

# Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles: Final Rule

The U.S. Environmental Protection Agency (EPA) is finalizing new, more protective emissions standards to reduce harmful air pollutants from light-duty and medium-duty vehicles (also known as Class 2b and 3 vehicles), starting with model year (MY) 2027. The final standards will significantly reduce emissions of greenhouse gases (GHG), hydrocarbons, nitrogen oxides (NO<sub>x</sub>), and particulate matter (PM<sub>2.5</sub>) from new passenger cars, light trucks, and larger pickups and vans, helping tackle the climate crisis and resulting in widespread reductions in air pollution. The standards will provide important health benefits to millions of people across the country, including both urban and rural communities near major roadways, which are disproportionately exposed to air pollution from motor vehicles. The standards will phase in gradually over model years (MYs) 2027 through 2032.

## Top Headlines

### *Climate Benefits*

The final standards establish technology-neutral, performance-based standards for cars, SUVs, light pickup trucks, and medium-duty large pickups and vans for model years 2027-2032. EPA projects that cumulative carbon dioxide (CO<sub>2</sub>) reductions as a result of the new standards are approximately 7.2 billion metric tons over the life of the program.

## **Health Benefits**

Cleaner vehicles provide much-needed benefits to communities across the country, especially in communities near major roadways, where people of color and people with low income often live and are disproportionately exposed. EPA estimates that the air pollution reductions from these standards will provide \$13 billion in annual health benefits. In 2055, EPA estimates harmful pollutants will be significantly reduced (compared to 2055 levels without the final standards) including:

- 8,700 tons of particulate matter
- 36,000 tons of nitrogen oxides
- 150,000 tons of volatile organic compounds

## **Economic and Consumer Benefits**

This rule has substantial benefits for society from fuel savings and lowers repair and maintenance costs for clean vehicles. The benefits of this rule will far exceed the total costs, with the annualized value of monetized net benefits to society estimated to be \$99 billion through the year 2055. This includes \$46 billion in reduced annual fuel costs, and nearly \$16 billion in reduced annual maintenance and repair costs for drivers. Consumers are expected to save an average of \$6,000 over the lifetime of a new vehicle from reduced fuel and maintenance costs, once the standards are fully phased in.

## **Advanced and Diverse Array of Technology**

The standards are technology neutral. EPA expects that manufacturers will choose to produce a diverse range of clean vehicles under the standards, including cleaner gasoline vehicles, hybrids (HEVs), and plug-in hybrid electric vehicles (PHEVs), and full battery electric vehicles (BEVs). This will translate into more vehicle options for consumers in the showroom.

## **Investments**

The final standards reflect the significant investments in clean vehicle technologies that industry is already making domestically and abroad, as well as ongoing U.S. market shifts and increasing consumer interest in clean vehicles.

In addition, the Bipartisan Infrastructure Law and the Inflation Reduction Act are providing unprecedented investment to accelerate the development and deployment of clean vehicle technology. These measures provide significant support for expanding the manufacture, sale, and use of clean vehicles.

## **Consumer Choice**

This rule is key to expanding vehicle choice and savings for American drivers. More than 100 plug-in hybrid and full battery electric vehicle models are now available in U.S. markets alongside hybrid and gas-powered options, giving Americans unprecedented flexibility in where and how they choose to fuel.

## Overview of the Standards

EPA's new emissions standards recognize continued advancements in emission control technologies that enable significant reductions in harmful air pollutants. These advancements include a diverse suite of technologies that can reduce both GHG emissions and emissions that form ozone, PM<sub>2.5</sub>, and NO<sub>x</sub> (i.e., "criteria pollutants"), including:

- Advanced gasoline vehicle technologies (e.g., advanced engines and transmissions)
- Hybrid electric vehicles (HEVs)
- Plug-in hybrid electric vehicles (PHEVs)
- Battery-electric vehicles (BEVs)

Rapid improvements in the feasibility and cost of these technologies as well as their increasing deployment in the U.S. and around the world demonstrate that they can greatly reduce emissions of both greenhouse gases and criteria pollutant precursors and are capable of being implemented across a large portion of the new vehicle fleet.

Under the performance-based emissions standards, manufacturers choose the mix of technologies they believe is best suited for their fleets to meet the standards. EPA anticipates that manufacturers will continue to employ a diverse range of technologies to comply with the standards, but also recognizes that manufacturer investments and consumer interest in electric vehicles are growing. Automakers are including electric vehicles as an increasingly integral part of their current and future product lines, leading to an increasing diversity of, and demand for, these clean vehicles.

## What Vehicle Types Are Covered by the Standards?

The light-duty vehicle standards apply to passenger cars, light trucks, and heavier vehicles designed primarily for the transportation of people, consistent with previous EPA criteria pollutant and greenhouse gas standards. The medium-duty vehicle (MDV) category includes heavy-duty Class 2b and 3 vehicles (vehicles with a gross vehicle weight rating (GVWR) of between 8,501 and 14,000 pounds), which are referred to here as MDVs to distinguish them from Class 4 and higher vehicles that remain under EPA's heavy-duty vehicle program. The MDV category primarily includes large pickups and vans that are typically used for work due to their higher towing and hauling capabilities compared to light-duty vehicles.

## Greenhouse Gas Emissions Standards

EPA is finalizing more protective greenhouse gas standards for both light-duty vehicles and medium-duty vehicles. These standards phase in over a six-year period from MY 2027 through MY 2032.

For light-duty vehicles, the standards are projected to result in an industry-wide average target for the light-duty fleet of 85 grams/mile (g/mile) of CO<sub>2</sub> in MY 2032, representing a nearly 50 percent reduction in projected fleet average emissions target levels relative to the existing MY 2026 standards. The table below presents a summary of the projected industry average g/mile targets for the MY 2027-2032 standards for cars, trucks, and the overall light-duty fleet.

Light-duty vehicle GHG standards: Projected targets, by regulatory class  
(CO<sub>2</sub> grams/mile)

	2027	2028	2029	2030	2031	2032
Cars	139	125	112	99	86	73
Trucks	184	165	146	128	109	90
Total Light-Duty Fleet	170	153	136	119	102	85

For medium-duty vehicles, EPA is revising the existing standards for MY 2027 and establishing new standards for MYs 2028-2032, given the increased feasibility of GHG emissions-reducing technologies in this sector in this time frame. These standards phase in over a six-year period from MY 2027 through MY 2032. When fully phased in, the MDV standards are projected to result in an average target of 274 g/mile of CO<sub>2</sub> by MY 2032, representing a 44 percent reduction in projected fleet average emissions target levels relative to the existing MY 2026 standards.

The table below presents a summary of the projected industry average g/mile targets for medium-duty vans, pickups, and the overall medium-duty fleet.

Medium-duty vehicle GHG standards: Projected targets, by regulatory class  
(CO<sub>2</sub> grams/mile)

	2027	2028	2029	2030	2031	2032
Vans	392	391	355	317	281	245
Pickups	497	486	437	371	331	290
Total Medium-Duty Fleet	461	453	408	353	314	274

### Criteria Pollutant Emissions Standards

EPA is finalizing “Tier 4” criteria pollutant emissions standards for non-methane organic gases (NMOG), NO<sub>x</sub>, PM, and other criteria pollutants and their precursors. For light-duty vehicles, EPA is finalizing NMOG plus NO<sub>x</sub> standards that will phase down to a fleet average level of 15 milligrams per mile (mg/mi) by MY 2032, representing a 50 percent reduction from the existing 30 mg/mi standards for MY 2025 established in the Tier 3 rule in 2014. For MDVs, EPA is finalizing NMOG+NO<sub>x</sub> standards that will require a fleet average level of 75 mg/mi by MY 2033, representing a 58 percent to 70 percent reduction from the Tier 3 standards of 178 mg/mi for Class 2b vehicles and 247 mg/mi for Class 3 vehicles. The standards will also reduce emissions of mobile source air toxics. The fleet average standards are shown in the following table.

## NMOG+NOx Fleet-Average Emissions Standards

Model Year	Light-Duty Vehicles NMOG+NOx (mg/mi)	Medium-Duty Vehicles NMOG+NOx (mg/mi)	
		Class 2b	Class 3
2026 (reference)	30*	178*	247*
2027	25	175	
2028	23	160	
2029	21	140	
2030	19	120	
2031	17	100	
2032	15	80	
2033 and later	15	75	
*Tier 3 standards provided for reference			

The NMOG+NOx standards continue the emissions certification “bin” structure approach EPA has used in prior programs. Under this structure, manufacturers assign each vehicle model to a bin that includes the applicable NMOG+NOx standards. The standards both add more bin resolution at low-emission bins to give manufacturers added flexibility and eliminate the highest certification bins to disallow production of the highest-emitting vehicles. EPA is requiring manufacturers to meet the standards across four driving cycles to ensure robust emissions control over a wide range of in-use driving conditions.

For both light-duty and medium-duty vehicles, EPA is finalizing a PM standard of 0.5 mg/mi and a requirement that the standard be met across three test cycles, including a cold temperature (-7°C) test. The PM standard is a per-vehicle cap (not a fleet average) and will be fully phased in by MY 2030 for light-duty vehicles and by MY 2031 for medium-duty vehicles. EPA projects the PM standard will reduce tailpipe PM emissions from gasoline vehicles by over 95 percent in addition to reducing mobile source air toxics.

EPA is finalizing cold temperature (-7°C) NMOG+NOx standards for light-duty vehicles and MDVs to ensure robust emissions control over a broad range of operating conditions. EPA is finalizing three provisions aligned with the California Air Resources Board (CARB) Advanced Clean Cars II (ACC II) program for addressing light-duty vehicle NMOG+NOx emissions from frequently encountered vehicle operating conditions not previously captured in EPA test procedures: (1) high power cold starts in plug-in hybrid electric vehicles, (2) early drive-away, and (3) mid-temperature engine starts. EPA is also finalizing standards aligned with the CARB ACC II program that address high load emissions from medium-duty vehicles with high gross combination weight rating (GCWR).

To provide manufacturers with additional time to adjust product plans and apply technologies to vehicles, EPA is finalizing gradual phase-ins for criteria pollutant standards shown in the table below. For light-duty vehicles greater than 6000 pounds GVWR and medium-duty vehicles, manufacturers have the choice of either the default phase-in or an optional incentivized early phase-in schedule.

**Phase-in Schedules for Criteria Pollutant Standards**

	Light-Duty Vehicles Light-Duty Trucks 1-2 (GVWR ≤ 6000 lb)	Light-duty Trucks 3-4 (GVWR 6001-8500 lb) and Medium-duty Passenger Vehicles (GVWR 8501 - 14,000 lb)		Medium-Duty Vehicles (GVWR 8501 - 14,000 lb)	
		Default	Early Option	Default	Early Option
2027	20%	0	20%	0	20%
2028	40%	0	40%	0	40%
2029	60%	0	60%	0	60%
2030	100%	100%	100%	0	80%
2031				100%	100%

In addition, EPA is setting more protective standards for carbon monoxide.

### Projected Mix of Technologies

The criteria pollutant and GHG standards are performance-based, allowing each automaker to choose the mix of emissions control technologies that is best suited for their vehicle fleet to meet the standards. EPA projects that there are a range of technology pathways for the industry to meet the standards. We expect that consumers will continue to have a wide range of vehicle choices in the market, from advanced gasoline vehicles to hybrids to plug-in hybrid electric vehicles to full battery electric vehicles.

The final standards are projected to accelerate the transition to clean vehicle technologies. EPA projects that from MYs 2030-2032 manufacturers may choose to produce battery electric vehicles (BEVs) for about 30 percent to 56 percent of new light-duty vehicle sales and about 20 percent to 32 percent of new medium-duty vehicle sales. EPA also projects that consumers will see an increase in the availability of other clean vehicle technologies, including hybrid electric vehicles and plug-in hybrid electric vehicles, as well as cleaner gasoline vehicles.

The final NMOG+NOX standards also have multiple feasible paths to compliance, depending on choices manufacturers make about deployment of emissions control technologies for internal combustion engine (ICE) vehicles as well as electrification technologies. To meet the more protective PM emissions standard, we project that manufacturers will widely utilize gasoline particulate filters on vehicles with internal combustion engines.

## Public Health and Welfare Benefits

The final standards will result in significant benefits for public health and welfare. Making cars cleaner is critical to improve air quality and address climate change. The transportation sector is the largest U.S. source of GHG emissions, representing 29 percent of total GHG emissions.<sup>1</sup>

Within the transportation sector, light-duty vehicles are the largest contributor, at 58 percent of all transportation sources and nearly 17 percent of total U.S. GHG,<sup>2</sup> even before considering the contribution of medium-duty Class 2b and 3 vehicles which are also included under this rule. GHG emissions have significant impacts on public health and welfare.

EPA's rule will significantly reduce emissions of air pollutants that contribute to climate change and unhealthy air. Between 2027 and 2055, the standards will cumulatively avoid 7.2 billion metric tons of CO<sub>2</sub>e. In 2055, the standards will reduce harmful air pollutants from vehicles, including approximately 8,700 tons of PM<sub>2.5</sub>, 36,000 tons of NO<sub>x</sub>, and 150,000 tons of hydrocarbons, compared to 2055 levels without the standards. These pollutants contribute to the formation of PM ("soot") and ozone ("smog"), as well as elevated concentrations of pollution near roadways, where millions of people live in communities that are disproportionately exposed to air pollution from motor vehicles.

The GHG emission reductions under these standards will make an important contribution to efforts to limit climate change and subsequently reduce the probability of severe climate change-related impacts including heat waves, drought, sea-level rise, extreme climate and weather events, coastal flooding, and wildfires. People of color, low-income populations and/or indigenous peoples may be especially vulnerable to the impacts of climate change.

## Benefits

EPA estimates that the total benefits of this rule far exceed the total costs, with annualized net benefits in the range of \$99 billion.

We estimate that \$13 billion of annualized benefits are attributable to reduced emissions of criteria pollutants that contribute to ambient concentrations of PM<sub>2.5</sub>. PM<sub>2.5</sub> is associated with premature death and serious health effects such as hospital admissions due to respiratory and cardiovascular illnesses, nonfatal heart attacks, aggravated asthma, and decreased lung function. The proposed program is estimated to have \$72 billion in climate benefits.

## Costs and Consumer Savings

The vehicle technology costs of this program are estimated at \$40 billion annualized value, but the program also will have additional social benefits from fuel savings of \$46 billion annualized value, and repair and maintenance savings of \$16 billion annualized value.

<sup>1</sup> Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990–2021 (EPA-430-R-23-002, published April 2023).

<sup>2</sup> Ibid.

EPA estimates that the standards will increase the per-vehicle technology costs to auto manufacturers by about \$1,200 for light-duty vehicles and \$1,400 for medium-duty vehicles over the six-year average from MY 2027-2032. This estimate represents compliance costs to the industry and is not the same as the price consumers pay when purchasing a new vehicle. For example, purchase price could be reduced by any state and Federal purchase incentives that are available to consumers. Under the Inflation Reduction Act, consumers are eligible for up to \$7,500 for the purchase of a new plug-in hybrid or full battery electric vehicle.

In addition, consumers will benefit from significant savings on operating costs, including fuel, maintenance, and repair savings, over the life of vehicles that meet the standards. Although EPA cannot predict how an individual manufacturer will price vehicles, we project that the average increase in the technology costs of a new vehicle will be more than fully offset by significant savings in operating costs. We estimate that on average consumers will save about \$6,000 over the lifetime of a model year 2032 vehicle, compared to a vehicle meeting the 2026 standards.

## **Additional Provisions**

In addition, EPA is finalizing greenhouse gas program revisions in several areas, including off-cycle and air conditioning credits, the treatment of upstream emissions associated with battery-electric and plug-in hybrid electric vehicles in compliance calculations, and vehicle certification and compliance.

EPA is also finalizing battery durability and warranty requirements for light- and medium-duty plug-in vehicles, and new standards to control refueling emissions from incomplete medium-duty vehicles.

Lastly, EPA is finalizing revised small volume manufacturer provisions that are available to manufacturers of less than 5,000 vehicles per year and additional flexibilities for small businesses.

## **Public Participation**

EPA appreciates the significant public input received through the rulemaking process. This rule was informed by input from the public, including stakeholders such as community groups, labor groups, environmental justice groups, automobile manufacturers, automotive suppliers, environmental and public health organizations, and state, local, and tribal governments.