



Explainer

EPA Phase 3 Rule Overview

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CALSTART's Trucks and Non-Road Vehicle Initiative works to keep goods and services moving while reducing air pollution and climate change, growing jobs, and increasing energy security.

The Trucks Initiative uses four strategies to drive change: helping fleets reduce the risk and cost of purchasing the cleanest trucks and equipment; partnering with industry and public agencies to develop the next generation of heavy-duty near-zero and zero-emission technologies; validating the performance and business case of clean vehicles to support fleet acceptance; and working with industry partners to craft smart regulations, policies, and funding for near-zero and zero-emission trucks and equipment.

In late March, the U.S. Environmental Protection Agency (EPA) released a final rule that sets Phase 3 greenhouse gas (GHG) emissions standards for heavy-duty vehicles (HDVs) and aims to reduce carbon dioxide (CO₂) emissions from trucks, buses, and other large vehicles. The standards are the strictest set of GHG regulations for HDVs that the federal government has ever enacted. They are expected to significantly cut GHG emissions from the HDV sector and yield billions of dollars in climate, health, and economic benefits. Although strict, the rule also contains many flexibilities and provisions that may dampen its impact on zero-emission vehicle (ZEV) deployment and emissions reductions.

The Phase 3 standards begin to phase in in model year (MY) 2027 and increase in stringency annually through MY 2032. The rule does not set standards for non-GHG pollutants such as soot and smog-forming pollutants, which are addressed under another rule. It is also not a ZEV mandate. The standards are technology neutral and give original equipment manufacturers (OEMs) flexibility to achieve CO₂ emissions reductions. The rule also does not affect consumers directly; it is targeted only at OEMs, who are responsible for ensuring that the vehicles they produce and sell into the U.S. market comply with the standards.

The standards are deployed through a crediting system, in which OEMs generate credits for producing vehicles that emit CO₂ levels below the requirements and generate deficits for producing vehicles that emit CO₂ at levels above the requirements. Under the EPA's Averaging, Banking, and Trading (ABT) System, these credits can be averaged within and traded across weight class groups, banked for use in future years (to a limited extent), and traded between OEMs. To be considered in compliance with the standards, an OEM simply needs its credits to equal its deficits and meet the standards across certain weight-class based vehicle sets on average, so each HDV an OEM produces does not necessarily need to meet the standards itself.

Vehicles Covered

The rule covers HDVs in Classes 2b-8, which are vehicles with a gross vehicle weight rating (GVWR) of between 8,500 lbs. (Class 2b) and 33,001 lbs. or more (Class 8). These include heavy-duty "vocational vehicles" such as delivery trucks, refuse trucks, utility trucks, school buses, and others, as well as tractor trucks, which are divided into day cabs and sleeper cabs.

The exceptions are Class 2b-3 pickup trucks and vans, which are instead covered by the EPA's newly released "[Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles](#)." It is important to note that the Phase 3 HDV rule does still cover Class 2b-3 vocational vehicles.

Standards and Comparison to the Proposed Rule

Proposed Rule and Potential Changes

The EPA released its [proposed Phase 3 rule](#) on April 27, 2023, in which it put forward a set of proposed CO₂ emissions standards for MYs 2027-2032. The EPA also included consideration of two other sets of CO₂ standards: a less stringent "alternative" standards, which would have still been more stringent than Phase 2 but would have left significant emissions cuts on the table, as well as more stringent "ACT aligned" standards that would have led to significant emissions cuts more in line with California's Advanced Clean Trucks (ACT) regulation.

In the proposed rule, the EPA requested public comment on several details in the rule that reflected options they were considering for the final rule. These included adopting either the alternative or ACT aligned standards, treating certain heavier vehicle categories more leniently, and removing certain compliance flexibilities from the rule.

Comparing the Final Rule to the Proposed Rule

In general, the CO₂ standards set by the final rule are **less stringent** than those in the proposed rule for earlier model years (2027-2030) and **more stringent** than those in the proposed rule for later model years (2031-2032).

The standards increase in stringency more slowly for all vehicle types from MY 2027-2030, while the rollout of more stringent standards for day cab tractors and "heavy heavy-duty" vocational vehicles is delayed until MY 2028 and 2029 respectively (stricter standards for both vehicle types started in 2027 in the proposed rule).

In addition to having a delayed rollout, the standards for heavy heavy-duty vocational vehicles are less stringent overall in the final rule than the equivalent standards in the proposed rule, even in later model years.

Heavy heavy-duty vocational vehicles are defined as Class 8 (GVWR over 33,001 lbs.) vocational vehicles, including large construction vehicles such as concrete mixer trucks, large refuse trucks, and buses.

Broken down by vehicle type, the final MY 2032 standards compared to the proposed rule are as following:

- Light and medium heavy-duty vocational vehicles and day cab tractors: **more stringent**
- Sleeper cab tractors: **equally stringent**
- Heavy heavy-duty vocational vehicles: **less stringent**

Notable Changes and Consistencies Between the Final and Proposed Rules

In the final rule, the EPA followed through on some of the changes it considered making to the proposed rule, but not others. The final rule does not finalize the proposed rule's ACT aligned standards for MYs 2027-2032, even given the more stringent standards for some vehicle types in MY 2032. It also does not finalize the proposed rule's alternative standards for MYs 2027-2032, even though the standards for certain years and vehicle types are less stringent. As mentioned above, the rule does set less stringent standards for some specific vehicle categories, namely "heavy-haul" vocational trucks (overall) and long-haul tractors (slower ramp-up).

Final Rule CO2 Standards

For the sake of determining the standards, vocational vehicles are categorized as urban, multi-purpose, or regional vehicles depending on their use cases, while tractors are categorized as low roof, mid roof, or high roof based on body type. Both vocational vehicles and tractors are further divided into light-, medium-, and heavy-duty categories based on GVWR.

There are also additional optional standards for specialized vocational vehicle types that OEMs can choose to follow. Vehicles included in this category include school buses, transit buses, concrete mixers, among others. There are separate additional standards for heavy-haul tractors, defined as tractors with a gross combined weight rating (GCWR)—which includes tractor, trailer, and payload weight—greater than 120,000 lbs.

These newly released standards are notably more stringent than the EPA's Phase 2 standards. In 2032, the standards for vocational vehicles are 60%, 40%, and 30% more stringent than the phase 2 standards for light-heavy, medium-heavy, and heavy-heavy vehicles respectively, while the day cab standards are 40% more stringent and the sleeper cab standards are 25% more stringent.

Methodological Changes in Final Rule Reflect New Assumptions

The EPA made several changes to the rule's underlying methodology that helped determine its stringency and projected benefits.

To start, the EPA updated its assumptions for the national “reference case” scenario (what the national HDV landscape would be without the rule) to include greater ZEV adoption due to the effect of the ACT rule and other state-level zero-emission heavy-duty vehicle (ZE HDV) policies, market forces encouraging the adoption of ZE HDVs, and billions of dollars in investments from the Inflation Reduction Act and Bipartisan Infrastructure Law.

Notably, the EPA also changed its zero-emission technology adoption curve, which reflects the agency’s assumptions about ZE HDV market penetration. The EPA adopted a curve that reflected more rapid penetration of ZEVs into the HDV market than the proposed rule’s curve. However, they also included lower ZE HDV adoption “caps,” which limit the percentage of market penetration that ZE HDVs could have in any given vehicle segment. This decision dampened the effect of the more ambitious technology adoption curve.

Flexibilities in the Final Rule

As mentioned earlier, the final rule contains flexibilities designed to help OEMs comply with the emissions standards. The primary flexibility mechanism is the crediting and ABT system described on the first page of this explainer. Importantly, the final rule retains the option for OEMs to transfer credits between vehicle groups; OEMs can transfer credits across any of the heavy-duty groups in the final rule and can also transfer credits generated from medium-duty vehicles under the separate light/medium-duty vehicles emissions rule into the light and medium heavy-duty vehicle groups covered by the Phase 3 rule. Advocates have warned that the ability to transfer these credits could slow down ZEV adoptions in certain HDV segments like long-haul tractors, as OEMs will likely focus on electrifying easier vehicles like step vans and transferring those credits to the heavier and more difficult to electrify vehicle groups.

The final rule also includes an advanced technology credit multiplier for MY 2027, which boosts credits gained by deploying ZEVs by four to five times their value. The EPA considered ending the multiplier in MY 2026, a move that was encouraged by climate and clean transportation advocates, but ultimately kept it in for MY 2027. However, they did limit the period in which OEMs can use the multiplier portion of credits and required OEMs to use up their base credits before using any credits generated from the multiplier.

Two Items That Deserve Attention: EPA’s Monitoring Provision and the Rule’s Treatment of Hydrogen Internal Combustion Engine (ICE) Vehicles

Monitoring Provision

After the proposed rule was released, the EPA received multiple comments from the trucking industry urging them to include an automatic off-ramp in the rule that would walk back the standards if certain charging infrastructure buildout and ZE HDV sales targets were not met. The EPA did not include any such off-ramp in the final rule, but it has decided to conduct periodic assessments and monitoring of vehicle deployments, supply chain, and infrastructure installation over the lifetime of the rule, beginning in 2026.

The EPA notes that the reports could lead to a reassessment of the regulation, a revised rulemaking, or no action. Depending on the assessment findings, the rule could be further adjusted to accommodate an increase or decrease in infrastructure buildout. It is worth highlighting that the EPA generally monitors the progress and impact of major rules and has issued public reports on the status of significant rules in the past, so while the monitoring and reporting provision is notable, it is not entirely out of the ordinary.

Hydrogen ICE Vehicles

Hydrogen ICE vehicles are essentially powered by conventional combustion engines that use hydrogen instead of diesel fuel. They are different than hydrogen fuel cell vehicles, which have zero tailpipe CO₂ emissions, as they emit small amounts of CO₂, along with non-CO₂ pollutants such as N₂O, NO_x, and particulate matter (PM). The EPA acknowledged in the rule that hydrogen ICE vehicles are not ZEVs; however, they classified them as such in the rule, which means that an OEM could produce a hydrogen ICE vehicle and claim zero-emission credits that will help it comply with the rule, even though the vehicles are not technically zero-emission and still emit CO₂ pollutants.

Impacts

Climate, Health, and Economic Benefits

Economic

Overall, the rule is expected to save the HDV industry billions of dollars over the next few decades. While the rule is expected to cost the HDV industry \$1 billion from 2027-2055 due to higher upfront costs for ZEV technology compared to ICE technology, it is simultaneously expected to save the industry roughly \$3.5 billion in operating costs due to lower maintenance, repair, and fuel costs for ZE HDVs.

Climate

The EPA estimates that the final rule will cut net CO₂ emissions from the HDV sector by roughly 1 billion metric tons, or slightly more than 9%, by 2055 as compared to the reference case. This is especially vital since transportation is the largest individual source of GHG emissions in the United States, and the HDV industry accounts for roughly a quarter of all transportation-related emissions. The EPA calculated that this reduction in CO₂ emissions will bring \$10 billion in annualized climate benefits.

The projected emissions cuts in the final rule are less than those in the proposed rule, which stood at 1.8 billion metric tons. However, the EPA explains that the reduction in emissions benefits is due to the increased levels of ZE HDV adoption in the updated reference case and does not reflect an overall decrease in stringency. Put simply, since the EPA is projecting there to be more ZE HDV deployment in a baseline scenario where no rule is passed than they originally were, this means that their baseline projected CO₂ emissions from the HDV sector will be lower as well. The additional CO₂ reduction benefits from this rule will therefore be smaller relative to the baseline than originally calculated, even though overall emissions levels from the sector will not be higher.

Health

The rule is also expected to significantly reduce downstream emissions of criteria air pollutants as well as toxic pollutants, including 20% cuts in NOx, volatile organic compounds, and sulfur dioxide emissions as well as a 5% cut in downstream PM 2.5 emissions. The emissions reductions caused by the final rule will significantly reduce instances of asthma, other illnesses, and premature death due to air pollution, which the EPA projects will result in \$300 million in annualized health benefits through the year 2055.

Net Benefits

Considering the rule's climate and health benefits, along with the savings it is projected to provide to the HDV industry, the EPA forecasts that the final rule can be expected to bring \$13 billion in annualized net benefits through 2055.

ZE HDV Adoption

It is difficult to ascertain the rule's real-world impact on ZE HDV adoption, since the standards are technology neutral and can be met by using a variety of vehicle technologies. However, the EPA did include a "technology adoption" pathway that shows reasonable levels of ZE HDVs that OEMs could produce to meet the standards. The pathway is included below.

Projected Percentage ZEVs in the MYs 2027-2032 Technology Packages for the Modeled Potential Compliance Pathway

Regulatory Group	2027	2028	2029	2030	2031	2032
LHD Vocational	17%	22%	27%	32%	46%	60%
MHD Vocational	13%	16%	19%	22%	31%	40%
HHD Vocational	0%	0%	13%	15%	23%	30%
MHD All Cab and HHD Day Cab Tractors	0%	8%	12%	16%	28%	40%
Sleeper Cab Tractors	0%	0%	0%	6%	12%	25%
Heavy Haul Tractors	0%	0%	1%	1%	3%	5%

Source: [EPA Final Rule](#)

Additionally, [modeling done by the Union of Concerned Scientists \(UCS\)](#) provides some estimates on ZE HDV adoption based on a number of different technology scenarios in the rule. UCS's modeling shows that the final rule will likely result in a notable increase in ZEV deployment in the HD sector, with up to 623,000 ZE HDVs deployed between MYs 2027 and 2032. Much of the increased adoption is expected to occur in states that have already adopted ACT, with little ZE HDV adoption in non-ACT states in a scenario where OEMs significantly deploy potential efficiency upgrading technology for diesel vehicles.

References

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EPA Final Rule

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EPA Proposed Rule

<https://www.govinfo.gov/content/pkg/FR-2023-04-27/pdf/2023-07955.pdf>

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<https://www.epa.gov/regulations-emissions-vehicles-and-engines/final-rule-multi-pollutant-emissions-standards-model#:~:text=On%20March%2020%2C%202024%2C%20EPA,starting%20with%20model%20year%202027>

UCS Analysis

<https://blog.ucsusa.org/dave-cooke/epas-final-2027-2032-truck-rule-risks-leaving-communities-behind/>

About the Author

Jonah Kasdan is the Trucks Regulatory Analysis Program Manager at CALSTART. In this role, he leads research and analysis efforts to support CALSTART’s medium- and heavy-duty vehicle policy efforts at both the national and state level.

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About CALSTART

A mission-driven, industry organization focused on transportation decarbonization and clean air for all, CALSTART has offices in California, Colorado, Florida, Michigan, New York, and Europe. CALSTART is uniquely positioned to build the national clean transportation industry by working closely with its member companies and building on the lessons learned from the major programs it manages for the State of California. CALSTART has more than 280 member companies and manages more than \$500 million in vehicle incentive and technical assistance programs in the United States.

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