

# Proposed Standards to Reduce Greenhouse Gas Emissions from Heavy-Duty Vehicles for Model Year 2027 and Beyond

The U.S. Environmental Protection Agency (EPA) is proposing a new and stronger set of greenhouse gas standards for heavy-duty vehicles for model years (MYs) 2027 through 2032, building from the “Phase 2” greenhouse gas standards established in 2016. These “Phase 3” greenhouse gas standards would significantly reduce carbon emissions from heavy-duty vehicles and, through the increased use of zero-emission vehicle technology projected in the proposal, would also reduce emissions of smog and soot-forming pollutants and help to address the challenges of global climate change and air pollution in communities near major roadways.

EPA last revised the greenhouse gas standards for on-highway heavy-duty trucks and engines in 2016 under the “Phase 2” greenhouse gas program. Those standards are on track to achieve important greenhouse gas reductions from medium- and heavy-duty vehicles in model year MY 2021 through MY 2027.

## What Vehicle Types Are Covered by this Proposal?

The proposed Phase 3 rulemaking applies to heavy-duty vocational vehicles (such as delivery trucks, refuse haulers, public utility trucks, transit, shuttle, and school buses) and tractors (such as day cabs and sleeper cabs on tractor-trailer trucks).

## Overview of the Proposed Standards

EPA’s proposal includes new and stronger greenhouse gas standards that phase in over MYs 2027 through 2032.

The proposed program revises the MY 2027 standards to be more stringent than the existing Phase 2 greenhouse gas standards for vocational vehicles and day cab tractors. It also introduces new standards for vocational vehicles and day cab tractors that become more stringent every model year from 2028 through 2032. For sleeper cab tractors, the proposed Phase 3 program introduces new standards in model year 2030 that increase in stringency in model years 2031 and 2032.

The proposed Phase 3 program maintains the flexible structure created in the Phase 2 greenhouse gas program, which is effectively designed to reflect the diverse nature of the heavy-duty industry. Under that structure, the proposed standards do not mandate the use of a specific technology and EPA expects internal combustion engine and zero-emission vehicle (ZEV) technologies will both play important roles in reducing greenhouse gas emissions. Like the Phase 2 greenhouse gas program, these standards include emission standards that are differentiated by vehicle type and use – as well as an averaging, banking and trading program that allows manufacturers to trade credits, bank credits for future years, and average credits in meeting the standards.

## **Projected Mix of Technologies**

The proposed standards are performance-based, allowing each manufacturer to choose what set of emissions control technologies is best suited for their vehicle fleet to meet the standards. EPA projects that one potential pathway for the industry to meet the proposed standards would be through:

- 50 percent ZEVs for vocational vehicles in MY 2032, which includes the use of battery electric and fuel cell technologies.
- 34 percent ZEVs for day cab tractors in MY 2032, which includes the use of battery electric and fuel cell technologies.
- 25 percent ZEVs for sleeper cab tractors in MY 2032, which primarily includes the use of fuel cell technologies.

These projections are even higher for many vehicle types.

## **Building on Momentum**

The proposed standards align with and support the commitments and billions of dollars' worth of investments from trucking fleets, vehicle manufacturers, and U.S. states as they plan to increase the use of zero-emissions technologies in heavy-duty fleets. As these technologies have been advancing, battery costs have continued to decline. Early ZEV models are in use today for some heavy-duty applications and are expected to expand to many more. These ongoing technological innovations allow for appropriate and feasible reductions in greenhouse gas emission standards considering cost, lead time, and other factors.

The Bipartisan Infrastructure Law and the Inflation Reduction Act provide unprecedented investments to support the development of and market for ZEV technologies and their infrastructure. In addition, multiple states have acted to accelerate the adoption of heavy-duty ZEVs, including California's action to set ZEV sales requirements under its Advanced Clean

Trucks program (requirements that multiple other states have moved to adopt), as well as the signing of the Multi-State Memorandum of Understanding by 17 states and the District of Columbia to establish specific goals for increasing heavy-duty ZEVs.

## Climate and Air Quality Urgency

Greenhouse gas emissions have significant impacts on public health and welfare. Transportation is the single largest U.S. source of greenhouse gas emissions, making up 27 percent of total greenhouse gas emissions. Within the transportation sector, heavy-duty vehicles are the second largest contributor, at 25 percent of all transportation sources.

The proposed standards for heavy-duty vehicles would avoid approximately 1.8 billion metric tons of greenhouse gas emissions from 2027 through 2055, making an important contribution to efforts to limit climate change and its impacts such as heat waves, drought, sea level rise, extreme climate and weather events, coastal flooding, and wildfires. These greenhouse gas reductions would benefit all U.S. residents, including populations such as people of color, low-income populations, indigenous peoples, and/or children that may be especially vulnerable to various forms of damages associated with climate change.

Air pollution continues to be a public health problem in many communities across the U.S., with exposure to ozone, particulate matter, and other pollutants leading to premature death, asthma, and other negative health and environmental effects. The proposed Phase 3 program is expected to increase use of zero-emission heavy-duty vehicles, which would reduce emissions of smog and soot-forming pollutants by:

- 650 tons of particulate matter,
- 72,000 tons of nitrogen oxides, and
- 21,000 tons of volatile organic compounds, compared to 2055 levels without the proposal.

The proposed standards would reduce air pollution near roads. Near-roadway communities are often low income or communities of color, and children who attend school near major roads are disproportionately represented by children of color and children from low-income households. These populations would benefit most directly from the projected emission reductions. Reducing these emissions would also provide cleaner air for communities across the country, prevent health issues like asthma, and ultimately save money, lives, and trips to the hospital.

## Benefits

EPA estimates that the total benefits of this proposal far exceed the total costs, by as much as \$320 billion. Society would realize approximately \$87 billion in climate benefits and up to \$29 billion in benefits from fewer premature death and serious health effects such as hospital admissions due to respiratory and cardiovascular illnesses, and approximately \$12 billion in reduced reliance on oil imports.

## Costs and Consumer Savings

Heavy-duty vehicle purchasers would see approximately \$250 billion in savings associated with less fuel used and less vehicle maintenance and repairs needed through 2055. EPA estimates the cost of compliance with the program for manufacturers would be only about \$6 billion, after accounting for an estimated \$3 billion in cost reductions from battery tax credits provided by the Inflation Reduction Act. After accounting for the vehicle purchase tax credits provided under the Inflation Reduction Act, we estimate the typical buyer of a new heavy-duty zero-emission vehicle would:

- Pay an average of between \$900 and \$11,000 more in upfront costs for a MY 2032 vocational vehicle ZEV than for a conventional, including the cost of electric vehicle charging infrastructure, but recoup these costs in 3 years or less through yearly operational savings.
- Pay an average of \$17,000 more in upfront costs for a MY 2032 day cab tractor ZEV than for a conventional, including the cost of electric vehicle charging infrastructure, but recoup these costs in 3 years or less through yearly operational savings.
- Pay an average of \$15,000 more in upfront costs for a MY 2032 sleeper cab tractor ZEV than for a conventional but recoup these costs in 7 years or less through yearly operational savings.

## Related Actions and The Clean Trucks Plan

Heavy-duty trucks and buses drive American commerce and connect people across the country. Creating cleaner trucks is an economic opportunity to support jobs and make more efficient vehicles while reducing harmful pollution. Heavy-duty trucks and buses continue to contribute significantly to air pollution at the local, regional, and national level.

As identified in Executive Order 14037, Strengthening American Leadership in Clean Cars and Trucks, EPA is issuing a series of regulations to reduce pollution from trucks and buses and to advance the transition to a clean transportation future. EPA's "Clean Trucks Plan" would result in significant emissions reductions from new medium- and heavy-duty vehicles and takes major steps towards improving air quality and addressing the climate crisis.

This proposal is the third and last part of this plan, complemented by new, stronger emissions standards finalized in December 2022 that will reduce NOx emissions from MY 2027 and later heavy-duty vehicles, and the light- and medium-duty multipollutant vehicle proposed rule that would reduce emissions from MY 2027 and later cars, commercial pickup trucks and vans. Taken together, these three rulemaking actions provide the opportunity for EPA to establish comprehensive, multipollutant standards for the onroad sector in the near term and the long term, all while considering the significant emission reductions and cost savings that ZEV technology can provide.

## Locomotives

This rulemaking also includes a proposal to revise EPA's regulations addressing preemption of state regulation of locomotives. The proposed locomotive amendments would enable EPA's preemption regulations to more closely track the language in the Clean Air Act. In 1998, EPA adopted its first

regulations addressing air pollutant emissions from locomotives. In that action, the agency also adopted regulations addressing federal preemption of state requirements relating to the control of emissions from locomotives. EPA is proposing amendments in part because the agency is concerned these preemption regulations adopted in 1998 may no longer be appropriate. Today's action reconsiders some of the conclusions reached in 1998.

## **Public Participation**

EPA welcomes public input into this rulemaking and looks forward to continuing its engagement with stakeholders throughout the rulemaking process. Today's proposal reflects input from stakeholders including community groups, the trucking industry, environmental and public health organizations, and state, local, and tribal governments through meetings with stakeholders throughout the development of the proposal.

EPA plans to hold a virtual public hearing for this proposal. For information about how to register for the hearing, please see our website or the hearing notice which will be published in the Federal Register.