate-borne toxics plaguing these communities. The harm to these communities, particularly communities of color, is increasingly being brought to light in both published studies and mainstream media.

Indeed, EPA notes in the Proposed Rule scientific reports by the U.S. Global Change Research Program (USGCRP), the Intergovernmental Panel on Climate Change (IPCC), and the National Academies of Science, Engineering, and Medicine that have provided evidence of environmental justice concerns. Importantly, these reports have concluded that 'poorer or predominantly non-White communities can be especially vulnerable to climate change impacts because they tend to have limited adaptive capacities and are more dependent on climate-sensitive resources such as local water and food supplies, or have less access to social and information resources.'98 Further, '[s]ome communities of color, specifically populations defined jointly by ethnic/racial characteristics and geographic location, may be uniquely vulnerable to climate change health impacts in the [U.S.]'99

In addition to these reports highlighted in the Proposed Rule, a recent study found that Black people are exposed to higher concentrations of PM2.5 emissions, the most significant environmental cause of death.100 PM2.5 is responsible for an estimated 85,000 to 200,000 excess deaths each year in the U.S. Meanwhile people of color generally are exposed more to almost every source of pollution as compared to white people. Equally concerning was an April 2021 Environmental Integrity Project report, which found that thirteen oil refineries across the country released elevated and reportable levels of benzene into predominantly minority and low-income communities in 2020.101

Given the direction of Executive Order 12898 to make achieving environmental justice part of each agency's mission, it's imperative that EPA do more than recognize the historical impact of GHG emissions on low-income and minority communities. By opening the door to higher ethanol blends, such as E30, EPA can work toward its stated goal of increasing its focus on environmental justice and equity.102 Displacing the aromatics in gasoline with higher octane, lower carbon fuel such as ethanol enables more efficient vehicles, reduces GHG emissions, and reduces the toxic pollutants in the air. [EPA-HQ-OAR-2021-0208-0262-A1, pp. 18-19]

EPA has the Statutory Authority to Promote Higher Ethanol Blends to Control the Hazardous Emissions from Transportation Fuel

In the Proposed Rule, EPA notes its authority to regulate the emission of air pollutants from all mobile sources under section 202(a) of the Clean Air Act (CAA).103 EPA highlights the multiple factors the agency must take into consideration to revise the forthcoming GHG emission standards for light-duty vehicles, including technological feasibility, compliance cost, and lead time. EPA may also consider factors, such as the impact on the auto industry, fuel savings by consumers, oil conservation, energy security and other energy impacts, and safety.

Despite the weight given to these factors in past rulemaking, we applaud EPA for recognizing the statutory intent of section 202(a) – reducing air pollution to protect the public's health and welfare. Notably, EPA makes clear that given the statutory purpose of this section, 'the Administrator finds it is appropriate to place greater weight on reducing emissions and to adopt standards that, when implemented, would result in significant reductions of light duty vehicle emissions both the near term and over the longer term.'104 (emphasis added). In doing so, EPA is requiring that the Proposed Rule's primary goal should be to address GHG emissions by reducing the threat posed to our health and environment from hazardous emissions. However, the Proposed Rule fails to accomplish this goal.

To effectively improve our public health and welfare, EPA should use its authority under section 211(c)(1) of the CAA to regulate gasoline octane levels. Under the CAA, EPA can set a national minimum octane level of 98-100 RON to enable more efficient high-compression engines and reduce GHG emissions. As a cleaner, lower cost, and more fuel-efficient alternative to our fossil fuel supply, a national minimum octane level of 98-100 RON would open the door to increased ethanol blended fuels such as E30 fuel. Internal combustion engines and the fuels they use comprise a single system, requiring the availability of higher ethanol blends to enable the optimization of more fuel-efficient vehicles.

Importantly, ethanol is readily available based on our domestic supply without increased land use or competing with our food supply. Ethanol producers have the capacity to supply any needed supply for years to come. And our existing infrastructure is capable of supplying higher ethanol blends to the market without substantial investment, unlike the case with the eventual transition to electrification. [EPA-HQ-OAR-2021-0208-0262-A1, pp. 19-20]B. EPA Must Remove the Regulatory Barriers to Higher Ethanol Blends

In addition to setting a national minimum octane standard, there are other steps EPA can take to level the playing field and enable ethanol to compete in the market. Specifically, we urge the EPA to take the following actions:

• Comply with the Mandatory Toxic Reduction Provisions in Section 202(l) of the CAA: EPA action is required under Section 202(l) of the CAA Amendments of 1990 to control aromatic/BTEX content in order to reduce mobile source air toxics (MSAT) emissions 'to the greatest degree … achievable.'105 Action on this requirement is mandatory;106 it was enacted concurrently and was explicitly based on the same provision of Section 202(a) under which EPA has justified the Proposed Rule, based on 'the magnitude and benefits of reducing emissions that endanger public health and welfare.'107 Without a minimum toxic reduction baseline enforced, refiners will find loopholes to allow them to backslide on the aromatic content in gasoline in reformulated gasoline (RFG) areas and/or be forced to dump gasoline with higher priced and higher volumes of aromatic-laced gasoline into non-RFG areas. The debilitating health impacts of these carcinogens has been ignored by EPA and must be addressed.

• Correct the Agency's Interpretation of 211(f) Substantially Similar Rule: As of January 1, 2017, E10 became the nation's certification fuel. When that happened, ethanol became an additive used in certification; therefore, it should not be controlled under section 211(f). In addition, in light of EPA not finalizing the Renewables Enhancement and Growth Support (REGS) Rule, its 'sub-sim' position on ethanol has not been codified. Correcting this interpretation will reduce unnecessary regulations, time to market, and reduce MSATs. If EPA wishes to control the use of higher blends in standard (non-FFV) vehicles, the legal burden of proof is on the agency to prove that higher than 15 percent ethanol blends damage emissions control systems or exacerbate tailpipe emissions. EPA cannot do so factually.

• Extend the 1 psi Reid Vaper Pressure (RVP) Waiver for E10 and E15 to Higher Blends: EPA should extend the RVP waiver of ethanol blends because the RVP decreases as the level of ethanol increases, supporting the transition to higher octane fuels by opening market access to such fuels in the summer months. Overall emission reduction gains from adding ethanol to gasoline far outweigh concerns that focus only on reducing gasoline volatility, would lower MSATs and help meet the requirements of CAA Section 202(l) requirements.

• Approve a Mid-Level Ethanol Blend Certification Fuel: EPA should expeditiously approve the use of a mid-level ethanol certification fuel (e.g., E30) to provide automakers with the added justification to design optimized, high compression vehicles that can make use of 98–100 RON gasoline. The certification of E30 fuel will help automakers cost effectively meet Corporate Average Fuel Economy (CAFE) and GHG requirements by improving engine efficiency, reducing CO2, and reducing MSATs.

• Update and Reform the Agency's MOVES2014 Model: EPA should suspend the use of the MOVES2014 model because the research literature shows that the model relied on an analysis that unfairly and inaccurately attributes higher emissions to ethanol rather than added aromatics. The MOVES model analysis has been proven to be contrary to what happens in real-world retail gasoline/ethanol blending, which is 'splash blending.' By updating the model, states currently using the MOVES2014 Model for State Implementation Plan (SIP) compliance will no longer be deterred from using higher blends of ethanol to reduce MSATs and meet ozone attainment goals that restrict the development of new business and roads.

• Update the 2007 MSAT Cost-Benefit Analysis (CBA): The assumptions used in EPA's 2007 MSAT rule (e.g., $19/barrel crude oil, $0.85 gasoline, and a 2:1 ethanol octane replacement value for toluene/BTEX/aromatics) inaccurately create the impression that replacing toxic aromatic hydrocarbons with higher octane, lower cost ethanol would not be cost effective. An updated CBA will show that ethanol provides positive MSAT reduction at a lower cost.

• Update and Reform the Agency's Life Cycle Assessment (LCA): Updating EPA's outdated 2010 LCA of ethanol's carbon emissions would align the agency's data with the continually updated and widely accepted Argonne National Laboratory GREET model, which shows double the GHG benefit identified by EPA. EPA's LCA model also should recognize the ability of high-yield corn to restore soil organic matter, which transforms corn acres into substantial carbon sinks, and therefore adjust its carbon intensity (CI) factors for corn ethanol downward. This adjustment would accelerate the penetration of higher ethanol blends in states and countries that do or will adopt high-octane low-carbon fuel standards. This will support EPA's responsibility to successfully implement the Renewable Fuel Standard (RFS) and help automobile manufacturers meet the requirements of CAFE and GHG standards.

• Reinstate Flexible-Fuel Vehicle (FFV) Type Credits: EPA should provide the regulatory roadmap and supporting data to help stakeholders interested in reinstating meaningful vehicle credits to incentivize automakers to design engines to utilize highoctane low-carbon fuels (e.g., E30). Similar to the transition to unleaded gasoline, this regulatory action would send a clear investment signal to automakers that have expressed interest in being able to pro-rate FFV-type credits (previously established and based on E85 ethanol volumes) and recalculate them for the use of high octane, low carbon midlevel ethanol blends (e.g., E30). These credits will help justify and offset the cost of investing in retooling and testing to meet CAFE and GHG requirements and will also leverage the DOE's investment into E85 refueling infrastructure by increasing the renewable/alternative fuel throughput to meet the objectives of that program. [EPA-HQ-OAR-2021-0208-0262-A1, pp. 20-22]

Commenter: Hyundai America Technical Center, Inc. (Hyundai)

Hyundai also expects FCEVs to play an important role in the full suite of diversified electric solutions. Diversification is important for serving differing use cases, preferences, resiliency, and energy security. As such the government should be committed to ensuring the expansion of hydrogen stations and establish a metric that helps ensure infrastructure growth for these vehicles. [EPA-HQ-OAR-2021-0208-0603-A1, p.5]

Low-Carbon Fuels

As shown in Figure 1 [Figure 1 can be found at docket number EPA-HQ-OAR-2021-0208-0603-A1, p. 5], above, even with aggressive introduction of electric vehicles the on-road fleet in 2030 is still expected to be comprised of more than 80% internal combustion engine vehicles. As such, we support EPA's plans to build upon their Renewable Fuels Standard12 by promoting the addition of more low-carbon fuels. A low carbon fuel standard would be another tool that would incentivize both auto manufacturers and utilities to sell electric vehicles and develop smart charging strategies, respectively. These fuels will reduce emissions from new gasoline vehicles but also, more importantly, from the existing fleet of gasoline vehicles on the road today. [EPA-HQ-OAR-2021-0208-0603-A1, p.10]

Commenter: Illinois et al. Corn Growers Associations

Currently, the regulatory barriers to low-carbon, high-octane fuels prevent automakers from taking advantage of octane's anti-knock properties to improve the efficiency of internal combustion engines—and thereby reduce carbon-dioxide emissions. Removing these barriers will allow EPA to achieve its emissions goals at much lower cost and with greater real-world benefit. The proposal acknowledges that liquid fuel-related issues will be "especially important considerations during the transition to zero-emission vehicles."1 But its suggestion that these issues should wait for a future rulemaking is fundamentally misguided and, in fact, arbitrary and capricious. Fuels and engines constitute a single system; EPA cannot rationally regulate the one without taking into account the other.2 Thus, as explained below, EPA should use the final rule to require a minimum octane standard pursuant to its authority under Title II of the Clean Air Act and should correct its inaccurate fuel economy formula to allow for the use of midlevel ethanol blends. [EPA-HQ-OAR-2021-0208-0563-A2,pp.2-3]

THE SOLUTION

Fortunately, there is a readily available solution that both lowers costs and that actually works in the real world. That solution is to unleash the potential of low-carbon, high-octane fuels made with ethanol. While we respectfully submit that this should take the place of multipliers in the final rule, the two approaches are independent. Regardless of whether EPA changes or eliminates the multipliers in the final rule, it should implement the fuel-related fixes described below. [EPA-HQ-OAR-2021-0208-0563-A2, p.5]

The Potential of Octane. Internal combustion engines are "heat engines": the hotter the burned gas in the cylinder, the more useful "work" can be extracted from the fuel's chemical energy to move the piston. Thus, the hotter the gas, the greater the potential energy efficiency. Burnt gas gets hotter as the "compression ratio" of the engine increases, boosting efficiency and thereby reducing the carbondioxide emission rate. Unfortunately, one cannot increase the compression ratio indefinitely. When a piston travels up the cylinder, the increase in pressure also increases the heat of the fuel-air mixture. If the pressure increases too much and too fast, the flammable mixture ignites by itself—a phenomenon known as "knock." When an automobile engine knocks, the gasoline burns before the engine is ready to extract work from it and much of the energy is wasted, decreasing efficiency and increasing wear and tear on the engine. [EPA-HQ-OAR-2021-0208-0563-A2, p.5]

The key benefit of octane is that it has anti-knock properties. Thus, high-octane fuels can be compressed to a higher rate than low-octane fuels without spontaneously combusting. This makes octane "the single most important property of gasoline when determining engine design."10 Despite this, octane's potential to increase fuel efficiency and decrease carbon-dioxide emissions is largely untapped. For example, as EPA has previously explained, a change opening the door to high-octane fuels such as E30 (gasoline blended with 30% ethanol) would enable automakers "to raise compression ratios to improve vehicle efficiency as a step toward complying with . . . light-duty greenhouse gas and CAFE standards."11 [EPA-HQ-OAR-2021-0208-0563-A2, pp.5-6]

In previous rulemakings before EPA, auto industry commenters have repeatedly pointed out that higher octane fuel's anti-knock properties make it "a key enabler for the next phase of advanced engines expected to occupy a large fraction of the vehicle fleet."12 This is because the use of high-octane fuel blends would "immediately improv[e] fuel economy across a substantial portion of the existing light-duty vehicle fleet."13 This is also supported by a large body of empirical research.14 In particular, recent research by Professor Mueller at the University of Illinois at Chicago has shown that the greenhouse gas reductions available from midlevel ethanol blends approximately equals those that EPA believes could be achieved through electrification.15 [EPA-HQ-OAR-2021-0208-0563-A2,pp.6-7]

Ethanol is the Best Source of Octane. Widespread use of high-octane fuel will not be achieved without more ethanol. As the Urban Air Initiative has pointed out in previous comments before EPA, "[t]oday's premium gasoline costs substantially more to produce than regular gasoline or midlevel ethanol blends, and premium will only become more expensive as the need for octane increases and as refiners increase their reliance on domestic, low-octane, light tight oil. By contrast, ethanol is readily available."16 [EPA-HQ-OAR-2021-0208-0563-A2, p.7]

Our members are willing and able to supply the corn as soon as it is needed. In addition, refiners can produce high-octane midlevel ethanol blends at low cost.17 And, unlike electrification, the existing fueling infrastructure is capable of supplying mid-level blends to the market without substantial investment—for example, the law has required underground storage tanks have to be compatible with E100 since roughly 1993, and above-ground systems are trending strongly towards E25 compatibility as a result of the rapid phase-in of chip-reader pumps. [EPA-HQ-OAR-2021-0208-0563-A2, p.7]

In addition, ethanol is a low-carbon source of octane, and midlevel ethanol blends also have the added benefit of reducing particulate matter pollution from GDI engines.18 [EPA-HQ-OAR-2021-0208-0563-A2, pp.7-8]

The benefits of ethanol-based midlevel blends can be realized in the near- to mid-term and without significant cost or disruption. All that stands in the way are regulatory barriers, most of which can be removed in short order by EPA. [EPA-HQ-OAR-2021-0208-0563-A2, p.8]

THREE WAYS EPA MUST ACT NOW TO REMOVE REGULATORY BARRIERS TO MIDLEVEL ETHANOL BLENDS

While there are many regulatory barriers that improperly limit the adoption of midlevel ethanol blends, we believe that the following three are the most important and that EPA should not delay acting on these issues. [EPA-HQ-OAR-2021-0208-0563-A2, p.8]

EPA Should Require a Minimum Octane Standard. Fuels and internal combustion engines are a single system. Despite this, EPA has often not considered fuels when regulating vehicle emissions. What this has meant in practice is that automakers are still having to build engines compatible with the lowest octane fuels available nationwide.19 This includes not only regular fuel, but also even lower "suboctane" blends used in some high-altitude states. As EPA has noted, "[i]f the minimum octane level available in the market were higher (especially the current suboctane regular grade in the mountain states), vehicle manufacturers might not feel compelled to design vehicles suboptimally to accommodate such blends."20 [EPA-HQ-OAR-2021-0208-0563-A2,p.8]

Section 211(c)(1) of the Clean Air Act gives EPA broad authority to address this issue by "control[ing]" gasoline octane levels.21 [EPA-HQ-OAR-2021-0208-0563-A2, p.9]

The Administrator may . . . by regulation, control or prohibit the manufacture, introduction into commerce, offering for sale, or sale of any fuel or fuel additive for use in a motor vehicle, motor vehicle engine, or nonroad engine or nonroad vehicle if, in the judgment of the Administrator, any fuel or fuel additive or any emission product of such fuel or fuel additive causes, or contributes, to air pollution or water pollution (including any degradation in the quality of groundwater) that may reasonably be anticipated to endanger the public health or welfare.22 [EPA-HQ-OAR-2021-0208-0563-A2, p.9]

As explained above, low-octane gasoline impairs manufacturers' ability to further increase compression ratios to reduce carbon-dioxide emissions to meet its greenhouse gas standards. This easily satisfies the "endangerment" requirement. In addition, EPA may use its § 211(c) authority because the low-octane fuel currently sold also increases the carbon dioxide emissions from existing legacy vehicles. [EPA-HQ-OAR-2021-0208-0563-A2, p.9]

In the final rule, EPA should use this authority to phase out today's low-octane blends. Indeed, it would be arbitrary and capricious not to. Not addressing this issue here and now will result in higher emissions and greater costs, which in turn will harm both "public health" and "welfare" by increasing health risks associated with both traditional criteria pollutants and greenhouse gas emissions as well as by driving up new vehicle costs. If EPA does not act here, it should commit in its final rule to pursuing minimum octane standard through a separate rulemaking as soon as possible. [EPA-HQ-OAR-2021-0208-0563-A2, p.9]

EPA Should Correct Its Inaccurate Fuel Economy Formula to Allow for the Use of Midlevel Ethanol Blends. EPA should repeal and replace its outdated fuel economy formula. EPA has admitted that part of that formula is erroneous and that it unfairly penalizes fuel with ethanol in it; but, inexplicably, EPA has not yet fixed the problem. The problem is an important one for automakers that face increasingly stringent fuel economy standards, and it discourages them from developing high-efficiency engines that require higher octane ratings and higher ethanol content. [EPA-HQ-OAR-2021-0208-0563-A2, pp.9-10]

The fuel-economy calculation turns on the so-called "R-factor." This is intended to make fuel economy testing on today's fuel equivalent to fuel economy testing in 1975 by adjusting for the lower energy content of ethanol.23 The current R-factor of 0.6 required by EPA's rules is—as EPA itself has recognized—inaccurate.24 So far, however, the Agency has failed to act. [EPA-HQ-OAR-2021-0208-0563-A2, p.10]

More fundamentally, the current fuel economy formula is wrong because it does not account for how the addition of ethanol reduces petroleum consumption per gallon of fuel. Under the Energy Independence and Security Act of 2007, EPA has authority to promote energy independence by "decid[ing] on the quantity of other fuel that is equivalent to one gallon of gasoline."25 EPA has relied on that authority to calculate a fuel efficiency credit for electric vehicles.26 EPA should treat ethanol the same way. Thus, for example gasoline with 25% ethanol (E25) should be treated as being equivalent to 75% of a gallon of gasoline for purposes of fuel economy compliance. [EPA-HQ-OAR-2021-0208-0563-A2,p.10]

For a more detailed explanation of this point, we refer the agency to an addendum to comments made previously by the Urban Air Initiative.27 [EPA-HQ-OAR-2021-0208-0563-A2, pp.10-11]

As the nation transitions to a lower-carbon future, effective regulation of greenhouse gas emissions from light-duty vehicles requires looking at the realities of current technology and market demand. Internal-combustion engines still dominate the market and will do so for some time to come, and automakers are rapidly approaching the limits of what can be achieved with low-octane liquid fuels. They will not be able to achieve EPA's very aggressive proposed greenhouse gas emissions standards unless and until EPA uses its authority to remove regulatory barriers to high-octane, low carbon fuels made with ethanol. EPA therefore must use this rulemaking to address this issue. [EPA-HQ-OAR-2021-0208-0563-A2,p.12]

19 The availability of higher-octane premium and plus fuel grades does not change this. Automakers must design their vehicles for nationwide operation over their useful life, which has meant that they have to take into account that consumers will often fuel even premium-recommended and premium-required vehicles with lower-octane regular gasoline.

24 The error of the current R-factor, and its negative impact on ethanol due to that fuel's lower energy density, is explained in detail in comments filed by Boyden Gray & Associates. Energy Future Coalition & Urban Air Initiative, Comments on Proposed Tier 3 Rule, EPA-HQ-OAR-2011-0135-4353 (July 1, 2013), at 41-43 & Appendix I, available at http://boydengrayassociates.com/comments-of-theenergy-future-coalition-and-urban-air-initiative-on-proposed-tier-3-motor-vehicle-emission-and-fuelstandards-july-1-2013/.

Commenter: International Union, United Automobile, Aerospace & Agricultural Implement Workers of America (UAW)

We also encourage EPA to further explore alternative fuel sources such as biofuels. We have engaged with a wide variety of stakeholders with the hopes that a consensus can be reached to ensure we have standards that both reduce emissions and set the conditions for the industry to thrive in the United States. [EPA-HQ-OAR-2021-0208-0749-A1, p. 2]

Commenter: Kansas Corn Growers Association

Unfortunately, the Environmental Protection Agency (EPA) missed a vital opportunity to address climate change in the short-term while supporting American farmers and providing American consumers with a cleaner burning, more cost-effective fuel. High octane fuel containing mid-level ethanol blends can be made available today with existing infrastructure and technology, unlike alternative fuel sources such as electricity. The Biden Administration has prioritized battling climate change, protecting public health and ensuring minorities are not overlooked. If the Administration is in fact serious about these priorities, then your agency has missed a golden opportunity in leaving out octane and biofuels from this proposed rule. [EPA-HQ-OAR-2021-0208-0220-A1, p. 1]

EPA Should Mandate a Minimum Octane Standard Pursuant to Its Fuel Regulation Authority

Current low-octane blends of fuel should be phased out as new vehicles are available to take advantage of the efficiency of mid-level ethanol blends. EPA has acknowledged that CAA § 211(c) gives it authority to “control” gasoline octane levels. EPA can set a minimum octane level under the above section of the Clean Air Act because low-octane fuels impair the ability of automakers to meet GHG standards, and also increase C02 emissions. To maximize GHG reductions, if octane levels are not addressed in this rule, we implore you to move quickly to begin a separate rulemaking on this important issue. [EPA-HQ-OAR-2021-0208-0220-A1, p. 1]

EPA Should Correct Its Inaccurate Fuel Economy Formula to Allow the Use of Mid-Level Ethanol Blends

EPA should repeal and replace its outdated fuel economy formula that is erroneous and unfairly penalizes fuel with ethanol in it. EPA has previously admitted these errors but has not taken action to fix the problem. EPA has also previously admitted that the R-Factor of 0.6 is outdated and the auto industry and other groups have suggested an adjusted R-Factor of 1.0. But again, the EPA has failed to address this issue in the rule. [EPA-HQ-OAR-2021-0208-0220-A1, p. 1]

EPA Should Reinstate the 0.15 F-Factor for Flex Fuel Vehicles (FFVs)

FFVs using E85 significantly reduce lifecycle carbon emissions because much of the carbon emitted was regenerated from the atmosphere through the production of the feedstock crop (i.e. corn). This conversion factor allows automakers to utilize this credit while adjusting for E85 utilized in FFVs as to not overestimate carbon reductions. Until 2015, EPA allowed automakers to use the 0.15 conversion to improve GHG compliance. Without certainty in this credit, automakers have produced fewer FFVs, which reduces the potential GHG savings from FFVs. If the F-factor level is not addressed in this rule, we implore you to move quickly to begin a separate rulemaking on this important issue.

In closing, high octane mid-level ethanol blends would enable more efficient engines; reduce vehicle and fuel costs for consumers; and reduce conventional pollution. More importantly, these fuel blends are available now. Feedstocks such as corn are abundantly available with no increased land use, and corn production can supply all needed the ethanol for many years without any land use changes. The nation’s current fueling infrastructure can supply these mid-level blends without substantial investment, something that cannot be said about alternative fuel sources such as electricity. The increased availability mid-level ethanol blends will not only boost the rural economy, but it will also provide American consumers of all income levels a cost-effective tool to fight climate change here and now. Thank you for your time and consideration in this important matter to rural America. [EPA-HQ-OAR-2021-0208-0220-A1, p. 2]

Commenter: Minnesota Corn Growers Association (MCGA)

As stated in the proposed rule, the transportation sector is the largest source of U.S. GHG emissions, representing 29 percent of total U.S. emissions. Within the sector, light-duty vehicles are the largest contributor, comprising 17 percent of U.S. GHG emissions. Immediate progress toward decarbonizing the light duty fleet will help meet the Administration's goal of cutting emissions by 2030 and reaching net zero emissions by 2050. [EPA-HQ-OAR-2021-0208-0530-A1, p. 3]

As EPA explains in the proposal, the difference between the stringency of the SAFE rule and the revised vehicle standards proposal is due to the greater weight the Administrator puts on emissions reductions and resulting health and welfare benefits than other factors. EPA relied on similar analysis for the proposal as the agency used to develop the SAFE rule and describes the results as in agreement with prior analysis. However, despite similar analysis and results as used for the SAFE rule, the agency is changing its position from the SAFE rule because it is "more appropriate" to put greater weight on the benefit of reducing emissions, in light of the purposes of the Clean Air Act.2 Under the Clean Air Act, EPA has an obligation to protect the health and welfare of Americans. While EPA projects this proposal to increase the stringency of vehicle emissions standards for model year (MY) 2023-2026 vehicles will result in 2.2 billion tons of avoided GHG emission by 2050, EPA leaves significant GHG emission reductions on the table if the agency fails to take steps in this proposal, or in a parallel action, to also improve fuel along with vehicles. [EPA-HQ-OAR-2021-0208-0530-A1, p. 3]

We encourage EPA to focus on outcomes and opening pathways for all low carbon fuels and technologies that enable stricter standards. Allowing all solutions ensures we take advantage of not only the low carbon benefits of higher ethanol blends, but also the cuts in toxic emissions, greater fuel efficiency and consumer cost savings that come with more renewable fuel use in transportation fuel. [EPA-HQ-OAR-2021-0208-0530-A1, p. 1]

EPA missed an opportunity in this proposal to broaden the solutions that reduce transportation emissions by beginning a transition to low carbon, high octane fuels to advance climate, air quality and environmental justice goals with these and future standards. In addition, alternative fuel vehicles such as flex-fuel vehicles, which have the potential to reach zero emissions, should be equitably incentivized through vehicles standards rules. For automakers to use new technologies and enhanced engines to meet stringent standards, they need updated fuel that enables new vehicles and fuels to work as a system to enhance GHG reductions. Higher ethanol blends used with advanced engines optimized for higher octane would provide a muchneeded pathway for automakers to meet higher standards for GHG emissions and fuel economy. [EPA-HQ-OAR-2021-0208-0530-A1, p. 2]

In addition to making improvements in this proposal, we urge EPA to use the rulemaking for MY 2027 and later to open pathways to achieve more emissions reductions from sustainable, affordable low carbon ethanol through a clean, high octane standard, removing barriers to higher ethanol blends and equitably incentivizing all alternative fuel vehicles on track to reach net-zero emissions. [EPA-HQ-OAR-2021-0208-0530-A1, p. 2]

Achieving those decarbonization goals in transportation will require a mix of solutions. As recent analysis from the Rhodium Group concludes, a "portfolio of strategies is the lowest cost and most likely to succeed," including low carbon liquid fuels such as biofuels.1 [EPA-HQ-OAR-2021-0208-0530-A1, p. 3]

If the agency is truly putting greater weight on "the magnitude and benefits of reducing emissions that endanger public health and welfare" in the proposal, EPA missed a significant opportunity to include complementary fuel improvements that would enable greater GHG reductions, greater fuel efficiency and more substantial air quality improvements from further reduction of non-GHG emissions than the proposal offers.3 [EPA-HQ-OAR-2021-0208-0530-A1, p. 3]

EPA estimates that "the vast majority of vehicles produced in the time frame of the proposed standards," will be powered by liquid fuels.4 In fact, EPA projects that just eight percent of the vehicle market share by MY 2026 will be plug-in hybrid electric vehicles (PHEVs) or all-electric vehicles (EVs), meaning the vehicles in the remaining 92 percent of the market share will require liquid fuel. The proposed standards do not rely on "dramatically increased penetration of electric vehicles into the fleet during the 2023-2026 model years."5 Instead, EPA's assessment of the technology feasibility of the proposal relies on advances in engine and transmission technologies that have entered the fleet in the past 10 years and expanded use of those already in place in today's vehicles. [EPA-HQ-OAR-2021-0208-0530-A1, p. 3]

Describing use of these new technologies, EPA notes that as of MY 2020, more than half of light-duty gasoline spark ignition engines now use direct injection (GDI) engines and more than a third are turbocharged. 6 However, further advancements from these and additional engine technologies such as higher compression ratios and greater downsizing are limited by current fuel formulations in the marketplace. Improving the fuel will enable greater GHG emissions reductions from the advanced engine technologies EPA is relying on to make these proposed standards feasible. Recognizing vehicles and fuels as a complete system, increasing the octane rating of the nation's fuel supply through a clean, high octane standard would deliver greater GHG emission reductions in the 92 percent of the vehicle market share EPA projects will be powered by liquid fuel in MY 2026 and during the 15 to 20 years those vehicles remain on the road after introduction. [EPA-HQ-OAR-2021-0208-0530-A1, p. 4]

A CLEAN HIGH OCTANE STANDARD

MCGA and NCGA support EPA establishing a pathway to a higher minimum clean octane standard for fuel of at least 98 RON that enables mid-level ethanol blends to immediately and cost-effectively reduce both GHG and tailpipe emissions, supporting greater fuel efficiency and bringing lower carbon and lower cost fuels to the market.

Even with advancements in engine technology, manufacturers are nearing a point where further improvements will be difficult without a higher-octane fuel. This is because advanced downsized, down sped engines, and their associated technologies, make an engine more susceptible to knock. Because of its knock-limiting properties, a higher-octane fuel, such as a midlevel ethanol blend, enables engine designs featuring higher compression ratios, turbocharging, and down speeding and increases overall engine performance and efficiency.7 According to Department of Energy (DOE) researchers at Oak Ridge National Laboratory, "the opportunity for further downsizing and down speeding of engines to improve fuel economy is limited by the available octane rating of fuels…[which] allow higher efficiency designs of naturally aspirated and turbocharged engines dedicated to use the high octane fuel."8 Since 2016, DOE has completed extensive research through its Co-Optimization of Fuels and Engines initiative (Co-Optima) on innovating fuels and engines together and understanding the types of fuels that can improve engine performance and efficiency to reduce emissions, with alcohol fuels like ethanol identified as top contenders. 9

Numerous engine testing experiments—on different engines and vehicles, under varying test conditions, and using a spectrum of ethanol blends—have produced what's now quite a large body of evidence demonstrating ethanol's ability to increase engine efficiency and efficacy while lowering emissions.10,11,12 In 2016, DOE researchers reviewed other recent engine testing efforts to quantify the potential of E25 to E40 fuel in their Summary of High-Octane Mid-Level Ethanol Blends Study. 13 In summarizing the studies on octane, midlevel ethanol blends used in dedicated high-octane vehicles achieved efficiency gains of 5 to 10 percent, more than overcoming any energy density differences with E10.

As DOE explained in its GHG analysis of high octane fuel, determining GHG impacts of high octane fuel relative to current gasoline requires accounting for vehicle efficiency gains, refinery operation changes and GHG emissions changes from ethanol blending. DOE's results show the largest impacts on wells to wheels (WTW) emissions from high octane fuel come from efficiency gains and the level of ethanol blending.

• DOE's modeling compared 100 RON E25 and E40 fuels to baseline E10. When used in HOF vehicles, the E25 reduced WTW GHG emissions by a total of 8 to 9 percent (or 36-40 g CO_2e/mile driven) compared to baseline E10. The vehicle efficiency gains from HOF reduced GHG emissions by 4 percentage points of that total, and the additional 4 percentage points of GHG reductions with the E25 fuel were realized from ethanol offsetting petroleum. For the E40 HOF, the ethanol content provides a 9 percent reduction in WTW GHG emissions.14

Current fuels with higher octane, such as E10 blends marketed as premium grades, are not cost-effective for consumers, fall short of enabling the efficiency and emissions technology changes automakers need and fail to advance transportation decarbonization. Because ethanol results in nearly half the emissions of gasoline and is on a pathway to future net-zero emissions, producing higher-octane fuel with a midlevel ethanol blend would do more to reduce GHG emissions and support the stringency goals of the proposed rule. Optimized vehicles powered by low carbon, high octane fuel made from a midlevel ethanol blend after model year 2023 would have much lower GHG emissions than vehicles running on either current E10 blends or premium E10 blends.

A clean, low carbon, high octane fuel standard avoids increasing the use of fossil-based octane sources, which produce more carbon emissions, erasing the GHG reduction benefits from gains in engine efficiencies while releasing more toxic emissions from harmful hydrocarbon aromatics, degrading air quality and respiratory health. Due to ethanol's high octane rating, a low carbon, high octane ethanol blend results in both additional fuel efficiency and significant GHG reductions. Higher ethanol content, reached by removing regulatory barriers to higher blends, would boost GHG reductions and replace harmful aromatics, providing a cost-effective low carbon fuel solution for consumers, including low income consumers, and the environment. [EPA-HQ-OAR-2021-0208-0530-A1, p. 4-5]

LOW CARBON ETHANOL: MOVING TO NET ZERO

EPA estimates the proposal will avoid 2.2 billion tons of GHG emissions by 2050. Compared to the proposal, the Renewable Fuel Standard (RFS) has already resulted in nearly 1 billion metric tons of cumulative GHG savings from 2008-2020, exceeding projections largely due to the reduced carbon intensity of corn ethanol.15 The RFS has already delivered half the emissions reductions in 13 years that EPA projects the vehicles rule will take nearly 30 years to deliver, highlighting the importance of using biofuels like ethanol to enhance the GHG emissions reductions from transportation with the right policies.

The most recent assessment from the Department of Energy's Argonne National Laboratory concludes corn ethanol's carbon intensity decreased 23 percent from 2005 to 2019 due to increased corn yield, reduced fertilizer intensity and improved ethanol production efficiency, with corn ethanol now between 44 and 52 percent lower in carbon intensity (CI) than the gasoline it replaces.16 Argonne's conclusions are similar to analysis from Environmental Health and Engineering finding ethanol now results in 46 percent fewer GHG emissions compared to gasoline, due to improved corn production, ethanol production efficiencies and land productivity.17

Corn-based ethanol can reach net zero emissions with continued on-farm improvements and soil carbon sequestration, along with carbon capture technology and new efficiencies in ethanol production. Corn farmers are proud of our leadership in adopting conservation and best management practices. NCGA's recently released Corn Sustainability Report details corn farmers' history of improvements and our commitment to further sustainability achievements by 2030

Sustainable production means corn farmers today are producing more corn using less land and fewer resources. For example, planted corn acres in 2020, at 90.8 million acres, were less than planted acres in 2007, the year the RFS was expanded, at 93.5 million acres. USDA data also shows the area planted to principal crops in the United States is not expanding overall. Corn production has increased primarily because crop yields have increased from an average of 150 bushels per acre in 2007 to 172 bushels in 2020. With the average yield in 1980 at just 91 bushels per acre, productivity growth is a long-term trend.

Using the expertise of Argonne's scientists and the U.S. Department of Agriculture's data, we believe Argonne's Greenhouse Gases, Regulated Emissions, and Energy Use in Transportation (GREET) model is the federal government's most accurate tool for evaluating biofuel and energy lifecycle emissions. Because GREET is regularly updated, this model captures GHG emissions reductions from farmers' improved production practices and will incorporate the ongoing, voluntary climate-smart improvements in agriculture production this Administration supports, ensuring further carbon intensity reductions are accounted for in the LCA.

Corn production has improved across all measures of resource efficiency, including higher crop yields per acre, resulting in greater corn production using less land and fewer inputs, further fortifying ethanol as a sustainable, low-carbon renewable fuel. This progress is reflected in Argonne's most recent analysis, which builds on and is consistent with other recent reviews.

For example, a 2018 USDA study shows that ethanol then resulted in 39 to 43 percent fewer GHG emissions than gasoline.18 Building on this progress, additional improvements on farms and in ethanol production supported by expanding markets for low carbon fuels could result in ethanol with up to 70 percent fewer GHG emissions than gasoline, according to USDA's analysis. Furthermore, according to California Air Resources Board (CARB) data, the CI of ethanol under the state's Low Carbon Fuel Standard (LCFS) is more than 35 percent lower today than it was in 2011 and more than 40 percent lower than the CI of gasoline.19

These increasing benefits have occurred without accounting for corn's ability to sequester carbon in the soil. Corn as a crop can serve as a carbon sink. As a photo-synthetically superior C4 plant, corn has an extraordinary ability to sequester carbon and move fertilizer nutrients back to the surface for plant growth rather than polluting ground water. Corn's extensive, deep root system makes it one of the few plants with this important capability to make crop production sustainable.

High-yield corn—combined with the steady adoption of best practices such as reductions in tillage intensity—is sequestering carbon from the atmosphere into the soil. This sequestration is increasing soil carbon levels and reducing atmospheric CO2. According to the Journal of Soil and Water Conservation, the potential to sequester atmospheric carbon in soil is greatest on lands currently used for annual crops; most remarkably, there is potential to sequester carbon in the soil at an annual growth rate of 0.4 percent each year. 20 The results of tracking soil organic carbon (SOC) advancements on select USDA-specified agricultural land areas is estimated to have sequestered an estimated 309 metric tons of CO2- equivalent in less than a decade.21

Although GHG lifecycle models do not currently account for this direct GHG reduction from corn production, NCGA believes the effect of corn crops on soil carbon sequestration, among other considerations, should be incorporated into current lifecycle analysis. This increase in soil carbon from corn production, when included, could result in a 20 gram/MJ carbon credit for corn-based ethanol.22

Fully accounting for corn's carbon sequestration would further demonstrate significant low-carbon advantages of a high-octane midlevel ethanol blend. [EPA-HQ-OAR-2021-0208-0530-A1, p. 6-8]

CRITERIA POLLUTANTS AND AIR TOXICS

Bringing high octane fuel to market in the form of midlevel ethanol blends will be significantly less capital-intensive than attempting to increase blendstock octane with hydrocarbon components at refineries. It will also be incredibly cleaner. The avoided production cost and offset emissions lower end-costs to consumers, reducing both economic costs and social costs related to health and environment, key considerations in advancing environmental justice and avoiding adverse impacts from oil refineries on communities that have historically borne them.

Increased volumes of ethanol in fuel displace the most harmful compounds from gasoline.23 These aromatic hydrocarbon additives (i.e. benzene, toluene, ethylbenzene, xylene – or BTEX) have high cancer-causing potential. Increasing the ethanol volume in fuel to a midlevel blend has a positive impact on tailpipe emissions of toxins, including significant reductions in particulates and carbon monoxide. These same aromatic hydrocarbons are also precursors to the formation of secondary organic aerosols (SOA), which in turn are a major contributor to particulate matter emissions (PM 2.5).

According to EPA's review for the 2020 Anti-backsliding Study, ethanol does not form SOA directly or affect SOA formation. However, as EPA states, toluene is a large contributor to SOA. Ethanol's high octane value "greatly reduces the need for other high-octane components including aromatics such as toluene."24

As explained in EPA's Fuel Trends Report: Gasoline 2006-2016, "Ethanol's high octane value has also allowed refiners to significantly reduce the aromatic content of the gasoline, a trend borne out in the data." EPA's data shows that aromatics' share of gasoline volume dropped from nearly 25 percent to 19.3 percent, and benzene volume dropped from 0.99 percent to 0.58 percent between 2000 and 2016, the same time as ethanol blending increased from 1 percent to at least 10 percent.

EPA's data demonstrates the air quality and human health benefits of increased ethanol blending in gasoline by replacing harmful aromatics with clean octane from ethanol. Limiting the aromatics content of gasoline and using higher ethanol blends in high octane fuel would further reduce risks from SOA formation and exposure to PM 2.5, which causes serious respiratory, cardiovascular, and other health harm, including premature death, according to the American Lung Association. The same GDI engine advancements that help lower GHG emissions have the unfortunate side effect of increasing particulate emissions, which could be reduced by use of midlevel ethanol blends. [EPA-HQ-OAR-2021-0208-0530-A1, p. 8]

Petroleum-based aerosol particles represent a significant source of pollution, especially in population-dense urban areas. Health issues related to PM and other emission-based pollutants can be reduced by lowering the volume of petroleum in the domestic gasoline pool, which can be accomplished by increasing octane with higher ethanol blends and replacing more hydrocarbon aromatics with ethanol.

In the proposed rule, EPA states that based on the predicted emissions changes from the proposed standards, very small changes in ambient air quality are expected.25 EPA could greatly increase the air quality, health, and environmental justice benefits of the proposal by cleaning up the fuel going into the 92 percent vehicles by MY 2026 expected to use liquid fuels. We urge EPA to take immediate steps toward setting a clean, high octane fuel standard that blends more ethanol to replace aromatics to expand the health and environmental justice benefits of this proposal, as well as set caps or limits on air toxics in future rulemakings. [EPA-HQ-OAR-2021-0208-0530-A1, p. 9]

TRANSPORTATION COSTS

In addition to failing to decarbonize liquid fuel, simply transitioning current premium fuel to the new “regular fuel” as a higher octane E10 blend, such as a 95 RON E10, would be significantly more expensive to consumers than current regular E10 fuel.

However, a higher RON level met through increased ethanol blending, would reduce fuel costs compared to higher RON fuels with less ethanol content. Incremental refining costs to produce a 98 RON E20 or E30 fuel could be between $0.02-$0.05 per gallon, respectively, based on one analysis. Incremental refining costs are estimated to be nearly $0.20 per gallon to produce a 98 RON fuel using 10 percent ethanol.26 Because of the availability and effectiveness of ethanol as an octane enhancer, a midlevel blend 98 RON fuel is cleaner and more cost-effective.

Analysis presented to Ag-Auto-Ethanol Work Group by the Defour Group compares the economics of a 95 RON E10 fuel and a 98 RON E25 fuel.27 This analysis builds on Hirshfeld, et al.’s use of a linear programming model to estimate the refining economics of increasing fuel octane ratings and ethanol content. This additional analysis shows that the presence of a 98 RON high-octane midlevel blend in the market, along with a 95 RON E10 fuel, would change the economics of high-octane fuel and fuel pricing.

When additional ethanol is blended to reach 98 RON, it allows for a lower-octane base gasoline blendstock, which costs less to produce at the refinery and avoids refinery GHG emissions. Coupled with the low cost of ethanol added to raise octane, the finished high-octane midlevel blend is less expensive. This updated analysis concludes that a 98 RON E25 fuel would be cost comparative with the current regular fuel, accounting for a transition with both 95 RON and 98 RON fuels in the market.

Using more ethanol enables a larger increase in fuel octane, allowing for greater efficiency improvements, at a lower cost. When more refining is needed to increase fuel octane, as with current premium E10 blends, the cost will be greater. An E25 blend would support additional octane at a lower price than current premium fuel. Drivers of future model year vehicles optimized to use a higher RON fuel would not pay more for fuel over the lifetime of the vehicle with low carbon, high octane midlevel ethanol blend fuel. [EPA-HQ-OAR-2021-0208-0530-A1, p. 9-10]

NCGA believes EPA should take the following actions to support the production and use of low carbon, high octane fuel, consistent with Title II of the Clean Air Act, in conjunction with setting vehicle standards:

Implement a pathway to a minimum fuel octane level of 98 RON, phasing out lower octane fuels as new optimized vehicles enter the market.

NCGA believes EPA has ample authority to regulate fuel octane because of the impact higher fuel octane would have on reducing GHG emissions from the vehicle fleet. EPA has previously acknowledged the agency has authority to regulate fuel octane under Section 211(c). [EPA-HQ-OAR-2021-0208-0530-A1, p. 10]

Higher octane fuel, with ethanol as a clean octane source, would result in a cost-effective fuel that offers automakers an additional technologically and economically feasible means to meet more stringent emissions standards. Additionally, high-octane fuel would enable vehicle technologies that result in more GHG emissions reductions and enable greater reductions from this proposal from the new vehicles EPA expects to be sold in coming years. When automakers have the option of higher-octane fuel, the total vehicle ownership cost to consumers is less than without higher octane fuel. A higher RON level, met through greater ethanol blending, would reduce fuel costs. As discussed previously in our comments, the higher ethanol content of the midlevel blend 98 -100 RON fuel makes it much more cost effective than current E10 premium fuel. A cleaner, high-octane midlevel blend would be costcompetitive with current regular fuel.

Finally, a higher RON level met through greater ethanol blending would reduce GHG emissions. At the refinery level, production of a 98 RON E20 fuel reduces refinery CO2 emissions by nearly 5 percent, and a 98 RON E30 blend would reduce refinery emissions by more than 10 percent. Conversely, even a 95 RON E10 would result in a small increase in refinery emissions.28 On a WTW basis, based on the previously discussed DOE analysis, the greater vehicle efficiency enabled by a higher RON fuel accounts for about half of the GHG emissions reductions with a 5 percent efficiency gain, and the percentage of the ethanol blend determines the additional GHG reduction from the high octane fuel. 29

Approve a high-octane, midlevel ethanol blend vehicle certification fuel (98-100 RON, E25-E30).

EPA’s timely approval of a high-octane, midlevel ethanol blend vehicle certification fuel would enable automakers to expedite design and testing of optimized vehicles for use with this new low carbon fuel. We believe EPA should propose or invite automakers to propose submission of this certification fuel in conjunction with this or future rulemakings. [EPA-HQ-OAR-2021-0208-0530-A1, p. 10-11]

Correct the fuel economy formula by updating the R-Factor to 1.0 to reflect documented operation of modern engine technology.

Correcting the R-Factor in the fuel economy formula would support automakers developing high efficiency engines that require higher octane ratings and a higher ethanol content. EPA has acknowledged that the current EPA-mandated R-Factor of 0.6, originally established in the 1980s, is outdated and fails to achieve the statutory purpose of making fuel economy testing on today's fuel equivalent to fuel economy testing in 1975.

An update to 1 from 0.6 would reflect results of analysis by the Department of Energy and EPA using modern engines and fulfill previous observations and commitments from EPA to address this issue. Published studies have shown that R for modern vehicles should be around 0.93 to 0.96.30 As NCGA explained in 2020 comments on EPA's proposed rule on vehicle test procedure adjustments in Docket EPA–HQ–OAR–2020-0104, an R-factor of 1.0 in the fuel economy formula would support a lowercarbon fuel policy, providing automakers with greater options for choice and innovation in meeting more stringent GHG standards through vehicle technologies and lower carbon fuels. Without this overdue correction, use of lower carbon fuels will continue to be unjustifiably penalized in the fuel economy formula.

Setting the R-factor to 1.0 sets fuel economy results on an energy basis. In application, the R factor equation is a "fuel response factor," adjusting for more than just energy density. An R of 1.0 essentially converts fuel economy to mile per gallon gasoline equivalent (MPGge), which is how other alternative fuels such as propane, natural gas, and electricity have been compared to their gasoline counterparts for decades. Setting R to 1.0 provides equitable treatment to renewable ethanol that other alternative fuels already receive. This change could help speed the transition to certification with Tier 3 fuel as well as encourage vehicle manufacturers to seek certification for even higher ethanol blends, such as E15 or the high octane E30 EPA suggested in its Tier 3 proposal several years ago. Manufacturers are not incentivized to build dedicated high-octane vehicles that reduce GHG emissions when those low carbon benefits are penalized by a low R factor. [EPA-HQ-OAR-2021-0208-0530-A1, p. 11]

Lower summer vapor pressure to 9 psi or less for all fuel or provide parity in Reid Vapor Pressure (RVP) treatment for all ethanol blends with E10.

Higher ethanol blends such as E15 offer an immediate decarbonization opportunity and support a transition to low carbon, high octane fuel. However, outdated RVP rules and the oil industry's refusal to produce lower volatility blendstock prevents E15 – which is lower in evaporative, tailpipe and GHG emissions – from reaching the market on the same terms as standard E10 fuel. Addressing these outdated rules would allow lower-volatility and lower-emissions E15 full market access and support EPA's efforts to reduce emissions across the board, and it is unfortunate the oil industry took EPA to court to block the agency's 2019 action aimed at updating unnecessary fuel restrictions in order to keep cleaner E15 out of the marketplace and limit consumer choice. [EPA-HQ-OAR-2021-0208-0530-A1, p. 11-12]

By using existing authority in the Clean Air Act to require lower volatility conventional gasoline blendstock during the summer months to reduce emissions of volatile organic compounds and decrease the potential for ozone formation, EPA would simultaneously open the market to E15 year-round. NCGA urges EPA to take this action to improve air quality while simultaneously eliminating outdated barriers to cleaner, low carbon higher ethanol blends like E15 and future high octane fuel. [EPA-HQ-OAR-2021-0208-0530-A1, p. 12]

FLEX FUEL VEHICLES and CREDITING

Beyond ethanol’s utility in all gasoline engines to reduce GHG emissions, other alternative vehicle technologies can also harness the GHG reductions and air quality benefits of ethanol, such as Flex Fuel Vehicles (FFVs). FFVs utilizing higher blends of low carbon ethanol, such as E85, can provide immediate emissions reductions without tangibly altering the price of the vehicle and reducing fuel costs. In fact, E85 is typically sold at a lower price than gasoline, translating to monetary savings in addition to the significant air pollution savings.

Compared to gasoline, E85 leads to significant reductions in NOx and GHG emissions. E85 avoids use of toxic hydrocarbon aromatics in gasoline that are precursors to secondary organic aerosols that result in harmful fine particulate matter emissions that cause serious respiratory, cardiovascular, and other health harm, including premature death, according to the American Lung Association. [EPA-HQ-OAR-2021-0208-0530-A1, p. 12]

Incentivized to reduce emissions through the state’s Low Carbon Fuel Standard (LCFS), in California some FFVs are even powered by a blend of 15 percent renewable naphtha with 85 percent ethanol. These vehicles use zero fossil fuels, have improved air emissions profiles, and have an extremely low carbon intensity. As such, NCGA has recently advocated to CARB to go a step further to decrease emissions in its most recent Advanced Clean Cars and Scoping Plan proposals by requiring that all PHEVs MY 2026 and later up be a FFV.

Just as we recommended to CARB, EPA also should not constrain its vision of a zero-emission vehicle and a zero-emissions future based on today’s vehicle limitations, but rather remain focused on setting technology and feedstock neutral standards and allowing markets to innovate and respond. California’s LCFS has resulted in a reduction in ethanol CI in the state, as well as increased demand for low carbon fuel like E85 and FFVs, as low carbon ethanol has helped the state meet ambitious GHG emission reduction goals. [EPA-HQ-OAR-2021-0208-0530-A1, p. 12-13]

Despite the GHG and criteria pollution reduction benefits of FFVs, as well as the low cost to purchase and fuel these vehicles, automakers have cut back on FFV models and now offer very few choices to consumers. Well-structured vehicle credit programs remain an impactful, cost-effective means for the government to encourage the introduction and adoption of new products and technologies. However, NCGA is concerned that reinstating a credit multiplier for EVs, as the proposal would do, further incentivizes selected types of low emissions vehicles but not others. With this proposal, EPA picks technology winners and losers. To encourage introduction of a wider range of low emission vehicle choices, NCGA believes EPA must provide equitable crediting across the spectrum of low emission vehicles, including FFVs. [EPA-HQ-OAR-2021-0208-0530-A1, p. 13]

NCGA also urges EPA to take steps to update the F-factor in the fuel economy formula to a forward looking F-factor of at least 0.2, as we outlined in 2020 comments in response to Docket EPA–HQ–OAR–2020-0104. Furthermore, we urge EPA to reinstate the 0.15 volumetric conversion factor for FFVs. EPA should reharmonize the 0.15 factor for FFVs in these standards, and, if not, in future standards. This change would accurately reflect the significant carbon emissions reductions from FFVs using E85 because the carbon emissions from the fuel are the release of carbon taken up through crop growth. [EPA-HQ-OAR-2021-0208-0530-A1, p. 13]

Conversely, EPA could also level the playing field for vehicle technology by similarly treating the ethanol portion of fuel as carbon neutral, supporting greater use of low carbon renewable fuels. The carbon emitted from ethanol use is the same carbon the corn plant absorbed from the atmosphere, resulting in no net carbon. [EPA-HQ-OAR-2021-0208-0530-A1, p. 14]

Commenter: Minnesota Farmers Union (MFU)

Urge your agency to support moving toward mid-level ethanol blends. This is a priority for our members not only because it will provide significant benefit to Minnesota’s rural economy, but also because it will immediately curb greenhouse gas emissions, improving our environment and contributing to the fight against climate change. [EPA-HQ-OAR-2021-0208-0534-A1, p.1]

We see biofuels—and moving toward high-octane mid-level ethanol blends—as a near-term, cost-effective step we can take to lower the carbon intensity of our transportation fleet. We echo National Farmers Union (NFU) in requesting that you prioritize moving toward mid-level ethanol blends, including by requiring specific octane levels under the Clean Air Act; easing the ability to use mid-level ethanol blends as a certification fuel; ensuring the appropriate R-factor for increased ethanol volumes; and working with the industry to resolve Reid Vapor Pressure (RVP) restrictions, allowing the year-round use of higher ethanol blends. We also strongly support establishing polices that promote the manufacture and sale of Flex Fuel Vehicles (FFVs), including by restoring incentives. [EPA-HQ-OAR-2021-0208-0534-A1, p.1]

Commenter: Modlin, R.R. and Detchon, B. Reid

As discussed below, and then presented in carefully annotated detail, we believe EPA missed an opportunity to consider the benefits of high-octane, low-carbon fuels to contribute to the objectives of the Proposed Rule. Such fuels could deliver average annualized benefits comparable to that claimed for the Proposed Rule and could achieve them sooner. As you prepare the Final Rule, we urge you to consider that potential and to seek input from stakeholders beyond the walls of EPA as to how an improved fuel can be adopted by the market. This consideration should be seen as a companion to the electrification of the transportation sector by application of feasible, available, and affordable technological solutions to climate and health challenges.

The Proposed Rule targets reducing emissions of greenhouse gases (GHGs) from new vehicles. However, we observe that EPA has missed a substantial opportunity to reduce GHG emissions from vehicles now on the road. To achieve early wins in the climate challenge by deploying effective, available, and affordable technology packages, EPA should also consider improving the fuel used by over 250 million existing vehicles. An analysis of the potential effectiveness of an improved fuel used in internal combustion engine (ICE) vehicles now and into the next few decades shows that adoption of an improved fuel could possibly double the CO2 reductions claimed by the Proposed Rule. (See analysis conducted by Steffen Mueller, University of Illinois at Chicago, to be reported by B. West, “Benefits of Ethanol Blending and Impact on Emissions and Emissions Control,” at SAE Powertrains, Fuels and Lubricants Summit, October 2021.) This observation alone should cause EPA to give very serious consideration into how an improved fuel can be adopted and deployed. An improved fuel would also bring along substantial further benefits.

We note the comment in the Proposed Rule that “in addition to substantially reducing GHG emissions, a longer-term rulemaking could also address criteria pollutant and air toxics emissions from the new light-duty vehicle fleet – especially important considerations during the transition to zero-emission vehicles.” Most vehicles entering the market today use gasoline direct injection (GDI) to enhance performance. DOE studies have identified a notable increase in ultrafine particle emissions from GDI engines. The increased number of particles and their size include emissions of toxic polycyclic aromatic hydrocarbons (PAHs).

For mobile source air toxics, such as PAHs derived from gasoline emissions, the Clean Air Act requires “the greatest degree of emission reduction achievable through the application of technology which will be available.” In that context, just as with greenhouse gas emissions, vehicles and fuels must be seen as parts of an integrated system. The Department of Energy clearly understands the need for such an approach. Since 2016, the Co-Optimization of Fuels & Engines initiative (known as Co-Optima) has explored how simultaneous innovations in fuels and engines can boost fuel economy and vehicle performance, while reducing emissions. The Co-Optima team views fuels “not as standalone elements in the transportation system, but as dynamic design variables that can work with modern engines to optimize and revolutionize the entire on-road fleet.” Their work will be useful as EPA considers the adoption of improved fuels in current and future rulemakings.

Because of the long lead time for capital planning in both the automobile and fuels industries, it is vital for EPA to send a signal of its intent as part of the current rulemaking. By encouraging the entry and adoption of higher-level biofuel blends in the market to reduce carbon emissions now, you will begin to see the benefits immediately – in terms of greenhouse gas emissions, air quality, and public health – a critical consideration in light of the Administration’s goal of reducing U.S. greenhouse gas emissions by at least 50% by 2030.

As explained in detail below, widespread adoption of improved fuels can complement the pathway to an electric vehicle future. With a period of 30 years needed to achieve that transition, and with emissions today causing premature deaths and stunting child development in the very cities that are the focus of the environmental justice movement, this is an approach that EPA should seize and embrace. It does not require new legislation – EPA has all the authority it needs to act and the subject Proposed Rule provides a convenient vehicle. Action, or inaction, now will affect public health for decades to come.

We urge your careful consideration of adopting an improved fuel to aid in attacking the climate challenge and improving the health of all Americans through the Final Rule and subsequent rules. [EPA-HQ-OAR-2021-0208-0235-A1, p. 1-3]

Commenter: National Corn Growers Association (NCGA)

As stated in the proposed rule, the transportation sector is the largest source of U.S. GHG emissions, representing 29 percent of total U.S. emissions. Within the sector, light-duty vehicles are the largest contributor, comprising 17 percent of U.S. GHG emissions. Immediate progress toward decarbonizing the light duty fleet will help meet the Administration's goal of cutting emissions by 2030 and reaching net zero emissions by 2050 [EPA-HQ-OAR-2021-0208-0246-A1, p. 2]

As the producers of low carbon feedstock for low carbon ethanol, corn farmers are part of the solution to cut transportation emissions. We encourage EPA to focus on outcomes and opening pathways for all low carbon fuels and technologies that enable stricter standards, taking advantage of not only the low carbon benefits of higher ethanol blends, but also the cuts in toxic emissions, greater fuel efficiency and consumer cost savings that come with more renewables. For automakers to use new technologies and enhanced engines to meet stringent standards, they need updated fuel that enables new vehicles and fuels to work as a system to enhance GHG reductions.

Higher ethanol blends used with advanced engines optimized for higher octane would provide a much-needed pathway for low carbon fuels. Higher octane fuel is an essential tool for automakers to meet revised standards, but higher octane must also be clean octane to meet emission reduction goals. Clean octane from today's ethanol is 50 percent lower in GHG emissions than gasoline and replaces the most harmful hydrocarbon aromatics to improve air quality and prevent adverse health impacts. EPA missed an opportunity in this proposal to broaden the solutions that reduce transportation emissions by beginning a transition to low carbon, high octane fuels to advance climate, air quality and environmental justice goals with these and future standards. Furthermore, alternative fuel vehicles such as flex-fuel vehicles, which have the potential to reach zero emissions, should be equitably incentivized through vehicle standards rules.

In addition to improving this proposal, NCGA urges EPA to use the rulemaking for MY 2027 and later to open pathways to achieve greater emissions reductions from sustainable, affordable low carbon ethanol through a clean, high octane standard, removing barriers to higher ethanol blends and equitably incentivizing all alternative fuels and vehicles on track to reach net-zero emissions. Low carbon, high octane fuels would also support any longer-term EPA rulemaking to address vehicle criteria pollutant and air toxics emissions. [EPA-HQ-OAR-2021-0208-0246-A1, p. 1]

Achieving those decarbonization goals in transportation will require a mix of solutions. As recent analysis from the Rhodium Group concludes, a 'portfolio of strategies is the lowest cost and most likely to succeed,' including low carbon liquid fuels such as biofuels.[1] [EPA-HQ-OAR-2021-0208-0246-A1, p. 2]

If the agency is truly putting greater weight on 'the magnitude and benefits of reducing emissions that endanger public health and welfare' in the proposal, EPA missed a significant opportunity to include complementary fuel improvements that would enable greater GHG reductions, greater fuel efficiency and more substantial air quality improvements from further reduction of non-GHG emissions than the proposal offers.[3] [EPA-HQ-OAR-2021-0208-0246-A1, p. 2]

Improving the fuel will enable greater GHG emissions reductions from the advanced engine technologies EPA is relying on to make these proposed standards feasible. Recognizing vehicles and fuels as a complete system, increasing the octane rating of the nation’s fuel supply through a clean, high octane standard would deliver greater GHG emission reductions in the 92 percent of the vehicle market share EPA projects will be powered by liquid fuel in MY 2026 and during the 15 to 20 years those vehicles remain on the road after introduction. [EPA-HQ-OAR-2021-0208-0246-A1, p. 2]

EPA estimates that 'the vast majority of vehicles produced in the time frame of the proposed standards,' will be powered by liquid fuels.[4] In fact, EPA projects that just eight percent of the vehicle market share by MY 2026 will be plug-in hybrid electric vehicles (PHEVs) or all-electric vehicles (EVs), meaning the vehicles in the remaining 92 percent of the market share will require liquid fuel. The proposed standards do not rely on 'dramatically increased penetration of electric vehicles into the fleet during the 2023-2026 model years.'[5] Instead, EPA’s assessment of the technology feasibility of the proposal relies on advances in engine and transmission technologies that have entered the fleet in the past 10 years and expanded use of those already in place in today’s vehicles. [EPA-HQ-OAR-2021-0208-0246-A1, p. 2]

A CLEAN HIGH OCTANE STANDARD

NCGA supports EPA establishing a pathway to a higher minimum clean octane standard for fuel of at least 98 RON that enables mid-level ethanol blends to immediately and cost-effectively reduce both GHG and tailpipe emissions, supporting greater fuel efficiency and bringing lower carbon and lower cost fuels to the market.

Even with advancements in engine technology, manufacturers are nearing a point where further improvements will be difficult without a higher-octane fuel. This is because advanced downsized, down sped engines, and their associated technologies, make an engine more susceptible to knock. Because of its knock-limiting properties, a higher-octane fuel, such as a midlevel ethanol blend, enables engine designs featuring higher compression ratios, turbocharging, and down speeding and increases overall engine performance and efficiency.[7] According to Department of Energy (DOE) researchers at Oak Ridge National Laboratory, ‘the opportunity for further downsizing and down speeding of engines to improve fuel economy is limited by the available octane rating of fuels…[which] allow higher efficiency designs of naturally aspirated and turbocharged engines dedicated to use the high octane fuel.' [8] Since 2016, DOE has completed extensive research through its Co-Optimization of Fuels and Engines initiative (Co-Optima) on innovating fuels and engines together and understanding the types of fuels that can improve engine performance and efficiency to reduce emissions, with alcohol fuels like ethanol identified as top contenders.[9]

Numerous engine testing experiments—on different engines and vehicles, under varying test conditions, and using a spectrum of ethanol blends—have produced what's now quite a large body of evidence demonstrating ethanol's ability to increase engine efficiency and efficacy while lowering emissions.[10],[11],[12] In 2016, DOE researchers reviewed other recent engine testing efforts to quantify the potential of E25 to E40 fuel in their Summary of High-Octane Mid-Level Ethanol Blends Study.[13] In summarizing the studies on octane, midlevel ethanol blends used in dedicated high-octane vehicles achieved efficiency gains of 5 to 10 percent, more than overcoming any energy density differences with E10.

As DOE explained in its GHG analysis of high octane fuel, determining GHG impacts of high octane fuel relative to current gasoline requires accounting for vehicle efficiency gains, refinery operation changes and GHG emissions changes from ethanol blending. DOE's results show the largest impacts on wells to wheels (WTW) emissions from high octane fuel come from efficiency gains and the level of ethanol blending.

• DOE's modeling compared 100 RON E25 and E40 fuels to baseline E10. When used in HOF vehicles, the E25 reduced WTW GHG emissions by a total of 8 to 9 percent (or 36-40 g CO2e/mile driven) compared to baseline E10. The vehicle efficiency gains from HOF reduced GHG emissions by 4 percentage points of that total, and the additional 4 percentage points of GHG reductions with the E25 fuel were realized from ethanol offsetting petroleum. For the E40 HOF, the ethanol content provides a 9 percent reduction in WTW GHG emissions.14

Current fuels with higher octane, such as E10 blends marketed as premium grades, are not cost-effective for consumers, fall short of enabling the efficiency and emissions technology changes automakers need and fail to advance transportation decarbonization. Because ethanol results in nearly half the emissions of gasoline and is on a pathway to future net-zero emissions, producing higher-octane fuel with a midlevel ethanol blend would do more to reduce GHG emissions and support the stringency goals of the proposed rule. Optimized vehicles powered by low carbon, high octane fuel made from a midlevel ethanol blend after model year 2023 would have much lower GHG emissions than vehicles running on either current E10 blends or premium E10 blends.

A clean, low carbon, high octane fuel standard avoids increasing the use of fossil-based octane sources, which produce more carbon emissions, erasing the GHG reduction benefits from gains in engine efficiencies while releasing more toxic emissions from harmful hydrocarbon aromatics, degrading air quality and respiratory health. Due to ethanol's high octane rating, a low carbon, high octane ethanol blend results in both additional fuel efficiency and significant GHG reductions. Higher ethanol content, reached by removing regulatory barriers to higher blends, would boost GHG reductions and replace harmful aromatics, providing a cost-effective low carbon fuel solution for consumers, including low income consumers, and the environment.

LOW CARBON ETHANOL: MOVING TO NET ZERO

EPA estimates the proposal will avoid 2.2 billion tons of GHG emissions by 2050. Compared to the proposal, the Renewable Fuel Standard (RFS) has already resulted in nearly 1 billion metric tons of cumulative GHG savings from 2008-2020, exceeding projections largely due to the reduced carbon intensity of corn ethanol.[15] The RFS has already delivered half the emissions reductions in 13 years that EPA projects the vehicles rule will take nearly 30 years to deliver, highlighting the importance of using biofuels like ethanol to enhance the GHG emissions reductions from transportation with the right policies.

The most recent assessment from the Department of Energy’s Argonne National Laboratory concludes corn ethanol’s carbon intensity decreased 23 percent from 2005 to 2019 due to increased corn yield, reduced fertilizer intensity and improved ethanol production efficiency, with corn ethanol now between 44 and 52 percent lower in carbon intensity (CI) than the gasoline it replaces.16 Argonne’s conclusions are similar to analysis from Environmental Health and Engineering finding ethanol now results in 46 percent fewer GHG emissions compared to gasoline, due to improved corn production, ethanol production efficiencies and land productivity.[17]

Corn-based ethanol can reach net zero emissions with continued on-farm improvements and soil carbon sequestration, along with carbon capture technology and new efficiencies in ethanol production. Corn farmers are proud of our leadership in adopting conservation and best management practices. NCGA’s recently released Corn Sustainability Report details corn farmers’ history of improvements and our commitment to further sustainability achievements by 2030

Sustainable production means corn farmers today are producing more corn using less land and fewer resources. For example, planted corn acres in 2020, at 90.8 million acres, were less than planted acres in 2007, the year the RFS was expanded, at 93.5 million acres. USDA data also shows the area planted to principal crops in the United States is not expanding overall. Corn production has increased primarily because crop yields have increased from an average of 150 bushels per acre in 2007 to 172 bushels in 2020. With the average yield in 1980 at just 91 bushels per acre, productivity growth is a long-term trend.

Using the expertise of Argonne’s scientists and the U.S. Department of Agriculture’s data, we believe Argonne’s Greenhouse Gases, Regulated Emissions, and Energy Use in Transportation (GREET) model is the federal government’s most accurate tool for evaluating biofuel and energy lifecycle emissions. Because GREET is regularly updated, this model captures GHG emissions reductions from farmers’ improved production practices and will incorporate the ongoing, voluntary climate-smart improvements in agriculture production this Administration supports, ensuring further carbon intensity reductions are accounted for in the LCA.

Corn production has improved across all measures of resource efficiency, including higher crop yields per acre, resulting in greater corn production using less land and fewer inputs, further fortifying ethanol as a sustainable, low-carbon renewable fuel. This progress is reflected in Argonne's most recent analysis, which builds on and is consistent with other recent reviews.

For example, a 2018 USDA study shows that ethanol then resulted in 39 to 43 percent fewer GHG emissions than gasoline.[18] Building on this progress, additional improvements on farms and in ethanol production supported by expanding markets for low carbon fuels could result in ethanol with up to 70 percent fewer GHG emissions than gasoline, according to USDA's analysis. Furthermore, according to California Air Resources Board (CARB) data, the CI of ethanol under the state's Low Carbon Fuel Standard (LCFS) is more than 35 percent lower today than it was in 2011 and more than 40 percent lower than the CI of gasoline.[19]

These increasing benefits have occurred without accounting for corn's ability to sequester carbon in the soil. Corn as a crop can serve as a carbon sink. As a photo-synthetically superior C4 plant, corn has an extraordinary ability to sequester carbon and move fertilizer nutrients back to the surface for plant growth rather than polluting ground water. Corn's extensive, deep root system makes it one of the few plants with this important capability to make crop production sustainable.

High-yield corn—combined with the steady adoption of best practices such as reductions in tillage intensity—is sequestering carbon from the atmosphere into the soil. This sequestration is increasing soil carbon levels and reducing atmospheric CO2. According to the Journal of Soil and Water Conservation, the potential to sequester atmospheric carbon in soil is greatest on lands currently used for annual crops; most remarkably, there is potential to sequester carbon in the soil at an annual growth rate of 0.4 percent each year.[20] The results of tracking soil organic carbon (SOC) advancements on select USDA-specified agricultural land areas is estimated to have sequestered an estimated 309 metric tons of CO2-equivalent in less than a decade.[21]

Although GHG lifecycle models do not currently account for this direct GHG reduction from corn production, NCGA believes the effect of corn crops on soil carbon sequestration, among other considerations, should be incorporated into current lifecycle analysis. This increase in soil carbon from corn production, when included, could result in a 20 gram/MJ carbon credit for corn-based ethanol.[22] Fully accounting for corn's carbon sequestration would further demonstrate significant low-carbon advantages of a high-octane midlevel ethanol blend.

CRITERIA POLLUTANTS AND AIR TOXICS

Bringing high octane fuel to market in the form of midlevel ethanol blends will be significantly less capital-intensive than attempting to increase blendstock octane with hydrocarbon components at refineries. It will also be incredibly cleaner. The avoided production cost and offset emissions lower end-costs to consumers, reducing both economic costs and social costs related to health and environment, key considerations in advancing environmental justice and avoiding adverse impacts from oil refineries on communities that have historically borne them.

Increased volumes of ethanol in fuel displace the most harmful compounds from gasoline.[23] These aromatic hydrocarbon additives (i.e. benzene, toluene, ethylbenzene, xylene – or BTEX) have high cancer-causing potential. Increasing the ethanol volume in fuel to a midlevel blend has a positive impact on tailpipe emissions of toxins, including significant reductions in particulates and carbon monoxide. These same aromatic hydrocarbons are also precursors to the formation of secondary organic aerosols (SOA), which in turn are a major contributor to particulate matter emissions (PM 2.5). [23]

According to EPA’s review for the 2020 Anti-backsliding Study, ethanol does not form SOA directly or affect SOA formation. However, as EPA states, toluene is a large contributor to SOA. Ethanol’s high octane value ‘greatly reduces the need for other high-octane components including aromatics such as toluene.’ [24]

As explained in EPA’s Fuel Trends Report: Gasoline 2006-2016, ‘Ethanol’s high octane value has also allowed refiners to significantly reduce the aromatic content of the gasoline, a trend borne out in the data.’ EPA’s data shows that aromatics’ share of gasoline volume dropped from nearly 25 percent to 19.3 percent, and benzene volume dropped from 0.99 percent to 0.58 percent between 2000 and 2016, the same time as ethanol blending increased from 1 percent to at least 10 percent.

EPA’s data demonstrates the air quality and human health benefits of increased ethanol blending in gasoline by replacing harmful aromatics with clean octane from ethanol. Limiting the aromatics content of gasoline and using higher ethanol blends in high octane fuel would further reduce risks from SOA formation and exposure to PM 2.5, which causes serious respiratory, cardiovascular, and other health harm, including premature death, according to the American Lung Association. The same GDI engine advancements that help lower GHG emissions have the unfortunate side effect of increasing particulate emissions, which could be reduced by use of midlevel ethanol blends.

Petroleum-based aerosol particles represent a significant source of pollution, especially in population-dense urban areas. Health issues related to PM and other emission-based pollutants can be reduced by lowering the volume of petroleum in the domestic gasoline pool, which can be accomplished by increasing octane with higher ethanol blends and replacing more hydrocarbon aromatics with ethanol.

In the proposed rule, EPA states that based on the predicted emissions changes from the proposed standards, very small changes in ambient air quality are expected.[25] EPA could greatly increase the air quality, health, and environmental justice benefits of the proposal by cleaning up the fuel going into the 92 percent vehicles by MY 2026 expected to use liquid fuels. We urge EPA to take immediate steps toward setting a clean, high octane fuel standard that blends more ethanol to replace aromatics to expand the health and environmental justice benefits of this proposal, as well as set caps or limits on air toxics in future rulemakings. [EPA-HQ-OAR-2021-0208-0246-A1, p. 6]

TRANSPORTATION COSTS

In addition to failing to decarbonize liquid fuel, simply transitioning current premium fuel to the new ‘regular fuel’ as a higher octane E10 blend, such as a 95 RON E10, would be significantly more expensive to consumers than current regular E10 fuel.

However, a higher RON level met through increased ethanol blending, would reduce fuel costs compared to higher RON fuels with less ethanol content. Incremental refining costs to produce a 98 RON E20 or E30 fuel could be between $0.02-$0.05 per gallon, respectively, based on one analysis. Incremental refining costs are estimated to be nearly $0.20 per gallon to produce a 98 RON fuel using 10 percent ethanol.26 Because of the availability and effectiveness of ethanol as an octane enhancer, a midlevel blend 98 RON fuel is cleaner and more cost-effective.

Analysis presented to Ag-Auto-Ethanol Work Group by the Defour Group compares the economics of a 95 RON E10 fuel and a 98 RON E25 fuel.[27] This analysis builds on Hirshfeld, et al.’s use of a linear programming model to estimate the refining economics of increasing fuel octane ratings and ethanol content. This additional analysis shows that the presence of a 98 RON high-octane midlevel blend in the market, along with a 95 RON E10 fuel, would change the economics of high-octane fuel and fuel pricing.

When additional ethanol is blended to reach 98 RON, it allows for a lower-octane base gasoline blendstock, which costs less to produce at the refinery and avoids refinery GHG emissions. Coupled with the low cost of ethanol added to raise octane, the finished high-octane midlevel blend is less expensive. This updated analysis concludes that a 98 RON E25 fuel would be cost comparative with the current regular fuel, accounting for a transition with both 95 RON and 98 RON fuels in the market.

Using more ethanol enables a larger increase in fuel octane, allowing for greater efficiency improvements, at a lower cost. When more refining is needed to increase fuel octane, as with current premium E10 blends, the cost will be greater. An E25 blend would support additional octane at a lower price than current premium fuel. Drivers of future model year vehicles optimized to use a higher RON fuel would not pay more for fuel over the lifetime of the vehicle with low carbon, high octane midlevel ethanol blend fuel.[EPA-HQ-OAR-2021-0208-0246-A1, pp. 2-7]

Higher octane fuel, with ethanol as a clean octane source, would result in a cost-effective fuel that offers automakers an additional technologically and economically feasible means to meet more stringent emissions standards. Additionally, high-octane fuel would enable vehicle technologies that result in more GHG emissions reductions and enable greater [EPA-HQ-OAR-2021-0208-0246-A1, p. 7]

Correct the fuel economy formula by updating the R-Factor to 1.0 to reflect documented operation of modern engine technology.

Correcting the R-Factor in the fuel economy formula would support automakers developing high efficiency engines that require higher octane ratings and a higher ethanol content. EPA has acknowledged that the current EPA-mandated R-Factor of 0.6, originally established in the

1980s, is outdated and fails to achieve the statutory purpose of making fuel economy testing on today's fuel equivalent to fuel economy testing in 1975.

An update to 1 from 0.6 would reflect results of analysis by the Department of Energy and EPA using modern engines and fulfill previous observations and commitments from EPA to address this issue. Published studies have shown that R for modern vehicles should be around 0.93 to 0.96.[30]

As NCGA explained in 2020 comments on EPA's proposed rule on vehicle test procedure adjustments in Docket EPA–HQ–OAR–2020-0104, an R-factor of 1.0 in the fuel economy formula would support a lower-carbon fuel policy, providing automakers with greater options for choice and innovation in meeting more stringent GHG standards through vehicle technologies and lower carbon fuels. Without this overdue correction, use of lower carbon fuels will continue to be unjustifiably penalized in the fuel economy formula. Setting the R-factor to 1.0 sets fuel economy results on an energy basis. In application, the R factor equation is a 'fuel response factor,' adjusting for more than just energy density. An R of 1.0 essentially converts fuel economy to mile per gallon gasoline equivalent (MPGge), which is how other alternative fuels such as propane, natural gas, and electricity have been compared to their gasoline counterparts for decades.

Setting R to 1.0 provides equitable treatment to renewable ethanol that other alternative fuels already receive. This change could help speed the transition to certification with Tier 3 fuel as well as encourage vehicle manufacturers to seek certification for even higher ethanol blends, such as E15 or the high octane E30 EPA suggested in its Tier 3 proposal several years ago. Manufacturers are not incentivized to build dedicated high-octane vehicles that reduce GHG emissions when those low carbon benefits are penalized by a low R factor. [EPA-HQ-OAR-2021-0208-0246-A1, p. 8]

Lower summer vapor pressure to 9 psi or less for all fuel or provide parity in Reid Vapor Pressure (RVP) treatment for all ethanol blends with E10.

Higher ethanol blends such as E15 offer an immediate decarbonization opportunity and support a transition to low carbon, high octane fuel. However, outdated RVP rules and the oil industry's refusal to produce lower volatility blendstock prevents E15 – which is lower in evaporative, tailpipe and GHG emissions – from reaching the market on the same terms as standard E10 fuel. Addressing these outdated rules would allow lower-volatility and lower-emissions E15 full market access and support EPA's efforts to reduce emissions across the board, and it is unfortunate the oil industry took EPA to court to block the agency's 2019 action aimed at updating unnecessary fuel restrictions in order to keep cleaner E15 out of the marketplace and limit consumer choice.

By using existing authority in the Clean Air Act to require lower volatility conventional gasoline blendstock during the summer months to reduce emissions of volatile organic compounds and decrease the potential for ozone formation, EPA would simultaneously open the market to E15 year-round. NCGA urges EPA to take this action to improve air quality while simultaneously eliminating outdated barriers to cleaner, low carbon higher ethanol blends like E15 and future high octane fuel. [EPA-HQ-OAR-2021-0208-0246-A1, p. 9]

FLEX FUEL VEHICLES and CREDITING

Beyond ethanol's utility in all gasoline engines to reduce GHG emissions, other alternative vehicle technologies can also harness the GHG reductions and air quality benefits of ethanol, such as Flex Fuel Vehicles (FFVs). FFVs utilizing higher blends of low carbon ethanol, such as E85, can provide immediate emissions reductions without tangibly altering the price of the vehicle and reducing fuel costs. In fact, E85 is typically sold at a lower price than gasoline, translating to monetary savings in addition to the significant air pollution savings.

Compared to gasoline, E85 leads to significant reductions in NOx and GHG emissions. E85 avoids use of toxic hydrocarbon aromatics in gasoline that are precursors to secondary organic aerosols that result in harmful fine particulate matter emissions that cause serious respiratory, cardiovascular, and other health harm, including premature death, according to the American Lung Association.

Incentivized to reduce emissions through the state's Low Carbon Fuel Standard (LCFS), in California some FFVs are even powered by a blend of 15 percent renewable naphtha with 85 percent ethanol. These vehicles use zero fossil fuels, have improved air emissions profiles, and have an extremely low carbon intensity. As such, NCGA has recently advocated to CARB to go a step further to decrease emissions in its most recent Advanced Clean Cars and Scoping Plan proposals by requiring that all PHEVs MY 2026 and later up be a FFV.

Just as we recommended to CARB, EPA also should not constrain its vision of a zero-emission vehicle and a zero-emissions future based on today's vehicle limitations, but rather remain focused on setting technology and feedstock neutral standards and allowing markets to innovate and respond. California's LCFS has resulted in a reduction in ethanol CI in the state, as well as increased demand for low carbon fuel like E85 and FFVs, as low carbon ethanol has helped the state meet ambitious GHG emission reduction goals. [EPA-HQ-OAR-2021-0208-0246-A1, pp. 9-10]

Despite the GHG and criteria pollution reduction benefits of FFVs, as well as the low cost to purchase and fuel these vehicles, automakers have cut back on FFV models and now offer very few choices to consumers. Well-structured vehicle credit programs remain an impactful, cost-effective means for the government to encourage the introduction and adoption of new products and technologies. However, NCGA is concerned that reinstating a credit multiplier for EVs, as the proposal would do, further incentivizes selected types of low emissions vehicles but not others. With this proposal, EPA picks technology winners and losers. To encourage introduction of a wider range of low emission vehicle choices, NCGA believes EPA must provide equitable crediting across the spectrum of low emission vehicles, including FFVs. [EPA-HQ-OAR-2021-0208-0246-A1, p. 10]

NCGA also urges EPA to take steps to update the F-factor in the fuel economy formula to a forward looking F-factor of at least 0.2, as we outlined in 2020 comments in response to Docket EPA–HQ–OAR–2020-0104. Furthermore, we urge EPA to reinstate the 0.15 volumetric conversion factor for FFVs. EPA should reharmonize the 0.15 factor for FFVs in these standards, and, if not, in future standards. This change would accurately reflect the significant carbon emissions reductions from FFVs using E85 because the carbon emissions from the fuel are the release of carbon taken up through crop growth. [EPA-HQ-OAR-2021-0208-0246-A1, p. 10]

Conversely, EPA could also level the playing field for vehicle technology by similarly treating the ethanol portion of fuel as carbon neutral, supporting greater use of low carbon renewable fuels. The carbon emitted from ethanol use is the same carbon the corn plant absorbed from the atmosphere, resulting in no net carbon. [EPA-HQ-OAR-2021-0208-0246-A1, p. 10]

Commenter: National Farmers Union (NFU)

NFU is particularly concerned with the challenges that climate change poses to agricultural production and family farmers’ ability to pursue improvements in global food security.1 Farmers, ranchers and rural communities can contribute to climate resilience and help circumvent serious harms to the economy and human health.[EPA-HQ-OAR-2021-0208-0243-A1, p.1]

These efforts are supported by the biofuels industry that eases the burdens on farmers and provides additional markets to facilitate a move toward sustainable practices and climate mitigation actions. Toward those ends, NFU supports the use of ethanol as a fuel additive for gasoline formulations to enhance octane levels, especially moving toward use of mid-level blends of ethanol. Use of higher ethanol blends will provide significant benefits to the rural community and beyond. Disincentives to move toward higher ethanol blends by favoring other technologies limits these investments and benefits to farmers. [EPA-HQ-OAR-2021-0208-0243-A1, pp. 1-2]

NFU has called upon EPA to take immediate and concrete steps aimed at curbing greenhouse gas (GHG) emissions. Ethanol has superior octane-boosting properties and is an environmentally safer substitute for oil-derived, benzene-based octane enhancers. Mid-level ethanol blends (e.g., E20-E40) are the most economical high-octane fuels available today. In response to numerous comments suggesting various actions EPA should take to support and promote use of high octane fuels, such as mid-level ethanol blends,2 EPA stated that it ‘has given careful consideration to these comments and agrees that these commenters have identified both current and promising technologies that may be able to deliver significant improvements in reducing GHG emissions once fully deployed.’3 Recently, NFU, as part of the High Octane Low Carbon Alliance (HOLCA) led by former Senator Tom Daschle, joined with numerous organizations, calling for this Administration to address octane in the revised Light-Duty Vehicle GHG Emissions Standards.4

Despite the widespread agreement regarding the need to move this country toward high octane fuels, including by auto manufacturers, and the numerous studies that have been presented to

EPA on the benefits of mid-level ethanol blends, EPA's proposal for revising the GHG standards for light-duty vehicles fails to take these fuels into account. This ignores a key consideration. NFU also understands EPA is planning to take additional actions to address emissions from vehicles. NFU submits these comments to urge the Administration to promote high octane fuels through supporting mid-level ethanol blends in the final rule and in future rulemakings. [EPA-HQ-OAR-2021-0208-0243-A1, p.2]

EPA MUST CONSIDER THE AVAILABILITY OF HIGH-OCTANE FUELS TO REDUCE GHG EMISSIONS FROM LIGHT-DUTY VEHICLES.

Automakers have been working on developing higher compression engines to improve thermal efficiency and thereby fuel economy. Studies have been presented to EPA that show the benefits of using high octane fuels on vehicle efficiency.5 Increased volume of ethanol increases the octane level of gasoline across grades. In addition to its higher octane level, ethanol also features high sensitivity and high heat of vaporization, which increase engine efficiency.6 In short, ethanol offers engine knock resistance at a lower cost than any other octane booster in gasoline. Higher ethanol blends can increase fuel octane without expensive refinery upgrades. A report issued by Oak Ridge National Laboratory, Argonne National Laboratory and the National Renewable Energy Laboratory cites increased vehicle efficiency, increased acceleration and significant reductions in GHG emissions among the demonstrated benefits of mid-level ethanol blend fuels.7 The study found that vehicle manufacturers could benefit from high octane, low carbon fuels as a means to meet future fuel economy and GHG requirements, and serve as a way to increase torque in performance applications. That study also found that feedstock availability and costs are not expected to be obstacles to the substantial development of a high-octane fuel market, with E40 providing the greater fuel cost savings.

EPA's proposal recognizes high compression engines as advancements in internal combustion engines (ICE), noting the availability of the 'very cost-effective ICE technology that is in-use today and ready for broader application.'8 For years, auto manufacturers have supported 'bringing high octane fuels to market' that are aligned with these improved engine technologies and vehicles,9 recognizing '[h]igher-octane fuels are the cheapest CO2 [carbon dioxide] reduction.'10 Recently, the Alliance for Automotive Innovation (Alliance), which represents automakers that produce nearly 99% of the new light-duty vehicles sold in the United States, acknowledged that vehicle improvements, along with high octane fuels, 'should be encouraged as additional solutions as soon as possible to maximize environmental benefits across the fleet.'11 The Alliance stated the use of high octane low carbon liquid fuels 'would simultaneously support vehicle performance, including fuel economy, and further reduce greenhouse gas emissions'; these benefits 'would be realized by new and existing internal combustion engines.'12 These engines and high octane fuels, specifically mid-level ethanol blends, are not 'crystal ball' technologies, but are technologically feasible and economically reasonable means to achieve better fuel economy and reduced GHG emissions available today.

Yet, it appears that EPA's proposal ignores the availability of high octane fuels to utilize high-compression ratio technology and advanced ICE technologies. These engine technologies can deliver the emissions reductions necessary to meet these and future GHG standards, but high octane fuels best optimize these technologies, and thereby optimize GHG reductions. Recent reports on climate change impacts indicate the very real need to reduce GHG emissions today. It is not just a missed opportunity to incorporate use of mid-level ethanol blends as high octane fuel for reducing GHG emissions from light-duty vehicles, it is error to refuse to even consider it. [EPA-HQ-OAR-2021-0208-0243-A1, pp. 2-4]

MID-LEVEL ETHANOL BLENDS ARE COST-EFFECTIVE, HIGH OCTANE LOW CARBON FUELS THAT PROVIIDE NUMEROUS BENEFITS.

The alternatives to ethanol as an octane booster are petroleum-based. [EPA-HQ-OAR-2021-0208-0243-A1, p. 4]

Ethanol, however, is substantially cleaner than petroleum-based octane additives, and 'using ethanol as the source of octane in future high octane fuels has the potential to significantly decrease petroleum refinery GHG emissions by reducing the energy intensity of the refining process.'[EPA-HQ-OAR-2021-0208-0243-A1, p. 4]

It reduces emissions of particulate matter (PM) and air toxics such as benzene, toluene, and xylene. PM2.5 has been shown to contribute to a significant portion of premature deaths due to air pollution, and such emissions from gasoline are likely significantly underreported.14 EPA-HQ-OAR-2021-0208-0243-A1, p. 4]

Importantly, increased ethanol use provides additional GHG emissions reductions, which is increasingly important as the carbon intensity of gasoline is increasing with greater use of unconventional fossil fuels. 'Emissions from fossil fuel combustion comprise the vast majority of energy-related emissions,' with an increase in emissions from the transportation sector largely attributed to increased vehicle miles travelled and motor gasoline consumption by light-duty vehicles.15 At the same time, energy use in ethanol production and lifecycle GHG emissions have decreased with changes in farming practices and increased intensification (e.g., higher yields). EPA has found, the land use, land-use change, and forestry sector resulted in a net increase in carbon stocks (i.e., net CO2 removals). [EPA-HQ-OAR-2021-0208-0243-A1, p. 4]

The National Highway Traffic Safety Administration's (NHTSA) Draft Supplemental Environmental Impact Statement on its recent proposal to revise fuel economy standards recognizes increased GHG benefits with higher blends of ethanol, as well as the ongoing reduced carbon intensity of corn ethanol.17 [EPA-HQ-OAR-2021-0208-0243-A1, pp. 4-5]

Previously, EPA has referenced purported challenges to transitioning to high octane fuels stemming from costs to consumers who drive vehicles designed for current regular octane grade fuel, contending the 'net positive benefits could take many years.'18 But, this has been disputed by automakers. In testimony before Congress, a representative of General Motors stated: 'We believe increasing the minimum octane level in U.S. gasoline for new vehicles will be a win for all industries and, most importantly, consumers.'19 'We have an opportunity to play a large role in offering consumers the most affordable option for fuel economy improvement and greenhouse gas reduction. We believe a higher efficiency gasoline solution with a higher Research Octane

Number (RON) is very important to achieving this.'20 Although that testimony referenced a lower RON than NFU believes should be utilized, consumers would benefit from projected fuel cost savings, reduced price volatility, increased torque in performance applications, and the energy security and environmental attributes of mid-level ethanol blends. Based on information previously provided, EPA should be fully aware of the reduced costs of producing mid-level ethanol blends, where ethanol is less expensive than gasoline, decreasing costs at the pump.21 As noted, the National Renewable Energy Laboratory found costs to not be a limiting factor to increase biofuel use through requiring higher octane fuels.22 More recent information confirm the benefits to consumers as a result of increased biofuel use.23 [EPA-HQ-OAR-2021-0208-0243-A1, p. 5]

As noted above, the Alliance has recognized that high octane fuels can benefit existing vehicles. More recent analysis further supports that mid-level ethanol blends can be used in existing vehicles, which should reduce concerns about any 'transition' to use of higher octane fuels. A study conducted by North Carolina State University found that vehicles on the road today can adapt to mid-level ethanol blends.24 Researchers compared E10 (regular and premium) with E27 in one flexible fuel vehicle (FFV) and four non-FFVs and found all five vehicles adapted to each fuel. The study also found E27 can increase engine efficiency and reduce carbon monoxide (CO) and PM emissions. A study by the University of Nebraska Lincoln on use of E30 in non-FFVs used by the State of Nebraska also found the non-FFVs were able to adjust the airto- fuel ratio to adapt to the higher oxygen content of E30, and E30 had no observable negative effect on overall vehicle performance.25 Comparing E15 to E30, the Nebraska report found a 40% reduction in CO2 emissions and that E30 is cost-effective due to the increased use of ethanol. Thus, these are benefits that can be achieved today, even in existing vehicles. [EPA-HQ-OAR-2021-0208-0243-A1, pp. 5-6]

EPA CAN, AND SHOULD, UNDERTAKE REGULATORY REVISIONS TO PROMOTE MID-LEVEL BLENDS OF ETHANOL.

Mid-level ethanol blends are available today, as they are authorized for use in FFVs and provide cost savings to consumers. But regulatory barriers are preventing their wider use. While EPA should have considered the availability of high octane fuels in its revised proposal, additional regulatory actions by EPA also should be taken to promote use of mid-level ethanol blends, as previously explained by NFU, among others.

Octane Fuel Requirements: First, as again stated by many at EPA's public hearing on EPA's proposal for revised light-duty vehicle GHG standards, EPA can use its authority under the Clean Air Act to approve and require specific octane levels, like 100 RON. Several comments have been submitted to EPA previously, outlining this authority.26 While NFU expects other comments on this proposal also will further address EPA's authority to approve and require higher octane in fuels under its Clean Air Act authority in Sections 202 and 211, which NFU supports, EPA has acknowledged that 42 U.S.C. §7545(c) gives it authority to 'control' gasoline octane levels.27

Certification Fuel Requirements: Second, EPA should ease the ability to use mid-level ethanol blends as certification fuel. EPA has acknowledged that mid-level ethanol blends can be approved as certification fuel under 40 C.F.R. §1065.701.28 NFU, among others, previously explained how EPA can streamline the approval process for mid-level ethanol blends, as high octane fuels, to be certification fuels.29 As explained, EPA can make findings to facilitate use of mid-level ethanol blends as certification fuel but may need to make regulatory changes to ensure flexibility to use mid-level ethanol blends more generally. Because mid-level ethanol blends are 'accessible, obtainable'30 in commerce today, EPA should make clear that mid-level ethanol blends meet the criteria in Section 1065.701(c) that the fuel be 'commercially available.'31 EPA should also clarify that E30 is representative of mid-level ethanol blends to give retailers and automakers more flexibility in sales and engine design without imposing undue certification requirements for each blend level. Once EPA approves the certification fuel, the manufacturer should be able to make a determination that the approved fuel can be appropriately used in other model year vehicles without going through the waiver process under 42 U.S.C. §7545(f). Such flexibility may require updates to EPA's fuel registration process under 40 C.F.R. Part 79. [EPA-HQ-OAR-2021-0208-0243-A1, pp. 6-7]

Fuel Economy Formula (R-Factor): Third, with approval of alternative certification fuels, EPA should also adjust the formula in 40 C.F.R. §600.113-12 used for determining fuel economy to ensure an appropriate R-factor and a multiplier in recognition of the lower carbon content of the proposed certification fuel. The current fuel economy equation includes adjustments meant to control for changes in the test fuel from testing in 1975 that affect fuel economy.32 One adjustment is known as the R-factor, which is intended to represent the response of a typical vehicle's fuel economy to small changes in the fuel's energy content.33 The current equation in the regulations uses an R-factor of 0.6 based on data from the 1980s. This factor fails to adequately adjust for changes in the test fuel with increased ethanol volume, as required by law.34 There has been support for making this change for years, and EPA has acknowledged that changes to the R-factor may be warranted.35 While EPA did propose a change in 2020 for E10,36 that proposed R-Factor (Ra=0.81) may still be too low, as there is ample information to show that the R-Factor should be '1' or closer to 1, which several commenters supported, including automakers.37 'With [a] correct R Factor, high-octane mid-level blends can offer real CAFE as well as GHG benefits.'8 Making this adjustment would allow automakers to use the new test fuel for purposes of compliance with the fuel economy requirements without being unfairly penalized for using a test fuel with a lower energy content. [EPA-HQ-OAR-2021-0208-0243-A1, pp. 7-8]

Reid Vapor Pressure: Fourth, EPA should work with the ethanol industry to resolve Reid Vapor Pressure (RVP) restrictions on using ethanol blends above E10 year-round. Ethanol itself has a low RVP rating, and, at higher blends, such as E30, the RVP should not be an issue, as the higher volume of ethanol counteracts potential increases based on the petroleum gasoline. NFU appreciates EPA's recent efforts to address the RVP waiver for E15. While those efforts remain pending in litigation on appeal, those efforts did not adequately address mid-level ethanol blends. The ethanol and automotive manufacturing industries have also suggested an alternative approach to issuing a broader waiver; that is, imposing lower RVP limits on the petroleum gasoline blendstock to ensure available blendstock for higher blends of ethanol. While EPA referenced potential adverse impacts on fungibility of fuel, there is precedent showing the gasoline blendstock can be set at a lower RVP to protect against exceeding 9 psi to address air quality concerns.39 In either case, NFU urges EPA to continue to work with the ethanol industry to find a solution to allow year-round sales, as the potential restrictions during the summer months will create practical restrictions to expanding the use of ethanol.40 [EPA-HQ-OAR-2021-0208-0243-A1, p. 8]

Substantially Similar Finding: Finally, EPA can also use its authority to approve midlevel ethanol blends for use under Clean Air Act section 211(f), 42 U.S.C. § 7545(f). Starting in 2017, gasoline emissions certification fuel now contains 10 percent ethanol. As such, section 211(f)(1) no longer limits ethanol blending in market fuel, as any ethanol blend, including midlevel ethanol blends, are 'substantially similar' to a certification fuel. Moreover, given that the effects of gasoline/ethanol blends like E20, E25, and E30 are already well-known, it makes little to no sense for EPA to interpret the requirements of section 211 as rigidly and burdensome as it has done in the past for new fuels. EPA should issue an updated interpretation of 'substantially similar' to confirm the ability to use these fuels. [EPA-HQ-OAR-2021-0208-0243-A1, p. 8]

EPA SHOULD INSTITUTE CREDITS TO SUPPORT VEHICLES THAT PROMOTE INCREASED USE OF RENEWABLE FUELS.

Congress established policies, which were intended to work together, to promote production of U.S. biofuels and, thereby, energy independence. These policies include the Renewable Fuel Standard (RFS) program, which has worked to support growth in the use of renewable fuels, including ethanol, since 2005.41 Although EPA has pointed to the RFS to explain why it need not support renewable fuels under its GHG requirements,42 EPA's GHG emission regulations should work hand-in-hand with the RFS program, supporting biofuels. And this ignores how increased use of ethanol can support compliance with the proposed and future GHG standards. The agencies should restore or include incentives that can be provided to automakers to ensure vehicles being produced consider the increased use of renewable fuels.

One way to promote mid-level ethanol blends, and thereby higher-octane fuels, is to restore meaningful credits for FFVs and to establish a new incentive for engines optimized for efficiency on mid-level ethanol blends. FFV production has been impacted by EPA's unfair treatment compared to other alternative fuel vehicles. Incentives to stimulate the production of vehicles that produce the benefits sought, and reduce costs to consumers, are appropriate. NFU appreciates EPA's guidance that it will retain an 'F Factor' of 0.14 for E85 (rather than default to zero) until EPA revises its guidance. Information has been provided to EPA to support an increase in the F Factor to account for greater penetration of E85 in the marketplace.43 EPA should issue any guidance necessary to give automakers sufficient certainty for automakers to make appropriate investments and work to update this factor for later model years to continue to support FFVs.44 Based on EPA's current restrictions on mid-level ethanol blends, FFVs remain an important incentive to sell mid-level ethanol blends, supporting continued investment in retail and infrastructure to expand use as part of any transition to high octane fuels.

In addition, EPA has acknowledged that raising octane levels could enable 'LDGHG standards that go beyond the 2025 standards.'45 Thus, automakers that take action to move ahead of the curve should be able to obtain credits toward meeting the GHG requirements. Such incentives could be tied to use of higher ethanol blends as a certification fuel, thereby supporting those efforts to provide mid-level ethanol blends at the pump but also better ensure the benefits of these higher performing engines. Although EPA is proposing to restrict the credits under the program, it provides little incentives for these other clear solutions to address GHG emissions. EPA should not unduly restrict such incentives as it did with FFVs. Providing such incentives will create better benefits and move the country toward more efficient vehicles and higher octane, lower carbon fuels. It is also consistent with EPA's interpretation of its authority under section 202 to provide incentives to push new technologies. Introduction of these better performing fuels and engines are needed, and we believe consumers will reap the benefits and continue their use [EPA-HQ-OAR-2021-0208-0243-A1, pp. 8-10]

EPA'S EMISSIONS MODELING SHOULD BE ADJUSTED TO BETTER ACCOUNT FOR THE BENEFITS OF ETHANOL FOR AIR QUALITY.

Ethanol Provides Air Quality Benefits, Which May Not Be Accurately Reflected in EPA's Current Models.

Ethanol, a renewable fuel, changes the emissions profile of gasoline, creating a cleaner, safer motor vehicle fuel. Real-world evidence shows use of ethanol blends reduces emissions of CO, PM, air toxics, and GHGs compared to burning petroleum gasoline. With higher octane fuels, and related engines discussed above, the motor fuel can burn even more efficiently. This results in better overall air quality than when vehicles burn conventional gasoline, significantly improving public health.

Concerns have been raised regarding the models used by EPA to determine emissions from fuels. Third-party reviews have shown that MOVES2014 may be inadequate as a tool for estimating the exhaust emissions of gasoline blends containing more than 10 percent ethanol. The model's results for mid-level ethanol blends have been shown to be inconsistent with other results from the scientific literature for both exhaust emissions and evaporative emissions, including results from real-world emissions testing.46 The problems with MOVES2014 have been tied to the model's use of data that misrepresents the actual parameters and composition of mid-level ethanol blends. While EPA recently released MOVES3, it is unclear if EPA made the appropriate adjustments to adequately reflect the benefits of blends above E10,47 and EPA should ensure its models are properly updated to do so.

Recent Assessments Show Continued Improvements in GHG Lifecycle Analysis, Finding Greater Emissions Reductions for Ethanol Compared to Petroleum Gasoline Than EPA Has Estimated.

The Energy Independence and Security Act of 2007 required EPA to conduct lifecycle GHG emissions analysis to identify the renewable fuels eligible to meet the various categories under the RFS program. EPA conducted this analysis for corn-based ethanol as part of the 2010 RFS rulemaking. Since that time, published studies and more recent data have improved the understanding of corn ethanol's lifecycle GHG impacts, showing much higher reductions in GHG emissions for corn ethanol compared to petroleum gasoline.48 As noted above, corn ethanol plants have become more efficient. In addition, U.S. farmers have responded to demand and concerns by moving toward sustainable practices and intensification, not land expansion. The land use aspect of EPA's analysis has not been experienced in the real world.49

Despite these advancements in lifecycle analysis, EPA has chosen not to acknowledge the significant overall benefits of increased ethanol use with respect to GHG reductions compared to petroleum-based gasoline. While requests to update the RFS lifecycle analysis have been rejected by EPA to date, the RFS statute includes specific parameters of how that analysis must be conducted, and this should not limit EPA's analysis of GHG benefits of ethanol blends. These newer studies and data show greater emissions reductions associated with corn ethanol, which is even more pronounced where more unconventional sources and heavier crudes are being used for gasoline today than in 2005 – the baseline used under the RFS. EPA, however, has declined to consider the significant GHG impacts of burning petroleum gasoline and the benefits of increasing use of renewable fuels beyond tailpipe emissions. [EPA-HQ-OAR-2021-0208-0243-A1, pp. 10-11]

The family farm forms the backbone of this country. As discussed above, biofuels have played an important role in supporting family farms, which have faced significant pressure to stay in production from many sides and a struggling economy. NFU supports continued efforts to address GHG emissions and, thereby, climate change and the climate resilience it brings to the food system. NFU strongly encourages EPA to make appropriate regulatory changes to support increased use of mid-level ethanol blends, which are high octane, low carbon fuels. As has been shown by numerous studies, ethanol provides significant air quality benefits, in addition to providing much needed jobs and creating stability in markets providing benefits and promoting investments in the rural economy. Virtually all parties, including EPA, acknowledge the GHG and fuel economy benefits of high octane fuels in more efficient engines, and the costeffectiveness of using higher ethanol blends to meet the goals of these requirements. [EPA-HQ-OAR-2021-0208-0243-A1, pp. 11-12]

20 Id. at 2. As described further below, NFU urges EPA to make various changes to expand use of mid-level ethanol blends. These actions would provide a transition to these improved technologies and achieve the benefits of using higher octane fuels today.

30 available, https://www.merriam-webster.com/dictionary/available. For example, E25 and E30 are 'common blends' offered at blender pumps. U.S. Department of Energy (DOE), Alternative Fuels Data Center: Ethanol Blends, https://www.afdc.energy.gov/fuels/ethanol_blends.html (last visited Aug. 27, 2021). The Renewable Fuels Association has estimated over 5000 retail stations as offering flexible fuel. RFA, Essential Energy: 2021 Pocket Guide to Ethanol, at 15 (2021), https://ethanolrfa.org/wp-content/uploads/2021/02/2021-Pocket-Guide.pdf. ASTM International has also established a standard for mid-level ethanol blends (D8076).

41 EPA has fallen behind in enforcing the RFS volume mandates, negatively impacting biofuel producers. NFU appreciates EPA's efforts to get the program 'back on track,' and urges EPA to enforce the full 'implied' conventional biofuel requirement of 15 billion gallons and increase the advanced biofuel volumes.

Commenter: National Propane Gas Association (NPGA)

Propane, also known as liquefied petroleum gas (LPG) or 'autogas' when used as a vehicle fuel, is a clean alternative engine fuel for both over-the-road vehicles and industrial lift trucks. Propane is also used in more than 18 million installations nationwide for home and commercial heating and cooking, in agriculture, in industrial processing.[EPA-HQ-OAR-2021-0208-0252-A1, p.1]

EPA recognizes propane as a clean, alternative fuel within the Clean Air Act, possessing lower emissions of hydrocarbons than gasoline and significantly less GHG emissions.8 Additionally, propane is an abundant domestic energy source.9 [EPA-HQ-OAR-2021-0208-0252-A1, p.2]

NPGA urges EPA to incorporate autogas among the multiplier incentives on the basis of its present-day contribution to effective reductions in GHG emissions aligned with the principles of the Biden Administration. The increasing popularity of autogas domestically and globally is evidence of market recognition for an affordable alternative fuel capable of significant emissions reductions.10 [EPA-HQ-OAR-2021-0208-0252-A1, p.2]

We also encourage EPA to include incentives for the production of vehicles that utilize renewable fuel sources, which is surprisingly absent in the proposal. Vehicles across the U.S. – from California11 to Virginia12 – are employing renewable propane to drop carbon intensity to 19 percent.13 We ask EPA to consider these alternative fuels in reevaluating multiplier incentives and leveraging present day technology to direct vehicle production in the orientation of President Biden's environmental goals. [EPA-HQ-OAR-2021-0208-0252-A1, p.2]

Autogas Vehicles

Many public and private vehicle fleets utilize autogas, and research continues to progress on new ways to expand on the clean emissions profile and abundant production volume of autogas. Autogas offers similar power, acceleration, and cruising speed as diesel and gasoline engines, but with a significant reduction in GHG emissions as well as other pollutants.14 Today's marketplace includes many autogas vehicle options15 and thousands of autogas fueling stations across the country.16 Industry-collected data indicates more than 85.4 million gallons of autogas were sold in 2018.17 Initial estimations for total sales in 2019 exceed 90 million gallons. 18 There are more than 200,000 autogas vehicles on the road in the U.S. including passenger and light-duty vehicles manufactured by original equipment manufacturers (OEMs) like Ford, Chevrolet, Freightliner, and Bluebird.19

The adoption of autogas vehicles, incorporation of bi-fuel vehicles, and evolution of renewable propane are evidence of autogas' success as well as an indication of the success autogas can bring to the environmental goals of the Administration. For example, the Clean Cities initiative by the U.S. Department of Energy awards funding to local governments for the procurement of autogas vehicles.20 In a partnership with Clean Cities, the Department of Energy's Argonne National Laboratory evaluated the replacement of 22 diesel commercial delivery trucks with autogas vehicles.21 Research revealed that less than two dozen autogas vehicles displaced 38,000 gallons of diesel annually and reduced greenhouse gas emissions by 80 tons annually.22 Public fleets also successfully utilize aftermarket conversions to reduce vehicle maintenance and fuel costs as well as emissions footprints and improve fuel reliability.23

Renewable Propane Technology

Renewable propane has entered the U.S. and European markets, unveiling new opportunities to transition from conventional fuel and equipment to renewable fuel created by vegetable oil waste.24 In contrast to diesel filters and electric or other alternatives, the innovative options of autogas rely on simple, cost-effective infrastructure and can drop-in to conventional propane equipment without expensive modifications. Renewable propane maintains all the advantages of conventional propane, but with even greater reductions in emissions.25 In Europe, an operation in the Netherlands is distributing approximately 160,000 tons of renewable propane over the next four years.26 One domestic operation based in Louisiana produces approximately 75 million gallons/year of renewable fuels including renewable propane.27 The produced renewable propane is currently utilized in the autogas market throughout the U.S. with a carbon intensity of 45-65 gCO_2e/MJ.28 Further, renewable propane is identical in chemical composition to conventional propane, which means that engines and equipment do not require add-ons or modification to utilize renewable propane or a combination of renewable and conventional propane.29

Our industry is also developing dual-fuel engines with DME. Dual-fuel engines blend two fuels and use a single injection system. Autogas and DME are readily combined based on similar properties and characteristics as both fuels must be kept in pressurized storage.30 DME and autogas can be blended at a ratio of 20 percent DME and 80 percent autogas.31 As noted by EPA, DME is a promising alternative fuel option.32 We are continuing our partnership with DME to explore blending propane and renewable DME (rDME). Specifically, Oberon Fuels and SHV Energy are partnering to develop vehicles and fueling infrastructure needs to utilize a blend of propane autogas and rDME.33 Blending conventional propane with rDME reduces the carbon intensity to 11 gCO_2e/MJ.34 With further research and development, it will be feasible to combine renewable propane and rDME for greater emissions reductions; opening the door to an entirely new fuel concept.35 We ask that EPA incorporate the potential of renewable propane as well as renewable and convention DME as the agency evaluates the multiplier incentives that encourage technology to reach the Administration's environmental goals. [EPA-HQ-OAR-2021-0208-0252-A1, pp. 2-4]

The multiplier incentive program should include provisions for alternative fuels, including autogas, to achieve the agency's ambition for effective GHG emission reduction. [EPA-HQ-OAR-2021-0208-0252-A1, p. 5]

We request that EPA recognize autogas as an alternative fuel that provides significant contributions to the reduction of GHG emissions without sacrificing affordability, convenience, safety, or national energy security. We believe that the incentives should incorporate the advancement of alternative fuels like autogas in the current marketplace. Likewise, EPA should consider the potential market growth as well as energy and emissions achievements that could be accomplished with incentives for alternative fuel combinations like bi-fuel and dual fuel engines. Also, renewable propane is a modern alternative fuel worthy of federal support to encourage market proliferation and deployment to achieve substantial GHG emissions reduction among today's vehicle fleet and engine technology. We strongly ask EPA to review the current landscape of the autogas vehicle market and the ongoing research to advance and improve the industry's vehicle technology. [EPA-HQ-OAR-2021-0208-0252-A1, p. 5]

35 For context on the possibilities, the California Air Resources Board estimates that manure converted to DME by Oberon has a carbon intensity of -278 gCO2/MJ. California Air Resources Board, Low Carbon Fuel Standard Proposed New Temporary Fuel Pathway: Renewable Propane (May 8, 2019).

Commenter: NATSO, Representing America's Travel Centers and Truck Stops et al.

The Associations support EPA's desire to lower GHG emissions from light-duty vehicles, but believe that – to best achieve the Agency's stated objectives – any review of emissions standards should be based on science and fuel-neutral. The most expeditious and economical way to lower GHG emissions is through market-oriented, consumer-focused policies that encourage: (1) all technologies to improve their respective emissions consequences and (2) retailers (and thus consumers) to gravitate toward the most environmentally and economically attractive solutions. [EPA-HQ-OAR-2021-0208-0570-A1, p.1]

In particular, the Associations urge EPA to fully account for the environmental benefits of renewable natural gas ('RNG') and high octane fuels. These technologies have the potential to provide compliance flexibility for automakers and expanded choice for consumers while also delivering increased environmental benefits. [EPA-HQ-OAR-2021-0208-0570-A1, p.1]

Octane

The Associations urge EPA to consider the opportunities associated with high octane fuels coupled with increased use of high compression engines. This would not only improve motor fuel's emissions characteristics, but it would enhance fuel economy as well. The Associations are eager to work with the Agency to explore ways that do this in a cost-effective manner that is feasible for both retailers and consumers. In so doing, it will be important that the Agency consider and address a variety of uncertainties around what fuel octane levels would appropriately balance feasibility, cost, and environmental concerns, and how such fuel can be integrated into the existing fuel infrastructure and markets. EPA should specifically address these issues, including:

• Cost-Effectiveness for Retailers – Higher octane fuels can only achieve significant market penetration if it is cost-effective for fuel retailers to sell such fuels. Done properly, higher octane fuels and vehicles that must run on them could gain consumer acceptance over time and fuel retailers will respond accordingly.

• Retailer Liability – Retailers would need to be assured that they will not be held responsible for customers that misfuel (e.g., dispensing less expensive, lower octane fuel into vehicles that must run on higher octane fuels).

• Labeling Requirements – Federal dispenser labeling requirements would have to be streamlined and state requirements would have to be preempted.

• Vehicle Warranties – Auto manufacturers would have to warrant all new higher octane vehicles up to at least E15 depending upon vehicles' capabilities, and would have to affirmatively state which cars in the existing fleet can run on E15 and ensure that the cars are warrantied or retroactively warrantied as such. [EPA-HQ-OAR-2021-0208-0570-A1, p.3]

Commenter: Nebraska Ethanol Board (NEB)

Unfortunately, the proposed rule does not include any provisions dealing with octane specifically or biofuels more generally. This is an enormous, missed opportunity.

While a successful pro-ethanol regulatory strategy will require work beyond this specific rule, EPA's proposal does invite comments on what the agency can do to promote more fuel-efficient vehicles and mentions various fuel-related issues. And, more generally, the Biden Administration has emphasized the following three priorities that, if taken seriously, strongly support the increased use of ethanol-based fuels: addressing climate change, protecting public health, and ensuring that minorities and the poor are not overlooked. We think that EPA needs to take this opportunity to open the door for the use of high-octane, low-carbon fuels made with ethanol. In the following text of these comments, we lay out a high-level overview of what this request should focus on as well as a non-exhaustive list of supporting points and related fixes that EPA would do well to consider.

High-octane midlevel ethanol blends would enable more efficient vehicles, reduce greenhouse gas emissions, and reduce pollution.2 EPA's duty under the Clean Air Act is to protect the health of all Americans by use of commercially available methods. And it is thus irresponsible for EPA to ignore this option in regulating greenhouse gas emissions from cars and trucks. An improved gasoline blended with 25-30% Ethanol offers an immediate, low-cost program that offers substantial carbon and health risk reduction that will have the greatest impact in poor, urban areas. EPA must include this important option in those considered for adoption in the new rule with an immediate effective point of no later than 2025. [EPA-HQ-OAR-2021-0208-0248-A1, pp. 1-2]

EPA Should Mandate a Minimum Octane Standard Pursuant to Its Fuel Regulation Authority.

• EPA should phase out today's low-octane blends, as new vehicles are available to take advantage of the efficiency benefits of midlevel ethanol blends. EPA has acknowledged that CAA § 211(c) gives it authority to 'control' gasoline octane levels.3

• EPA can set a minimum octane level under CAA § 211(c)(1) because low-octane gasoline (1) impairs manufacturers' ability to further increase compression ratios to reduce CO2 emissions to meet the GHG standards and also (2) increases CO2 emissions in existing legacy vehicles.4

• The fact that EPA did not explicitly discuss this option does not mean that EPA cannot include octane in the final rule. Indeed, it would be arbitrary and capricious not to do so. EPA has flagged fuel-quality-related issues in the proposal, such as efficiency and particulate matter emissions. Internal combustion engines and the fuels they use comprise a single system, and automakers will not be able to develop engines that can take full advantage of the efficiency benefits of midlevel blends unless EPA acts promptly. If not now, when?

• If this rule does not address octane, EPA should move quickly to begin a separate rulemaking on this issue. [EPA-HQ-OAR-2021-0208-0248-A1, p. 2]

EPA Should Correct Its Inaccurate Fuel Economy Formula to Allow the Use of Midlevel Ethanol Blends.5

• EPA should repeal and replace its outdated fuel economy formula. EPA has admitted that part of that formula is erroneous and that it unfairly penalizes fuel with ethanol in it; but EPA has not yet fixed the problem. The problem is an important one because it discourages automakers from developing high-efficiency engines that require higher octane ratings and higher ethanol content.

• The fuel-economy calculation contains an 'R-factor,' which is intended to make fuel economy testing on today's certification fuel equivalent to fuel economy testing in 1975 by adjusting for varying energy content in certification fuels. The error is exacerbated with the addition of lower energy content ethanol. But as EPA has acknowledged, the current EPA-mandated R-factor of 0.6 is erroneous and fails to achieve its statutory purpose. The auto industry has asked EPA for an R-factor of 1.0. In response, EPA has acknowledged that the current R-factor is wrong and suggested that a corrected value might lie 'between 0.8 and 0.9.' This would be an improvement, but it would be even better if EPA simply abandoned the R-factor equation and simply use MPGe. [EPA-HQ-OAR-2021-0208-0248-A1, p. 3]

EPA Should Address Outstanding Tier-III Adjustment Issues.

• A closely related issue to greenhouse gas emissions regulation is the so-called 'Tier III adjustment,' a long-promised correction to that would re-align test results from greenhouse gas and CAFE fuel economy testing to account for EPA's 2014 change of laboratory test fuel to be more similar to the fuels actually used on the road. Until this change is made, EPA has acknowledged that there has been an effective change in the stringency of the greenhouse and CAFE standards.

• EPA has not acted on its May 2020 proposed rulemaking—with EPA now proposing new, more stringent greenhouse gas requirements, it is long past time that it make the necessary changes to test fuel requirements to ensure that the stringency requirements it sets will be measured in a way that corresponds to real-world engine efficiency. [EPA-HQ-OAR-2021-0208-0248-A1, p. 3]

EPA Should Reinstate the 0.15 ‘Volumetric Conversion Factor’ for FFVs.

• FFVs using E85 significantly reduce lifecycle carbon emissions because the carbon emissions produced in the combustion of ethanol are in large measure regenerated through crop-growing cycles. Under CAFE, the fuel efficiency of alternative fuel is divided by the 0.15 ‘volumetric conversion factor’ to account for this carbon regeneration.

• Until 2015, EPA allowed automakers to use the 0.15 volumetric conversion factor to improve greenhouse gas compliance. Its removal improperly decreases the greenhouse gas emissions calculations for FFVs because automakers must comply with both CAFE standards and EPA’s greenhouse gas standards. This has significantly reduced FFV production and, correspondingly, has decreased the greenhouse gas reductions that FFVs are able to contribute.

• EPA should reharmonize the 0.15 factor for FFVs as part of the new greenhouse gas rule. If it does not do so, it should tackle this issue in a separate rulemaking in the near future. [EPA-HQ-OAR-2021-0208-0248-A1, pp. 3-4]

High-Octane Midlevel Ethanol Blends Would Enable More Efficient High-Compression Engines and Would Reduce Greenhous Gas Emissions.6

• Scientific literature establishes that a 95 to 100 RON midlevel ethanol blend would enable vehicles with increased compression ratios and would reduce carbon dioxide emissions. Research also shows that 95 to 100 RON fuel with high sensitivity is ideal from an engine efficiency standpoint.

• Research by Prof. Mueller shows that greenhouse gas cuts that could be achieved by using higher-octane midlevel blends with ethanol equal those that EPA thinks are available from electrification. EPA is thus ignoring a very cost-effective way of achieving its desired improvements to the detriment of environmental quality, consumers, farmers, and industry.7 [EPA-HQ-OAR-2021-0208-0248-A1, p. 4]

This serves EPA’s important interest in protecting health; and, as EPA has separately stated in its September 2021 ‘Social Vulnerability Report,’ the negative effects of climate change are going to be felt most by the poor and racial minorities. [EPA-HQ-OAR-2021-0208-0248-A1, p. 4]

High-Octane Midlevel Ethanol Blends Would Reduce Vehicle and Fuel Costs for Consumers.9

• Including high-octane midlevel ethanol blends as a compliance option would reduce the cost of complying with the proposed standards, further reducing vehicle costs.

• Optimizing vehicles for high-octane midlevel ethanol blends would benefit consumers. Unlike today's premium gasoline, midlevel ethanol blends could be cheaper than regular gasoline, so consumers would save money at the pump.10

• EPA's proposal claims that consumers will see a benefit from having more fuel-efficient cars. However, this benefit will come at the expense of other attributes that purchasers want like higher horsepower or greater towing capacity. EPA wrongly assumes that consumers are unable to prioritize fuel economy in choosing a new vehicle. If it really wants to benefit consumers, EPA should open the door to mid-level blends, which would allow automakers to improve both fuel economy and power simultaneously and at low cost. [EPA-HQ-OAR-2021-0208-0248-A1, pp. 4-5]

High-Octane Midlevel Ethanol Blends Would Reduce Conventional Pollution.11

• Midlevel ethanol blends would reduce primary particulate matter pollution from GDI engines.

• Midlevel ethanol blends would reduce secondary particulate matter pollution caused by gasoline aromatics. This is important because lowering aromatics will reduce health risks, especially in disadvantaged communities throughout the country.12

• Midlevel ethanol blends would reduce or have no significant effect on other conventional pollutants. [EPA-HQ-OAR-2021-0208-0248-A1, p. 5]

High-Octane, Low-Carbon Midlevel Blends Are Available Now.

• Corn is abundantly available with no increased land use or challenged food supply. Production capacity is capable of supplying all needed ethanol for several years, and growing demand will encourage profitable production growth.

• Infrastructure is capable of supplying mid-level blends to the market without substantial investment. For example, underground storage tanks have been required to be compatible with E100 since about 1993.13 Above ground systems are trending strongly toward E25 compatibility at least as a result of rapid phase in of chip-reader pumps. [EPA-HQ-OAR-2021-0208-0248-A1, p. 5]

13 The only significant hurdle about underground storage tank systems concerns whether adequate documentation demonstrating compliance is available.

Commenter: NGVAmerica

All clean options must be advanced to make a collective difference beginning today. We can't afford to pick the wrong solution or leave out available solutions. It is imperative that regulatory incentives not be used as a weapon to ensure market dominance for any one technology or company. It is abundantly clear that regulatory incentives influence today's market decisions. Our industry would not be where it is without the Renewable Fuel Standard and clean fuel standard programs adopted by several states. These programs have proven extremely valuable in encouraging the development, production, and use of low-carbon fuels. It is also clear that regulatory incentives for electric vehicles have been disproportionately favorable to that technology (e.g., ignoring upstream emissions, providing sales multipliers, allowing credit trading from low-mileage vehicles to high-mileage vehicles, providing credits for fueling station capacity - not actual fuel use or emission reductions). It was revealing to hear the overwhelming opposition to regulatory incentives voiced during the August EPA hearing. Perhaps there would be less opposition to regulatory incentives if there was a much greater relationship between the performance of a technology and the level of credit it receives. [EPA-HQ-OAR-2021-0208-0214-A1, p.3]

EPA's motor vehicle standards also can and should be used to support vehicles that operate on lowcarbon fuels. If there are no vehicle incentives, there likely will be no vehicles – that is what we have seen in the U.S. market for light-duty natural gas vehicles. There is no imperative and no real incentive for OEMs to produce light-duty natural gas vehicles at this time. The limited demand for natural gas vehicles in this segment has only been sufficient to justify limited production runs (e.g., previously the Honda Civic, Chevrolet Cavalier) and conversions. Impending mandates related to zero emission vehicles and emission standards that only look at tailpipe emissions eliminate any appetite for automakers to consider other fuel options. Without significant incentives, natural gas vehicles are unlikely to return in this market segment in the U.S. Outside the U.S. in Europe, Asia, and South America there continues to be strong interest in natural gas vehicles with significant OEM offerings. [EPA-HQ-OAR-2021-0208-0214-A1, p.3]

Commenter: North Dakota Farmers Union (NDFU)

The National Highway Traffic Safety Administration's (NHTSA) Draft Supplemental Environmental Impact Statement on its recent proposal to revise fuel economy standards recognizes increased GHG benefits with higher blends of ethanol, as well as the ongoing reduced carbon intensity of corn ethanol.15 [EPA-HQ-OAR-2021-0208-0293-A1, p. 4]

EPA SHOULD INSTITUTE CREDITS TO SUPPORT VEHICLES THAT PROMOTE INCREASED USE OF RENEWABLE FUELS.

Congress established policies, which were intended to work together, to promote production of U.S. biofuels and, thereby, energy independence. These policies include the Renewable Fuel Standard (RFS) program, which has worked to support growth in the use of renewable fuels, including ethanol, since 2005.38 Although EPA has pointed to the RFS to explain why it need not support renewable fuels under its GHG requirements,39 EPA's GHG emission regulations should work hand-in-hand with the RFS program, supporting biofuels. Increased use of ethanol can support compliance with the proposed and future GHG standards. The agencies should restore or include incentives that can be provided to automakers to ensure vehicles being produced consider the increased use of renewable fuels.

One way to promote mid-level ethanol blends, and thereby higher-octane fuels, is to restore meaningful credits for FFVs and to establish a new incentive for engines optimized for efficiency on mid-level ethanol blends. FFV production has been impacted by EPA's unfair treatment compared to other alternative fuel vehicles. Incentives to stimulate the production of vehicles that produce the benefits sought, and reduce costs to consumers, are appropriate. NDFU appreciates EPA's guidance that it will retain an "F Factor" of 0.14 for E85 (rather than default to zero) until EPA revises its guidance. Information has been provided to EPA to support an increase in the F Factor to account for greater penetration of E85 in the marketplace.40 EPA should issue any guidance necessary to give automakers sufficient certainty for automakers to make appropriate investments and work to update this factor for later model years to continue to support FFVs.41 Based on EPA's current restrictions on mid-level ethanol blends, FFVs remain an important incentive to sell mid-level ethanol blends, supporting continued investment in retail and infrastructure to expand use as part of any transition to high octane fuels.

In addition, EPA has acknowledged that raising octane levels could enable "LDGHG standards that go beyond the 2025 standards."42 Thus, automakers that take action to move ahead of the curve should be able to obtain credits toward meeting the GHG requirements. Such incentives could be tied to use of higher ethanol blends as a certification fuel, thereby supporting those efforts to provide mid-level ethanol blends at the pump but also better ensure the benefits of these higher performing engines. Although EPA is proposing to restrict the credits under the program, it provides little incentives for these other clear solutions to address GHG emissions. EPA should not unduly restrict such incentives as it did with FFVs. Providing such incentives will create better benefits and move the country toward more efficient vehicles and higher octane, lower carbon fuels. It is also consistent with EPA's interpretation of its authority under section 202 to provide incentives to push new technologies. Introduction of these better performing fuels and engines are needed, and we believe consumers will reap the benefits and continue their use. [EPA-HQ-OAR-2021-0208-0293-A1, p. 8-10]

NDFU is concerned by the challenges that climate change poses to agricultural production. Farmers, ranchers and rural communities can contribute to climate resilience and help circumvent serious harms to the economy and human health. These efforts are supported by the biofuels industry that eases the burdens on farmers and provides additional markets to facilitate a move toward sustainable practices and climate mitigation actions. NDFU supports the use of ethanol as a fuel additive for gasoline formulations to enhance octane levels, especially moving toward use of mid-level blends of ethanol. Use of higher ethanol blends will provide significant benefits to the rural community and beyond.

Ethanol has superior octane-boosting properties and is an environmentally safer substitute for oil-derived, benzene-based octane enhancers. Mid-level ethanol blends (e.g., E20-E40) are the most economical high-octane fuels available today. In response to numerous comments suggesting various actions EPA should take to support and promote use of high octane fuels, such as mid-level ethanol blends,1 EPA stated that it "has given careful consideration to these comments and agrees that these commenters have identified both current and promising technologies that may be able to deliver significant improvements in reducing GHG emissions once fully deployed."2

Despite the widespread agreement regarding the need to move this country toward high octane fuels, including by auto manufacturers, and the numerous studies that have been presented to EPA on the benefits of mid-level ethanol blends, EPA's proposal for revising the GHG standards for light-duty vehicles fails to take these fuels into account. This ignores a key consideration. NDFU also understands EPA is planning to take additional actions to address emissions from vehicles. NDFU urges the Administration to promote high octane fuels through supporting mid-level ethanol blends in the final rule and in future rulemakings.

EPA MUST CONSIDER THE AVAILABILITY OF HIGH-OCTANE FUELS TO REDUCE GHG EMISSIONS FROM LIGHT-DUTY VEHICLES.

Automakers have been working on developing higher compression engines to improve thermal efficiency and thereby fuel economy. Studies have been presented to EPA that show the benefits of using high octane fuels on vehicle efficiency.3 Increased volume of ethanol increases the octane level of gasoline across grades. In addition to its higher octane level, ethanol also features high sensitivity and high heat of vaporization, which increase engine efficiency.4 In short, ethanol offers engine knock resistance at a lower cost than any other octane booster in gasoline. Higher ethanol blends can increase fuel octane without expensive refinery upgrades. A report issued by Oak Ridge National Laboratory, Argonne National Laboratory and the National Renewable Energy Laboratory cites increased vehicle efficiency, increased acceleration and significant reductions in GHG emissions among the demonstrated benefits of mid-level ethanol blend fuels.5 The study found that vehicle manufacturers could benefit from high octane, low carbon fuels as a means to meet future fuel economy and GHG requirements, and serve as a way to increase torque in performance applications. That study also found that feedstock availability and costs are not expected to be obstacles to the substantial development of a high-octane fuel market, with E40 providing the greater fuel cost savings.

EPA's proposal recognizes high compression engines as advancements in internal combustion engines (ICE), noting the availability of the "very cost-effective ICE technology that is in-use today and ready for broader application."6 For years, auto manufacturers have supported "bringing high octane fuels to market" that are aligned with these improved engine technologies and vehicles,7 recognizing "[h]igher-octane fuels are the cheapest CO2 [carbon dioxide] reduction."8 Recently, the Alliance for Automotive Innovation (Alliance), which represents automakers that produce nearly 99% of the new light-duty vehicles sold in the United States, acknowledged that vehicle improvements, along with high octane fuels, "should be encouraged as additional solutions as soon as possible to maximize environmental benefits across the fleet."9 The Alliance stated the use of high octane low carbon liquid fuels "would simultaneously support vehicle performance, including fuel economy, and further reduce greenhouse gas emissions"; these benefits "would be realized by new and existing internal combustion engines."10 These engines and high octane fuels, specifically mid-level ethanol blends, are not "crystal ball" technologies, but are technologically feasible and economically reasonable means to achieve better fuel economy and reduced GHG emissions available today.

Yet, it appears that EPA's proposal ignores the availability of high octane fuels to utilize high-compression ratio technology and advanced ICE technologies. These engine technologies can deliver the emissions reductions necessary to meet these and future GHG standards, but high octane fuels best optimize these technologies, and thereby optimize GHG reductions. Recent reports on climate change impacts indicate the very real need to reduce GHG emissions today. EPA's decision not to incorporate mid-level ethanol blends for reducing GHG emissions is a missed opportunity. We believe the refusal to even consider mid-level ethanol blends is an error. [EPA-HQ-OAR-2021-0208-0293-A1, p. 1-3]

MID-LEVEL ETHANOL BLENDS ARE COST-EFFECTIVE, HIGH OCTANE LOW CARBON FUELS THAT PROVIIDE NUMEROUS BENEFITS.

The alternatives to ethanol as an octane booster are petroleum-based.

Ethanol, however, is substantially cleaner than petroleum-based octane additives, and "using ethanol as the source of octane in future high octane fuels has the potential to significantly decrease petroleum refinery GHG emissions by reducing the energy intensity of the refining process."11 [EPA-HQ-OAR-2021-0208-0293-A1, p. 3-4]

It reduces emissions of particulate matter (PM) and air toxics such as benzene, toluene, and xylene. PM2.5 has been shown to contribute to a significant portion of premature deaths due to air pollution, and such emissions from gasoline are likely significantly underreported.12 [EPA-HQ-OAR-2021-0208-0293-A1, p. 4]

Importantly, increased ethanol use provides additional GHG emissions reductions, which is increasingly important as the carbon intensity of gasoline is increasing with greater use of unconventional fossil fuels. "Emissions from fossil fuel combustion comprise the vast majority of energy-related emissions," with an increase in emissions from the transportation sector largely attributed to increased vehicle miles travelled and motor gasoline consumption by lightduty vehicles.13 At the same time, energy use in ethanol production and lifecycle GHG emissions have decreased with changes in farming practices and increased intensification (e.g., higher yields). EPA has found, the land use, land-use change, and forestry sector resulted in a net increase in carbon stocks (i.e., net CO2 removals).14 [EPA-HQ-OAR-2021-0208-0293-A1, p. 4]

Previously, EPA has referenced purported challenges to transitioning to high octane fuels stemming from costs to consumers who drive vehicles designed for current regular octane grade fuel, contending the "net positive benefits could take many years."16 But, this has been disputed by automakers. In testimony before Congress, a representative of General Motors stated: "We believe increasing the minimum octane level in U.S. gasoline for new vehicles will be a win for all industries and, most importantly, consumers."17 "We have an opportunity to play a large role in offering consumers the most affordable option for fuel economy improvement and greenhouse gas reduction. We believe a higher efficiency gasoline solution with a higher Research Octane Number (RON) is very important to achieving this."18 Although that testimony referenced a lower RON than NDFU believes should be utilized, consumers would benefit from projected fuel cost savings, reduced price volatility, increased torque in performance applications, and the energy security and environmental attributes of mid-level ethanol blends. Based on information previously provided, EPA should be fully aware of the reduced costs of producing mid-level ethanol blends, where ethanol is less expensive than gasoline, decreasing costs at the pump.19 As noted, the National Renewable Energy Laboratory found costs to not be a limiting factor to increase biofuel use through requiring higher octane fuels.20 More recent information confirm the benefits to consumers as a result of increased biofuel use.21 [EPA-HQ-OAR-2021-0208-0293-A1, p. 4-5]

As noted above, the Alliance has recognized that high octane fuels can benefit existing vehicles. More recent analysis further supports that mid-level ethanol blends can be used in existing vehicles, alleviating concerns about any “transition” to use of higher octane fuels. A study conducted by North Carolina State University found that vehicles on the road today can adapt to mid-level ethanol blends.22 Researchers compared E10 (regular and premium) with E27 in one flexible fuel vehicle (FFV) and four non-FFVs and found all five vehicles adapted to each fuel. The study also found E27 can increase engine efficiency and reduce carbon monoxide (CO) and PM emissions. A study by the University of Nebraska Lincoln on use of E30 in non-FFVs used by the State of Nebraska also found the non-FFVs were able to adjust the air-to-fuel ratio to adapt to the higher oxygen content of E30, and E30 had no observable negative effect on overall vehicle performance.23 Comparing E15 to E30, the Nebraska report found that E30 use resulted in a 40% reduction in CO2 emissions and that E30 is cost-effective. These are benefits that can be achieved today, even in existing vehicles.

EPA CAN, AND SHOULD, UNDERTAKE REGULATORY REVISIONS TO PROMOTE MID-LEVEL BLENDS OF ETHANOL.

Mid-level ethanol blends are available today, as they are authorized for use in FFVs and provide cost savings to consumers. But regulatory barriers are preventing their wider use. While EPA should have considered the availability of high octane fuels in its revised proposal, additional regulatory actions by EPA also should be taken to promote use of mid-level ethanol blends.

Octane Fuel Requirements: First, as again stated by many at EPA’s public hearing on EPA’s proposal for revised light-duty vehicle GHG standards, EPA can use its authority under the Clean Air Act to approve and require specific octane levels, like 100 RON. Several comments have been submitted to EPA previously, outlining this authority.24 NDFU urges EPA to use its authority to approve and require higher octane in fuels under its Clean Air Act authority in Sections 202 and 211. EPA has acknowledged that 42 U.S.C. §7545(c) gives it authority to “control” gasoline octane levels.25

Certification Fuel Requirements: Second, EPA should ease the ability to use mid-level ethanol blends as certification fuel. EPA has acknowledged that mid-level ethanol blends can be approved as certification fuel under 40 C.F.R. §1065.701.26 EPA can make findings to facilitate use of mid-level ethanol blends as certification fuel but may need to make regulatory changes to ensure flexibility to use mid-level ethanol blends more generally. Because mid-level ethanol blends are “accessible, obtainable”27 in commerce today, EPA should make clear that mid-level ethanol blends meet the criteria in Section 1065.701(c) that the fuel be “commercially available.”28 EPA should also clarify that E30 is representative of mid-level ethanol blends to give retailers and automakers more flexibility in sales and engine design without imposing undue certification requirements for each blend level. Once EPA approves the certification fuel, the manufacturer should be able to make a determination that the approved fuel can be appropriately used in other model year vehicles without going through the waiver process under 42 U.S.C. §7545(f). Such flexibility may require updates to EPA's fuel registration process under 40 C.F.R. Part 79. [EPA-HQ-OAR-2021-0208-0293-A1, p. 5-7]

Fuel Economy Formula (R-Factor): Third, with approval of alternative certification fuels, EPA should also adjust the formula in 40 C.F.R. §600.113-12 used for determining fuel economy to ensure an appropriate R-factor and a multiplier in recognition of the lower carbon content of the proposed certification fuel. The current fuel economy equation includes adjustments meant to control for changes in the test fuel from testing in 1975 that affect fuel economy.29 One adjustment is known as the R-factor, which is intended to represent the response of a typical vehicle's fuel economy to small changes in the fuel's energy content.30 The current equation in the regulations uses an R-factor of 0.6 based on data from the 1980s. This factor fails to adequately adjust for changes in the test fuel with increased ethanol volume, as required by law.31 There has been support for making this change for years, and EPA has acknowledged that changes to the R-factor may be warranted.32 While EPA did propose a change in 2020 for E10,33 that proposed R-Factor (Ra=0.81) may still be too low, as there is ample information to show that the R-Factor should be "1" or closer to 1, which several commenters supported, including automakers.34 "With [a] correct R Factor, high-octane mid-level blends can offer real CAFE as well as GHG benefits."35 Making this adjustment would allow automakers to use the new test fuel for purposes of compliance with the fuel economy requirements without being unfairly penalized for using a test fuel with a lower energy content. [EPA-HQ-OAR-2021-0208-0293-A1, p. 7-8]

Reid Vapor Pressure: Fourth, EPA should work with the ethanol industry to resolve Reid Vapor Pressure (RVP) restrictions on using ethanol blends above E10 year-round. Ethanol itself has a low RVP rating, and, at higher blends, such as E30, the RVP should not be an issue, as the higher volume of ethanol counteracts potential increases based on the petroleum gasoline. NDFU appreciates EPA's recent efforts to address the RVP waiver for E15. While those efforts remain pending in litigation on appeal, those efforts did not adequately address mid-level ethanol blends. The ethanol and automotive manufacturing industries have also suggested an alternative approach to issuing a broader waiver; that is, imposing lower RVP limits on the petroleum gasoline blendstock to ensure available blendstock for higher blends of ethanol. While EPA referenced potential adverse impacts on fungibility of fuel, there is precedent showing the gasoline blendstock can be set at a lower RVP to protect against exceeding 9 psi to address air quality concerns.36 In either case, NDFU urges EPA to continue to work with the ethanol industry to find a solution to allow year-round sales, as the potential restrictions during the summer months will create practical restrictions to expanding the use of ethanol.37 [EPA-HQ-OAR-2021-0208-0293-A1, p. 8]

Substantially Similar Finding: Finally, EPA can also use its authority to approve mid-level ethanol blends for use under Clean Air Act section 211(f), 42 U.S.C. § 7545(f). Starting in 2017, gasoline emissions certification fuel now contains 10 percent ethanol. As such, section 211(f)(1) no longer limits ethanol blending in market fuel, as any ethanol blend, including mid-level ethanol blends, are “substantially similar” to a certification fuel. Moreover, given that the effects of gasoline/ethanol blends like E20, E25, and E30 are already well-known, it makes little to no sense for EPA to interpret the requirements of section 211 as rigidly and burdensome as it has done in the past for new fuels. EPA should issue an updated interpretation of “substantially similar” to confirm the ability to use these fuels. [EPA-HQ-OAR-2021-0208-0293-A1, p. 8]

EPA SHOULD INSTITUTE CREDITS TO SUPPORT VEHICLES THAT PROMOTE INCREASED USE OF RENEWABLE FUELS.

Congress established policies, which were intended to work together, to promote production of U.S. biofuels and, thereby, energy independence. These policies include the Renewable Fuel Standard (RFS) program, which has worked to support growth in the use of renewable fuels, including ethanol, since 2005.38 Although EPA has pointed to the RFS to explain why it need not support renewable fuels under its GHG requirements,39 EPA’s GHG emission regulations should work hand-in-hand with the RFS program, supporting biofuels. Increased use of ethanol can support compliance with the proposed and future GHG standards. The agencies should restore or include incentives that can be provided to automakers to ensure vehicles being produced consider the increased use of renewable fuels.

One way to promote mid-level ethanol blends, and thereby higher-octane fuels, is to restore meaningful credits for FFVs and to establish a new incentive for engines optimized for efficiency on mid-level ethanol blends. FFV production has been impacted by EPA’s unfair treatment compared to other alternative fuel vehicles. Incentives to stimulate the production of vehicles that produce the benefits sought, and reduce costs to consumers, are appropriate. NDFU appreciates EPA’s guidance that it will retain an “F Factor” of 0.14 for E85 (rather than default to zero) until EPA revises its guidance. Information has been provided to EPA to support an increase in the F Factor to account for greater penetration of E85 in the marketplace.40 EPA should issue any guidance necessary to give automakers sufficient certainty for automakers to make appropriate investments and work to update this factor for later model years to continue to support FFVs.41 Based on EPA’s current restrictions on mid-level ethanol blends, FFVs remain an important incentive to sell mid-level ethanol blends, supporting continued investment in retail and infrastructure to expand use as part of any transition to high octane fuels.

In addition, EPA has acknowledged that raising octane levels could enable “LDGHG standards that go beyond the 2025 standards.”42 Thus, automakers that take action to move ahead of the curve should be able to obtain credits toward meeting the GHG requirements. Such incentives could be tied to use of higher ethanol blends as a certification fuel, thereby supporting those efforts to provide mid-level ethanol blends at the pump but also better ensure the benefits of these higher performing engines. Although EPA is proposing to restrict the credits under the program, it provides little incentives for these other clear solutions to address GHG emissions. EPA should not unduly restrict such incentives as it did with FFVs. Providing such incentives will create better benefits and move the country toward more efficient vehicles and higher octane, lower carbon fuels. It is also consistent with EPA’s interpretation of its authority under section 202 to provide incentives to push new technologies. Introduction of these better performing fuels and engines are needed, and we believe consumers will reap the benefits and continue their use. [EPA-HQ-OAR-2021-0208-0293-A1, p. 8-10]

EPA'S EMISSIONS MODELING SHOULD BE ADJUSTED TO BETTER ACCOUNT FOR THE BENEFITS OF ETHANOL FOR AIR QUALITY.

Ethanol Provides Air Quality Benefits, Which May Not Be Accurately Reflected in EPA's Current Models.

Ethanol, a renewable fuel, changes the emissions profile of gasoline, creating a cleaner, safer motor vehicle fuel. Real-world evidence shows use of ethanol blends reduces emissions of CO, PM, air toxics, and GHGs compared to burning petroleum gasoline. With higher octane fuels, and related engines discussed above, the motor fuel can burn even more efficiently. This results in better overall air quality than when vehicles burn conventional gasoline, significantly improving public health.

Concerns have been raised regarding the models used by EPA to determine emissions from fuels. Third-party reviews have shown that MOVES2014 may be inadequate as a tool for estimating the exhaust emissions of gasoline blends containing more than 10 percent ethanol. The model's results for mid-level ethanol blends have been shown to be inconsistent with other results from the scientific literature for both exhaust emissions and evaporative emissions, including results from real-world emissions testing.43 The problems with MOVES2014 have been tied to the model's use of data that misrepresents the actual parameters and composition of mid-level ethanol blends. While EPA recently released MOVES3, it is unclear if EPA made the appropriate adjustments to adequately reflect the benefits of blends above E10,44 and EPA should ensure its models are properly updated to do so.

Recent Assessments Show Continued Improvements in GHG Lifecycle Analysis, Finding Greater Emissions Reductions for Ethanol Compared to Petroleum Gasoline Than EPA Has Estimated.

The Energy Independence and Security Act of 2007 required EPA to conduct lifecycle GHG emissions analysis to identify the renewable fuels eligible to meet the various categories under the RFS program. EPA conducted this analysis for corn-based ethanol as part of the 2010 RFS rulemaking. Since that time, published studies and more recent data have improved the understanding of corn ethanol's lifecycle GHG impacts, showing much higher reductions in GHG emissions for corn ethanol compared to petroleum gasoline.45 As noted above, corn ethanol plants have become more efficient. In addition, U.S. farmers have responded to demand and concerns by moving toward sustainable practices and intensification, not land expansion. The land use aspect of EPA's analysis has not been experienced in the real world.46

Despite these advancements in lifecycle analysis, EPA has chosen not to acknowledge the significant overall benefits of increased ethanol use with respect to GHG reductions compared to petroleum-based gasoline. While requests to update the RFS lifecycle analysis have been rejected by EPA to date, the RFS statute includes specific parameters of how that analysis must be conducted, and this should not limit EPA's analysis of GHG benefits of ethanol blends. These newer studies and data show greater emissions reductions associated with corn ethanol, which is even more pronounced where more unconventional sources and heavier crudes are being used for gasoline today than in 2005 – the baseline used under the RFS. EPA, however, has declined to consider the significant GHG impacts of burning petroleum gasoline and the benefits of increasing use of renewable fuels beyond tailpipe emissions. [EPA-HQ-OAR-2021-0208-0293-A1, p. 10-11]

Biofuels play an important role in supporting family farms, driving rural economic growth and reducing harmful emissions. NDFU supports continued efforts to address GHG emissions and, thereby, climate change and the climate resilience it brings to the food system. NDFU strongly encourages EPA to make appropriate regulatory changes to support increased use of mid-level ethanol blends, which are high octane, low carbon fuels. Virtually all parties, including EPA, acknowledge the GHG and fuel economy benefits of high octane fuels in more efficient engines, and the cost-effectiveness of using higher ethanol blends to meet the goals of these requirements. [EPA-HQ-OAR-2021-0208-0293-A1, p. 12]

38 EPA has fallen behind in enforcing the RFS volume mandates, negatively impacting biofuel producers. NFU appreciates EPA's efforts to get the program "back on track," and urges EPA to enforce the full "implied" conventional biofuel requirement of 15 billion gallons and increase the advanced biofuel volumes.

40 E85 Flexible Fuel Vehicle Weighting Factor (F-Factor) for Model Years 2021 and Later Vehicles; Notice, 85 Fed. Reg. 52,590 (Aug. 26, 2020) (noting EPA "has extended the use of the existing F-factor of 0.14 to model year 2020," which "will remain in place beyond MY2020 until such time as EPA adopts a revised F-factor based on new data and updated methodology"); see also EPA Aug. 20, 2020 Memo, E85 Flexible Fuel Vehicle Weighting Factor for Model Years 2020 and Later Vehicles, https://iaspub.epa.gov/otaqpub/display_file.jsp?docid=50843&flag=1.

Commenter: Noyes, James

[The following comments were submitted as testimony at the virtual public hearing on August 26, 2021. See Hearing Testimony – 26Aug2021, p. 262.]

I want to just provide the input to the agency that there are tremendous opportunities with flex fuel vehicles, with high-blend ethanol E85, with mid-level ethanol blends, and with other biofuels to provide greenhouse gas reductions that aren't currently integrated into the greenhouse gas proposed rule and are, frankly, carbon reductions left on the table. Within California, we've seen over 75 million metric tons of greenhouse gas reduction from the use of various low-carbon fuels and electricity over the last 10 years of the Low-Carbon Fuel Standard Program, and 85 percent of those reductions have been bio-based fuels, so we would very much encourage the agency to consider the value of these fuels. They can be utilized in existing internal combustion engines.

[The following comments were submitted as testimony at the virtual public hearing on August 26, 2021. See Hearing Testimony – 26Aug2021, p. 263.]

And, therefore, we think California provides an indication that the agency should take very seriously of how important decarbonizing the internal combustion side of the picture is, and also realizing that, to the extent that there's not the encouragement of flex-fuel vehicles, or mid-level ethanol blends, or other biofuels and technologies, then the default is to fossil fuel with the increased criteria pollutant emissions and the increased greenhouse gases from those fuels.

Commenter: Ohio Corn & Wheat Growers Association (OCWGA)

In his January 27, 2021 Executive Order on Tackling the Climate Crisis at Home and Abroad, President Biden acknowledged agriculture's "important role to play in combating the climate crisis and reducing greenhouse gas emissions, by sequestering carbon in soils, grasses, trees, and other vegetation and sourcing sustainable bioproducts and fuels." I applaud the administration's recognition of the vital role fuels such as cleaner burning, more cost-effective corn-based ethanol can play in immediately addressing climate change.

Unfortunately, the EPA has missed a critical opportunity to support the administration's priorities by denying consumers greater access to mid-level blends of ethanol. These fuels are proven to offer significant greenhouse gas (GHG) emission reductions and are available through existing infrastructure, mitigating the need for massive subsidies required to expand the use of other alternative fuels. As the agency finalizes this proposed rule, OCWGA urges the EPA to address the following shortfalls:

EPA Should Mandate a Minimum Octane Standard Pursuant to Its Fuel Regulation Authority

Current low-octane blends of fuel should be phased out as new vehicles are available to take advantage of the efficiency of mid-level ethanol blends. EPA has acknowledged that CAA § 211(c) gives it authority to "control" gasoline octane levels. EPA can set a minimum octane level under the above section of the Clean Air Act because low-octane fuels impair the ability of automakers to meet GHG standards, and also increase C02 emissions. To maximize GHG reductions, if octane levels are not addressed in this rule, we implore you to move quickly to begin a separate rulemaking on this important issue.

EPA Should Correct Its Inaccurate Fuel Economy Formula to Allow the Use of Mid-Level Ethanol Blends

EPA should repeal and replace its outdated fuel economy formula that is erroneous and unfairly penalizes fuel with ethanol in it. EPA has previously admitted these errors but has not taken action to fix the problem. EPA has also previously admitted that the R-Factor of 0.6 is outdated and the auto industry and other groups have suggested an adjusted R-Factor of 1.0. But again, the EPA has failed to address this issue in the rule.

EPA Should Address Outstanding Tier-III Adjustment Issues

EPA has long promised to correct testing methods of GHG and fuel economy testing to account for fuels actually used on the road today. EPA has not acted on this rulemaking proposed in May of 2020, and it is past time that the agency acts on this to ensure testing corresponds to real-world engine efficiency and fuels that are actually used on the road today.

EPA Should Reinstate the 0.15 F-Factor for Flex Fuel Vehicles (FFVs)

FFVs using E85 significantly reduce lifecycle carbon emissions because much of the carbon emitted was regenerated from the atmosphere through the production of the feedstock crop (i.e. corn). This conversion factor allows automakers to utilize this credit while adjusting for E85 utilized in FFVs as to not overestimate carbon reductions. Until 2015, EPA allowed automakers to use the 0.15 conversion to improve GHG compliance. Without certainty in this credit, automakers have produced fewer FFVs, which reduces the potential GHG savings from FFVs. If the F-factor level is not addressed in this rule, we implore you to move quickly to begin a separate rulemaking on this important issue.

Ohio’s corn and grain producers have been on the front line of stewardship, conservation, and clean energy for decades. Technological advances and best management practices have positioned corn as a sustainable, reliable, and economically viable feedstock. Coupled with the advances in fueling infrastructure and modern engine technology, ethanol is positioned to deliver immediate environmental value today – while providing a cost-effective solution for hard working American consumers. In closing, I urge the EPA to recognize the role high octane, mid-level blends of ethanol can, and do, play in meeting the administration’s goals for immediate and long-term reduction in GHG emissions and delivering an “equitable, clean energy future.” [EPA-HQ-OAR-2021-0208-0217-A1, p. 1-2]

Commenter: Pearson Fuels

Summary

As the U.S. Environmental Protection Agency (EPA) completes the development of the Revised 2023 and Later Model Year Light-Duty Vehicle Greenhouse Gas Emissions Standards (the “Revised Standards”), Pearson Fuels recommends that the Agency incorporate specific compliance flexibilities that enable attainment of EPA’s carbon dioxide emissions (GHG) standards while providing real-world petroleum and GHG reductions. While Pearson Fuels is not taking a position on the stringency of the standards, we are providing comment on the importance of compliance flexibilities to enable manufacturers to cost- effectively meet the final GHG standards established in this process. In particular, we express concern that EPA is proposing to adopt Revised Standards that completely overlook the GHG reduction capabilities of a proven fuel used in the internal combustion engine that completely dominates the US market while providing extremely favorable treatment and placing complete reliance upon electric vehicles that made up less than 2% of new car sales in 2021.1

FFVs represent a key compliance flexibility that utilize a proven technology to cost-effectively achieve real-world petroleum and GHG reductions. FFVs are highly versatile in that these vehicles are approved by original equipment manufacturers (OEMs) to utilize blends of ethanol and gasoline that range from 0-85% ethanol, and are likewise federally certified to this range of fuel blends. Automakers can take advantage of FFVs to transition toward deployment of new efficient technologies requiring higher octane fuels in the range of 98 to 100 RON. E85 stations with blender pumps built to supply fuel to FFVs are uniquely capable of providing various ethanol blends to those future HOLC fueled vehicles that deploy advanced internal combustion engine technologies.

Restoring more harmonized FFV crediting between the Corporate Average Fuel Economy (CAFE) and GHG program structures would benefit automakers, consumers, and marketers by affording all a choice in the market and by establishing a diversified technology portfolio approach to decarbonization. FFVs deliver a wide array of real-world benefits when fueled with E85 or other gasoline-ethanol blends, including improved US energy security, support for the US farm economy, as well as significant reductions in GHG emissions.

Fuel marketers can take advantage of their existing FFV fueling infrastructure to service a wider range of vehicle fueling needs in the future. Consumers that purchase or currently have FFVs can have confidence that they have the flexibility to fuel with any gasoline-ethanol blend. And these same FFV consumers can respond to fuel market signals by utilizing high blend E85 ethanol when the fuel is at the greatest discount to petroleum, midlevel ethanol blends to obtain optimal engine performance, and conventional gasoline in the event that ethanol prices are relatively high as compared to gasoline.

These are all vital flexibilities to a successful evolution of the vehicle market and to achieving the goals of the GHG rulemaking – increased efficiency, improved energy security, reduced costs to consumers, and reduced GHG emissions from the transportation sector.

Policy Benefits of FFVs

Blend Level Flexibility

There are approximately 22 million FFVs registered in the U.S. today. 2 This equates to a little less than 10 percent of the US gasoline powered vehicle fleet. The flexible capabilities of these vehicles support consumer choice at the pump. FFVs can legally and without any risk of regulatory or warranty breach use a wide range of any gasoline-ethanol blends up to 85 percent ethanol. This flexibility is good for the consumer, the retail fuel marketers, and supports state and federal renewable fuel requirements and policy objectives.

GHG Reductions

FFVs that utilize E85 also provide significant GHG benefits. Regardless of the blend ratio, ethanol reduces the overall GHG emissions as compared to conventional gasoline. The higher the blend, the more the benefits. From a lifecycle basis, the amount of GHG reduction compared to conventional gasoline is based on multiple factors including the type of feedstock utilized to produce the ethanol, the nature of the production process, the process energy utilized, and the production of other co-products. The most extensive certification system for determining the GHG reductions achieved by ethanol produced from different facilities has been developed by the California Air Resources Board (CARB) pursuant to the Low Carbon Fuel Standard (LCFS). CARB has certified 552 different ethanol pathways. The average GHG reduction that CARB has certified for corn starch ethanol is approximately 30 percent. For advanced cellulosic feedstocks, CARB has certified multiple pathways in the range of providing 60-80 percent GHG reductions.3 While precise GHG emission benefits vary, it’s safe to say that the higher the ethanol blend, the better the GHG benefit.

Air Quality Benefits

There are numerous studies that demonstrate the value of ethanol blends in reducing tailpipe emission that cause or contribute to air quality problems as well as reduction in emissions that pose hazards to consumers from direct exposure to toxic tailpipe emissions. Two recent studies demonstrate how ethanol blends can significantly improve air quality and protect public health. The separate studies were conducted by the North Carolina State University (NCSU) and the University of California Riverside (UCR). The independent studies were designed to evaluate tailpipe emissions using fuels similar to what consumers can buy at the gas station, instead of laboratory created test fuels.4

Today, nearly all of gasoline in the United States contains 10% ethanol (E10). These studies provide evidence that air quality can be significantly improved with blends in excess of E10. While both studies focused on tailpipe emissions, the UCR study also evaluated the impact emissions have on air quality after leaving the tailpipe. Researchers found ethanol blends reduce toxic emissions by up to 50%, including smog and ultra-fine particulates. The study also found that petroleum based aromatic compounds benzene and toluene that are used to boost octane directly raise emissions, while higher blends of ethanol added to gasoline boost octane while decreasing emissions. The UCR study compared E10, E30 and E85 fuels and found the best results with the higher ethanol blends.5

Cost Savings to the American

Public It is now clear that customers are embracing E85 fuel with the largest state gasoline market in the country showing 30% year on year growth in E85 sales. CARB has confirmed the rigor of its oversight program and the rate of E85 growth in a letter to Pearson Fuels that is attached as an exhibit to this comment. 6 The growth in demand for E85 from FFVs in the nation’s largest market is remarkable, surging from less than 6.5 MGY in 2012 to over 40 MGY in 2019. While E85 demand was flat in volume in 2020 compared to 2019, the fuel was continuing to increase market share at a time when demand for gasoline dropped dramatically due to the impact of COVID-19 on the market. Preliminary Pearson Fuels’ sales data through August 2021 suggests the growth rate for 2021 E85 sales has accelerated to exceed 35% year-on-year growth compared to 2020 and is on pace to exceed 55 million gallons statewide.

The primary reason E85 use is on the rise in California and across the entire country is a typical and crucial driver in the fuel market, price. At the retail level, U.S. FFV owners can fill up on

E85 and routinely save 10 percent or more compared to conventional unleaded on a price per mile basis. FFV owners previously unable to fuel with E85 because of limited availability are just now being exposed to a robust network of E85 stations offering steep price discounts to gasoline, and providing a cleaner fuel that simultaneously boosts octane, the farm economy, and U.S. energy security. E85's rapidly growing market appeal is not limited to California and is part of broader US market transition toward higher ethanol blends. This rapid growth in E85 demand is occurring at the same time that diminished FFV crediting under the GHG program has undercut the incentive for the automakers to manufacture FFVs. At a time when all effective GHG reduction technologies should be fully deployed, the lack of EPA recognition for FFV technology with the GHG program is having the opposite effect.

Vehicle Bridge to Advanced IC Engine Technologies

In addition to delivering petroleum reduction, costs savings, air quality benefits and GHG reductions, FFVs provide a vehicle bridge to advanced IC engine technologies that utilize HOLC fuels. The resulting policy imperative to support FFVs is well-expressed in a study authored by the National Renewable Energy Laboratory and Argonne National Laboratory:

"Original equipment manufacturers (OEMs) of light-duty vehicles are pursuing a broad portfolio of technologies to reduce CO2 emissions and improve fuel economy. Central to this effort is higher efficiency spark ignition (SI) engines, including technologies reliant on higher compression ratios and fuels with improved anti-knock properties, such as gasoline with significantly increased octane numbers. Ethanol has an inherently high octane number and would be an ideal octane booster for lower-octane petroleum blendstocks. (…) Thus the legacy FFV fleet can serve as a bridge by providing a market for the new fuel immediately, so that future vehicles will have improved efficiency as the new fuel becomes widespread. In this way, (High Octane Fuel) can simultaneously help improve fuel economy while expanding the ethanol market in the United States via a growing market for an ethanol blend higher thanE10."7

The ideal way to facilitate the transition from today's legacy fleet to new vehicles with advanced internal combustion engine technologies designed to run optimally on high-octane fuels is to utilize FFVs as bridge vehicles that can provide immediate demand for any ethanol blend, including midlevel ethanol blends (MLEB). Oak Ridge National Laboratory (ORNL) has investigated the use of high octane ethanol blends such as E25 and E30 in FFVs that are designed and compatible with ethanol blend levels from 0 to 85% and can therefore seamlessly and with OEM approval utilize midlevel ethanol blends. Key findings from ORNL include: "Experiments were performed with four FFVs using an E10 (92 RON) and E30 (100 RON) fuel. The two direct-injection FFVs demonstrated performance improvements for E30 compared to E10 of 2.5 to 3 percent, based on the 15-80 wide-open throttle acceleration time. Three of the four FFVs showed performance improvement with high-octane E30 compared to regular E10. (…) Marketing E25 or E30 to FFV owners as a performance fuel may enable greater utilization of ethanol in the near term and could help establish the refueling infrastructure to enable manufacturers to build dedicated vehicles designed for a high-octane midlevel ethanol blend."8

Infrastructure Bridge to HOLC Fuels

E85 stations provide an infrastructure bridge to fuel HOLC-fueled vehicles because E85 stations maintain high-blend ethanol in storage on site and typically utilize blender pumps that enable fueling of MLEB as well as E85. Existing E85 stations can be leveraged to rapidly establish a nation-wide MLEB fueling station network. E85 stations should be recognized as national infrastructure assets that have been developed and continue to be developed as a result of the highly-effective and longstanding partnership between the federal and state governments, fuel distributors, and the farming community to expand fuel ethanol production and use. This partnership coupled with other state and federal renewable fuel policies has successfully more than tripled U.S. ethanol production and domestic use between 2005-2020. 9 To enable the supply of higher ethanol blends including pumps that supply FFVs, the U.S. Department of Agriculture recently awarded 100 million dollars to install 4,880 blender pumps across twenty states. 10 These federal grants were matched by state funds and successfully expanded the national network of E85 stations with blender pumps that is immediately available to deliver FFVs.

Carbon Neutrality Cannot Feasibly be Achieved without FFVs:

On April 22, 2021, President Biden announced a “nationally determined contribution” pledge under the 2015 Paris climate agreement to cut U.S. GHG emissions in half by 2030 at a virtual climate summit attended by dozens of world leaders. In his remarks about the pledge from the White House, the President stated, “These steps will set America on a path of net zero emissions economy by no later than 2050.”11 Thus the President has re-established aggressive GHG reduction as a priority policy of the federal government.

The State of California has taken a leadership role in climate policy dating back to 2006, and has developed a network of policies and strategies to enable decarbonization. Consistent with this, Governor Jerry Brown signed Executive Order No. B-55-18 in 2018. The Executive Order established a new statewide goal to achieve carbon neutrality as soon as possible, and no later than 2045, and to achieve and maintain net negative emissions thereafter. Further to that goal, the California Legislature approved the Budget Act of 2019 (AB 74) that funded two studies, administered by the California Environmental Protection Agency, to: 1) identify strategies to reduce emissions from transportation energy use, and 2) identify strategies to manage the decline in fossil fuel production and associated emissions in parallel with reductions in demand. The study to reduce emissions from transportation use was conducted by the University of California Institute of Transportation Studies (“ITS”) at four campuses, UC Davis, UC Berkeley, UC Irvine, and UCLA.

The resulting ITS report is entitled, “Driving California’s Transportation Emissions to Zero.”12 While California leads the nation in electrifying transportation, the primary strategy developed in the report still recognized the reality that forcing all internal combustion engines off the road by 2045 is impossible in a free country. As a result, the Driving California’s Transportation Emissions to Zero report concluded that to achieve carbon neutrality it was necessary for California to make a complete transition by 2045 from petroleum-based gasoline to bio-based gasoline including ethanol blends as is illustrated in the following graph. Consistent with this forecast, Pearson Fuels is already supplying almost 100% renewable E-85 fuel into the California marketplace. The 15% portion of the gallon formerly consisting of gasoline is now renewable naphtha with the only remaining petroleum being the denaturant.13 The only existing vehicles that can utilize this type of bio-based gasoline are FFVs. GHG-reducing innovations in fuels as well as vehicles are necessary to meet President Biden's pledge and should be supported by the EPA's Revised Standards. [EPA-HQ-OAR-2021-0208-0289-A1, p. 2-7] [Graph # can be found on p. 7 of Docket number EPA-HQ-OAR-2021-0208-0289-A1]

Recommendations:

We encourage the Agency to re-affirm the policy value of FFVs and American ethanol production by restoring meaningful GHG crediting for the manufacture of FFVs by making the following modifications to the Revised Standards. These requested modifications are consistent with the requests made in the comment letter submitted to this proceeding by Growth Energy. Pearson Fuels fully supports the reasoning and authority contained in the Growth Energy comment.

1. EPA must recognize the full lifecycle net greenhouse gas emission reduction benefits of vehicles that use ethanol and other low-carbon fuel alternatives to gasoline.

2. EPA must make technical adjustments to better incentivize production and use of flexfuel vehicles (FFVs). Specifically, EPA must re-instate the volumetric conversion factor (VCF) for FFVs. Doing so provides incentives for all the main types of alternative fuel, low-carbon vehicles, not just a subset of EPA preferred technologies.

a. EPA must re-instate the VCF for FFVs based on the significant greenhouse gas emission reductions benefits of these FFVs.

b. The VCF avoids the adverse programmatic consequences of multipliers.

c. The VCF must be reinstated in the GHG program for FFVs in a manner similar to how it currently appears in the regulations for FFVs through model year 2015, which is a relatively straightforward regulatory fix.

Controlling Precedent:

The United States Supreme Court has held that, agency action such as rulemaking contemplated by the Notice of Proposed Rulemaking (NPRM) should be overturned when it "entirely failed to consider an important aspect of the problem." Motor Vehicle Mfrs. Ass'n v. State Farm, 463 U.S. 29, 43 (1983). As outlined in these comments, the NPRM has "entirely failed to consider" vehicle GHG issues in several critical ways. First, EPA generally failed to consider ethanol at all – and ethanol blended with gasoline at various levels fuels the vast majority of vehicles addressed by the NPRM. Second, EPA failed to consider flex fuels vehicles at all, and flex fuel technology enables the cost-effective conversion of spark ignition engines to utilize a significantly lower carbon fuel than gasoline. Finally, EPA failed address lifecycle greenhouse gas emissions, which is the full and appropriate measure of the very problem EPA seeks to address.

EPA has considerable latitude in establishing the framework of its vehicle greenhouse gas program. EPA developed this program under general authority of Clean Air Act section 202, following the 2007 United States Supreme Court decision Massachusetts v. EPA. Citing that case, the NPRM notes that "Once EPA makes the appropriate endangerment and cause or contribute findings … then section 202(a) authorizes EPA to issue standards applicable to emissions of those pollutants." (NPRM at 43,751). The NPRM there continues "Indeed, EPA's obligation to do so is mandatory."

What EPA cannot do is exercise this authority to reduce greenhouse gas emissions in an arbitrary and capricious way. EPA is arbitrary and capricious in entirely failing to consider fuel blends used by the vast majority of vehicles addressed by the rule, overlooking the potential value of flex fuel vehicles to achieve immediate GHG reductions, and ignoring the full lifecycle measure of the GHG pollutants at issue.

Conclusion

As EPA works to finalize the Revised Standards, we encourage a view toward the future to identify compliance flexibilities that offer the greatest opportunity for the market to evolve in a cost-effective, transparent and flexible manner. This approach includes considerations of future vehicle design and deployment but also recognizes the importance of proven technologies, policy continuity, and vehicles capable of facilitating a transition to more efficient internal combustion engines. FFVs utilize proven technologies to improve efficiency, save consumers and automakers money, reduce GHG emissions, improve US energy security, strengthen the US farm economy, and build a bridge to future technologies. Restoring fair and harmonized incentives for the manufacture of FFVs should therefore be a part of the Revised Standards.

Specifically, we request that EPA re-affirm the value of the FFV manufacturing programs by restoring a meaningful credit for future FFV production under the GHG program. A harmonized CAFE and GHG crediting system for FFVs will save American citizens money at the pump, reduce automaker costs, recognize real-world GHG and petroleum reductions, and re-establish continuity in federal policy in support of the U.S. ethanol and farm industries. [EPA-HQ-OAR-2021-0208-0289-A1, p. 7-9]

Commenter: Piper, Edward

It is also more easy to transport recoverable energy through liquid hydrocarbon fuels than batteries, natural gas, or hydrogen. A 5 gallon can of gas weighs about 30 lbs of fuel and for a vehicle that gets about 25 mpg, it contains about 125 miles of range. A few gallons of gas can easily be carried by hand if a vehicle runs out of energy or the vehicle is being taken to a place where a fueling station is not available. This would be harder to do with the other forms of energy. This is possible (even more so) with vehicles that use gasoline or diesel with better fuel economy, but higher fuel economy requirements will likely result in a larger portion of vehicles using an alternate energy sources only for which this is not possible. Hybrids get around this potential difficulty. [EPA-HQ-OAR-2021-0208-0520, p. 2]

Commenter: Price, Heather

[The following comments were submitted as testimony at the virtual public hearing on August 26, 2021. See Hearing Testimony – 26Aug2021, pp. 293-294.]

I used to think that hydrogen was going to be one of the main solutions, even gray and blue hydrogen, which I encourage you to look up if you don't understand what those are. The only solution if we're going to use hydrogen is if it is green hydrogen coming from clean electricity. In terms of biofuels, I used to run my 26 car on biodiesel, and through the work that I've been doing over the past 20 years, I've come to realize that biofuels are also a delay tactic. They are not a solution, that they produce the same air quality issues and air pollution, particularly NOx pollution, and, in some cases, more pollution.

[The following comments were submitted as testimony at the virtual public hearing on August 26, 2021. See Hearing Testimony – 26Aug2021, pp. 295-296.]

The other thing I want to mention quickly is RNG, which is called renewable natural gas, is also not a viable solution either in our pipelines or people's homes. This is a little bit different than the clean fuel standards for autos, but I think it's an important piece of the puzzle because a lot of companies are trying to say that RNG belongs in vehicles, too, and natural gas is not clean. It is a climate wrecking ball as it leaks. The latest IPCC report shows that it's 84 times more potent than carbon dioxide, and when that leaks over time, it turns into carbon dioxide which persists for centuries, acidifying our oceans, continuing to heat our planet. So, we really need true solutions.

Commenter: Renewable Fuels Association (RFA)

As an initial matter, RFA believes well-designed fuel economy and greenhouse gas standards can work in tandem with programs like the Renewable Fuel Standard (RFS) to significantly reduce fossil fuel consumption, improve public health, and combat climate change. If our nation is to reach its goal of net-zero GHG emissions by mid-century, we'll need both cleaner, more efficient cars and cleaner, more efficient fuels.

Unfortunately, EPA's proposal fails to recognize that the fuels we put into our engines can have as much—or more—impact on fuel economy and GHG emissions as the engine technologies themselves. We believe the proposal missed a critical opportunity to expressly solicit public comment on potential regulatory pathways for adopting high-octane, low-carbon liquid fuels as a means of improving fuel economy and reducing emissions from the light-duty vehicle fleet.

Recent studies and analyses, including the Department of Energy's comprehensive Co-Optima research program, clearly show that ethanol-based high-octane, low-carbon fuels can increase fuel efficiency by 5-10 percent and reduce lifecycle GHG emissions per mile by 9 percent or more when paired with the high-compression ratio engine technologies.

RFA also notes that EPA's technical assessment of the proposed CO2 standards suggests that 'broader availability' of high-compression ratio technologies will be necessary to achieve the 2023-2026 fuel economy requirements.1 EPA's proposal notes that an engine with high-compression, natural-aspiration, and direct injection is 'a very cost-effective internal combustion engine technology that is in use today and ready for broader application.'2

However, the proposal fails to mention that engines utilizing high-compression ratio technology will require higher-octane fuels to prevent premature fuel ignition. In other words, the proposed rule counts on broad deployment of high-compression ratio engines that will require high-octane fuel, but does nothing to ensure those high-octane fuels will actually be produced and available in the marketplace.

Because EPA is relying on these engine technologies to deliver the fuel efficiency gains and emissions reductions necessary to meet future standards, we believe discussion of the high-octane fuels that enable these technologies is well within the scope of this rulemaking process. Thus, we urge EPA to treat any written comments received regarding the role of high-octane, low carbon fuels as germane to this rulemaking, including these comments and those submitted by the High Octane Low Carbon Alliance.

With the actions described below, EPA's final rule for 2023-2026 tailpipe GHG emissions standards could provide a powerful incentive to automakers and fuel suppliers to rapidly adopt the internal combustion engine and high-octane fuel technologies that would deliver significant efficiency gains and emissions reductions.

• Require a transition to a higher minimum-octane gasoline (98-100 RON) for all new internal combustion vehicles. EPA has acknowledged it has the authority under the Clean Air Act to regulate minimum octane levels as a means of increasing fuel efficiency and reducing emissions. In response to previous proposed rulemakings establishing light-duty vehicle tailpipe GHG emissions standards, RFA has filed extensive written comments and technical reports with EPA regarding the ability of high-octane fuels to boost fuel economy and reduce both GHG emissions and criteria air pollutants. RFA hereby incorporates those comments by reference.3

At minimum, EPA should express its intent to consider adoption of a high-octane fuel standard as part of a future rulemaking to establish longer-term standards. According to the proposed rule, 'EPA expects that a future longer-term rulemaking will take critical steps to continue the trajectory of transportation emission reductions needed to protect public health and welfare.'4 If EPA fails to use the current rulemaking to establish a higher minimum octane standard, RFA encourages EPA to undertake a longer-term rulemaking (presumably establishing standards for 2027 and beyond) as soon as possible. At a minimum, the final rule for the 2023-2026 standards should include a statement expressing the agency's intent to consider adoption of a high octane (98-100 RON) fuel standard as part of a future longer-term rulemaking to establish standards for 2027 and beyond. [EPA-HQ-OAR-2021-0208-0525-A1, pp.1-3]

• Establish parity and consistency in the regulation of fuel volatility for ethanol and gasoline blends. There is no longer any justification for certain ethanolgasoline blends to have differing regulatory allowances for volatility, as measured by Reid vapor pressure (RVP). Nearly 30 years ago, EPA developed a 1-pound per square inch (psi) waiver of the RVP volatility requirements for certain gasoline blends. It did so in recognition of the fact that lower volatility blendstocks were not readily available in the marketplace and to encourage the increased use of renewable fuels.

Partially as a result of EPA's establishment of the 1-psi RVP waiver, renewable fuels are blended into nearly every gallon of gasoline sold in the country today. The waiver has indeed served its purpose, and today EPA should take action to effectively eliminate the relevance of the 1-psi RVP waiver. The Agency should use its authority to mandate that refiners market lower-RVP blendstocks for conventional gasoline in the summertime (i.e., 8.0 psi in attainment areas) thereby allowing retailers to market a full spectrum of renewable fuel blends appropriate for use in a range of vehicle technologies.

The 1-psi RVP waiver—originally provided to expand the production and use of fuel ethanol—is now having the perverse effect of discouraging greater ethanol use in today's gasoline market, and it is obstructing the successful implementation of important fuel and carbon reduction policies enacted since then, including the Renewable Fuel Standard.

Under the Clean Air Act, EPA has general authority to regulate the composition of fuels, see 42 U.S.C. § 7545(c), and it also has specific authority to mitigate any adverse effects on air quality based on the 'renewable volumes' required by the Act, id. § 7545(v). These sections provide the Agency with ample authority to effectively eliminate the waiver by requiring lower-RVP gasoline blendstocks, thereby reducing volatility across the board and removing the refining industry's last excuse for achieving the renewable volume requirements mandated by Congress, while at the same time assuring even greater reductions in urban ozone formation. Compelling refiners to produce lower-RVP blendstock would also complement public-private efforts—such as the U.S. Department of Agriculture's Higher Blends Infrastructure Investment Program—to expand renewable fuel distribution infrastructure. [EPA-HQ-OAR-2021-0208-0525-A1, pp.3-4]

• Approve a Mid-Level Ethanol Blend Certification Fuel: EPA should expeditiously approve the use of a mid-level ethanol certification fuel (e.g., E25-E30) to provide automakers with the added justification to design optimized, high compression vehicles that can make use of 98–100 RON gasoline. The certification of E25-E30 fuel will help automakers cost effectively meet Corporate Average Fuel Economy (CAFE) and GHG requirements by improving engine efficiency, reducing CO2, and reducing MSATs. [EPA-HQ-OAR-2021-0208-0525-A1, p.4]

• Reject the results of the EPAct/V2/E-89 Fuel Effects Study and suspend further use or development of the MOVES2014 model until a new emissions study based on appropriate test fuels is conducted. According to a number of independent third-party reviews, EPA's current vehicle emissions modeling system (MOVES2014) is inadequate and unreliable as a tool for estimating the exhaust emissions of gasoline blends containing more than 10% ethanol. This is important because state air agencies use the MOVES modeling system to demonstrate compliance with Clean Air Act requirements. In its current condition, the model discourages states from pursuing the use of higher ethanol blends as a strategy for reducing mobile source emissions. The flaws in MOVES2014 with regard to ethanol blends stem from the model's use of data from the EPAct/V2/E-89 Fuel Effects Study. RFA strongly recommends suspending further use or development of the MOVES2014 model until a new emissions study is conducted using test fuels that more accurately represent real-world fuel blends. A detailed analysis of the MOVES2014 model conducted by scientists from Wyle Laboratories and the Volpe National Transportation Systems Center concluded that, 'Overall, it was found that the predictive emissions results generated by MOVES2014 for mid-level ethanol blends were sometimes inconsistent with other emissions results from the scientific literature for both exhaust emissions and evaporative emissions…results and trends from MOVES2014 for certain pollutants are often contrary to the findings of other studies and reports in the literature.'5

Of particular concern is that the MOVES2014 model predicts increased exhaust emissions of nitrogen components and particulate matter as the ethanol content in gasoline increases, even though real-world emissions testing based on mid-level ethanol blends has shown distinctly opposite trends. 'The results from other researchers often show ethanol-related emissions trends that are different than the MOVES2014 results obtained for this study…' the Volpe study found. 'In some cases not only were magnitudes different but different [directional] trends were presented.' The model's questionable predictions for certain emissions results from its use of data that misrepresents the actual parameters and composition of midlevel ethanol blends. Specifically, the default ethanol blend data in the MOVES2014 model is based on arcane 'match blending' methods intended to 'match' specific fuel parameters, rather than 'splash blending' methods that are used in the real world. This data comes from the EPAct/V2/E-89 Fuel Effects Study. According to Wyle and Volpe experts, '…real-world splash blends may not have the same attributes as the modeled default match blends used in MOVES, and actual emissions may be different than the emissions predictions from MOVES.' [EPA-HQ-OAR-2021-0208-0525-A1, pp.4-5]

• Update EPA's Lifecycle Analysis of Corn Ethanol Greenhouse Gas (GHG) Emissions: In the 2010 pre-amble for the RFS2 final rule, EPA acknowledged that lifecycle GHG analysis is an evolving science, and that updates to the Agency's analysis would be undertaken as better data and methodologies became available. EPA wrote that it '…recognizes that as the state of scientific knowledge continues to evolve in this area, the lifecycle GHG assessments for a variety of fuel pathways will continue to change.'6 The Agency further stated that it '…plans to continue to improve upon its [lifecycle] analyses, and will update it in the future as appropriate…' and '…the Agency is also committing to further reassess these determinations and lifecycle estimates.'7

Yet, nearly 12 years after EPA promised to update its lifecycle analysis as newer data and better methods became available, the Agency has failed to honor its commitment. A recent analysis conducted by the U.S. Department of Energy found that average 2019-era corn ethanol reduced lifecycle GHG emissions by 44-52% compared to EPA's 2005 petroleum baseline.8 In contrast, EPA's analysis suggests 2022-era average corn ethanol will reduce lifecycle GHG emissions by only 21% relative to the 2005 baseline. RFA again calls upon EPA to update its outdated analysis of corn ethanol lifecycle GHG emissions. An updated analysis by EPA is necessary to help inform regulatory decision-making and public policy debates about the climate benefits of the RFS and renewable fuels in general.

• Level the playing field for GHG emissions credit generation for all alternative fuel vehicles, including flexible fuel vehicles (FFVs). Ethanol flex fuels like E85 used in FFVs have been proven to significantly reduce both tailpipe and full lifecycle GHG emissions. EPA should restore the approach to GHG standard compliance credit generation that was available to FFV manufacturers during the 2012-2016 CAFE/GHG standards regime. [EPA-HQ-OAR-2021-0208-0525-A1, p.5]

Action by the EPA will be necessary to catalyze the development and introduction of cleaner, more efficient fuels into the marketplace, just as EPA action was required to eliminate lead, limit benzene, and reduce the sulfur content of our gasoline and diesel fuel. We respectfully ask that EPA use the current rulemaking process and future rulemakings to take the actions requested above and to establish the roadmap for increasing the required minimum octane rating of our nation’s light-duty vehicle fuel. [EPA-HQ-OAR-2021-0208-0525-A1, pp. 5-6]

Commenter: Scholar, Reverend

To date, the transportation sector has been the largest source of climate pollution in the U.S., accounting for nearly onethird of our nation’s greenhouse gas emissions. Cars and light trucks in particular, account for about 45 percent of all U.S. oil consumption and about 20 percent of all U.S. greenhouse gas emissions. There is no reason why we should even be using petrol or fossil fuel products we can run cars, trucks, on solid hydrogen as demonstrated by Stan Ovshinsky. We can run trains and fly planes on biodiesel, we can even make plastic-like products from biomass cellulose products so there is no reason why we should be using petrol products at all. By not using biofuels you are hurting American Farmers. So please stop allowing drilling for oil, fracking for gas, which pollutes the atmosphere and destabilizes the earth's crust by drilling and fracking. We need to move toward a sustainable and renewable future. In addition, there are biofuels which would help American Farmers make money that are also available to be used for fuel so there is no reason for us to be using petrol at all. Fundamentally the use of petrol is old world moronic thinking. Are you a wise person or a moron, be a wise person and oppose such horrible environmental damage. We all live on this planet and we only have one planet we have to be as the bible says good stewards of the earth. Do not give into greed or for the lust of power, greed and the lust for power leads to perdition. If we do not invest in a green infrastructure then the United States of America will fall behind in these technologies. All new cars should be biodiesel hybrids this would go far to eliminate pollution. Countries like China will gain market share in these areas of business. If we have sustainable green energy we will always eternally have sustainable green energy. This is a wise decision to switch to clean energy so we will always have energy. With the recent computer hack on the Colonial Company pipeline I think that need for biofuels are even more prevalent please support such legislation. [EPA-HQ-OAR-2021-0208-0724-A1, p. 1]

Commenter: South Dakota Farmers Union (SDFU)

As a family farm organization, SDFU is particularly concerned with the challenges that climate change poses to agricultural production and family farmers' ability to pursue improvements in global food security. Farmers, ranchers 1 and rural communities can contribute to climate resilience and help circumvent serious harms to the economy and human health. These efforts are supported by the biofuels industry that eases the burdens on farmers and provides additional markets to facilitate a move toward sustainable practices and climate mitigation actions. Toward those ends, SDFU supports the use of ethanol as a fuel additive for gasoline formulations to enhance octane levels, especially moving toward use of mid-level blends of ethanol. Use of higher ethanol blends will provide significant benefits to the rural community and beyond. Disincentives to move toward higher ethanol blends by favoring other technologies limits these investments and benefits to farmers. S

DFU has called upon EPA to take immediate and concrete steps aimed at curbing greenhouse gas (GHG) emissions. Ethanol has superior octane-boosting properties and is an environmentally safer substitute for oil-derived, benzene-based octane enhancers. Mid-level ethanol blends (e.g., E20-E40) are the most economical high-octane fuels available today. In response to numerous comments suggesting various actions EPA should take to support and promote use of high octane fuels, such as mid-level ethanol blends, 2 EPA stated that it 'has given careful consideration to these comments and agrees that these commenters have identified both current and promising technologies that may be able to deliver significant improvements in reducing GHG emissions once fully deployed.'3 Recently SDFU's national organizational affiliate, the National Farmers Union, as part of the High Octane Low Carbon Alliance (HOLCA) led by former Senator Tom Daschle, joined with numerous organizations, calling for this Administration to address octane in the revised Light-Duty Vehicle GHG Emissions Standards. 4

Despite the widespread agreement regarding the need to move this country toward high octane fuels, including by auto manufacturers, and the numerous studies that have been presented to EPA on the benefits of mid-level ethanol blends, EPA's proposal for revising the GHG standards for light-duty vehicles fails to take these fuels into account. This ignores a key consideration. SDFU also understands EPA is planning to take additional actions to address emissions from vehicles. SDFU submits these comments to urge the Administration to promote high octane fuels through supporting mid-level ethanol blends in the final rule and in future rulemakings. [EPA-HQ-OAR-2021-0208-0250-A1, pp.1-2]

EPA MUST CONSIDER THE AVAILABILITY OF HIGH-OCTANE FUELS TO REDUCE GHG EMISSIONS FROM LIGHT-DUTY VEHICLES.

Automakers have been working on developing higher compression engines to improve thermal efficiency and thereby fuel economy. Studies have been presented to EPA that show the benefits of using high octane fuels on vehicle efficiency. 5 Increased volume of ethanol increases the octane level of gasoline across grades. In addition to its higher octane level, ethanol also features high sensitivity and high heat of vaporization, which increase engine efficiency.6 In short, ethanol offers engine knock resistance at a lower cost than any other octane booster in gasoline. Higher ethanol blends can increase fuel octane without expensive refinery upgrades. A report issued by Oak Ridge National Laboratory, Argonne National Laboratory and the National

Renewable Energy Laboratory cites increased vehicle efficiency, increased acceleration and significant reductions in GHG emissions among the demonstrated benefits of mid-level ethanol blend fuels.7 The study found that vehicle manufacturers could benefit from high octane, low carbon fuels as a means to meet future fuel economy and GHG requirements, and serve as a way to increase torque in performance applications. That study also found that feedstock availability and costs are not expected to be obstacles to the substantial development of a high-octane fuel market, with E40 providing the greater fuel cost savings.

EPA's proposal recognizes high compression engines as advancements in internal combustion engines (ICE), noting the availability of the 'very cost-effective ICE technology that is in-use today and ready for broader application.'8 For years, auto manufacturers have supported 'bringing high octane fuels to market' that are aligned with these improved engine technologies and vehicles,9 recognizing '[h]igher-octane fuels are the cheapest CO2 [carbon dioxide] reduction.'10 Recently, the Alliance for Automotive Innovation (Alliance), which represents automakers that produce nearly 99% of the new light-duty vehicles sold in the United States, acknowledged that vehicle improvements, along with high octane fuels, 'should be encouraged as additional solutions as soon as possible to maximize environmental benefits across the fleet.' The Alliance stated the use 11 of high octane low carbon liquid fuels 'would simultaneously support vehicle performance, including fuel economy, and further reduce greenhouse gas emissions'; these benefits 'would be realized by new and existing internal combustion engines.'12 These engines and high octane fuels, specifically mid-level ethanol blends, are not 'crystal ball' technologies, but are technologically feasible and economically reasonable means to achieve better fuel economy and reduced GHG emissions available today.

Yet, it appears that EPA's proposal ignores the availability of high octane fuels to utilize high-compression ratio technology and advanced ICE technologies. These engine technologies can deliver the emissions reductions necessary to meet these and future GHG standards, but high octane fuels best optimize these technologies, and thereby optimize GHG reductions. Recent reports on climate change impacts indicate the very real need to reduce GHG emissions today. It is not just a missed opportunity to incorporate use of mid-level ethanol blends as high octane fuel for reducing GHG emissions from light-duty vehicles, it is error to refuse to even consider it. [EPA-HQ-OAR-2021-0208-0250-A1, pp.2-4]

MID-LEVEL ETHANOL BLENDS ARE COST-EFFECTIVE, HIGH OCTANE LOW CARBON FUELS THAT PROVIDE NUMEROUS BENEFITS.

The alternatives to ethanol as an octane booster are petroleum-based. Ethanol, however, is substantially cleaner than petroleum-based octane additives, and 'using ethanol as the source of octane in future high octane fuels has the potential to significantly decrease petroleum refinery GHG emissions by reducing the energy intensity of the refining process.'13 It reduces emissions of particulate matter (PM) and air toxics such as benzene, toluene, and xylene. PM2.5 has been shown to contribute to a significant portion of premature deaths due to air pollution, and such emissions from gasoline are likely significantly underreported. 14

Importantly, increased ethanol use provides additional GHG emissions reductions, which is increasingly important as the carbon intensity of gasoline is increasing with greater use of unconventional fossil fuels. ‘Emissions from fossil fuel combustion comprise the vast majority of energy-related emissions,’ with an increase in emissions from the transportation sector largely attributed to increased vehicle miles travelled and motor gasoline consumption by light-duty vehicles. At the same time, energy use in ethanol production and l 15 ifecycle GHG emissions have decreased with changes in farming practices and increased intensification (e.g., higher yields). EPA has found, the land use, land-use change, and forestry sector resulted in a net increase in carbon stocks (i.e., net CO2 removals).16 The National Highway Traffic Safety Administration’s (NHTSA) Draft Supplemental Environmental Impact Statement on its recent proposal to revise fuel economy standards recognizes increased GHG benefits with higher blends of ethanol, as well as the ongoing reduced carbon intensity of corn ethanol. 17

Previously, EPA has referenced purported challenges to transitioning to high octane fuels stemming from costs to consumers who drive vehicles designed for current regular octane grade fuel, contending the ‘net positive benefits could take many years.’18 But, this has been disputed by automakers. In testimony before Congress, a representative of General Motors stated: ‘We believe increasing the minimum octane level in U.S. gasoline for new vehicles will be a win for all industries and, most importantly, consumers.’19 ‘We have an opportunity to play a large role in offering consumers the most affordable option for fuel economy improvement and greenhouse gas reduction. We believe a higher efficiency gasoline solution with a higher Research Octane Number (RON) is very important to achieving this.’20 Although that testimony referenced a lower RON than SDFU believes should be utilized, consumers would benefit from projected fuel cost savings, reduced price volatility, increased torque in performance applications, and the energy security and environmental attributes of mid-level ethanol blends. Based on information previously provided, EPA should be fully aware of the reduced costs of producing mid-level ethanol blends, where ethanol is less expensive than gasoline, decreasing costs at the pump.21 As noted, the National Renewable Energy Laboratory found costs to not be a limiting factor to increase biofuel use through requiring higher octane fuels. 22 More recent information confirm the benefits to consumers as a result of increased biofuel use. 23

As noted above, the Alliance has recognized that high octane fuels can benefit existing vehicles. More recent analysis further supports that mid-level ethanol blends can be used in existing vehicles, which should reduce concerns about any ‘transition’ to use of higher octane fuels. A study conducted by North Carolina State University found that vehicles on the road today can adapt to mid-level ethanol blends.24 Researchers compared E10 (regular and premium) with E27 in one flexible fuel vehicle (FFV) and four non-FFVs and found all five vehicles adapted to each fuel. The study also found E27 can increase engine efficiency and reduce carbon monoxide (CO) and PM emissions. A study by the University of Nebraska Lincoln on use of E30 in non-FFVs used by the State of Nebraska also found the non-FFVs were able to adjust the airto- fuel ratio to adapt to the higher oxygen content of E30, and E30 had no observable negative effect on overall vehicle performance.25 Comparing E15 to E30, the Nebraska report found a 40% reduction in CO2 emissions and that E30 is cost-effective due to the increased use of ethanol. Thus, these are benefits that can be achieved today, even in existing vehicles. [EPA-HQ-OAR-2021-0208-0250-A1, pp.4-6]

EPA CAN, AND SHOULD, UNDERTAKE REGULATORY REVISIONS TO PROMOTE MID-LEVEL BLENDS OF ETHANOL.

Mid-level ethanol blends are available today, as they are authorized for use in FFVs and provide cost savings to consumers. But regulatory barriers are preventing their wider use. While EPA should have considered the availability of high octane fuels in its revised proposal, additional regulatory actions by EPA also should be taken to promote use of mid-level ethanol blends, as previously explained by SDFU, among others.

Octane Fuel Requirements: First, as again stated by many at EPA's public hearing on EPA's proposal for revised light-duty vehicle GHG standards, EPA can use its authority under the Clean Air Act to approve and require specific octane levels, like 100 RON. Several comments have been submitted to EPA previously, outlining this authority. 26 While SDFU expects other comments on this proposal also will further address EPA's authority to approve and require higher octane in fuels under its Clean Air Act authority in Sections 202 and 211, which SDFU supports, EPA has acknowledged that 42 U.S.C. §7545(c) gives it authority to 'control' gasoline octane levels. 27

Certification Fuel Requirements: Second, EPA should ease the ability to use mid-level ethanol blends as certification fuel. EPA has acknowledged that mid-level ethanol blends can be approved as certification fuel under 40 C.F.R. §1065.701.28 SDFU, among others, previously explained how EPA can streamline the approval process for mid-level ethanol blends, as high octane fuels, to be certification fuels.29 As explained, EPA can make findings to facilitate use of mid-level ethanol blends as certification fuel but may need to make regulatory changes to ensure flexibility to use mid-level ethanol blends more generally. Because mid-level ethanol blends are 'accessible, obtainable'30 in commerce today, EPA should make clear that mid-level ethanol blends meet the criteria in Section 1065.701(c) that the fuel be 'commercially available.'31 EPA should also clarify that E30 is representative of mid-level ethanol blends to give retailers and automakers more flexibility in sales and engine design without imposing undue certification requirements for each blend level. Once EPA approves the certification fuel, the manufacturer should be able to make a determination that the approved fuel can be appropriately used in other model year vehicles without going through the waiver process under 42 U.S.C. §7545(f). Such flexibility may require updates to EPA's fuel registration process under 40 C.F.R. Part 79.

Fuel Economy Formula (R-Factor): Third, with approval of alternative certification fuels, EPA should also adjust the formula in 40 C.F.R. §600.113-12 used for determining fuel economy to ensure an appropriate R-factor and a multiplier in recognition of the lower carbon content of the proposed certification fuel. The current fuel economy equation includes adjustments meant to control for changes in the test fuel from testing in 1975 that affect fuel economy. One adjustment is known as the R-factor, which i 32 s intended to represent the response of a typical vehicle's fuel economy to small changes in the fuel's energy content.33 The current equation in the regulations uses an R-factor of 0.6 based on data from the 1980s. This factor fails to adequately adjust for changes in the test fuel with increased ethanol volume, as required by law.34 There has been support for making this change for years, and EPA has acknowledged that changes to the R-factor may be warranted.35 While EPA did propose a change in 2020 for E10,36 that proposed R-Factor (Ra=0.81) may still be too low, as there is ample information to show that the R-Factor should be '1' or closer to 1, which several commenters supported, including automakers.37 'With [a] correct R Factor, high-octane mid-level blends can offer real CAFE as well as GHG benefits.'38 Making this adjustment would allow automakers to use the new test fuel for purposes of compliance with the fuel economy requirements without being unfairly penalized for using a test fuel with a lower energy content.

Reid Vapor Pressure: Fourth, EPA should work with the ethanol industry to resolve Reid Vapor Pressure (RVP) restrictions on using ethanol blends above E10 year-round. Ethanol itself has a low RVP rating, and, at higher blends, such as E30, the RVP should not be an issue, as the higher volume of ethanol counteracts potential increases based on the petroleum gasoline. SDFU appreciates EPA's recent efforts to address the RVP waiver for E15. While those efforts remain pending in litigation on appeal, those efforts did not adequately address mid-level ethanol blends. The ethanol and automotive manufacturing industries have also suggested an alternative approach to issuing a broader waiver; that is, imposing lower RVP limits on the petroleum gasoline blendstock to ensure available blendstock for higher blends of ethanol. While EPA referenced potential adverse impacts on fungibility of fuel, there is precedent showing the gasoline blendstock can be set at a lower RVP to protect against exceeding 9 psi to address air quality concerns.39 In either case, SDFU urges EPA to continue to work with the ethanol industry to find a solution to allow year-round sales, as the potential restrictions during the summer months will create practical restrictions to expanding the use of ethanol. 40

Substantially Similar Finding: Finally, EPA can also use its authority to approve midlevel ethanol blends for use under Clean Air Act section 211(f), 42 U.S.C. § 7545(f). Starting in 2017, gasoline emissions certification fuel now contains 10 percent ethanol. As such, section 211(f)(1) no longer limits ethanol blending in market fuel, as any ethanol blend, including midlevel ethanol blends, are 'substantially similar' to a certification fuel. Moreover, given that the effects of gasoline/ethanol blends like E20, E25, and E30 are already well-known, it makes little to no sense for EPA to interpret the requirements of section 211 as rigidly and burdensome as it has done in the past for new fuels. EPA should issue an updated interpretation of 'substantially similar' to confirm the ability to use these fuels. [EPA-HQ-OAR-2021-0208-0250-A1, pp.6-9]

EPA SHOULD INSTITUTE CREDITS TO SUPPORT VEHICLES THAT PROMOTE INCREASED USE OF RENEWABLE FUELS.

Congress established policies, which were intended to work together, to promote production of U.S. biofuels and, thereby, energy independence. These policies include the Renewable Fuel Standard (RFS) program, which has worked to support growth in the use of renewable fuels, including ethanol, since 2005.41 Although EPA has pointed to the RFS to explain why it need not support renewable fuels under its GHG requirements,42 EPA's GHG emission regulations should work hand-in-hand with the RFS program, supporting biofuels. And this ignores how increased use of ethanol can support compliance with the proposed and future GHG standards. The agencies should restore or include incentives that can be provided to automakers to ensure vehicles being produced consider the increased use of renewable fuels.

One way to promote mid-level ethanol blends, and thereby higher-octane fuels, is to restore meaningful credits for FFVs and to establish a new incentive for engines optimized for efficiency on mid-level ethanol blends. FFV production has been impacted by EPA's unfair treatment compared to other alternative fuel vehicles. Incentives to stimulate the production of vehicles that produce the benefits sought, and reduce costs to consumers, are appropriate. SDFU appreciates EPA's guidance that it will retain an 'F Factor' of 0.14 for E85 (rather than default to zero) until EPA revises its guidance. Information has been provided to EPA to support an increase in the F Factor to account for greater penetration of E85 in the marketplace.43 EPA should issue any guidance necessary to give automakers sufficient certainty for automakers to make appropriate investments and work to update this factor for later model years to continue to support FFVs.44 Based on EPA's current restrictions on mid-level ethanol blends, FFVs remain an important incentive to sell mid-level ethanol blends, supporting continued investment in retail and infrastructure to expand use as part of any transition to high octane fuels.

In addition, EPA has acknowledged that raising octane levels could enable 'LDGHG standards that go beyond the 2025 standards.'45 Thus, automakers that take action to move ahead of the curve should be able to obtain credits toward meeting the GHG requirements. Such incentives could be tied to use of higher ethanol blends as a certification fuel, thereby supporting those efforts to provide mid-level ethanol blends at the pump but also better ensure the benefits of these higher performing engines. Although EPA is proposing to restrict the credits under the program, it provides little incentives for these other clear solutions to address GHG emissions. EPA should not unduly restrict such incentives as it did with FFVs. Providing such incentives will create better benefits and move the country toward more efficient vehicles and higher octane, lower carbon fuels. It is also consistent with EPA's interpretation of its authority under section 202 to provide incentives to push new technologies. Introduction of these better performing fuels and engines are needed, and we believe consumers will reap the benefits and continue their use. [EPA-HQ-OAR-2021-0208-0250-A1, pp.9-10]

EPA'S EMISSIONS MODELING SHOULD BE ADJUSTED TO BETTER ACCOUNT FOR THE BENEFITS OF ETHANOL FOR AIR QUALITY.

Ethanol Provides Air Quality Benefits, Which May Not Be Accurately Reflected in EPA's Current Models.

Ethanol, a renewable fuel, changes the emissions profile of gasoline, creating a cleaner, safer motor vehicle fuel. Real-world evidence shows use of ethanol blends reduces emissions of CO, PM, air toxics, and GHGs compared to burning petroleum gasoline. With higher octane fuels, and related engines discussed above, the motor fuel can burn even more efficiently. This results in better overall air quality than when vehicles burn conventional gasoline, significantly improving public health.

Concerns have been raised regarding the models used by EPA to determine emissions from fuels. Third-party reviews have shown that MOVES2014 may be inadequate as a tool for estimating the exhaust emissions of gasoline blends containing more than 10 percent ethanol. The model's results for mid-level ethanol blends have been shown to be inconsistent with other results from the scientific literature for both exhaust emissions and evaporative emissions, including results from real-world emissions testing. 46 The problems with MOVES2014 have been tied to the model's use of data that misrepresents the actual parameters and composition of mid-level ethanol blends. While EPA recently released MOVES3, it is unclear if EPA made the appropriate adjustments to adequately reflect the benefits of blends above E10,47 and EPA should ensure its models are properly updated to do so.

Recent Assessments Show Continued Improvements in GHG Lifecycle Analysis, Finding Greater Emissions Reductions for Ethanol Compared to Petroleum Gasoline Than EPA Has Estimated.

The Energy Independence and Security Act of 2007 required EPA to conduct lifecycle GHG emissions analysis to identify the renewable fuels eligible to meet the various categories under the RFS program. EPA conducted this analysis for corn-based ethanol as part of the 2010 RFS rulemaking. Since that time, published studies and more recent data have improved the understanding of corn ethanol's lifecycle GHG impacts, showing much higher reductions in GHG emissions for corn ethanol compared to petroleum gasoline.48 As noted above, corn ethanol plants have become more efficient. In addition, U.S. farmers have responded to demand and concerns by moving toward sustainable practices and intensification, not land expansion.

Despite these advancements in lifecycle analysis, EPA has chosen not to acknowledge the significant overall benefits of increased ethanol use with respect to GHG reductions compared to petroleum-based gasoline. While requests to update the RFS lifecycle analysis have been rejected by EPA to date, the RFS statute includes specific parameters of how that analysis must be conducted, and this should not limit EPA's analysis of GHG benefits of ethanol blends. These newer studies and data show greater emissions reductions associated with corn ethanol, which is even more pronounced where more unconventional sources and heavier crudes are being used for gasoline today than in 2005 – the baseline used under the RFS. EPA, however, has declined to consider the significant GHG impacts of burning petroleum gasoline and the benefits of increasing use of renewable fuels beyond tailpipe emissions.

The family farm forms the backbone of this country. As discussed above, biofuels have played an important role in supporting family farms, which have faced significant pressure to stay in production from many sides and a struggling economy. SDFU supports continued efforts to address GHG emissions and, thereby, climate change and the climate resilience it brings to the food system. SDFU strongly encourages EPA to make appropriate regulatory changes to support increased use of mid-level ethanol blends, which are high octane, low carbon fuels. As has been shown by numerous studies, ethanol provides significant air quality benefits, in addition to providing much needed jobs and creating stability in markets providing benefits and promoting investments in the rural economy. Virtually all parties, including EPA, acknowledge the GHG and fuel economy benefits of high octane fuels in more efficient engines, and the costeffectiveness of using higher ethanol blends to meet the goals of these requirements. [EPA-HQ-OAR-2021-0208-0250-A1, pp. 10-12]

41 EPA has fallen behind in enforcing the RFS volume mandates, negatively impacting biofuel producers. NFU appreciates EPA's efforts to get the program 'back on track,' and urges EPA to enforce the full 'implied' conventional biofuel requirement of 15 billion gallons and increase the advanced biofuel volumes.

43 E85 Flexible Fuel Vehicle Weighting Factor (F-Factor) for Model Years 2021 and Later Vehicles; Notice, 85 Fed. Reg. 52,590 (Aug. 26, 2020) (noting EPA 'has extended the use of the existing F-factor of 0.14 to model year 2020,' which 'will remain in place beyond MY2020 until such time as EPA adopts a revised F-factor based on new data and updated methodology'); see also EPA Aug. 20, 2020 Memo, E85 Flexible Fuel Vehicle Weighting Factor for Model Years 2020 and Later Vehicles, https://iaspub.epa.gov/otaqpub/display_file.jsp?docid=50843&flag=1.

Commenter: Stellantis

Improve Fuels and Implement a Nationwide Low Carbon Fuel Standard - Improved liquid fuels will complement, not compete with, other technologies like electrification. Improving liquid fuels can provide significant reductions in GHG and non-GHG emissions from ICE equipped vehicles, engines and equipment while the EV market grows. In particular, octane is a critical fuel parameter for ICE vehicles, and low octane fuels remain a barrier to market introduction of more efficient ICE vehicles. EPA should take action and mandate a transition to higher minimum-octane gasoline (minimum 95- 98 RON) for all new ICE vehicles. Additionally, implementation of a national low carbon fuel standard could act as a market-based approach to decarbonizing transportation fuel and provide revenue sources to incentivize market adoption of EVs. Now is the time to treat vehicle and fuels as a system, and address the opportunities with new vehicles and the existing car parc, by undertaking a separate rulemaking that directly addresses liquid fuel opportunities. [EPA-HQ-OAR-2021-0208-0532-A1, p. 5]

Improve Fuels and Implement a Nationwide Low Carbon Fuel Standard

A wide range of fuel and vehicle technologies will be needed to achieve significant GHG reductions from the transportation sector going forward. Even with the push towards electrification, ICE vehicles are projected to represent a significant portion of industry sales in the future and persist in the car parc for decades to come. Improving liquid fuel is the largest remaining ICE 'system technology' lever. Improved liquid fuel can benefit the entire parc and need not rely on turnover or introduction of new vehicle onboard systems. Improved liquid fuel can provide significant reductions in GHG and non-GHG emissions from ICE equipped vehicles, engines and equipment that will complement (not replace) other technologies like electrification.

A broad spectrum of stakeholders recognizes the importance of improved liquid fuels. In 2020, the U. S. Department of Agriculture (USDA) announced the Higher Blends Infrastructure Incentive Program (HBIIP),47 which built upon previous USDA grants, to provide up to $100 million to expand the infrastructure and availability for higher blends of renewable fuels. Additionally, the U.S. Department of Energy's Bioenergy Technologies Office aims to advance biomass conversion and utilization technologies that can create cost effective, low-carbon biofuels and bioproducts.48 Domestically produced renewable biofuels support energy security and domestic jobs, while reducing GHG emissions.

The U.S. Congress seeks action to improve liquid fuels. On August 24, 2021 the ‘Next Generation Fuels Act of 2021’’,49 was introduced in the U.S. House of Representatives. The bill’s goal is, ‘to promote the use of low-carbon, high-octane fuels, to protect public health, and to improve vehicle efficiency and performance.’ The Next Generation Fuels Act of 2021 highlights one approach utilizing the improved liquid fuels pathway to facilitate increased fuel efficiency and reduced GHG emissions.

Stellantis and its predecessor companies have long advocated for cost effective liquid fuel improvements that enable increased fuel efficiency and reduced emissions. Stellantis supports the Alliance for Automotive Innovation (Auto Innovators) comments on improved liquid fuels and echoes Auto Innovators request for EPA to take action.50 Now is the time to treat vehicle and fuels as a system, and address the opportunities with new vehicles and the existing car parc, by undertaking a separate rulemaking that directly addresses liquid fuel opportunities.

EPA should undertake a comprehensive fuels rulemaking to;

• Transition to a higher minimum-octane gasoline (minimum 95–98 RON) for new ICE vehicles

• Implement a national low carbon fuel standard to increase use of lower carbon fuels in the car parc and to provide new revenue sources used to incentivize market adoption of zero emissions technologies

• Immediately eliminate sub-87 AKI octane fuels from the market to increase fuel efficiency and reduce GHG emissions

• Lower the sulfur cap of gasoline from 80 ppm to 20 ppm at the refinery gate to further reduce non-GHG emissions from ICE equipped vehicles and engines to improve air quality

• Cap summer vapor pressure of gasoline at 9.0 psi or less, regardless of ethanol content, to further reduce evaporative emissions from all ICE equipped vehicles, engines and equipment as E10 fuel is ubiquitous in the market

• Regulate the particulate forming tendency of market gasoline by eliminating the heavy aromatic fraction of gasoline, thereby reducing PM emissions from all ICE vehicles, equipment and engines to improve air quality for all

• Limit air toxics and their precursors from the fuel to improve air quality for all

• Preserve the future benefit of low carbon fuels by not implementing an E10 carbon adjustment factor, an action that effectively closes the door to future low carbon fuel GHG benefits

Improved liquid fuels are an important technology pathway that has been largely ignored. The improved liquid fuels pathway will facilitate increased fuel efficiency, reduced GHG and non-GHG emissions during the market transition to vehicle electrification. [EPA-HQ-OAR-2021-0208-0532-A1, pp. 30-32]

Commenter: Valero Energy Corporation (Valero)

If EPA is to fulfill its stated objective of reducing GHG emissions associated with the transportation sector consistent with its obligations under the Clean Air Act, it must fairly and transparently consider the full lifecycle emissions associated with all types of vehicles and fuel sources and provide a compliance demonstration methodology that fairly reflects all relevant factors and the true GHG emissions associated with them. [EPA-HQ-OAR-2021-0208-0601-A2, p.3]

Meanwhile, EPA completely overlooks the significant current and projected reductions in GHG emissions associated with the liquid transportation fuel pool that are occurring in response to the federal Renewable Fuel Standard ("RFS"),6 the California Low Carbon Fuel Standard ("LCFS"),7 and interest from shareholders to reduce GHG emissions associated with the production of fuels. Production of fuels with lower carbon intensity has already resulted in significant reductions in GHG emissions attributable to the domestic transportation fuel pool and, due to the continued implementation of the RFS and LCFS, we are seeing significant private investment in low-carbon fuel technologies that will further expand GHG reductions in the transportation economy. Indeed, renewable diesel reduces GHG emissions by up to 80% as compared with traditional diesel fuel, and EPA's own lifecycle analysis of renewable fuel pathways indicates a wide and ever-increasing range of fuel pathways achieving GHG reductions of 50-60% or more.8 Further, numerous companies involved in both exploration and production of crude oil as well as production of both renewable and nonrenewable liquid fuels, including Valero, have begun projects to sequester carbon, further reducing the GHG emissions associated with the transportation sector. These projects result in significant reductions in GHG emissions substantially earlier and at a lower cost than forcing the conversion of the transportation sector to electric vehicles only. Yet, the preamble to the proposed rule does not recognize the impact of these significant measures that are already in play or planned for near-term implementation. [EPA-HQ-OAR-2021-0208-0601-A2, p.3]

EPA is frank in the preamble that the standards currently proposed in this rulemaking as well as those under development for MY2027 and beyond aim to advance the policy goal articulated in President Biden's August 10, 2021 Executive Order 14037 ("EO") that 50 percent of all new passenger cars and light trucks sold in 2030 be zero-emission vehicles. However, it would be arbitrary for an agency to adhere blindly to aspirational directives in an executive order; the EO does not—and cannot—relieve EPA of the Congressionally directed duty to evaluate relevant information objectively, comprehensively, and fairly about the GHG emissions impacts of new motor vehicles and engines. To the extent the EO contravenes express Congressional mandates such as those under the RFS, as discussed further below, deference to the EO at the expense of the RFS renewable fuel volume mandates would violate separation of powers and the Administrative Procedure Act. [EPA-HQ-OAR-2021-0208-0601-A2, p.3]

Extension of multipliers for electric vehicles, coupled with absence of incentives for vehicles using lower-carbon fuels, arbitrarily subsidizes the electric vehicle industry while foregoing opportunities to incentivize equivalent or greater GHG reductions in the liquid fuel market.

This menu of alternatives is unreasonable because it considers incentives only for electric vehicle adoption while overlooking opportunities to create incentives for other GHG reduction measures that may provide greater and earlier emissions reductions. Emerging technology and fuel usage that facilitate lower GHG emissions needs promotion, and at a minimum should not be excluded from receiving equal treatment as electric vehicles. There is no justification for withholding incentives for other technology and fuels that reduce GHG emissions for internal combustion engines while ignoring the rather large GHG emission footprint associated with the production and charging of electric vehicles. [EPA-HQ-OAR-2021-0208-0601-A2, p.4]

EPA should develop a mechanism to incentivize and provide credit toward meeting the GHG emission standards based on vehicle efficiency improvements and reductions in lifecycle carbon intensity that could be applied fairly to all vehicle technologies and all fuel sources. This would be consistent with the objectives of the Energy Independence and Security Act of 2007 ("EISA") to promote GHG capture and storage options and the statutory mandate that EPA prescribe standards targeting "the emission of any air pollutant from any class or classes of new motor vehicles or new motor vehicle engines, which in its judgment cause, or contribute to, air pollution which may reasonably be anticipated to endanger public health or welfare," and would facilitate near-term advancement of affordable low-carbon fuels such as 95 RON that are likely to achieve widespread consumer adoption in a very short time frame.9 Because there is already a market for consumption of these fuels in the existing vehicle fleet, this would result in immediate reductions throughout the transportation fleet in addition to the reductions to be realized in new vehicles. [EPA-HQ-OAR-2021-0208-0601-A2, p.4]

Furthermore, the reductions in lifecycle carbon intensity associated with traditional renewable fuels can be enhanced significantly by use of carbon capture and storage ("CCS"). The Biden Administration and many state governments have recently taken an increased interest in CCS, and seek to encourage its use as a tool to decrease and offset CO2 emissions in the atmosphere. Therefore, while vehicles fueled by liquid fuels would not be zero-emissions vehicles, a multiplier encouraging their production would also encourage the further development and implementation of CCS. There are countless efforts to develop technology that can reduce or offset GHG emissions from internal combustion engines that may be abandoned if the EPA GHG standard is not structured in a way that allows those reductions to be counted. [EPA-HQ-OAR-2021-0208-0601-A2, pp.4-5]

EPA's proposed GHG standards must not compromise statutory mandates under the Energy Independence and Security Act. Clean Air Act § 202(a), cited as the basis for the current action as well as the anticipated rule for MY 2027 and beyond, provides nonspecific authority for EPA to prescribe standards applicable to the emission of pollutants from new motor vehicles or new motor vehicle engines based on a finding of endangerment. However, any action taken to implement EPA's general obligation under § CAA 202(a) must be consistent with EPA's very specific statutory mandates under the RFS, established pursuant to the Energy Independence and Security Act (EISA)." [EPA-HQ-OAR-2021-0208-0601-A2, p.5]

The RFS mandates that EPA issue regulations to provide for the applicable volumes of specific categories of renewable fuel as set forth in the statute. Numeric statutory volume mandates for each category of renewable fuel are listed only through 2022. However, the RFS directs that EPA, in coordination with the Secretaries of Energy and Agriculture, must determine applicable volumes of renewable fuel, advanced biofuel, cellulosic biofuel, and biomass-based diesel for 2023 and subsequent years, based on analysis of an extensive list of considerations detailed in CAA § 211(o)(2)(B)(ii), and subject to minimum volume mandates for certain categories of renewable fuels. Specifically, the RFS requires that the applicable volume for advanced biofuel must be at least the same percentage of the applicable volume of renewable fuel as in 2022, and the volume of biomass-based diesel must be at least one billion gallons.12 [EPA-HQ-OAR-2021-0208-0601-A2, p.5]

Additionally, the RFS mandates that the applicable fuel volumes for 2023 and subsequent years must be determined based on an analysis of:

(I) the impact of the production and use of renewable fuels on the environment, including on air quality, climate change, conversion of wetlands, ecosystems, wildlife habitat, water quality, and water supply;

(II) the impact of renewable fuels on the energy security of the United States;

(III) the expected annual rate of future commercial production of renewable fuels, including advanced biofuels in each category (cellulosic biofuel and biomass-based diesel);

(IV) the impact of renewable fuels on the infrastructure of the United States, including deliverability of materials, goods, and products other than renewable fuel, and the sufficiency of infrastructure to deliver and use renewable fuel;

(V) the impact of the use of renewable fuels on the cost to consumers of transportation fuel and on the cost to transport goods; and

(VI) the impact of the use of renewable fuels on other factors, including job creation, the price and supply of agricultural commodities, rural economic development, and food prices.13 [EPA-HQ-OAR-2021-0208-0601-A2, pp.5-6]

Because Congress has specifically directed EPA, EPA cannot promote the substantial or exclusive use of a technology that will frustrate the goals of the RFS. According to EPA's analysis, the proposed rule is projected to result in reducing gasoline consumption by nine million barrels (or 378 million gallons) in 2023, reducing gasoline consumption by 10% by 2050. However, EPA's analysis fails to recognize that most gasoline sold in the U.S. is E10. Thus, EPA's analysis of changes in fuel consumption overstates the reduction in petroleum-derived gasoline while overlooking entirely the reduction in renewable fuel consumption that would be expected to occur as a result of the proposed rule. Because it obscures the likely reduction in renewable fuel consumption that will occur as a result of the present rulemaking, EPA's analysis fails to address the impact of the proposed standard on availability of RINs needed to meet the mandates of the RFS. [EPA-HQ-OAR-2021-0208-0601-A2,p.6]

Further, while EPA projects that electric vehicles will represent only eight percent of the transportation vehicle market by 2026, EPA describes the proposed rule as a "critical building block for a comprehensive, multipollutant longer-term regulatory program implementing EPA's statutory authority under the CAA," signaling clearly that EPA plans to propose more aggressive measures to promote electric vehicles in the manner outlined by the EO. In developing the current and future standards, however, EPA must satisfy all of its statutory obligations under the Clean Air Act. Ironically, in over-incentivizing electric vehicles, EPA not only frustrates implementation of the RFS, it misses the opportunity to promote significant GHG-reducing opportunities that liquid fuels provide. [EPA-HQ-OAR-2021-0208-0601-A2, p.6]

Finally, as discussed above, the rule as currently proposed fails to create incentives for GHG capture and storage.

If it finalizes the proposed rule, EPA would also exceed its authority under the CAA by issuing a rule that will undermine performance of the RFS. The proposed rule contains more stringent emission standards than EPA has promulgated in the past. To accommodate for this increased stringency, EPA is extending and enhancing multipliers for electric vehicles, zero emissions vehicles, and other advanced technologies. EPA recognizes that meeting its more stringent standards is only possible if manufacturers make use of these multiplier incentives by producing more electric vehicles. Accordingly, this multiplier is designed to force transition of the light duty fleet to "zero emissions" technology. By not including similar incentives for renewable fuels, alternative fuel formulations, CCUS, and emerging technologies for internal combustion engines, the proposed rule arbitrarily forecloses greater and more timely GHG emission reduction opportunities in favor of electrification. [EPA-HQ-OAR-2021-0208-0601-A2,pp.7-8]

This is in clear conflict with the mandates of EISA. The expressly stated purpose of EISA and the RFS is "to increase the production of clean renewable fuels...."17 While EPA has broad authority to prescribe motor vehicle emission standards under Section 202(a)(1) of the CAA, its policy encouraging zero emissions vehicles at the expense of internal combustion engine vehicles is an overreach of its authority inconsistent with the statutory design of the CAA, and therefore unreasonable and not entitled to Chevron deference.[EPA-HQ-OAR-2021-0208-0601-A2,p.8]

EPA's authority to "prescribe... standards applicable to the emission of any air pollutant" 18 created by vehicles is not unfettered. EPA must not infringe on the goals of another section of Title II of the CAA. Courts generally "must ... interpret [a] statute 'as a symmetrical and coherent regulatory scheme,' and fit, 'if possible, all parts into an harmonious whole.'"19 Reading Title II of the CAA as a coherent regulatory scheme would lead to a different interpretation than EPA's: that the statute confers on EPA the power to issue emissions standards that address air pollutants from vehicles but only to the extent those standards do not interfere with EISA and the RFS' s goals of increasing production of renewable fuels. As such, the text and context of the CAA does not support EPA's interpretation. [EPA-HQ-OAR-2021-0208-0601-A2,p.8]

In conclusion, EPA's authorization under CAA § 202(a) to prescribe standards applicable to the emissions of air pollutants from motor vehicles and engines does not constrain the agency to a myopic focus on tailpipe emissions. In the proposed GHG emission standards for MY 2023-6, EPA has overlooked the opportunity to recognize and encourage development of liquid fuels that have inherently lower carbon intensities as well as opportunities to encourage offsets of GHG emissions. Emerging technologies involving carbon capture, efficiency, and blends of low carbon fuel components could result in substantially lower overall GHG emissions and could be ready more quickly for widespread consumer adoption. EPA's design of the GHG standard in a manner that treats only tailpipe emissions as relevant will lead to failure to properly identify the actual emissions of GHG associated with vehicles, passes up the opportunity to maximize GHG emission reductions, and will arbitrarily limit innovation and discourage investment in important developing technologies. Finally, by focusing only on tailpipe GHG emissions and by putting its thumb on the scale in favor of facilitating electric vehicle development, EPA has failed to properly consider the full costs and benefits of its rulemaking such as the environmental, social, and economic impacts associated with increased electricity demand and increased mineral mining and smelting. EPA's approach may very well lead to higher overall GHG emissions at almost certainly the highest cost for GHG reductions. [EPA-HQ-OAR-2021-0208-0601-A2,p.8]

Commenter: West, Brian

I support EPA’s commitment to regulating GHGs and feel strongly that all promising solutions should be pursued. Simply put, domestically produced biofuels provide the nation with improved energy security while also reducing GHG emissions. Adding a more substantial volume fraction of bio-derived fuels like ethanol to today’s gasoline offers a straightforward, low-cost approach to helping the automakers comply with tailpipe GHG regulations while further reducing GHGs. If the administration is serious about addressing climate change, it is imperative that this rule include an improved fuel component. EPA is obligated to protect public health by use of any and all readily available means. To not add an octane requirement at this time would be an appalling missed opportunity.

Countless research programs have shown that mid-level ethanol blends (e.g., E25 to E40) produced from today’s 87 AKI E10 will provide a low-cost, high-RON fuel that enables vehicle manufacturers to achieve improved efficiency. Establishing a minimum RON standard will give the manufacturers another tool for fuel economy/GHG compliance at lower cost to consumers. Renewable ethanol added to gasoline lowers the carbon intensity, and increased efficiency of the high-RON engines further reduces GHG emissions.

Years ago, EPA requested comment on a new high-octane ethanol blended fuel in the Tier 3 proposal:

“we allow vehicle manufacturers to request approval for … fuel such as a high-octane 30 percent ethanol … blend (E30) for vehicles … optimized for such fuel”

Despite wide ranging support for such an approach, EPA has taken limited action to improve certification fuel. While E10 certification fuel was defined under Tier 3 and began to phase-in for emissions compliance testing in model year 2017, many manufacturers are still using E0 for fuel economy certification due to the flawed “R-Factor” equation which unfairly penalizes oxygenated fuels. To put liquid-fueled vehicles on equal footing with electric vehicles and other alternatives, EPA should set the R factor to 1.0, or eliminate it altogether and use MPGge.

Recent analysis by Steffen Mueller at the University of Illinois Chicago shows that with a 95 RON minimum octane requirement for all new 2026 and newer vehicles, modest efficiency gains of 3% in millions of vehicles will save tens of millions of tonnes of GHG in the near term. This approach should be a key part of a robust “all of the above” strategy that is needed to complement BEV and other advanced technologies.

In closing, I strongly support EPA establishing a minimum octane standard for the United States as part of this rule. [EPA-HQ-OAR-2021-0208-0230-A1, p. 1-2]

Commenter: High Octane-Low Carbon Fuel Alliance (HOLC)

We strongly urge the agency to finalize the most stringent standards for model year (MY) 2026, and we urge the agency to signal in the final rule its intentions for 2027 and beyond to enable automakers to optimize the benefits of higher octane, lower carbon fuels in both new and existing internal combustion engines. [EPA-HQ-OAR-2021-0208-0262-A1, p. 1]

EPA Response

In response to questions regarding the use of E0 and the appropriate R-factor change for fuel economy and GHG emissions adjustments for Tier 3 E10 certification fuel, EPA notes that the Agency has proposed in a separate action adjustments to both the fuel economy equation and the CO2 results at 85 FR 28564, May 13, 2020; https://www.epa.gov/regulations-emissions-vehicles-and-engines/vehicle-test-procedure-adjustments-tier-3-certification.

EPA has determined that the other comments contained in this section are all out of the scope of this rulemaking.

26.2. Comments Regarding the California Waiver

Commenters Included in this Section

Americans for Prosperity
California Air Resources Board (CARB)
California Attorney General Office, et al.
City of Albuquerque, NM
Connecticut Department of Energy and Environmental Protection
Kreucher, Walter
Lucid USA, Inc. (Lucid)
Maine Department of Environmental Protection
Minnesota Pollution Control Agency (MPCA) and Minnesota Department of Transportation (MnDOT)
National Association of Clean Air Agencies (NACAA)
New Mexico Environment Department
Nissan North America, Inc.
Ohio Attorney General Office, et al.

Commenter: Americans for Prosperity

California and Section 177 States Have Reduced Less Emissions Through Top-Down Regulations and Mandates

California has reduced less transportation-related CO2 emissions than states that have avoided top-down transportation climate policies. Based on data from the U.S. Energy Information Administration21 from 2005 to 2018 Alabama, Kentucky, and Oklahoma have each reduced transportation-related CO2 emissions five times more than California. West Virginia has reduced transportation-related CO2 emissions 16 times more than California. While Wyoming has reduced emissions 24 times more than California.

Not only do California and Section 177 States' mandates fail to benefit the environment, but they also pick technological winners and losers that hurt the most vulnerable in society. This proposed rule will force automakers to do the same to stay compliant. This does little to benefit the environment when consumer preferences lie elsewhere. California environmental lawyer Jennifer Hernandez articled this argument well:

[T]he state needs to embrace the best available technology today, even if it's not zero carbon and stop making ill-considered technology choices that continue to result in higher pollution impact in disadvantaged communities. [California Air Resources Board] CARB has rejected rules that would mandate trucks powered by compressed natural gas or biogas, technologies that are feasible today and would both substantially reduce greenhouse gas emissions and improve air quality in low-income communities that are disproportionately affected by particulate air pollutants, in favor of an all-electric trucking fleet that is at best aspirational and may not be technically feasible at all in view of many experts.22

The proposed rule places a heavy emphasis on the California Framework with a lens of 'environmental exceptionalism', coming from a state that has continually mandated top-down regulations that achieve worse environmental outcomes and hurt the most vulnerable. This should sound the alarm for Americans. California and New York's (Section 177 state) top-down transportation climate policies have benefited the wealthiest in the state. Before the pandemic, half of the electric vehicles sold in the U.S. were purchased in California and New York.23 The Pacific Research Institute found that almost 80 percent of those utilizing EV tax incentives have incomes over $100,000, making it not just a corporate handout but also a transfer from all workers to wealthier Americans.24 The California Framework and failed top-down policies leave Americans behind and should not be gold standard for EPA to set national vehicle emissions regulations. A better way is to recognize and embrace bottom-up innovations, remove barriers to voluntary efficiency and environmental progress, reorient programs away from restrictions on new market entrants, and streamline permitting and licensing requirements for all types of energy innovation. [EPA-HQ-OAR-2021-0208-0226-A1, p. 5]

Commenter: California Air Resources Board (CARB)

CARB has consistently and vigorously opposed the actions by U.S. EPA to improperly withdraw a waiver of federal preemption for its standards.10 CARB encourages U.S. EPA to quickly finalize its proposal to restore California's waiver of preemption for its standards. [EPA-HQ-OAR-2021-0208-0643-A6, p.9]

Commenter: California Attorney General Office, et al.

The Nation's motor vehicles have been and continue to be a substantial source of harmful air pollution. More than half a century ago, Congress established a regulatory regime to reduce motor vehicle emissions. See Pub. L. 89-272 § 201, 79 Stat. 992, 992-93 (1965). Under this regime, EPA must promulgate 'standards applicable to the emission of any air pollutant from' new motor vehicles that 'cause, or contribute to, air pollution which may reasonably be anticipated to endanger public health or welfare.' 42 U.S.C. § 7521(a)(1). States are generally preempted from regulating new motor vehicle emissions. Id. § 7543(a). But because California had been regulating vehicular emissions long before Congress established and authorized federal standards, and because Congress recognized the value of California's leadership in this field, Congress directed EPA to waive preemption for California's new motor vehicle emission standards unless one of three, limited statutory bases for denying such a waiver are satisfied. Id. § 7543(b)(1). Other States may choose to adopt and enforce California's standards under certain conditions pursuant to Section 177 of the Clean Air Act. Id. § 7507.

The First GHG Standards for New Motor Vehicles and the First National Program

Consistent with this history and statutory scheme, California began regulating GHG emissions from new motor vehicles before EPA. In 2002, the California Legislature enacted a statute requiring the California Air Resources Board (CARB) to promulgate GHG standards for motor vehicles that, beginning with model year 2009, would 'achieve the maximum feasible and costeffective reduction' in these emissions. Cal. Health & Safety Code § 43018.5(a), (b). The

Legislature recognized both that light-duty vehicles (passenger cars and light-duty trucks) were responsible for 40% of the State's GHG emissions, A.B. 1493 § 1(e), and that the reduction of these (and other) GHG emissions was necessary to mitigate the extraordinary impacts of climate change in California, including threats to the State's water supply and food production, as well as increasing risks from catastrophic wildfires, id. § 1(c), (d)(1), (d)(4). In 2005, CARB finalized the first GHG standards for new motor vehicles in the United States, beginning with model year 2009. Cal. Code Regs. tit. 13, § 1961.1. CARB requested a waiver of preemption from EPA, and other States adopted California's GHG standards pursuant to Section 177.

Meanwhile, in 2003, EPA had denied a petition asking it to determine that GHG emissions from new motor vehicles endanger public health and welfare and to establish standards to reduce those emissions as required by Section 202(a). Massachusetts v. EPA, 549 U.S. 497, 511 (2007). In 2007, however, the Supreme Court invalidated EPA's denial of the petition, holding that GHGs are within the scope of air pollution covered by Section 202(a) and that EPA could not avoid regulation of those emissions by declining to determine whether they endanger public health and welfare. Id. at 528-534. Despite that decision, in 2008, EPA took the unprecedented step of denying California's request for a preemption waiver for its GHG emission standards. 73 Fed. Reg. 12,156 (March 6, 2008). California and others challenged that denial.

In response to Massachusetts, in 2009, EPA published its 'endangerment finding,' concluding 'that greenhouse gases in the atmosphere may reasonably be anticipated both to endanger public health and to endanger public welfare.' 74 Fed. Reg. 66,496, 66,497 (Dec. 15, 2009). EPA recognized public health risks, including changes in air quality, more frequent heat waves and other extreme weather events, and increases in food- and water-borne pathogens, id., as well as harms to public welfare, including threats to water supplies and water quality, id. at 66,497-98. EPA found that 'new motor vehicles and new motor vehicle engines contribute to the greenhouse gas air pollution' that gives rise to these threats. Id. at 66,496. This endangerment finding—which EPA has affirmed several times since 2009—requires EPA to regulate GHGs from new motor vehicles. 42 U.S.C. § 7521(a); see also Coal. for Responsible Regulation, Inc. v. EPA, 684 F.3d 102, 126-27 (D.C. Cir. 2012), rev'd in (unrelated) part by Util. Air Regul. Grp. v. EPA, 573 U.S. 302 (2014).

Also in 2009, EPA reversed its denial of California's preemption waiver for the State's GHG emission standards, permitting California and the Section 177 States to enforce those standards. 74 Fed. Reg. 32,744 (July 8, 2009). Thus, in 2009, some States were already regulating GHG emissions from new motor vehicles sold in their States, and nationwide federal regulation of those emissions was imminent.

The federal government then negotiated an agreement with California and major automakers that resulted in a 'National Program' of harmonized standards for vehicular GHG emissions and fuel economy. Chamber of Commerce v. EPA, 642 F.3d 192, 198 (D.C. Cir. 2011). Under this agreement, EPA and NHTSA conducted a joint rulemaking in which EPA promulgated the first federal GHG standards for new motor vehicles and NHTSA promulgated fuel-economy standards. 75 Fed. Reg. 25,324 (May 7, 2010). The standards covered model years 2012 through 2016. Id. at 25,324. California and EPA also aligned their respective GHG standards, and

California agreed to allow automakers to comply with its state standards by complying with EPA's. Id. at 25,327-28.

The Extension of the National Program

EPA, NHTSA, California, and major automakers later agreed to extend the National Program. In a 2012 joint rulemaking with NHTSA, EPA promulgated GHG standards for model years 2017-2025. 77 Fed. Reg. 62,624 (Oct. 15, 2012). Because NHTSA is limited to promulgating no more than five years of fuel economy standards at a time, 49 U.S.C. § 32902(b)(3)(B), NHTSA promulgated fuel-economy standards only for model years 2017-2021, 77 Fed. Reg. at 62,627. However, it announced 'augural' standards—harmonized with EPA's—for model years 2022-2025, finding they reflected 'NHTSA's current best estimate … of what levels of stringency might be maximum feasible in those model years.' Id. In 2013, EPA also granted California a preemption waiver for its Advanced Clean Cars program, which included, among other things GHG standards for model years 2017-2025 that were similar to EPA's. 78 Fed. Reg. 2,112 (Jan. 9, 2013).93

In the 2012 final rule, EPA explained it was responding 'to the country's critical need to address global climate change,' id. at 62,626-27, estimating the standards would prevent 'approximately 2 billion metric tons' of GHG emissions. Id. at 62,627. EPA found that 'a wide range of technologies' was already available for compliance, with further advancements and deployments anticipated. Id. at 62,631. Although the standards might add, on average, $1,800 to the cost of a new light-duty vehicle in MY2025, that cost would be dwarfed by fuel savings of $5,700 to $7,400 'for a net [vehicle] lifetime savings of $3,400 to $5,000.' Id. at 62,627. EPA and NHTSA projected 'net benefits to society … in the range of $326 billion to $451 billion.' Id.

The Mid-Term Evaluation

Automakers generally supported the standards but requested a mid-program review of the standards EPA set for model years 2022-2025. 77 Fed. Reg. at 62,636. EPA agreed, committing to conduct a 'Mid-Term Evaluation,' by April 2018, of the appropriateness of those later-year standards. Id. at 62,652. That evaluation was to be 'a collaborative, robust and transparent process, including public notice and comment' and would begin with, and be based on, a rigorous Technical Assessment Report (TAR) to be prepared jointly by EPA, NHTSA, and CARB. Id. at 62,784. EPA codified these commitments in its Mid-Term Evaluation regulation, identifying eight specific factors it would assess before determining whether the standards remained appropriate. 40 C.F.R. § 86.1818–12(h).

In July 2016, EPA, NHTSA, and CARB published their 1,217-page TAR. 81 Fed. Reg. 49,217 (July 27, 2016). They found that a 'wider range of [compliance] technologies' had become available at costs 'similar or lower, than those projected' when the standards were promulgated in 2012. California v. EPA, 940 F.3d 1342, 1347 (D.C. Cir. 2019) (cleaned up). Based in large part on the TAR and extensive public comments, EPA issued a 268-page Proposed Determination. Id. That Proposed Determination assessed the eight regulatory factors and concluded that the standards for model years 2022-2025 remained appropriate. 81 Fed. Reg.

87,927 (Dec. 6, 2016). EPA finalized that determination in January 2017. Final Determination on the Appropriateness of the Model Year 2022-2025 Light-Duty Vehicle Greenhouse Gas Emissions Standards under the Midterm Evaluation (January 2017)94; see also California, 940 F.3d at 1347.

’Following the transition in presidential administrations, EPA changed lanes.’ California, 940 F.3d at 1348. In March 2017, EPA announced that it would reconsider the final determination issued just two months earlier. 82 Fed. Reg. 14,671, 14,672 (March 22, 2017). In April 2018, EPA published an eleven-page Revised Determination concluding that the standards set in 2012 were no longer appropriate. 83 Fed. Reg. 16,077 (Apr. 13, 2018). The Administrator claimed, without support, that ‘uncertainty’ existed about the availability of compliance technologies, id. at 16,082, and asserted brand new, and unfounded, concerns about consumer costs, id. at 16,084. The Revised Determination contained only fleeting references to the TAR and failed to provide the detailed assessments of the eight factors required by 40 C.F.R. § 86.1818–12(h). E.g., 83 Fed. Reg. at 16,081-82, 16,085.

A number of parties (including many of the undersigned) challenged the Revised Determination. California, 940 F.3d at 1345. The Court held that the decision was not ‘final action,’ 42 U.S.C. § 7607(b)(1), and dismissed the petitions, California, 940 F.3d at 1353. Recognizing that EPA might revise its standards, and, in fact, had proposed to do so during the litigation, the D.C. Circuit and EPA’s counsel confirmed that EPA’s withdrawal of its 2017 Final Determination did not ‘eliminate any part of the existing administrative record’—including the TAR. California, 940 F.3d. at 1351. [EPA-HQ-OAR-2021-0208-0245-A1, pp.14-17]

93 California’s Advanced Clean Cars program also contained a provision that continued to allow automakers to comply with California’s GHG standards by complying with EPA’s, assuming EPA’s standards were ‘substantially as described’ in a July 2011 Notice of Intent EPA had issued. Letter from CARB Chair Mary Nichols (July 28, 2011) at 2; see also CARB Board Resolution 12-11 at 19, 20; CARB Board Resolution 12-21 at 8; CARB Staff Report: Initial Statement of Reasons for Rulemaking – Proposed Amendments to New Passenger Motor Vehicle Greenhouse Gas Emissions Standards for Model Years 2017-2025 (Sept. 14, 2012) at 4.

Commenter: City of Albuquerque, NM

Support New Mexico’s current efforts to adopt California’s advanced clean car standards; 6. Go into effect three years earlier – with model year 2023 – than New Mexico will be able to require compliance with the California advanced clean car standards; [EPA-HQ-OAR-2021-0208-0535-A1, p.2]

Commenter: Connecticut Department of Energy and Environmental Protection

National policies that push electrification are also important. While DEEP applauds President Biden’s executive order targeting 50% zero emission vehicle (ZEV) sales by 2030, EPA should work with California and the other 177 states to adopt standards with actual requirements for national ZEV sales targets. [EPA-HQ-OAR-2021-0208-0264-A1, p.2]

Commenter: Kreucher, Walter

MARKET PENETRATION OF EVS IS INCREASINGLY DRIVEN BY STATE ZEV MANDATES, WHICH ARE ‘RELATED TO’ FUEL ECONOMY STANDARDS AND, THUS, PREEMPTED UNDER EPCA 32919(A), AS THE SAFE RULE CORRECTLY ARGUES

EPA does not have the authority to grant a waiver to the State of California that effectively circumvents Federal statutes that preclude any Agency other than the Department of Transportation from issuing regulations related to vehicle fuel economy.

The SAFE Rulemaking3 correctly states: ‘California regulation of tailpipe CO2 emissions both through its GHG standards and ZEV program, conflicts directly and indirectly with EPCA and the CAFE program. Justice Roberts4, in his dissenting opinion in MASS v EPA rejects the California arguments that they are permitted to regulate fuel economy. EPCA expressly preempts State standards5 related to fuel economy. Tailpipe CO2 standards, whether in the form of fleet-wide CO2 limits or in the form of requirements that manufacturers selling vehicles in California sell a certain number of low- and no-tailpipe-CO2 emissions vehicles as part of their overall sales, are unquestionably related to fuel economy standards (one need look no further than the Agencies inclusion of the California ZEV mandate in the baseline for fuel economy standard setting). Standards that control tailpipe CO2 emissions are de facto fuel economy standards because CO2 is a direct and inevitable byproduct of the combustion of carbon-based fuels to make energy, and the vast majority of the energy that powers passenger cars and light trucks comes from carbon-based fuels.’

The current rulemaking attempts to erase the statute 49 U.S. Code § 32919 arguing that it did not possess the authority to issue ‘legislative’ rules. This is completely irrelevant. The plain reading of the statute precludes a state or any agency other than the Department of Transportation from issuing standards related to fuel economy. GHG standards and zero emission vehicle mandates are clearly related to regulating vehicle fuel economy.

‘Improving fuel economy means getting the vehicle to go farther on a gallon of gas; a vehicle that goes farther on a gallon of gas produces less CO2 per unit of distance; therefore, improving fuel economy necessarily reduces tailpipe CO2 emissions, and reducing CO2 emissions necessarily improves fuel economy. EPCA therefore necessarily preempts California’s Advanced Clean Cars program to the extent that it regulates or prohibits tailpipe CO2 emissions6.’

The EPCA preemption clearly applies not only to the tailpipe carbon dioxide standards but also to the ZEV mandate incorporated in California’s Advanced Clean Cars program.

California is not without policy options in its quest for reducing its carbon footprint. Notwithstanding its inability to regulate vehicle fuel economy, California 7 has an almost unlimited range of GHG policy tools at its disposal including: regulating State energy production and use, regulating the carbon content of fuel sold in the state, fiscal energy policy, regulating businesses, and upgrading its vast vehicle fleet to any number of alternative fuel powered vehicles or even to bicycles. What California cannot do is regulate fuel economy or its counterpart, tailpipe carbon dioxide. [EPA-HQ-OAR-2021-0208-0199-A1, pp. 4-5]

4 California's request for a waiver is based on a policy difference with the federal government. As ROBERTS, C. J., wrote in his dissenting opinion MASSACHUSETTS ET AL. v. ENVIRONMENTAL PROTECTION AGENCY ET AL 'Global warming may be a 'crisis,' even 'the most pressing environmental problem of our time.' Pet. for Cert. 26, 22. Indeed, it may ultimately affect nearly everyone on the planet in some potentially adverse way, and it may be that governments have done too little to address it. It is not a problem, however, that has escaped the attention of policymakers in the Executive and Legislative Branches of our Government, who continue to consider regulatory, legislative, and treaty-based means of addressing global climate change. Apparently dissatisfied with the pace of progress on this issue in the elected branches, petitioners have come to the courts claiming broad-ranging injury, and attempting to tie that injury to the Government's alleged failure to comply with a rather narrow statutory provision. I would reject these challenges as nonjusticiable.

7 The need for separate California tailpipe standards has already reached the point of diminishing returns. The EPA and CARB tailpipe standards for criteria pollutants are essentially the same. The policy objective of reducing the mobile source contribution to California's NAAQS compliance issues has reached the point where other policies (fiscal and otherwise reducing transportation demand) are far more effective.

Commenter: Lucid USA, Inc. (Lucid)

LUCID SUPPORTS A REGULATORY APPROACH THAT PROTECTS CALIFORNIA'S ROLE IN REGULATING GHG EMISSIONS AND PROMOTING ZEVS

Lucid strongly supports EPA's reinstatement of California's Clean Air Act waiver. California's ability to set GHG emissions standards that exceed the stringency of federal standards has clear benefits for the future of the Nation's climate policy.

Although California's specific air quality issues continue to require policies that are more stringent than national standards, California has also been a laboratory for emissions regulation mechanisms for the entire Nation. The federal government can learn from California's approaches, successes, and difficulties. California sets the pace for nationwide change by setting emissions standards that the Section 177 States also adopt, which will apply to approximately 40% of the nationwide light-duty sales.

Lucid encourages EPA to emphasize California's longstanding role as a pioneer in shaping air quality standards and regulating air pollution. In particular, Lucid encourages EPA to acknowledge the following in its final rulemaking:

the importance of California's GHG and ZEV regulatory programs in achieving the Administration's long-term electrification and zero emission goals;

California’s unique treatment under the Clean Air Act (and related regulatory history behind the provision), which allows California to seek a waiver of preemption; the Clean Air Act does not contemplate withdrawal or revocation of waivers granted under Section 209 (42 U.S.C. § 7543) and therefore EPA must reinstate the waiver; and the assertion that the Energy Policy and Conservation Act (EPCA) preempts regulation of GHGs by California’s ZEV and low-emission vehicle (LEV) programs is contrary to precedent, including Supreme Court precedent in Massachusetts v. EPA, 549 US 497, 532 (2007) ('The two obligations [to regulate fuel economy and greenhouse gas emissions] may overlap, but there is no reason to think the two agencies cannot both administer their obligations and yet avoid inconsistency.'). [EPA-HQ-OAR-2021-0208-0528-A1, p.4]

Commenter: Maine Department of Environmental Protection

Zero emission vehicle (ZEV) and GHG emission reduction technologies have seen rapid advancements since the 1990’s, and these technologies are now widely available and competitive with conventional vehicles in terms of both performance and cost. These technological advancements have been driven by efforts such as California’s 2012 Advanced Clean Cars (ACC) program. The ACC program was the first comprehensive effort to reduce GHG emissions from the light-duty vehicle (LDV) fleet and has now been successfully adopted by a number of additional states pursuant to Section 177 of the Clean Air Act, including Maine. [EPA-HQ-OAR-2021-0208-0225-A1, p.1]

Looking to the future, EPA should consider ambitious post-model year 2026 GHG standards consistent with proposals currently under consideration for California’s ACC II program. [EPA-HQ-OAR-2021-0208-0225-A1, p.2]

In 2019, as federal requirements were being relaxed under the SAFE Vehicles rule and California’s authority to adopt GHG emission standards was under challenge, California and 13 other states signed agreements with five major automakers to voluntarily meet the California 2026 GHG emission reduction targets across their national vehicle fleets,. The 2019 Framework Agreements call for a yearly decrease in GHG emissions of about 4 percent through model year 2026 and provide strong evidence that the technologies needed to meet the proposed GHG standards are both readily available and cost-effective. [EPA-HQ-OAR-2021-0208-0225-A1, p.2]

Commenter: Minnesota Pollution Control Agency (MPCA) and Minnesota Department of Transportation (MnDOT)

To protect the health of Minnesotans against potential damages from the SAFE rule, and to take important steps towards our statutory Next Generation Energy Act GHG emission reduction goals, in 2021 the MPCA adopted the Clean Cars Minnesota rule. This rulemaking adopted the Low-Emission Vehicle and Zero-Emission Vehicle Standards developed by California, as allowed under section 177 of the Clean Air Act. Section 177 provides an important authority to states to protect the health of their population and environment, and avoid regulatory whiplash from changing federal rules. The MPCA and MnDOT encourage EPA to move towards strong national standards that align the federal backstop with the section 177 states and California; protect state authorities under section 177; achieve substantial emissions reductions; and support rapid and broad electrification of the transportation sector, as well as the use of biofuels. 4 [EPA-HQ-OAR-2021-0208-0211-A1, p.2]

The MPCA and MnDOT continue to support strong national standards as a critical backstop for emissions reductions. States have the clear authority under section 177 of the Clean Air Act to adopt more stringent vehicle emissions standards that are identical to standards adopted by the State of California. This authority under section 177 is a critical regulatory mechanism for states to achieve the National Ambient Air Quality Standards, as well as their local climate, environmental justice, and air quality goals. While these authorities under section 177 are critical for states, GHGs emitted anywhere impact climate everywhere, so stringent national standards are absolutely necessary for the health and wellbeing of residents of Minnesota. [EPA-HQ-OAR-2021-0208-0211-A1, pp.3-4]

Commenter: National Association of Clean Air Agencies (NACAA)

Further, EPA should work to ultimately return to a national program that maintains the authority preserved to California and other states under the Clean Air Act; includes light-duty vehicle emission standards that are informed by science; is protective of the climate; is developed in close collaboration with state and local air agencies, including California; protects and preserves states' rights; and delivers emission reductions essential for achieving and/or maintaining environmental and public health goals. [EPA-HQ-OAR-2021-0208-0255-A1, p.2]

Overall, EPA should ultimately return to a national program that maintains the authority preserved to California and other states under the Clean Air Act; includes light-duty vehicle emission standards that are informed by science; is protective of the climate; is developed in close collaboration with state and local air agencies, including California; protects and preserves states' rights; and delivers emission reductions essential for achieving and/or maintaining environmental and public health goals. [EPA-HQ-OAR-2021-0208-0255-A1, p.8]

Commenter: New Mexico Environment Department

EPA proposed national standards support New Mexico's current efforts to adopt California's advanced clean car standards as permitted under Section 177 of the Clean Air Act. NMED and the City of Albuquerque will petition their respective air quality boards to adopt California advanced clean car standards before the end of this year. NMED anticipates that the EPA-proposed national emission standard, together with the Corporate Average Fuel Economy proposed by the National Highway Traffic Safety Administration will send a strong signal to the boards, stakeholders, and the public in New Mexico about the importance of reducing LDV tailpipe emissions. [EPA-HQ-OAR-2021-0208-0205-A1][pp.2-3]

Commenter: Nissan North America, Inc.

Moreover, Nissan encourages EPA and NHTSA to continue their efforts to coordinate the federal GHG emission and CAFE standards with the GHG and ZEV standards set by the California Air Resources Board ("CARB"), to develop a harmonized national program for automotive certification. In particular, Nissan believes it is important for EPA to work with CARB to clarify the relationship between the federal GHG standards, the California GHG standards, and the Framework Agreements between CARB and several automakers. Close coordination between these three regulatory entities would ensure that manufacturers can focus on developing the cleanest, most fuel efficient, and most affordable vehicles rather than on compliance with uncertain and unnecessarily fragmented regulatory programs. [EPA-HQ-OAR-2021-0208-0529-A1, p. 2]

Continued Support for a Unified National Approach

Nissan strongly encourages EPA, NHTSA, and CARB to develop a unified national approach to automotive regulation. In particular, Nissan echoes the points made in the letter submitted by the Alliance for Automotive Innovation ("Alliance") to Secretary Buttigieg and Administrator Regan on June 28, 2021, regarding harmonization of CAFE and GHG light-duty vehicle standards.

A patchwork of different federal and state GHG and CAFE programs is neither effective nor efficient. In contrast, a harmonized national program maximizes both GHG and CAFE benefits on a nationwide basis while also providing regulatory certainty and minimizing unnecessary compliance burdens for the industry. Such an approach allows automakers to develop a single, unified fleet that meets all federal and state requirements while maintaining a full range of vehicle options for consumers. More importantly, a harmonized approach allows manufacturers to focus their planning and investments on achieving fuel economy improvements and emissions reductions rather than on compliance with unnecessarily fragmented regulatory standards and programs. Under a harmonized approach, environmental benefits can be achieved at a lower cost to manufacturers and consumers. Lower costs help address social equity concerns related to EV accessibility and also encourage faster fleet turnover, replacing older vehicles with more efficient, cleaner, and safer vehicles.

As EPA and NHTSA consider potential changes to the federal GHG and CAFE programs, Nissan believes it is essential that the agencies work together to maximize compatibility and coordination of the programs. Nissan understands that, due to statutory limitations, certain programmatic elements of the GHG and CAFE programs may not be identical. Nissan encourages EPA and NHTSA to make the standards as equivalent and complementary as possible, however, by adopting appropriate regulatory adjustments where available.

Nissan also urges the Administration to work with California regulators to harmonize the federal and CARB programs to the fullest extent possible. This could be accomplished by reinstating California's "deemed-to-comply" measures, under which vehicles that meet federal standards are "deemed-to-comply" with CARB standards. Nissan is also open to new alternative approaches for harmonizing federal and California standards, as well. Nissan encourages EPA to work proactively with CARB to clarify the relationship between federal and California standards, including between OEMs that signed on to California's Framework Agreements and those that did not. In particular, harmonization amongst all three agencies (EPA, NHTSA, and CARB) will be critical if EPA restores California's Clean Air Act Waiver covering model years 2021 through 2025 California GHG standards and ZEV requirements.

For its part, EPA has self-characterized the Proposed GHG Rule as: "equivalent to the stringency of the California Framework Agreements emission reduction targets in MY 2023 and increasingly more stringent than the Framework Agreements from MY 2024 through 2026." It is critical for the industry to have a clear understanding of how EPA's Proposed GHG Rule and California's enforcement of its standards will be implemented going forward (e.g., whether a "deemed-to-comply" option will be available for compliance with California GHG requirements). [EPA-HQ-OAR-2021-0208-0529-A1, p. 5-6]

Commenter: Ohio Attorney General Office, et al.

Annual household income for a family in Ohio is almost $19,000 less than the annual income for a family in California.[48] Thus, Ohioans may not be able to afford drastic changes mandated by California, leading Ohioans to drive older vehicles for longer and exacerbating the problem California believes it is solving. [EPA-HQ-OAR-2021-0208-0258-A1, p.6]

<u>EPA Response</u>

EPA received comments with a variety of perspectives on its pending decision with respect to reconsideration of the SAFE 1 final action which withdrew the waiver of preemption previously issued to California pursuant to section 209(b) of the Clean Air Act for California's certain elements of the Advanced Clean Car program.[118] The SAFE 1 reconsideration is a distinct proceeding, and these comments are beyond the scope of this rulemaking.

[118] See 86 FR 22,421 (Apr. 28, 2021); Docket ID No. EPA–HQ–OAR–2021–0257.

26.3. Comments Outside the Scope of this Rule

<u>Commenters Included in this Section</u>

Alliance For Automotive Innovation
Aluminum Association
American Coalition for Ethanol (ACE)
Baier, Mary Ann
Brandt, Peter
Chicago Metropolitan Agency for Planning
Citizens Climate Lobby
Environmental Protection Network (EPN)
General Motors LLC (GM)
Illinois et al. Corn Growers Associations
Kansas Corn Growers Association
Keefe, Patricia
Kempker, David
Maine Department of Environmental Protection
Minnesota Corn Growers Association (MCGA)
National Association of Clean Air Agencies (NACAA)
National Corn Growers Association (NCGA)
Nissan North America, Inc.
Osbourn, Paul
Stellantis
Taxpayers Protection Alliance
U.S. Chamber of Commerce ('the Chamber')
Venner, Marie
Whyte, Yolanda
Wisconsin Department of Natural Resources

Commenter: Alliance For Automotive Innovation

Auto Innovators requests that EPA reduce pre-model year reporting requirements. EPA requires that the pre-model year report include information applicable to the next model year and, to the extent possible, two model years into the future. While we recognize that the extended report content required by EPA may be of interest to the agency, the requirement to report up to three future model years adds significant burden to prepare the information. We recommend that EPA modify the pre-model year report requirements to the next single model year. [EPA-HQ-OAR-2021-0208-0571-A1, p. 36]

First, any net reductions in PM2.5 emissions (primary or PM2.5 precursors) accomplished by the revised standards will not provide public health benefits that are additive to the emissions reductions accomplished by EPA’s mobile-source and stationary-source programs for criteria air pollutants. The public health benefits are not additive, as we explain below, because of the way Congress designed the Clean Air Act and the way EPA defines emissions limits and non-attainment on a community-by-community basis.

Second, reductions in vehicle emissions do not provide additive benefits to public health because of the structure of the Clean Air Act, which allow the states to include national changes in mobile source emissions in their state emissions inventories and implementation plans for attainment of the National Ambient Air Quality Standards. In nonattainment areas and areas close to nonattainment, states and localities are disinclined to impose any more limits on stationary source emissions than is necessary to meet EPA's air-quality standards. If state and local limits are unduly strict, new factories may be built in other states and localities where the state implementation plans are not as strict on new stationary sources. (In attainment areas, where PM2.5 health benefits might also be considered, there is the complication of the PSD doctrine that needs to be evaluated). Thus, the practical impact of diminished mobile source emissions, at the margin, is somewhat less pressure on stationary sources to meet the requirements described in state implementation plans. Thus, there are benefits from further reductions in mobile source emissions, but they are likely to be realized in reduced compliance costs for stationary sources rather than as public health benefits from reduced overall exposures to PM2.5. The magnitude of the compliance cost savings is likely to be a small fraction of the estimated public health benefits, given EPA estimates that the benefits of PM control vastly exceed costs in the stationary source arena.

Finally, insofar as residual emissions of criteria or toxic air pollutants are seen as a rationale for the revised standards or for the transition to BEVs, the Agencies should consider some possible alternative policies to accomplish those benefits that might be more effective and cost effective than stricter CAFE/GHG standards or BEVs. Examples of such measures include tighter tailpipe standards for PM-related pollutants, (indeed, CARB has already proposed tighter particulate limits, and EPA has announced interest in a new rulemaking in this area) and improvements to gasoline. The incremental air-quality benefits of BEVs would be diminished significantly as EPA and CARB took further steps to control PM from mobile sources.

Commenter: Aluminum Association

Studies continue in the increasingly important area of material life cycle assessment (LCA) to evaluate the full environmental impact of lightweighting internal combustion engine (ICE) and electric vehicles by using advanced lightweight materials like aluminum. [EPA-HQ-OAR-2021-0208-0233-A1, p.4]

According to a literature review by a team of EPA researchers on more than 26 LCA studies conducted by both independent researchers and relevant industries since 2010, 'most of the LCAs demonstrated that aluminum-intensive designs were able to achieve the largest reductions in life-cycle energy use and GHG impacts' (Hottle 2017).

Increasing aluminum recycling at the end of a vehicle's life also improves the life cycle sustainability of aluminum-intensive vehicles. In the vehicle manufacturing process, innovative closed-loop recycling systems ensure that manufacturing scrap aluminum is rigorously segregated by alloy type in order to maintain its highest possible material value for reuse. For instance, Ford Motor Company pioneered a closed-loop recycling process at its Dearborn, Michigan truck plant to recover and re-use manufacturing scrap aluminum. Ford recycles 20 million pounds of stamped aluminum each month – enough to build 37,000 new F-series truck bodies. This recycling reduces energy use by more than 90% as compared to the production of primary aluminum sheet for the same purpose. And recent Association research demonstrates that the metal recovery efficiency of end-of-life automotive aluminum recycling is, on average, 91 percent, and is in some cases as high as 96 percent (WPI 2016, 2018). [EPA-HQ-OAR-2021-0208-0233-A1, p. 5]

Commenter: American Coalition for Ethanol (ACE)

Finally, while it is outside the scope of this rulemaking, we encourage EPA to set the maximum statutory conventional renewable fuel volumes under the RFS in the 2021 and 2022 Renewable Volume Obligation (RVO) rulemaking and pursue every option at its disposal to ensure uninterrupted market access for E15. Further we strongly discourage EPA from retroactively reducing the RVO for 2020 as has been rumored. [EPA-HQ-OAR-2021-0208-0221-A1, p. 6]

Commenter: Baier, Mary Ann

[The following comments were submitted as testimony at the virtual public hearing on August 26, 2021. See Hearing Testimony – 26Aug2021, pp. 62-63.]

I believe that disincentives should be applied to any internal combustion engine vehicle by applying a carbon tax and incentives should be given to those businesses who purchase an electric vehicle by not only giving a tax credit but by allowing them to take a faster depreciation on the vehicle.

Commenter: Brandt, Peter

[The following comments were submitted as testimony at the virtual public hearing on August 26, 2021. See Hearing Testimony – 26Aug2021, pp. 212-214.]

So as a lawyer and a teacher, I've studied how powerful industries tend to react whenever enhanced public health and safety regulations are proposed. There's a lot to learn from that history.

The main lesson I take away from it is no matter what the new protection might be, the sky is always falling according to the regulated industry.

Many of the protective laws we take for granted now were foretold by the meat industry as the death knell for their entire enterprise.

The first U.S. animal welfare law had to do with animals on trains and it just required after a little over 24 hours you have to let those animals out so they can drink and rest and have some food. This is the late 19th Century/early 20th Century.

What did the railroad barons say? This was going to crush them. They just could not survive this. I think we are all pretty aware no one had more power and resources in that time frame than the railroads.

What happened? They complied and the sky didn't fall and the law was motivated to protect animals but Congress made clear it understood the threat to human health, like it is dangerous to eat the meat of an animal that's extremely sick from transport. The Humane Methods of Slaughter Act, the law that says you can't kill a cow by hitting it in the head with a sledgehammer. In 1950s, when the law was first enacted, it only applied to sales to the U.S. Government.

What did the industry say? Sky was falling. Even the Secretary of USDA told Congress not to enact it. Obviously the sky didn't fall. Things got better. Things got safer.

So it's just easy for trade groups to paint every new incremental protection as the death knell for their industry but it's almost universally overblown. I grew up with no airbags in cars. It was only required in the late 1990s and that was after decades of auto industry opposition and delay and that's fine. There are people that get paid a lot of money in Washington, D.C., to delay any new regulation

Commenter: Chicago Metropolitan Agency for Planning

As the comprehensive regional planning organization of northeastern Illinois, the Chicago Metropolitan Agency for Planning (CMAP) is well aware that the largest U.S. source of emissions comes from the transportation sector. ON TO 2050, the region's long-range plan, urges communities to proactively address climate change by both planning for climate resilience and intensifying climate mitigation efforts. The plan also sets a target for the Chicago region to reduce emissions to 80 percent below 1990 levels by 2050. In the region, surface transportation accounts for at least 29 percent of all emissions. Unfortunately, that carbon footprint has remained flat or slightly increased since 2010. If this trend continues, the region will fall far short of our regional goal. [EPA-HQ-OAR-2021-0208-0219-A1, p.1]

Commenter: Citizens Climate Lobby

As I am as co leader of Montrose CO citizens climate lobby I support carbon fee and dividend.There are many similar carbon fees bills in Congress.This would promote electric vehicles. [EPA-HQ-OAR-2021-0208-0600-A1, p. 1]

Commenter: Environmental Protection Network (EPN)

On inauguration day, the president rejoined the Paris Climate Agreement,[6] just two months after the previous administration had formally withdrawn. On January 27th, the president issued an Executive Order that, among other things, set a goal of a carbon-free electricity sector no later than 2035.[7] On April 22nd, Earth Day, President Biden hosted the Leaders Summit on Climate where he announced a new target for the U.S. to achieve a 50-52% reduction from 2005 levels in economy-wide net GHG emissions in 2030. This target will be formally submitted to the United Nations Framework Convention on Climate Change later this year as the first step toward reaching net zero economy-wide GHG emissions by no later than 2050.[8] On August 5th, the president set a goal that 50% of new cars and light trucks sold in 2030 be zero-emissions vehicles, putting the U.S. on track to reduce GHG emissions from new-car and light-truck sales by more than 60% in 2030, relative to 2020.[9] The administration's two infrastructure proposals include funding for a wide range of important climate initiatives. [EPA-HQ-OAR-2021-0208-0213-A1, p. 2-3]

Commenter: General Motors LLC (GM)

Complementary Policies are Essential to the Nation's Transition to an All-Electric Future GM supports the creation of a federally managed task force including stakeholders from the automotive industry, suppliers, and the public utilities commissions, to ensure that necessary complementary EV policies are enacted in the following areas, among others: Consumer Incentives and Education, EV Charging Infrastructure, Battery Research, and EV Raw Material Supply Chain.[EPA-HQ-OAR-2021-0208-0234-A1][p.4]

Battery Research and EV Raw Material Supply Chain

Today, there is an urgent global race to own the intellectual property and manufacturing footprint of battery electric and autonomous vehicle technologies, and to spur these global ambitions through deliberate and national industrial policies. Supply chains for sourcing and processing battery grade critical minerals in the U.S. are currently undeveloped. To compete in this global race, the U.S. government must adopt policies to promote domestic EV battery technologies, for example:

• Increasing the R&D investment in emerging battery cell technologies (cobalt lean/cobalt-free, Li-metal solid state and silicon-dominant negative electrode, etc.).

• Providing grants for public/private battery cell learning laboratories.

• Investing in U.S.-based battery cell and battery pack manufacturing capacity.

• Supporting growth of domestic EV battery supply chains, including extraction and processing of critical minerals for batteries, motors, and magnets.

• Enactment of the provisions for Battery Materials Research, EV and battery raw material processing, and battery cell manufacturing included in the Bipartisan Infrastructure Bill passed by the U.S. Senate on August 10, 2021 and presently pending in the U.S. House of Representatives. [EPA-HQ-OAR-2021-0208-0234-A1][p.5]

Commenter: Illinois et al. Corn Growers Associations

Further, in conjunction with this rulemaking, EPA should conclude the ongoing Tier-III adjustment rulemaking to ensure that the stringency requirements it sets with this rule will be measured in a way that corresponds to real-world engine efficiency. [EPA-HQ-OAR-2021-0208-0563-A2,p.3]

EPA Should Conclude the Outstanding Tier-III Adjustment Rulemaking.

A closely related issue is the so-called "Tier III adjustment," a longpromised correction to that would re-align test results from greenhouse gas and CAFE fuel economy testing to account for EPA's 2014 change of laboratory test fuel to be more similar to the fuels actually used on the road.28 Until proper changes are made, EPA has acknowledged that there has been an effective change in the stringency of the greenhouse and CAFE standards. Those stringency changes should come from rulemakings like this one under Clean Air Act § 202, not from testing procedures under § 206, which concerns the accuracy of testing, not the stringency of green-house gas emissions standards. [EPA-HQ-OAR-2021-0208-0563-A2, p.11]

EPA has not acted on its May 2020 proposed rulemaking about the Tier-III adjustment. Now, with EPA now proposing new, more stringent greenhouse gas requirements, it is long past time that it make the necessary changes to test fuel requirements to ensure that the stringency requirements it sets will be measured in a way that corresponds to real-world engine efficiency. [EPA-HQ-OAR-2021-0208-0563-A2,p.11]

For a full discussion of these issues, we refer EPA to the comments we submitted in response to the Tier-III adjustment rulemaking along with several other groups.29 As explained in those comments, the "fix" EPA has proposed has a number of critical flaws. Specifically, (1) the proposed rule's distortion of measured carbon-dioxide emissions exceeds EPA's authority under Clean Air Act § 206 to determine vehicle test procedures; and (2) the proposal's R-factor of 0.81 significantly underestimates actual fuel economy. EPA should adopt and follow a "fuel neutral" approach to setting emission standards and test procedures. This greenhouse gas emissions rule must be supported by proper testing procedures in order for it to be accurate and fair. EPA should therefore complete the Tier-III adjustment rulemaking in conjunction with this rule and in a manner that facilitates accurate, scientifically grounded testing. [EPA-HQ-OAR-2021-0208-0563-A2, pp.11-12]

Commenter: Kansas Corn Growers Association

EPA Should Address Outstanding Tier-III Adjustment Issues

EPA has long promised to correct testing methods of GHG and fuel economy testing to account for fuels actually used on the road today. EPA has not acted on this rulemaking proposed in May of 2020, and it is past time that the agency acts on this to ensure testing corresponds to real-world engine efficiency and fuels that are actually used on the road today. [EPA-HQ-OAR-2021-0208-0220-A1, p. 2]

Commenter: Keefe, Patricia

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, pp. 129-130.]

So I worked with our state senator and I found out that the EPA of Minnesota was developing rules about clean cars. So we do have that process already entered into the state register in Minnesota. So the process is going forward and I'm sure the EPA can get a copy of -- can you still hear me -- a copy of the rules that were developed by the EPA and they were entered into the Minnesota Register recently and they used some of the information from California's experience on clean cars.

So we now are in -- it's now being in the public domain and the rules will be applied in the future to new cars and light trucks in Minnesota. So if EPA here wants to get those, they can get them from the EPA of Minnesota and so can anybody else.

Commenter: Kempker, David

I am in favor of the revised standard. However, any change in standards of vehicle efficiency and emissions should include all pickup trucks, which are a major personal vehicle sector in the U.S. I also feel the EPA should heavily promote electrification of all vehicles - light and heavy [EPA-HQ-OAR-2021-0208-0333, p. 1]

Commenter: Maine Department of Environmental Protection

At the federal level, the U.S. EPA initially adopted GHG emission standards for 2017 model year LDVs in 2012, with these standards receiving widespread support from both industry and the states. [EPA-HQ-OAR-2021-0208-0225-A1, p.1]

Commenter: Minnesota Corn Growers Association (MCGA)

Use Tier 3 certification fuel, and any future certification fuel, without test procedure adjustments for CO2.

As NCGA recommended to EPA in 2020 comments on Docket EPA–HQ–OAR–2016-0604, actual tailpipe carbon emissions, regardless of the test fuel, must continue to be the only measure of vehicle emissions performance in vehicle testing. CO2 test adjustments would needlessly complicate vehicle test procedures. Relying solely on test results eliminates uncertainty, averaging and potential for inaccuracies in procedures to adjust emission test results for the fuel.

Lower GHG emissions from vehicles benefit consumers, our environment, and our energy security. Just as updating the test fuel from E0 to E10 reduced GHG emissions by blending cleaner, renewable ethanol with gasoline, E15 and future clean, high octane fuels that blend more ethanol will further reduce emissions and improve fuel economy when used with optimized engines. Vehicle test procedures for Tier 3 fuel, or any future certification fuel, must not create impediments to low carbon fuels such as E15 and higher blends and the vehicle technologies that help reach our mutual goal of lower GHG emissions. Stringency of the standards is best maintained through the Administrator's authority to adjust the standards, as EPA is using in this proposal, not by adjusting emission test results. [EPA-HQ-OAR-2021-0208-0530-A1, p. 12]

Commenter: National Association of Clean Air Agencies (NACAA)

Among other things, EPA should expeditiously pursue additional federal measures to reduce NOx and VOC emissions, including for mobile sources such as heavy-duty trucks, locomotives, aircraft and ocean-going vessels. [EPA-HQ-OAR-2021-0208-0255-A1, p.5]

Commenter: National Corn Growers Association (NCGA)

As EPA explains in the proposal, the difference between the stringency of the SAFE rule and the revised vehicle standards proposal is due to the greater weight the Administrator puts on emissions reductions and resulting health and welfare benefits than other factors. EPA relied on similar analysis for the proposal as the agency used to develop the SAFE rule and describes the results as in agreement with prior analysis. However, despite similar analysis and results as used for the SAFE rule, the agency is changing its position from the SAFE rule because it is 'more appropriate' to put greater weight on the benefit of reducing emissions, in light of the purposes of the Clean Air Act.[2]

Under the Clean Air Act, EPA has an obligation to protect the health and welfare of Americans. While EPA projects this proposal to increase the stringency of vehicle emissions standards for model year (MY) 2023-2026 vehicles will result in 2.2 billion tons of avoided GHG emission by 2050, EPA leaves significant GHG emission reductions on the table if the agency fails to take steps in this proposal, or in a parallel action, to also improve fuel along with vehicles. [EPA-HQ-OAR-2021-0208-0246-A1, p. 2]

NCGA believes EPA should take the following actions to support the production and use of low carbon, high octane fuel, consistent with Title II of the Clean Air Act, in conjunction with setting vehicle standards:

Implement a pathway to a minimum fuel octane level of 98 RON, phasing out lower octane fuels as new optimized vehicles enter the market.

NCGA believes EPA has ample authority to regulate fuel octane because of the impact higher fuel octane would have on reducing GHG emissions from the vehicle fleet. EPA has previously acknowledged the agency has authority to regulate fuel octane under Section 211(c). [EPA-HQ-OAR-2021-0208-0246-A1, p. 7]

Use Tier 3 certification fuel, and any future certification fuel, without test procedure adjustments for CO_2.

As NCGA recommended to EPA in 2020 comments on Docket EPA–HQ–OAR–2016-0604, actual tailpipe carbon emissions, regardless of the test fuel, must continue to be the only measure of vehicle emissions performance in vehicle testing. CO2 test adjustments would needlessly complicate vehicle test procedures. Relying solely on test results eliminates uncertainty, averaging and potential for inaccuracies in procedures to adjust emission test results for the fuel.

Lower GHG emissions from vehicles benefit consumers, our environment, and our energy security. Just as updating the test fuel from E0 to E10 reduced GHG emissions by blending cleaner, renewable ethanol with gasoline, E15 and future clean, high octane fuels that blend more ethanol will further reduce emissions and improve fuel economy when used with optimized engines. Vehicle test procedures for Tier 3 fuel, or any future certification fuel, must not create impediments to low carbon fuels such as E15 and higher blends and the vehicle technologies that help reach our mutual goal of lower GHG emissions. Stringency of the standards is best maintained through the Administrator's authority to adjust the standards, as EPA is using in this proposal, not by adjusting emission test results. [EPA-HQ-OAR-2021-0208-0246-A1, p. 9]

Commenter: Nissan North America, Inc.

CAFE Reporting Template. To the extent NHTSA is proposing to modify the CAFE Reporting Template, Nissan suggests the agency consider steps to streamline the template and remove unnecessary/additional detail that is not directly relevant to the applicable reporting 10 Nissan Group of the Americas 1 Nissan Way, Franklin, Tennessee 37067 requirements. The data requested in the new NHTSA Reporting Template is extensive and substantially increases the resources required in the data preparation process. Some of the data, however, is not necessary for calculating CAFE compliance values or determining CAFE compliance. For example, much of the in-depth powertrain specification data is not essential for CAFE compliance and reporting purposes and should be excluded from the Reporting Template.

CAFE Credit Trading and Transfer Rules. EPA's GHG credit trading program allows for the unrestricted and unlimited transfer of GHG credits between a manufacturer's car and light truck fleet. NHTSA's CAFE program, however, effectively prohibits the banking or carrying forward of transferred CAFE credits, treating them differently than credits initially generated as part of the relevant fleet. Nissan urges NHTSA to reconsider this restriction. Once transferred, credits should be considered part of the receiving fleet, and should be able to be carried forward or backward to the same extent as the credits originally generated by that fleet. Consistent with the goal of harmonization with the GHG program, NHTSA should: (1) ease the credit transfer limit; and (2) change the definition of "transfer" under the CAFE program at 40 C.F.R. § 536.3 to be consistent with EPA's GHG credit transfer program, as originally expressed in the 2010 preamble to the proposed rulemaking for the 2017-2025 GHG/CAFE standards. Additionally, Nissan urges NHTSA to reconsider the proposal to require a CAFE Credit Reporting Template. As currently proposed, the template is time-consuming and requests highly sensitive information, including monetary and non-monetary terms of credit trading contracts. To the extent such sensitive and confidential information relating to credit trades and transactions is collected by NHTSA, Nissan urges the agency to maintain confidentiality and limit the public disclosure of such information. [EPA-HQ-OAR-2021-0208-0529-A1, p. 9-10]

Commenter: Osbourn, Paul

[The following comments were submitted as testimony at the virtual public hearing on August 26, 2021. See Hearing Testimony – 26Aug2021, p. 187.]

I believe the flaw in the plan does not have a pragmatic path to cleaner emissions, and I believe that if the EPA wants this to success they must partner with Congress to offer greater tax incentives to buy these newer vehicles. In particular, those tax incentives must include all cleaner fuels, including renewable natural gas, renewable propane, as well as the hybrids and the EVs that are out there.

The new plan looks way too favorable towards one technology that is not going to address all the needs of all the fleets and that is my concern.

Commenter: Stellantis

EPA should study the feasibility of implementing an alternative compliance mechanism, such as the mitigation plans envisioned by the California Framework. The intent would be to achieve needed GHG reductions if there are any gaps in executing this multi-faceted industry/ government effort to transform the new vehicle fleet. [EPA-HQ-OAR-2021-0208-0532-A1, pp. 2-3]

Update Federal EV Incentives and Apply at Point of Purchase - EV technology continues to cost thousands more than comparable internal combustion engine (ICE) models,6 making affordability a key headwind to increased sales. For many popular vehicle segments, price parity between EVs and internal combustion engine vehicles may not be achieved until 2030 or later, a projection highly dependent on future battery costs. Financial incentives have shown to be effective in overcoming this gap, but the current federal incentive is phasing out and remains unattainable for many consumers. A refundable, point-of-sale incentive on both retail and commercial vehicles is necessary to close the cost gap between electrified technology and traditional ICEs and to grow the EV market. [EPA-HQ-OAR-2021-0208-0532-A1, p. 4]

Implement Fleet Purchase Requirements - Over 8 million cars and trucks are owned by fleet operators in the US.7 Fleet applications are generally more suitable to early electrification because of consistent routes and centralized charging points where it is easier to predict and plan for the total infrastructure needs. A national fleet purchase requirement, similar to those requirements being developed in California, should be considered to help create certainty during this relatively rapid transition to electrification. [EPA-HQ-OAR-2021-0208-0532-A1, p. 4]

Introduce Flexibility to Offset GHG Shortfalls

EPA should study the feasibility of implementing an alternative compliance mechanism, such as the one implemented in the California framework. The intent would be to achieve needed GHG reductions if there are any gaps in executing this multi-faceted industry/ government effort to transform the new vehicle fleet.

Stellantis will have the EV and PHEV products needed to delight customers and meet the regulatory requirements. We've highlighted throughout this document that development of the market involves a lot more than just having products – we are reliant on a commitment from the Biden Administration and U.S. policymakers to provide the full suite of supportive policies included in the Build Back Better Plan. If this doesn't happen, it could leave a manufacturer with fewer GHG credits than needed despite having a product plan that should achieve compliance.

Different from the CAFE program, EPA cannot collect fines as a compliance mechanism, however, EPA can and does use other compliance flexibilities such as allowing credit trading between manufacturers. The Clean Air Act gives EPA regulatory authority to employ Supplemental Environmental Projects (SEP) and emissions mitigation projects. These have been used in the past to address criteria emissions violations. We believe a mitigation plan, structured as a relief valve with limits, could be a compliance enabler while the market is transforming to an electrified fleet.

EPA should craft a credit mechanism, similar to that found in the California Framework agreement, which would allow compliance to be achieved through OEM funding of EPA or OEM identified carbon reduction projects in the auto, energy, or other sectors which offset GHG tons equivalent to or greater than the manufacturer's shortfall.

This would provide OEMs the ability to avoid drastic penalties for unanticipated sales variances. To avoid excessive dependence, a cap could be set by the administrator to limit the use of this mechanism. There should be a cost cap in the mechanism set to be generally consistent with prices for GHG credits in California's cap-and-trade program, the Regional Greenhouse Gas Initiative, or other similar GHG market programs, taking into account such other equitable factors as may be appropriate given the circumstances, and considering the social cost of CO2 using the 3% Average values as expressed in Table ES-1 of the Technical Support Document26, issued under Executive Order 13990 by the Interagency Working Group on Social Cost of Greenhouse Gases, United States Government (February 2021). [EPA-HQ-OAR-2021-0208-0532-A1, pp. 19-20]

Commenter: Taxpayers Protection Alliance

The EPA can and should promulgate rulemaking that would protect human health and the environment. The agency would be wise to carefully monitor the activities of other agencies such as the Department of Defense, which is responsible for about 80 percent of the federal government's carbon emissions. The EPA should also closely monitor publicly owned power plants, hospitals, and water utilities, which are approximately 15-20 percent more likely to violate federal air and water standards than their private counterparts. This tailored approach would be far preferable to current rules with low benefits and high costs. We urge you to promulgate sensible rulemaking in the best interests of taxpayers and consumers.[EPA-HQ-OAR-2021-0208-0202-A1, p.1]

Commenter: U.S. Chamber of Commerce ('the Chamber')

Pursue permitting reforms across the federal government to speed up investment in needed infrastructure to support any ambitious standards

It is well understood that the environmental review and permitting process has become hampered by unreasonable costs and delays that stifle investment and economic activity across a broad range of sectors. Though clean energy related projects often enjoy popular support, they too have fallen victim to bureaucratic roadblocks and political opposition that hinder investment and development. As the Bipartisan Policy Center has emphasized,11 even the most well-intended efforts to decarbonize the economy will simply not succeed without stable, well implemented permitting reforms, beginning with the environmental review process established under the National Environmental Policy Act and including the thoughtful reforms to that process that were made in 2020 at the conclusion of a robust and lengthy rulemaking process.

Mining that is necessary to support materials essential to the manufacture of high-capacity batteries and other clean energy resources is no exception. According to the National Mining Association, mine permitting in the U.S. takes on average seven to 10 years, and often longer. In other countries with similarly strong environmental standards, such as Canada and Australia, permitting is typically achieved in just two to three years.

The Chamber recommends that the Administration take steps to ensure timely review and fair consideration of battery-related mining development under NEPA. For mining, this includes supporting and utilizing the recently finalized rule making non-energy mining sector projects eligible for assistance and expedited review under Fixing America’s Surface Transportation Act (FAST-41) processes. Supporting implementation of this rule would help project sponsors to better navigate the federal permitting process for mining, consistent with the policy goals of multiple Administrations representing both political parties that have issued executive orders and presidential memoranda directing the government to increase the efficiency of federal permitting for critical infrastructure.

More broadly, we also recommend that any EPA reviews of environmental impact statements under NEPA and federal government updates to the permitting process explicitly consider and account for potential impacts to strategic minerals supply chains during the review process. [EPA-HQ-OAR-2021-0208-0524-A1, pp. 5-6]

Commenter: Venner, Marie

[The following comments were submitted as testimony at the virtual public hearing on August 26, 2021. See Hearing Testimony – 26Aug2021, pp. 19-20.]

A date should be set when no more fossil fuel vehicles can be registered and used on public roads. Public funds for widening should be paused this decade and transportation funds should be spent on ensuring that everyone has access to universal broadband and transportation options, only investing in clean and healthy ones, many, many lives to condone it.

Commenter: Whyte, Yolanda

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, pp. 143-144.]

Last December for the first time in world history, air pollution was listed as a cause of death on a death certificate. The young girl had severe uncontrollable asthma due to ozone particulate matter and nitrogen dioxide air pollutants from living along a busy roadway in London and London has more protective standards than we do here in the U.S.

It would be great if the EPA worked with the U.S. Department of Health and Human Services to train physicians to also understand the health impacts of air pollution and also educate patients about it and ways to protect themselves from it.

Commenter: Wisconsin Department of Natural Resources

EPA should take timely action to further address emissions from mobile sources. EPA's proposal, while important, represents just incremental progress. It is critical that EPA further reduce mobile source emissions, including emissions from medium and heavy-duty diesel trucks, vehicle emission control systems tampering, commercial marine vehicles, and aircraft. [EPA-HQ-OAR-2021-0208-0223-A1, p.4]

NHTSA, in its proposed rule, offers some other potential mitigation measures EPA could implement to address any increases in NOx and VOC emissions, including offering incentives for the purchase of more fuel efficient vehicles and implementing various measures to reduce vehicle miles traveled. Since most state air agencies and NHTSA do not have the authority to regulate criteria pollutants from light duty vehicles, it is critically important that EPA explore its statutory options to 'net out' any near-term increases in NOx and VOC emissions associated with its final rule. [EPA-HQ-OAR-2021-0208-0223-A1, p.3]

EPA should offset any short-term increases in NOx and VOC emissions associated with the rule. In addition to addressing climate change, stringent yet technologically feasible and cost effective mobile source emissions standards are critically needed by states to reduce ozone-forming pollutants. Transportation-related emissions are significant contributors to ozone formation in Wisconsin, with the on-road sector responsible for 38% of all NOx emissions and 17% of VOC emissions.5 In addition, on-road NOx and VOC emissions from the upwind states of Illinois and Indiana significantly contribute to Wisconsin's ozone levels; for example, those two states were responsible for approximately 40% of the ozone measured at Wisconsin's Chiwaukee Prairie monitor in 2017, and that percentage is projected to increase.6 Given limited state authority to control mobile source emissions, Wisconsin, like many states, relies heavily on federal vehicle emissions standards to help attain and maintain the ozone National Ambient Air Quality Standards (NAAQS).

While EPA's proposal would result in long-term reductions in NOx and VOC emissions, it is also anticipated to cause a near-term increase of these pollutants. Specifically, VOC emissions would increase through 2025, while NOx emissions would increase through 2027.7 While these emissions increases are relatively small, they would occur as Wisconsin will face critical ozone

NAAQS attainment dates; specifically, the 2015 ozone NAAQS moderate area attainment date in 2024 and potentially the 2008 ozone NAAQS severe attainment date in 2027. Given the many challenges states already face to attain and maintain the ozone NAAQS, any increase in NOx or VOC emissions due to EPA's rule are counter to the already pressing need to further reduce emissions from this sector. [EPA-HQ-OAR-2021-0208-0223-A1, p.3]

In addition to maximizing GHG emissions reductions, Alternative 2 has the additional benefit of minimizing the short-term increases in NOx and VOC emissions associated with this rule (see comment #3 [p.3]). [EPA-HQ-OAR-2021-0208-0223-A1, p.2]

To address this disbenefit, EPA should mitigate the anticipated short-term increases in NOx and VOC emissions so that its final rule is at least neutral in its effects on those pollutants. As an initial matter, EPA should finalize Alternative 2, which would reduce VOC emissions every year and significantly decrease the near-term NOx increases (see Table 1). [EPA-HQ-OAR-2021-0208-0223-A1, p.3] [[Table 1 can be found on p.3 of EPA-HQ-OAR-2021-0208-0223-A1]]

EPA should offset any increases in sulfur dioxide (SO2) emissions associated with the rule. EPA's proposal estimates that SO2 emissions will increase every year over the lifetime of its rule, culminating with a net annual increase of nearly 5,000 tons per year by 2050. Given that EPA recently concluded a successful, decade-long campaign to reduce SO2 emissions from stationary sources through implementation of its 2010 SO2 NAAQS and associated Data Requirements Rule, it is important that those gains are not subsequently undermined by rules addressing the mobile sector. As with NOx and VOC emissions, EPA should use its authority to ensure that any potential increases in SO2 emissions are completely offset in the final rule. [EPA-HQ-OAR-2021-0208-0223-A1, p.4]

7 See Table 45 of the proposed rule (p. 43780). NHTSA's proposal similarly concludes NOx and VOC emissions will increase in this timeframe.

EPA Response

EPA has determined that the comments contained in this section are all out of scope of this rulemaking.

26.4. Comments Regarding Standards for MYs 2027 and Later

Commenters Included in this Section

Alliance of Nurses for Health Environments
Aluminum Association
American Council for an Energy-Efficient Economy (ACEEE)
American Lung Association
American Lung Association (Sacramento, CA)
Brandt, Elizabeth
Center for Biological Diversity, Earthjustice, and Sierra Club
Center for Climate and Energy Solutions (C2ES)
CERES
Chemours Company (Chemours)
Chicago Metropolitan Agency for Planning
City of Albuquerque, NM
Connecticut Department of Energy and Environmental Protection
District of Columbia Department of Energy and Environment
Edison Electric Institute (EEI)
Energy Innovation Policy and Technology LLC
Environmental Defense Fund (EDF)
Environmental Law & Policy Center (ELPC), et al.
Environmental Law and Policy Center (ELPC)
Environmental Protection Network (EPN)
EOS at Federated Hermes (on behalf of its stewardship clients)
Fajardo, Jane-Marie
Fuels Freedom Foundation
General Motors LLC (GM)
Hyundai America Technical Center, Inc. (Hyundai)
Interfaith Power & Light (IPL)
Lish, Christopher
Lucid USA, Inc. (Lucid)
Manufacturers of Emission Controls Association (MECA)
Maryland Department of Environment
Mass Comment Campaign sponsored by American Lung Association (121)
Mass Comment Campaign sponsored by Center for Biological Diversity (77,692)
Mass Comment Campaign sponsored by Environment America (11,080)
Mass Comment Campaign sponsored by Interfaith Power and Light et al. (1,599)
Mass Comment Campaign sponsoring organization unknown-2 (2,214)
Mass Comment Campaign sponsoring organization unknown-4 (195)
Mass Comment Campaign sponsoring organization unknown-7 (37)
Mass Comment Campaign sponsoring organization unknown-9 (3,219)
Metropolitan Mayors Caucus
Minnesota Corn Growers Association (MCGA)

Minnesota Pollution Control Agency (MPCA) and Minnesota Department of Transportation (MnDOT)
Motor & Equipment Manufacturers Association (MEMA)
National Association of Clean Air Agencies (NACAA)
National Coalition for Advanced Transportation (NCAT)
National Corn Growers Association (NCGA)
New Mexico Environment Department
New York State Department of Environmental Conservation
Nissan North America, Inc.
Northeast States for Coordinated Air Use Management (NESCAUM)
Poore, Michael
Pruitt, Katherine
Rauch, Molly
Richards, Claire
Sierra Club
South Coast Air Quality Management District
Southern Environmental Law Center
Toyota Motor North America, Inc. (Toyota)
Union of Concerned Scientists (UCS)
Volkswagen Group of America, Inc. (Volkswagen)
Volvo Car Corporation
Wisconsin Department of Natural Resources
Wiste, Leah

Commenter: Alliance of Nurses for Health Environments

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, p. 21.]

This proposal is a step in the right direction. However, our organization strongly urges EPA to set the strongest possible clean car standards to protect public health and address the climate crisis.

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, p. 22.]

We are requesting EPA to move swiftly to set the next round of standards and specifically the rule must be as strong as possible for Model Year 2026 to ensure the U.S. can achieve a hundred percent zero emission vehicle sales by no later than 2035 consistent with the Biden Administration's Executive Order.

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, p. 22-23.]

We thank EPA for taking the necessary first step by addressing the previous Administration's rollbacks of clean car standards but more is needed.

Also, we're urging EPA to set much stronger standards covering cars, SUVs, and light trucks through at least 2030. Standards should be reflective of the robust response required to reduce carbon pollution and to derive the transition to zero emission vehicles.

Commenter: Aluminum Association

Post 2026, clarity on future EPA emission targets will be critical for automakers and their suppliers as many automotive technologies take more than five years to engineer, develop, validate, and establish production capacity. The clarity in the 2012 standards was instrumental in supporting the unprecedented improvements in efficient technologies seen in the intervening years and similar long term regulatory certainty in the future will be essential to the U.S. aluminum industry, which continues to make significant investments in new products, processes and capacity to meet growing demand for automotive aluminum. [EPA-HQ-OAR-2021-0208-0233-A1, p. 4]

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

Post-MY 2026 standards need to both be ambitious enough to meet our goals but also need to adapt to a new, more electrified automotive market. This includes accurately accounting for the emissions of electric vehicles and updating the off-cycle credit process. [EPA-HQ-OAR-2021-0208-0251-A1, p. 13]

Commenter: American Lung Association

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, pp. 166-167.]

Standards under this rule are a necessary step but are limited to Model Years 2023 to 2026. We need to see more health-protective standards beyond that.

In the Executive Order on Strengthening American Leadership and Clean Cars and Trucks, the President directed EPA to establish new multi-pollutant emissions standards for light- and medium-duty vehicles covering Model Years 2026 to 2030.

Setting up more protective standards now will ensure that the nation is on track to meet the President's goal of having 50 percent on passenger vehicles be zero emission in 2030.

We encourage EPA to move quickly to finalize this current rule and begin the process of future standards without delay.

Commenter: American Lung Association (Sacramento, CA)

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, p. 255.]

U.S. EPA should also move quickly to establish even more stringent next round standards that set the path to full electrification in the light-duty sector as well as to begin the work of standards to accelerate the growing medium- and heavy-duty zero emission vehicle segments.

Commenter: Brandt, Elizabeth

[The following comments were submitted as testimony at the virtual public hearing on August 26, 2021. See Hearing Testimony – 26Aug2021, p. 199.]

This proposal is a step toward a safer climate for all of us. The EPA must set more ambitious clean car standards for Model Year 2027 and beyond.

Commenter: Center for Biological Diversity, Earthjustice, and Sierra Club

or future rulemakings, we recommend that the agency provide models of EV penetration rates in the coming years. As discussed above, EPA heard from a 'wide range of stakeholders . . . that significant investments [are] being made now to develop and launch new EV [models] and in the expansion of EV charging infrastructure could enable higher levels of EV penetration . . . than EPA has projected.'59 The likely higher future EV penetration rate would support more stringent alternatives both by reducing each model year's tailpipe emissions and through the production of credits that otherwise noncompliant automakers can purchase. [EPA-HQ-OAR-2021-0208-0270-A1, pp.9-10]

Commenter: Center for Climate and Energy Solutions (C2ES)

Any future rulemaking, particularly beginning in MY 2027, should adjust the trajectory of increased ambition to coincide with this goal: reaching zero or near-zero average fleet wide emissions no later than 2035. [EPA-HQ-OAR-2021-0208-0287-A1, p.4]

EPA should set the emissions standards at a stringent enough level to preserve ambition while still allowing this flexibility. Lowering the MY 2026 fleet average target levels five to 10 g/mile below the current level proposed would support increased ambition and prepare the auto industry for more ambitious targets beginning in MY 2027, while preparing the national fleet to meet the decarbonization challenge ahead. [EPA-HQ-OAR-2021-0208-0287-A1, p.4]

Commenter: CERES

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, pp. 84-85.]

We also strongly urge that the next round of standards are aligned with climate goals by ensuring at least 50 percent EV sales by 2030 while ensuring requisite reductions in conventional vehicles in the interim.

Commenter: Chemours Company (Chemours)

Finally, EPA should consider accelerating its timetable for the consideration of additional GHG standards to apply to MY 2027 and later vehicles. Given the Administration's announced goal of achieving 50% electric vehicle sales by 2030, early engagement of industry in the upcoming regulatory process is essential. [EPA-HQ-OAR-2021-0208-0232-A1, p. 3]

Executive Order 14037 indicates that EPA shall "consider beginning work on a rulemaking" that would address light- and medium duty vehicles "beginning with model year 2027 and extending through and including at least model year 2030." And as part of this work, the President has articulated a policy goal that "50% of all new passenger cars and light duty trucks sold in 2030 be zero-emission vehicles."

The proposed rule, however, only indicates that the next phase of GHG standards will be considered in a "separate, future rulemaking for model years 2027 and beyond" and does not set any precise timeframe for this action, nor indicate when EPA will begin the process necessary to propose and finalize a rule in accordance with the schedule outlined in Executive Order 14037. Therefore, EPA should clearly articulate in the final rule the Agency's intended schedule for standards that will apply beginning with MY 2027, with a goal that work begin simultaneously with the promulgation of standards for MY 2023-2026.

There are many policy reasons for EPA to begin work on MY 2027+ standards promptly. The Agency, however, must consider that vehicle manufacturers and the vendors that work closely with such manufacturers to develop new vehicles and vehicle subsystems require sufficient lead time to plan for more stringent requirements. Especially with regard to standards that seek to reduce GHGs dramatically, advance notice and planning will be essential to eventual success. Given that the 2027 MY is barely five years away, EPA must strive to give the regulated industry as much time as possible to efficiently bring new technology and products to market.[EPA-HQ-OAR-2021-0208-0232-A1, p. 17]

Finally, as noted above, EPA should promptly begin work on standards that are intended to apply in MY 2027 and later years. Given the need to develop product plans and work with vendors on new technology, EPA should begin work on "follow-on" standards concurrent with the finalization of this proposed rulemaking. [EPA-HQ-OAR-2021-0208-0232-A1, p. 18]

Commenter: Chicago Metropolitan Agency for Planning

Should this rule be implemented, CMAP encourages the continued adoption of aggressive post-Model Year 2026 emission standards to continue the acceleration of a transition to low and zero emissions fleets. [EPA-HQ-OAR-2021-0208-0219-A1, p.2]

Commenter: City of Albuquerque, NM

Set the precedent for EPA to adopt more ambitious standards for model year 2027 and beyond. [EPA-HQ-OAR-2021-0208-0535-A1, p. 2]

Commenter: Connecticut Department of Energy and Environmental Protection

Additionally, EPA should adopt longer term goals beyond 2026, to ensure continued emission reductions and turn a critical eye toward standards that can be adopted to curb criteria pollutant and GHG emissions from the heavy-duty sector, which stands to be an increasing portion of mobile source emissions. [EPA-HQ-OAR-2021-0208-0264-A1, p. 2]

Commenter: District of Columbia Department of Energy and Environment

DOEE also supports beginning work on a new rule that takes a multi-pollutant approach, to be in place for MY 2027 and beyond. [EPA-HQ-OAR-2021-0208-0240-A1, p.1]

In his August 5, 2021 Executive Order 14037, 'Strengthening American Leadership on Clean Cars and Trucks,' President Biden directs the EPA to develop an additional rule that would establish more stringent GHGs and criteria pollutant emission standards for light- and medium-duty vehicles beginning with MY 2025. Given the District's commitment to a fifty percent reduction in GHG emissions by 2032 and to being carbon neutral by 2050, as well as its need to attain and maintain the NAAQS (in particular the 2015 ozone NAAQS for which the District is still in nonattainment), a long-term multi-pollutant approach to light- and medium-duty vehicle standards is necessary. [EPA-HQ-OAR-2021-0208-0240-A1, p.2]

Begin work on stronger multi-pollutant emission standards for MY 2027 and beyond. [EPA-HQ-OAR-2021-0208-0240-A1, p.3]

Commenter: Edison Electric Institute (EEI)

EPA's Commitment to Future Rulemaking to Drive Electrification is Appropriate, and the Electrical Grid Can Meet the Challenge.

EPA includes a lengthy discussion in its preamble to this rule noting its long-term regulatory focus on driving the electrification of the transportation sector via future rulemakings. The Agency notes that:

This proposed action therefore serves as a critical building block for a comprehensive, multipollutant longer-term regulatory program implementing EPA's statutory authority under the [Clean Air Act (CAA)]. We are at a pivotal moment in the history of the light-duty transportation sector—a shift to zero-emission vehicle technologies is already underway, and it presents a strong potential for dramatic reductions in GHG and criteria pollutant emissions over the longer term. Major automakers as well as many global jurisdictions and U.S. states have announced plans to shift the light-duty fleet toward zero-emissions technology, as detailed below. EPA anticipates that the design of a future, longer-term program beyond 2026 will incorporate accelerating advances in zero-emission technologies.

86 Fed. Reg. at 43,729. EPA goes on to cite the major announcements by every major automaker regarding new EV sales goals and cites the growing prevalence of EV penetration globally. Id. This discussion provides an important market and regulatory signal to all interested stakeholders—in particular, to the electric sector. States such as California, a leader in vehicle electrification, often includes these kinds of discussions in their long-term planning documents, which have provided critical direction to California electric companies in building the infrastructure to support increased electrification of the transportation sector. These types of broad market and regulatory signals will be helpful to EEI's members as they engage with their state commissions to move quickly to build EV infrastructure. Including specific language regarding upcoming likely moves by EPA to set further regulatory standards to incentivize an 7 increase in transportation electrification can send these signals effectively and should be included in any final rule.

EEI member companies are leading the charge to ready the market for widescale EV adoption. EEI members are making investments and offering customer programs designed to help their customers overcome barriers to EV adoption, while also supporting existing EV users and yearover-year growth in the EV market. Many of these programs help to deploy and/or offset the cost of EV charging infrastructure in homes, workplaces, and public locations, as well as for fleet operators. To date, more than 30 states and the District of Columbia have approved customer programs and investments totaling nearly $3 billion.8 Furthermore, EEI members are leading by example with their own fleets by setting individual fleet electrification goals that put them on track to electrify more than a third of their fleet vehicles by 2030.

Currently, more than 33 EEI member companies have proposed or are implementing more than 52 separate programs in 24 different states, with more on the way.9 Electric company investments coupled with those of other companies and stakeholders have dramatically increased access to charging in the U.S. Electric company investments have the potential (pending regulatory approval) to support more than 300,000 new charging stations in the next several years. 10 As of September 2021, there were more than 108,000 public charging ports, not including home chargers.11 This represents a more than 2000 percent increase in the number of public charging ports since 2011.12

These investments are substantial and demonstrate that the industry—with the support of stakeholders necessary to authorize and enable these investments—are ready and willing to help facilitate America's shift towards EVs. The Agency's comments regarding future electrification both acknowledge this progress while also laying out the roadmap on how future standards will provide a clear path for increasing electrification in the transportation sector—and sends a strong signal about the need to build even greater EV infrastructure to meet an electrified future. EPA's role here is consistent with both the Administration's and broad electrification stakeholder community's objectives and will be helpful to EEI's members as they continue to propose and implement even more EV infrastructure projects across their service territories. EPA should finalize this language expeditiously. [EPA-HQ-OAR-2021-0208-0284-A1, p. 6-8]

9 These programs include efforts to increase access to charging for all customers, including lowincome customers and customers who live in multi-family housing

Commenter: Energy Innovation Policy and Technology LLC

For example, our 2035 Report 2.0 shows it is technically feasible and economically beneficial for 100 percent of new light-duty vehicle (LDV) sales to be electric by 2030, and 100 percent of medium- and heavy-duty truck (MDV/HDT) sales to be electric by 2035, while supported by a 90 percent clean electricity grid. Based on our analysis, transitioning to an electrified transportation future and a decarbonized electricity system would:

- Yield a 93 percent reduction in transportation-sector greenhouse gas emissions (GHG) by 2050, helping mitigate the harmful impacts of climate change and aligning the U.S. with broader decarbonization objectives on the path to a 1.5 degree Celsius scenario;

- Prevent 150,000 premature deaths and avoid $1.3 trillion in environmental and health costs through 2050 by reducing harmful air pollution, which disproportionately impacts frontline communities, Black, Indigenous, and People of Color (BIPOC) communities, and low-income/low-wealth populations;

- Save consumers $2.7 trillion by 2050, which translates to about $1,000 for every household per year over the next 30 years;

- Support a net increase of over 2 million jobs in 2035; and

- Maintain a reliable and affordable electricity system.

While we recognize the proposed rule does not endeavor to regulate electric vehicle (EV) sales out to 2035, the adopted standards and future tailpipe emissions standards for all vehicle classes should be as forward-looking as possible to ensure a swift transition to a clean, electrified transportation future and provide more Americans access to the above benefits. A more ambitious approach going forward would also put the U.S. on the path to achieve President Biden's Executive Order aimed at making ZEVs 50 percent of all new cars sold in 2030.[i] [EPA-HQ-OAR-2021-0208-0605-A1, pp. 2]

As noted by the EPA, '[a]ddressing the climate crisis will require substantial reductions in the GHG emissions from the transportation sector,'ix and 'GHG emissions have significant impacts on public health and welfare as evidenced by well-documented scientific record and as set forth in the EPA's Endangerment and Cause of Contribute Findings under Section 202(a) of the CAA.'x We agree with these findings, and modeling from Energy Innovation's EPS demonstrates that widespread deployment of ZEVs, powered by a clean grid, is essential to reducing GHG emissions in alignment with a 1.5°C Scenario (Figure 1).[xi] [Figure 1 can be found at Docket number [EPA-HQ-OAR-2021-0208-0605-A1, p.3]

As the EPA undertakes its subsequent analyses to inform the next iteration of tailpipe standards for both light-duty and medium- and heavy-duty vehicles, we strongly encourage it consider integrating the key findings and underlying assumptions from the 2035 Report 2.0 series (summarized below and discussed in more detail in the attached reports).

To comprehensively address the concurrent imperatives of climate change, public health, environmental justice, consumer affordability, and global competitiveness, we encourage the EPA to continue integrating the most updated assumptions in its analyses. Vehicle technology innovations, consumer adoption trends, cost declines, and other benefits should be reflected in the next iteration of the standards.

Based on our analysis, the strongest possible clean car standards can deliver multiple benefits like reducing vehicle pollution, saving consumers money, and spurring domestic economic activity and innovation in the transportation sector. In addition, strong clean car standards are key to mitigating the disproportionate impacts on the health and well-being of BIPOC and low-wealth communities.[xiv] To that end, we recommend the EPA aim for adoption of a 0g/mile by 2035 tailpipe standard by 2035, to accelerate ZEV deployment and achieve the array of benefits from a clean, electrified transportation system. The key findings from the 2035 Report 2.0 highlight the benefits and opportunities such a shift would entail.

Key Findings from the 2035 2.0 Report Series

• Given recent advances in EV battery cost and performance, range, and recharging, along with a proliferation of vehicle models and the plummeting cost of wind and solar power, the 2035 2.0 Report shows achieving a cost-effective 90 percent clean electricity grid by 2035 and ending pollution-emitting light-duty vehicles sales is technically feasible and economically beneficial within the next 10 to 15 years.

• The 2035 2.0 Report compares two scenarios:

(1) the Drive Rapid Innovation in Vehicle Electrification (DRIVE Clean) scenario, in which EVs constitute 100 percent of new U.S. LDV sales by 2030 as well as 100 percent of MDV and HDT sales by 2035. The grid reaches 90 percent clean electricity by 2035, and substantial EV charging infrastructure is deployed.

(2) the No New Policy scenario, in which EVs constitute 45 percent of new LDV sales, 38 percent of MDV sales, and 12 percent of HDT sales in 2035, and the clean electricity share reaches only 47 percent by 2035.

The study models public charging infrastructure, estimating the number and cost of the public charging ports needed to accommodate tens of millions of electric cars and trucks, the power supplies needed to meet the increased power demand from this shift, and the capital investment needed to achieve an accelerated transition in the DRIVE Clean scenario.

• The DRIVE Clean scenario yields cumulative economic savings of approximately $2.7 trillion through 2050 compared to the No New Policy scenario — an average household savings of approximately $1,000 per year over the next 30 years. The 2035 2.0 report models the total cost of ownership for gasoline and EVs, finding that electric trucks are already cheaper to own than diesel versions on a total cost-per-mile basis, and that electric cars will be cheaper than gasoline equivalents within the next five years (Figures 3 and 4). [EPA-HQ-OAR-2021-0208-0605-A1, pp. 5-6] [Figure 3 can be found on Docket number [EPA-HQ-OAR-2021-0208-0605-A1, p. 6] and figure 4 can be found on Docket number [EPA-HQ-OAR-2021-0208-0605-A1, p. 7]

• Compared with the No New Policy scenario, the total transportation sector pollutant3 and carbon dioxide emissions reductions in the DRIVE Clean scenario avoid approximately 150,000 premature deaths and equate to nearly $1.3 trillion in health and environmental savings through 2050. The DRIVE Clean scenario reduces ground transportation sector CO2 emissions by 60 percent in 2035 and by 93 percent in 2050, relative to 2020 levels (Figures 5 and 6). [Figure 5 can be found on Docket number [EPA-HQ-OAR-2021-0208-0605-A1, p. 7] and figure 6 can be found on Docket number [EPA-HQ-OAR-2021-0208-0605-A1, p. 8] [3] Namely fine particulate matter, nitrous oxides, and sulfur oxides.

• The DRIVE Clean scenario results in 2 million net new jobs in 2035 compared to the No New Policy scenario (Figure 7). Employment gradually ramps up in this timeframe as EV manufacturing expands, and the electricity grid adds new renewable energy and battery storage resources to support increased vehicle electrification. Consumer cost savings in the transition to EVs similarly creates induced jobs in the economy. [Figure 7 can be found at Docket number [EPA-HQ-OAR-2021-0208-0605-A1, p. 8]

• The DRIVE Clean scenario would require an amplified deployment of EV charging infrastructure: the U.S. must install an average of approximately 270,000 public chargepoints for LDVs and 35,000 MDV/HDT chargepoints each year for the next 30 years. The rate of installation is comparable to that achieved in other rapidly electrifying countries.[4,xv]

• The DRIVE Clean scenario's 90 percent by 2035 clean grid is dependable without coal plants or new natural gas plants, and the resulting wholesale electricity cost is lower than today's costs. Electricity demand growth from increased electrification averages about 2 percent per year, a growth rate slower than that achieved in between 1975 to 2005 (Figure 8). To meet this demand, the U.S. must install on average 105 gigawatts of new wind and solar and 30 gigawatts of new battery storage each year. [Figure 8 can be found at Docket number [EPA-HQ-OAR-2021-0208-0605-A1, p. 9]

• New investments in the distribution system are necessary to support increased load from EVs and enable more chargers. However, a complementary analysis to the 2035 Report 2.0, Distribution Grid Cost Impacts Driven by Transportation Electrification (attached), led by Energy+Environmental Economics shows that cost of public charging and estimated distribution upgrade costs associated with transportation electrification will not increase electricity rates. The analysis found that transportation electrification increases system utilization and reduces average distribution rates, even in the high-cost estimates. Managed EV charging, which was not modeled, could further improve the economics.[xvi]

Similarly, EPA's acknowledgement that a 'longer-term rulemaking could also address criteria pollutant and air toxics emissions from the new light-duty vehicle fleet' supports its stated plan to take 'critical steps to continue the trajectory of transportation emission reductions needed to protect public health and welfare.'[vi] [EPA-HQ-OAR-2021-0208-0605-A1, pp . 2]

Commenter: Environmental Defense Fund (EDF)

EDF supports EPA's and the Administration's vision that "a future, longer-term program for MYs 2027 and later will build upon these near-term standards." Moreover, as both the Proposal and President Biden's August 5, 2021 Executive Order 14037 recognize, those long-term standards must ensure substantial deployment of zero-emission vehicles ("ZEVs") to deliver urgently needed climate reductions and to protect the health of communities. To that end, it is important that this Proposal create the strongest foundation possible for future action. [EPA-HQ-OAR-2021-0208-0688-A1, p. 1]

Finally, we urge the administration to propose and finalize those next-generation standards promptly and set new multi-pollutant standards for passenger cars that eliminate tailpipe pollution from new vehicles sold by 2035. Long term standards beyond MY 2026 are crucial to achieving President Biden's goal of 50 percent sales of new zero-emitting passenger cars and light trucks by 2030, and to put the country firmly on the path to eliminating tailpipe pollution from new passenger vehicles by 2035.3 [EPA-HQ-OAR-2021-0208-0688-A1, p. 2]

The Proposed Standards are an important first step to begin the shift toward all new ZEV sales. The agencies must follow this rulemaking promptly with longer-term transformative, multipollutant light-duty standards that will fully transition the light-duty fleet. EDF modeled the impacts of multipollutant standards that ensure all new light-duty vehicles sold by model year 2035 are ZEVs. Such standards would deliver substantial benefits to all Americans by reducing harmful air and climate pollution, saving lives, saving consumers money, and delivering high-quality jobs. [EPA-HQ-OAR-2021-0208-0688-A1, p. 36-37]

Commenter: Environmental Law & Policy Center (ELPC), et al.

EPA must also act swiftly to set standards for MY 2027 and beyond that will slash climate-changing pollution and ensure the U.S. can achieve 100% zero-emission vehicle sales no later than 2035, consistent with the Biden administration's science-based goal of net-zero greenhouse gas emissions economy-wide by 2050. [EPA-HQ-OAR-2021-0208-0567-A1, p. 5]

Commenter: Environmental Law and Policy Center (ELPC)

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, p. 291.]

EPA must act swiftly on setting standards for Model Year 2027 and beyond.

Commenter: Environmental Protection Network (EPN)

Section III discusses how this proposal fits with the longer-term goal. EPN recognizes that this proposal covers just MYs 2023 through 2026, and that most of the necessary transformation to zero-emissions technology will occur after these model years. Therefore, the most important way to judge this proposal is by asking whether it provides the most appropriate foundation for adopting and implementing the longer-term strategy discussed in Section II, and whether it takes the most appropriate steps in these four MYs to make the most progress possible towards this longer-term goal. [EPA-HQ-OAR-2021-0208-0213-A1, p. 1]

EPN is pleased that EPA framed the proposed MY 2023-2026 standards as 'a critical building block for a comprehensive, multipollutant longer-term regulatory program…[with]…a strong potential for dramatic reductions in GHG and criteria pollutant emissions over the longer term.[2] EPN strongly recommends that the agency follow through with an unequivocal commitment to make promulgation of a post-MY 2026 rulemaking requiring near-100% zero emissions vehicle sales by MY 2035 its top mobile source priority over the next two years. [EPA-HQ-OAR-2021-0208-0213-A1, p. 2]

EPA, by promulgating a post-MY 2026 rulemaking requiring near-100% zero-emissions vehicle sales by MY 2035, can play a critical role in facilitating a fast EV transition. There are several compelling justifications for such a strong rule.

One, a fast transition to EVs would yield massive societal benefits. The Environmental Defense Fund (EDF) has projected that a transformation of the new-car and light-truck market to 100% EVs by 2035 would yield net societal benefits of $88 billion in calendar year 2040 and $112 billion in calendar year 2050, with cumulative net societal benefits through 2050 of $1.6 trillion. The societal benefits are about equally split between monetary savings to consumers and health and environmental benefits. [EPA-HQ-OAR-2021-0208-0213-A1, p.7]

Three, as discussed above, it seems increasingly apparent that there are some automakers who want to be leaders in a fast EV transition. In the absence of regulation, however, those automakers may be wary of ‘getting out in front of the market’ while their competitors try to delay the transition as long as possible in order to maximize profits from past investments in existing gasoline vehicle designs and engine/transmission/assembly plants. A strong regulation can provide critical regulatory certainty and a level playing field for those automakers who want to be leaders without worrying that others may drag their feet.

Finally, the most compelling justification for a near-100% EV sales requirement in 2035 is simply that we have no more time to waste. We are facing a global climate emergency, and we must commit to a zero-emissions vehicle future over the next decade if we are to protect ourselves, the planet, and future generations from increasingly severe climate-related tragedies.

EPN stipulates that a fast transition to EVs will be a very big deal for consumers and automakers alike, and EPN understands that the agency will be criticized by many for going too fast. But EPA simply must act to protect the planet and public health, and for the first time, the agency can show that there is a practical and cost-effective technological pathway for doing so, with at least some automakers likely willing to support a regulatory requirement with sufficient lead time.

EPN strongly believes that anything short of a near-100% zero-emissions requirement in model year 2035—e.g., a rule that only goes through model year 2030—would miss the best opportunity the agency has ever had, and may ever have, to define a zero emissions future, and would allow those automakers who do not want to lead to continue to stall and make it harder for those automakers who do.

EPA has a critical decision to make—its post-2026 rule will either define a clear path to a zero-emissions car and light-truck future by 2035 or it won't. EPN implores the agency to have the courage of its convictions and do what we all know must be done to protect the planet and public health for future generations. [EPA-HQ-OAR-2021-0208-0213-A1,pp.8-9]

How This Proposal Furthers the Administration's Stated Long-Term Climate Goals

The proposal makes the minimum progress needed to lay a strong foundation for reaching the longer-term electrification goals, and EPA should consider strengthening it to make greater progress.

As discussed in Section II, EPN strongly believes it is critically important that EPA adopt longer-term standards calling for almost all new passenger cars and light trucks to be electric powered by MY 2035. President Biden's August 5, 2021, Executive Order calls for America to lead the world on clean and efficient cars and trucks and sets a goal of 50% of new cars and light trucks to be electric powered by MY 2030. To implement this the Executive Order calls for EPA to conduct a longer-term rulemaking for MY 2027 and later to be finalized by July 2024.

This proposal is limited to the four MYs preceding MY 2027, making it a relatively limited and near-term set of standards. However, this rulemaking lays the groundwork for the critically important longer-term rulemaking addressed in the Executive Order. Given the need for strong longer-term standards, the most important way to judge this proposal is by asking whether it provides the most appropriate foundation for adopting and implementing the longer-term strategy discussed above. Does this rulemaking take the most appropriate steps in these four MYs and make the most progress possible towards this longer-term goal?

As discussed in Section II, there is no time to lose given the dire need to reduce GHGs from the transportation sector as part of addressing climate change, and the compelling need for large reductions in NOx and PM. There is a relatively short time span to work with. Reaching 50% electric power by MY 2030 and near 100% by MY 2035 will require strong progress through MY 2026 and establishment of a strong foundation for progress after MY 2026.[EPA-HQ-OAR-2021-0208-0213-A1, p. 9]

The NPRM only provides a limited discussion of EPA's longer-term goals and plans. While recognizing EPA retains flexibility on many of the details of its plans, the agency needs to provide a clear signal to all stakeholders, domestic and global, that EPA is moving aggressively to achieve a goal of 50% electrification of new cars and light trucks by MY 2030 and near 100% electrification by MY 2035. Based on the Executive Order, this next rulemaking is around the corner. EPA should publicly recognize this and clearly announce its basic goals for this critical rulemaking addressing MYs after 2026. [EPA-HQ-OAR-2021-0208-0213-A1, p. 13]

Conclusion

Overall, EPN is supportive of this proposal and looks forward to swift finalization and implementation. As previously stated, we believe EPA's top priority moving forward should be a post-2026 rule to establish a clear regulatory requirement to achieve near-100% zero-emissions car and light-truck sales by 2035. If the U.S. is to reach the IPCC goal of net-zero emissions by 2050, it is imperative that the agency promulgate standards to transform the new car fleet to zero-emissions vehicles by 2035, providing critical regulatory certainty and lead time, and a level playing field for U.S. automakers to be EV leaders. [EPA-HQ-OAR-2021-0208-0213-A1, p. 14]

EPA should clearly lay out its goal for the next rulemaking and send a clear signal of what it intends for the years leading to MY 2035, recognizing the need to retain flexibility on the myriad details involved in the next rulemaking. EPN looks forward to the opportunity to work with EPA as the agency begins to develop post-2026 standards. [EPA-HQ-OAR-2021-0208-0213-A1, p. 14]

Commenter: EOS at Federated Hermes (on behalf of its stewardship clients)

Robust vehicle standards are critical to ensuring the global competitiveness of the U.S. auto industry, as well as staving off the worst impacts of climate change. In addition to adopting standards at least as stringent as Alternative 2, we urge EPA to ensure that the next round of standards is aligned with climate goals by ensuring at least 50% ZEV sales, and a 60% reduction in emissions, by 2030. [EPA-HQ-OAR-2021-0208-0568-A1, p. 1]

Commenter: Fajardo, Jane-Marie

As a parent, I am writing to oppose the electrification of all new cars by 2035. The transportation sector is the largest source of climate pollution in the US, but electrification is not the only answer. I could support a smaller percentage, but there are several issues with this aggressive goal.

1) it does not address the emissions upstream that are a result of manufacturing batteries, nor the end life of said batteries. Until there is a crib to crypt model, it would be irresponsible of the EPA to mandate electrification of all cars.

2) the infrastructure is not in place yet to handle so many electric cars.

We do not need 100% of new car sales to be zero-emissions by 2035. To reach that goal, the infrastructure should be in place first. In addition, electrification, only, ignores other renewable resources. We must view climate protection holistically, we cannot think that electrification is the only way when zero emissions at the tailpipe is not the same as zero emissions. Please finalize the strongest possible climate pollution action plan by holistically striving to lower emissions to help protect our children's health and future from the climate crisis. [EPA-HQ-OAR-2021-0208-0668-A1, p. 1]

Commenter: Fuels Freedom Foundation

As acknowledged in the Proposed Rule, internal combustion engines (ICE) vehicles are expected to dominate U.S. roadways far beyond MY2026. Vehicles purchased in any given year will be on the road for 12 years or more. Yet the continued dominance of ICEs does not mean that EPA should decrease ambitions to reduce GHG emissions. Parallel to the long-term commitment to electric vehicles (EVs) in the Proposed Rule, in the Final Rule, the agency should initiate measures to ensure the ability of automakers to both maximize GHG reductions in the vehicles of today, and produce the full range of vehicles that can dramatically reduce carbon intensity and satisfy consumer needs, budgets, and preferences into MY2027 and beyond. [EPA-HQ-OAR-2021-0208-0231-A1, p. 2]

For the long term to 2050, a holistic program is necessary for the EPA to maximize lifecycle GHG emissions in light-duty transportation. From a full fuel-cycle perspective, feedstocks and fuel production are significant contributors to GHG emissions. For electric vehicles, GHG emissions of the electric grid needs to be fully accounted for. For liquid fuels, the carbon intensity of gasoline and diesel increases as production moves further afield, incorporates more carbon-intensive sources, and easier reservoirs are drawn down. The Proposed Rule's recognition that liquid fuels will continue to power the vast majority of vehicles for decades thus demands concerted action to aggressively reverse this direction in order to dramatically reduce carbon intensity. [EPA-HQ-OAR-2021-0208-0231-A1, p. 2]

Commenter: General Motors LLC (GM)

We additionally recognize that this proposal will set the baseline for a future rulemaking by the Biden Administration for the 2027 model year and beyond. We fully expect that rulemaking to leverage and accelerate the ambitious progress by industry toward our shared – and ultimate – goal of an all electric, low-carbon transportation future. [EPA-HQ-OAR-2021-0208-0234-A1][pp.2-3]

Commenter: Hyundai America Technical Center, Inc. (Hyundai)

Hyundai supports the Administration's aspirational goal of achieving 40 to 50% zero emission vehicle sales by 2030. Meeting this electrification goal and the foundation being laid by the GHG reductions proposed in EPA's GHG NPRM will be both challenging and transformative. As such, a host of complementary measures are needed to make it a reality. Ensuring consumer demand, grid resiliency, widespread infrastructure availability, consumer incentives, and green electricity and hydrogen are just a few examples of necessary actions. Coordination between Federal agencies, automakers, and other stakeholders is paramount. [EPA-HQ-OAR-2021-0208-0603-A1, p.1]

Commenter: Interfaith Power & Light (IPL)

[E]stablish a 2030 standard for cars and light-duty trucks that achieves fleet average greenhouse gas emissions 60 percent or more below today's average; put the nation on a trajectory to make all new cars and light-duty trucks electric vehicles no later than 2035, which requires at least 60% to be electric by 2030; and ensure all new trucks and buses are zero-emission no later than 2040.[EPA-HQ-OAR-2021-0208-0224-A1, p. 2]

Commenter: Lish, Christopher

Then, to drive real progress, I urge you to write new long-term rules that:

2. Supplement this proposal with another, to be finalized before the end of 2022, that sets a ZEV mandate for model year 2026 consistent with a pathway toward requiring 100 percent of new vehicles to be ZEVs by 2030.

3. Start another rulemaking for model years 2027 to 2030 that achieves 100 percent ZEVs by 2030.

4. Require automakers to reduce heat-trapping pollution by 7% each year till then;

5. Close loopholes that allow manufacturers to avoid making real improvements;

6. Promote justice and good electric-vehicle jobs. [EPA-HQ-OAR-2021-0208-0218-A1, p. 2]

Commenter: Lucid USA, Inc. (Lucid)

The U.S. automobile market needs a transition period from its current state to a more efficient vehicle mix, and the proposed standards could facilitate that transition. After the transition period of model years 2023-2026, the federal agencies must consider the next stage: a national ZEV program. In the United States, the transportation sector is one of the largest contributors to GHG emissions and in 2019 accounted for 29% of total U.S. GHG emissions. Of those transportation sector GHG emissions, light-duty automobiles accounted for 58% of U.S. GHG emissions in 2019, by far outproducing any other mobile source. A National ZEV program is the natural next step to respond to the climate crisis. [EPA-HQ-OAR-2021-0208-0528-A1, p. 6]

As EPA moves to a final regulation in this rulemaking, Lucid urges the Agency to look ahead to the next rulemaking for Model Years 2027 and beyond. EPA can lay the groundwork now for a technology-forcing regulation in the future that will set nationwide ZEV standards. The auto industry in the United States has given clear signals this year that it is ready for the transition to electric vehicles. The Biden Administration can give the industry a push down the road to a zero emission future with these standards and the next round of standards. [EPA-HQ-OAR-2021-0208-0528-A1, p. 6]

Commenter: Manufacturers of Emission Controls Association (MECA)

While suppliers continue to innovate and introduce new technologies, the uncertainty surrounding these standards over the past five years has limited investment and job creation in the U.S. We therefore urge EPA to set standards as soon as possible for MY2027 and beyond. Our members depend on long term regulatory certainty to justify their investments that will allow the U.S. to meet its national climate objectives and ensure that U.S. technology suppliers remain internationally competitive. [EPA-HQ-OAR-2021-0208-0261-A1, p.1]

MECA supports EPA’s efforts to develop multipollutant standards, including criteria and GHG emission limits for MY 2027 and later light-duty vehicles which are vital to the attainment of long term national environmental goals. Since most economic forecasts out to 2050 include scenarios that predict millions of cars will be sold with ICEs, including some limited sales in 2050, these standards should take into consideration technologies that can feasibly reduce the environmental footprint of all vehicles. In addition, MECA suggests that EPA consider the vehicle and fuel in a systems approach when developing the MY 2027+ standards in order to encourage that all powertrains and fuels are contributing to our national air quality and climate goals.

As electric vehicles become a more significant fraction of the on-road vehicle fleet in 2027 and beyond, MECA urges EPA to consider upstream emissions through a full lifecycle assessment for all vehicle powertrains and advanced vehicle fuels in EPA, NHTSA and DOE programs and regulations. With the growing emphasis on rapid real world emission reductions, it becomes increasingly important to consider all emissions and impacts to the environment, including upstream emissions related to fuels, vehicle production supply chains and supporting fueling infrastructures in a consistent, accurate and equitable manner. Historically, EPA’s methodology has considered a balanced and equitable treatment of fuels and technologies to arrive at cost effective regulations. Numerous studies have shown that in many parts of the country, the air quality benefits of transportation strategies are not uniform with regards to lifecycle emissions. In order to make sound incentive and investment decisions, there is a vital need to consider these additional factors to ensure the most environmentally equitable near-term CO2 reductions that support the attainment of long-term national objectives. [EPA-HQ-OAR-2021-0208-0261-A1, pp.4-5]

Commenter: Maryland Department of Environment

Therefore, Maryland also agrees with NACAA and 'supports such a second rulemaking for future longer-term actions to further reduce LDV emissions – GHG, criteria pollutant and air toxics – and advance penetration of EVs into the market, beginning with MY 2027 and extending through at least MY 2030, to lead to 50 percent of all new passenger cars and light trucks sold in 2030, and 100 percent of those sold in 2035, being ZEVs.' [EPA-HQ-OAR-2021-0208-0241-A1, p.2]

Commenter: Mass Comment Campaign sponsored by American Lung Association (121)

Then, please act quickly to set stronger standards out to at least 2030 that drive the transition to zero-emission transportation nationwide. [EPA-HQ-OAR-2021-0208-0559-A1,p.1]

Commenter: Mass Comment Campaign sponsored by Center for Biological Diversity (77,692)

I urge you to write new long-term rules that:

1. Phase out sales of gas-powered cars and trucks in favor of electric vehicles by 2030; [EPA-HQ-OAR-2021-0208-0560-A1, p.1]

Require automakers to reduce heat-trapping pollution by 7% each year till then; [EPA-HQ-OAR-2021-0208-0560-A1,p.1]

Commenter: Mass Comment Campaign sponsored by Environment America (11,080)

The U.S. Environmental Protection Agency’s proposed rule to Revise Existing National GHG Emissions Standards for Passenger Cars and Light Trucks Through Model Year 2026 is a start, but must be more ambitious if we are to combat the worst effects of climate change and ensure Americans have clean air as soon as possible. Transportation is the number one source of climate change-inducing pollution in the U.S., and we cannot meet the bold climate goals set by President Biden unless we ensure all new cars are electric by no later than 2035. [EPA-HQ-OAR-2021-0208-0557-A1, p.1]

Commenter: Mass Comment Campaign sponsored by Interfaith Power and Light et al. (1,599)

As religious leaders, we urge you to enact the strongest possible standards to reduce vehicle pollution. We ask that you:

• Establish a 2030 standard for cars and light-duty trucks that achieves fleet average greenhouse gas emissions 60 percent or more below today’s average;

• Put the nation on a trajectory to make all new cars and light-duty trucks zero-emission vehicles no later than 2035;

• Ensure all new trucks and buses are zero-emission no later than 2040. [EPA-HQ-OAR-2021-0208-0192-A1, p.2]

Commenter: Mass Comment Campaign sponsoring organization unknown-2 (2,214)

Start another rulemaking for model years 2027 to 2030 that achieves 100 percent ZEVs by 2030. [EPA-HQ-OAR-2021-0208-0546,p.1]

Commenter: Mass Comment Campaign sponsoring organization unknown-4 (195)

EPA should also act quickly to set standards for model year 2027 and beyond that will slash climate-changing pollution and ensure the U.S. can achieve 100% zero-emission vehicle sales no later than 2035, as called for by President Biden. [EPA-HQ-OAR-2021-0208-0548,p.1]

Commenter: Mass Comment Campaign sponsoring organization unknown-7 (37)

In addition, I urge EPA to swiftly move forward with setting stronger emissions standards that drive a dramatic transition to zero-emission vehicles through 2030 and beyond. [EPA-HQ-OAR-2021-0208-0551, p.1]

Commenter: Mass Comment Campaign sponsoring organization unknown-9 (3,219)

I respectfully urge you to finalize them as soon as possible and move swiftly to establish the next set of standards that put us on the path to 100% sales of new zero-pollution cars and light trucks by 2035. With ambitious multi-pollutant standards, we can protect the health of our communities and achieve the President's goal of a zero-emission transportation future. [EPA-HQ-OAR-2021-0208-0640-A1, p.1]

By setting standards that put the U.S. on a pathway to eliminate all passenger vehicle tailpipe pollution by 2035, Environmental Defense Fund estimates that the U.S. could:

1. Prevent as many as 98,000 premature deaths by 2050;

2. Reduce a total of more than 11.5 billion metric tons of carbon pollution by 2050; and

3. Provide more than $1.6 trillion in benefits to Americans, including pollution reductions and economic savings. [EPA-HQ-OAR-2021-0208-0640-A1,p.1]

Commenter: Metropolitan Mayors Caucus

Act quickly to propose ambitious post-model year 2026 standards. [EPA-HQ-OAR-2021-0208-0504, p.1]

We support the most stringent GHG emission standards for light-duty vehicles feasible and will support swift and aggressive emissions standard for MY 2026 and beyond. [EPA-HQ-OAR-2021-0208-0504, p.1]

Commenter: Minnesota Corn Growers Association (MCGA)

In addition to making improvements in this proposal, we urge EPA to use the rulemaking for MY 2027 and later to open pathways to achieve more emissions reductions from sustainable, affordable low carbon ethanol through a clean, high octane standard, removing barriers to higher ethanol blends and equitably incentivizing all alternative fuel vehicles on track to reach net-zero emissions. [EPA-HQ-OAR-2021-0208-0530-A1, p. 2]

Commenter: Minnesota Pollution Control Agency (MPCA) and Minnesota Department of Transportation (MnDOT)

In his August 5, 2021, Executive Order 14037, 'Strengthening American Leadership on Clean Cars and Trucks,' President Biden directs EPA to begin work on another rule under the Clean Air Act to establish new multi-pollutant emission standards, including for GHGs, for light- and medium-duty vehicles beginning with MY 2027 and extending through at least MY 2030, with a final rule due no later than July 2024. EPA characterizes the current notice as 'a critical building block for a comprehensive, multipollutant longer-term regulatory program implementing EPA’s statutory authority under the CAA' and writes that the agency 'anticipates that the design of a future, longer-term program beyond 2026 will incorporate accelerating advances in zero-emission technologies' (86 FR 43729).

The MPCA and MnDOT support such a future, longer-term rulemaking to slash emissions from the transportation sector and advance the penetration of EV technology. We also encourage EPA to consider the role biofuels can play in reducing emissions in the near-term, and perhaps in the longer term, especially in certain use-cases where electrification is more challenging.

EPA should begin work on this second rulemaking immediately. The California Air Resources Board expects to finalize the next phase of its light-duty vehicle emission standards next year. The many states who are currently exercising their authorities under section 177 of the Clean Air Act to go farther than the backstop national standards are already having to consider whether to pursue adoption of these new standards. In order to make informed decisions about pursuing state-level rulemaking under section 177, states need to know what EPA is considering and how stringent the federal standards might be. The MPCA and MnDOT encourage EPA to pursue a national program that sets the whole country on a path to deep and rapid decarbonization of the transportation sector, while also maintaining the authority preserved to states under the Clean Air Act. We recommend that EPA issue an Advance Notice of Proposed Rulemaking by no later than mid-2022 to share its thinking and ideas, take comments and input and initiate a robust discussion to inform this subsequent regulatory effort. [EPA-HQ-OAR-2021-0208-0211-A1, pp.4-5]

Commenter: Motor & Equipment Manufacturers Association (MEMA)

Looking beyond MY2026, MEMA stands ready to work with EPA to establish a holistic long-term framework for GHG standards that are ambitious but pragmatic and provide multiple technology pathways for compliance. [EPA-HQ-OAR-2021-0208-0249-A1, p. 3]

MEMA Supports a Post-2026 Program that Utilizes a Broad Spectrum of Advanced Technologies - Beyond MY2026, we support a program that transitions the industry to a cleaner transportation future that allows multiple pathways for compliance and utilizes a broad spectrum of advanced technologies. Vehicle suppliers stand ready to help the industry meet the goal of 50 percent of passenger cars and light trucks sold in 2030 are zero emissions vehicles (ZEVs).6 The roll out of higher levels of advanced technologies, including electrification, must be partnered with cohesive complementary policies that address both supply and demand for these technologies. All these elements, along with long-term program consistency, are essential to support vehicle suppliers' commitments, avoid stranded investments, and advance industry's innovation. [EPA-HQ-OAR-2021-0208-0249-A1, p. 4]

MEMA supports EPA's proposed rule for MY2023 and beyond because the standards are achievable with currently available technologies resulting from long-term supplier resource commitments and investments and includes performance-based standards that allow multiple pathways to compliance. We emphasize that a finalization of the rule will require suppliers and the industry as a whole to continue significant capital investments and commitments.

The recent EO directs EPA to establish new emissions standards beginning with MY2027 and extending through at least MY2030. MEMA urges EPA to provide the industry with a long-term holistic framework that includes GHG target ranges and goals beyond 2030. Reaching long-term goals set by the administration, including the 50 percent ZEV target in 2030, will require significant amount of additional research and development from suppliers. As technology investments become more diversified, the supplier industry needs long-term, consistent, coordinated standards from the administration, EPA, NHTSA and California for a smooth path forward.

Vehicle suppliers look forward to working with EPA on the post-2026 program. The post-2026 program and how it is implemented, may well determine global leadership in transportation technology and how investments are made for generations to come. Similar to the pre-2026 program, MEMA strongly supports a post-2026 program that continues to be performance-based and leverages American innovation by allowing the goals to be met with a wide range of advanced propulsion technologies.

It is imperative that various pathways are utilized to meet the even more stringent targets for MY2027 and beyond. Along with higher levels of electrification, there are multiple advanced technologies for ICE and other systems that can significantly contribute to meeting the emissions targets. All these technologies have a place in meeting the nation's goals.

For supplier long-term investments, it is critical that the program allows multiple pathways for compliance, utilizing a broad spectrum of advanced technologies. This approach, partnered with a reasonable pace, will encourage competition around available cost-effective technologies, and preserve U.S. global competitiveness and innovation leadership. Allowing multiple technology pathways is also critical for suppliers to sustain previous supplier commitments, recuperate investments and development over the long-term, and avoid stranding investments.

The roll out of higher levels of electrification and other advanced technologies needs to be partnered with cohesive complementary policies. All these elements, along with long-term targets and consistency, are essential to support vehicle suppliers' investments in these technologies, advance the industry's innovation, and meet the nation's goals.

In the post-2026 program, vehicle suppliers stand ready to help the industry meet the goal set in the EO14037 establishing that ZEVs make up 50 percent of all new passenger cars and light trucks sold in 2030.43 Reaching this goal will require an enormous amount of investments from suppliers on electrification, on top of significant investments already made.

MEMA strongly supports the administration's current definition of ZEVs that includes BEVs, PHEVs, and FCEVs. MEMA strongly supports PHEVs being included in the ZEV definition. PHEVs will facilitate the transition to higher vehicle electrification and, to lower emissions, promote consumer acceptance of electrified powertrains, and reduce tensions in the supply chain, workforce, and needed U.S. charging infrastructure. Industry-based projections show PHEVs are expected to represent at least 20 percent of ZEV sales for the next five years. That percentage not expected to take a general downward trend over that period.

PHEVs offer important flexibility for consumers, including lower income consumers, who may be able to charge at work or elsewhere, but not at a consistent dedicated charging point at home. Research shows that "PHEVs may remain an important choice among lower income consumers" for the foreseeable future because there is consistent data that show a strong link to people not buying a repeat EV in lower income communities because these communities did not have a home charging option. PHEVs are a good option when a BEV or FCEV transition is not feasible. Nationwide, more than 25 percent of housing units are part of structures with at least two units and, accordingly, less likely to have a charging point at home.

While we support the current ZEV definition, MEMA strongly encourages EPA to explore broadening it to include hydrogen ICE (HICE) in the post-2026 program. Broadening the definition of ZEVs to include HICE vehicles and other potential clean technologies would encourage further technology innovation that could accelerate attaining the nation's net-zero carbon emission goals.

HICE could contribute to significant emissions reduction improvements. HICE essentially has no CO2 emissions, and the NOx emissions (comparable to normal ICEs) can be controlled with current technology such as the selective catalytic reduction (SCR). Adding HICE could provide additional flexibility in the ZEV fleet and consumer preference because HICE vehicle performance provides higher load, towing, and longer range. HICE would continue to rely on current ICE manufacturing technology and would reduce tensions in industry manufacturing capacity and retooling needs. [EPA-HQ-OAR-2021-0208-0249-A1, p. 12-14]

Commenter: National Association of Clean Air Agencies (NACAA)

In his August 5, 2021, Executive Order 14037, 'Strengthening American Leadership on Clean Cars and Trucks,' President Biden directs EPA to begin work on another rule under the Clean Air Act to establish new multi-pollutant emission standards, including for GHGs, for light- and medium-duty vehicles beginning with MY 2027 and extending through at least MY 2030, with a final rule due no later than July 2024 (see 86 Fed. Reg. 45,583-45,584). EPA characterizes the current NPRM as 'a critical building block for a comprehensive, multipollutant longer-term regulatory program implementing EPA's statutory authority under the CAA' and writes that the agency ‘anticipates that the design of a future, longer-term program beyond 2026 will incorporate accelerating advances in zero-emission technologies’ (see 86 Fed Reg 43,729).

NACAA supports such a second rulemaking for future longer-term actions to further reduce LDV emissions – GHG, criteria pollutant and air toxics – and advance penetration of EVs into the market, beginning with MY 2027 and extending through at least MY 2030, to lead to 50 percent of all new passenger cars and light trucks sold in 2030, and 100 percent of those sold in 2035, being ZEVs.

EPA should begin work on this second rule now. The California Air Resources Board expects to finalize its next phase of LDV emission standards next year. NACAA recommends that EPA issue an Advance Notice of Proposed Rulemaking by no later than mid-2022, take comments and input and initiate a robust discussion to inform this subsequent regulatory effort. [EPA-HQ-OAR-2021-0208-0255-A1, p.8]

Commenter: National Coalition for Advanced Transportation (NCAT)

Looking forward to the GHG emissions standards that EPA will promulgate in a separate rulemaking for MY 2027 and beyond, NCAT supports EPA adopting strong standards that will continue to drive very substantial reductions in GHG emissions from vehicles. EPA should adopt standards that provide a longer-term benchmark to give manufacturers, state air agencies, public utility commissions and consumers a sense of long-term clarity. EPA’s longer-term approach should be both stringent and durable. This durability is important not just for manufacturers to roll out longer-term plans, but also for state utility commissioners who are planning to meet the electricity demand and support the infrastructure necessary for the continued transition to transportation electrification.

NCAT completely agrees with EPA that “[w]e are at a pivotal moment in the history of the light-duty transportation sector—a shift to zero-emission vehicle technologies is already underway, and it presents a strong potential for dramatic reductions in GHG and criteria pollutant emissions over the longer term.” The design of the longer-term program for MY 2027 and beyond must incorporate the “accelerating advances in zero-emission technologies”, in particular given the fast-paced nature of these industry changes, and “continue the trajectory of transportation emission reductions needed to protect public health and welfare.” As EPA recognizes, the benefits from these longer-term standards achieved with increased fleet penetration of zeroemission vehicles are enormously consequential. These benefits include large reductions in GHG emissions as well as criteria pollutants and air toxics emissions on and around roadways. In addition, they would support for the future development of vehicle-to-grid services, beneficially using renewable energy sources, such as wind and solar, across the electric grid.161 [EPA-HQ-OAR-2021-0208-0239-A1, p. 23-24]

Commenter: National Corn Growers Association (NCGA)

In addition to improving this proposal, NCGA urges EPA to use the rulemaking for MY 2027 and later to open pathways to achieve greater emissions reductions from sustainable, affordable low carbon ethanol through a clean, high octane standard, removing barriers to higher ethanol blends and equitably incentivizing all alternative fuels and vehicles on track to reach net-zero emissions. Low carbon, high octane fuels would also support any longer-term EPA rulemaking to address vehicle criteria pollutant and air toxics emissions. [EPA-HQ-OAR-2021-0208-0246-A1, p. 1]

Commenter: New Mexico Environment Department

Adopting the most stringent standards now will allow the EPA to adopt more ambitious standards for Model Year 2027 and beyond. Future car standards that increase stringency of standards for GHG, criteria pollutants, and air toxins will be fundamental to meet the national and state GHGe reduction goals and improve public health. [EPA-HQ-OAR-2021-0208-0205-A1] [p.3]

In addition to the more stringent proposed rules currently proposed by the EPA, New Mexico supports EPA in proposing future, longer-term policies and regulatory actions that will address LDV criteria pollutants and air toxin emissions in addition to GHGe. These future regulations will be instrumental in defining a strong national program with a path that accelerates the transition to zero-tailpipe emission for all vehicles sold in the United States. [EPA-HQ-OAR-2021-0208-0205-A1] [p.3]

Commenter: New York State Department of Environmental Conservation

New York encourages EPA to finalize this proposed rule and immediately turn its attention to establishing new rules that effectuate President Biden's goal that 50% of all passenger vehicles sold in the United States in 2030 will be zero emission. As recommended on April 21, 2021 by the Governors of New York and eleven other states, those rules should guide the transition to the sale of only zero emission passenger vehicles by 2035, putting the nation back on track in reducing emissions from the transportation sector at a critical moment, On September 8, New York Governor Kathy Hochul signed legislation1 that establishes a 100% light-duty new vehicle. ZEV sales goal in New York State by 2035. The climate crisis is here now, and steadfast leadership from the federal government and state governments alike is necessary to protect our planet and create today the jobs of the future. [EPA-HQ-OAR-2021-0208-0238-A1, p.3]

Commenter: Nissan North America, Inc.

As an industry leader and early developer of advanced technologies, including EVs, Nissan strongly supports the Biden Administration’s long-term electrification and carbon neutrality goals. Though advancements in gasoline powered/internal combustion engine (“ICE”) vehicles are an important element of improving fuel efficiency and achieving immediate GHG goals, the development and widespread adoption of EVs is essential to more substantial, long-term reductions—and even elimination—of tailpipe emissions. [EPA-HQ-OAR-2021-0208-0529-A1, p. 3]

Nissan is committed to helping create a carbon neutral society and accelerate the global effort against climate change. Nissan appreciates the Administration's focus on and support for advancing electrification and carbon neutrality. Nissan believes that the ambitious emission and fuel economy standards embodied in the proposed rules are important steps in driving the automotive industry towards these goals. The complimentary EV market measures discussed in the next section are an essential element of those steps and reaching the long-term goals. [EPA-HQ-OAR-2021-0208-0529-A1, p. 4]

Commenter: Northeast States for Coordinated Air Use Management (NESCAUM)

For the reasons stated above, NESCAUM urges EPA to promptly adopt the most stringent GHG emission standards feasible for MYs 2023-2026, and to move swiftly thereafter to propose ambitious post-MY 2026 GHG standards, to put the nation on track to rapidly electrify the entire light-duty fleet. [EPA-HQ-OAR-2021-0208-0259-A1, p. 5.]

Commenter: Poore, Michael

A revision to the SAFE Vehicles Rule for Model Years 2021-2026 Passenger Cars and Light Trucks is both necessary to help mitigate climate change and is compliant under the Clean Air Act. However, I believe the revision should extend the SAFE rule to more align with the recent Executive Order on Strengthening American Leadership in Clean Cars and Trucks. Additionally, while it does consider environmental justice issues, I believe more research needs to be conducted regarding short term affordability and equity.

The recent executive order, as inducted by Biden, sets a goal of having "50 percent of all new passenger cars and light trucks sold in 2030 be zero-emission vehicles, including battery electric, plug-in hybrid electric, or fuel cell electric vehicles.". Additionally, the executive order calls for the establishment of "new multi-pollutant emissions standards, including for greenhouse gas emissions, for light- and medium-duty vehicles beginning with model year 2027 and extending through and including at least model year 2030.".

While this rule revision calls itself a "stepping off point" for a longer-term program, I do not believe it needs to be such. To best align and meet the standards of the previous cited executive order, the revision should extend the SAFE rule to 2030, with the likeliness of more stringent standards for the extended years. [EPA-HQ-OAR-2021-0208-0371, p. 1]

Commenter: Pruitt, Katherine

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, p. 158.]

Additionally, EPA must also move ahead to set much stronger standards covering cars, SUVs, and light trucks through at least 2030 to drive the transition to zero emission vehicles the nation needs and that President Biden has called for in his Executive Order.

Commenter: Rauch, Molly

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, p.37.]

We need 100 percent of new car sales to be zero emissions by 2035. To reach that goal the near-term standards for climate pollution must be as strong as possible as soon as possible.

Commenter: Richards, Claire

[The following comments were submitted as testimony at the virtual public hearing on August 26, 2021. See Hearing Testimony – 26Aug2021, p. 269.]

It is critical that we have a long-term plan. The EPA must also set stronger standards through at least 2030 to drive the transition to zero emission vehicles the Nation needs and that President Biden has called for in his executive order. We must cut emissions as quickly as possible from gasoline cars and increase the adoption of electric vehicles so that we can get to a 100-percent electric new car market by 2035.

Commenter: Sierra Club

[The following comments were submitted as testimony at the virtual public hearing on August 25, 2021. See Hearing Testimony – 25Aug2021, p. 32.]

So we must get to a hundred percent electric vehicles sales by 2035 and, unfortunately, the EPA's proposed rule doesn't go far enough to get us on that path.

Commenter: South Coast Air Quality Management District

The South Coast AQMD also supports future regulatory action to address criteria pollutant and air toxics emissions from the new light-duty vehicle fleet.

The District appreciates the proposal's recognition that the standards have an in-built 'expectation that a future, longer-term program for MYs 2027 and later will build upon these [proposed] near-term standards' 86 FR at 32287. And the District fully agrees that this is a 'pivotal moment in the history of the light-duty transportation sector,' 86 FR at 43279, where zero emission technologies hold real promise for dramatic GHG and criteria pollutant reductions over the longer term. This forward-thinking recognition contrasts starkly with the SAFE rulemaking, which stubbornly failed to take account of any of the dire, longer-term impacts of the rollback. In essentially weakening EPA standards to achieve less than would be expected even without any regulation, the SAFE rule was undermining the vehicles program for 2027 and later (not to mention indirect or attenuated impacts of the rollback for regulation of other mobile sources). As concerns the urgency of the climate crisis, where the science recognizes GHGs to be 'long-lived' pollutants, the trajectory matters. Put differently, EPA must see that it is charged to adopt standards that are directionally appropriate; in this context, weak standards, in a real sense, can be worse than doing nothing. In the concept of building on the proposed near-term standards, the District fully supports EPA's announced aspirations for a future, longer term rulemaking that 'could also address criteria pollutants and air toxics emissions from the new-light duty fleet.' 86 FR 43730. [EPA-HQ-OAR-2021-0208-0215-A1, pp.3-4]

Commenter: Toyota Motor North America, Inc. (Toyota)

Toyota embraces an electric vehicle future and shares the Administration's objective of 40% to 50% of new vehicles sales in 2030 being electrified. We believe the surest way to reduce carbon the fastest is to embrace all forms of electrified vehicles to meet the varying needs of consumers, as well as low carbon fuels to reduce carbon from Internal Combustion Engines (ICEs) as the fleet turns over to electrified vehicles. We appreciate that the proposed standards remain performance-based while providing limited regulatory incentives to promote electrification and provide manufacturers with needed regulatory flexibility.

Toyota generally supports the proposed 2023-2026 model year GHG standards. Successful implementation of, and compliance with, the proposed standards requires complementary market-development and sustainment measures, including non-discriminatory consumer tax credits, infrastructure investments on electric charging and hydrogen refueling, critical mineral supply chain development, and a robust system to recycle end-of-life vehicle batteries. Toyota stands ready to work with federal and state regulators and lawmakers to support these measures provided they maintain a level competitive playing field. [EPA-HQ-OAR-2021-0208-0531-A1, p. 3]

Conclusion

Toyota generally supports the proposed 2023-2026 model year GHG standards recognizing that compliance will involve numerous stakeholders collaborating to increase customer adoption rates for BEV, FCEV, PHEV, and conventional hybrids. The more widespread deployment of today's best-in-class conventional gasoline technologies will also play an important role. Flexibilities and regulatory harmonization between EPA's GHG regulations and NHTSA's CAFE regulations are critical to cost-effectively manage compliance. Toyota is ready to contribute the proposed program's success to achieve the desired greenhouse reductions while simultaneously meeting the needs of our customers. [EPA-HQ-OAR-2021-0208-0531-A1, p. 14-15]

Commenter: Union of Concerned Scientists (UCS)

EPA must move forward expeditiously in proposing and finalizing MY2027 and later standards which puts the U.S. on track to a full transition to zero emission light-duty vehicle sales by 2035. A proposal in 2022 followed by finalization in 2023 would provide manufacturers with regulatory certainty as they continue to invest in the transition to zero emission vehicles. [EPA-HQ-OAR-2021-0208-0277-A1, pp.3-4]

The U.S. must rapidly transition to zero-emission vehicles to address climate emissions from the transportation sector. As demonstrated by UCS modeling, achieving 100 percent sales of zero emission passenger cars and trucks by 2035 will help put the U.S. on the path to net-zero emission by 2050, the level of reductions needed to avoid the worse consequences of climate change.

EPA must move forward expeditiously to finalize the strongest standards through MY2026 and propose and finalize standards for MY2027 and beyond as soon as possible to ensure the U.S. is on track to meet 100 percent zero emission vehicle sales by 2035. As noted above, and illustrated in Figure 7, adoption of Alternative 2 with an additional 10 g/mile requirement for MY2026, would result in the greatest amount of electric vehicle sales. However, without additional action, the U.S. will not meet the zero emission vehicle goals in President Biden's August 5, 2021, Executive Order, or the recommendation of the National Academies which call for 50 percent sales of electric vehicles by 2030. [Figure 7 at docket number EPA-HQ-OAR-2021-0208-0277-A1, p. 17]

In order to send a strong signal to the automotive industry and provide regulatory certainty for manufacturers, EPA should propose standards for MY2027 and beyond in 2022 and finalize standards in 2023 consistent with reaching 100 percent sales of zero emission vehicles by 2035. Some manufacturers, including General Motors, have signaled support for a transition to 100 percent zero emission vehicle sales. However, strong standards consistent with this trajectory are necessary to drive investments across the industry, hold all manufacturers accountable, and spur the additional investments needed to make a full transition away from internal combustion vehicles.

The urgency of the moment could not be more clear. Climate change is already having catastrophic impacts on the health and well-being of millions around the globe. The latest IPCC report provides a dire warning of the consequences of failing to act quickly and aggressively to curb climate emissions. Addressing pollution from our cars and trucks is a critical, necessary step.

Fortunately, cost-effective technology is available to reduce, and even eliminate, the pollution from vehicles operating on our roads and highways. EPA must finalize the strongest standards possible to set us on a path to addressing the pollution from our nation's transportation system. [EPA-HQ-OAR-2021-0208-0277-A1, pp. 39-40]

Commenter: Volkswagen Group of America, Inc. (Volkswagen)

Volkswagen supports the intention of the Administration to begin examining similar Federal pathways for 2027 and the direction for the Federal and State agencies to coordinate on the development of future standards. Volkswagen is committed to be a constructive partner in the dialogue for those future standards and to find pathways that can further expand the market for electrification in the US. Discussions regarding post 2027 is helping Volkswagen define it's own 'New Auto' strategy. [EPA-HQ-OAR-2021-0208-0237-A1, p.3]

Commenter: Volvo Car Corporation

Volvo Cars shares the Biden administration goals to advance sustainability and electrification. Volvo Cars wants to lead the transition to zero tailpipe emission mobility and our plan is to be a fully electric car company by 2030. Our goal is to be climate neutral by 2040, in line with the Paris Agreement. Therefore, Volvo Cars supports the Administration's goals of an electric vehicle future and lower emissions year over year. [EPA-HQ-OAR-2021-0208-0253-A1, p.2]

Commenter: Wisconsin Department of Natural Resources

EPA should also proceed expediently, in conjunction with NHTSA, to further strengthen emissions standards from light-duty vehicles, starting with the 2027 model year. Given limited state authority over these sources, timely federal action is critical to help states meet their state and federal air quality requirements. [EPA-HQ-OAR-2021-0208-0223-A1, p.4]

Commenter: Wiste, Leah

[The following comments were submitted as testimony at the virtual public hearing on August 26, 2021. See Hearing Testimony – 26Aug2021, p. 87.]

We're asking for a 2030 standard for cars and light-duty trucks that reduces greenhouse gases to 60 percent below today's average and to make all new trucks and buses zero emissions by 2040.

We're calling for all cars and light-duty trucks to be zero emissions by 2035 which will require at least 60 percent to be zero emissions by 2030.

EPA Response

EPA acknowledges comments expressing views on GHG emissions standards beyond MY 2026. As explained in the proposal and this final rule, EPA is adopting this rule to revise standards for MY 2023-2026 and is not adopting standards for later model years at this time, although EPA intends to initiate a new rulemaking for later model years. EPA believes this approach is appropriate in light of the timeline and record for this rulemaking.