



Updated February 14, 2023

Heavy-Duty Vehicles, Air Pollution, and Climate Change

In August 2021, the Biden Administration announced plans to reduce greenhouse gas (GHG) emissions and other air pollutants from medium- and heavy-duty vehicles and engines through a series of rulemakings over three years (Executive Order 14037 of August 5, 2021, “Strengthening American Leadership in Clean Cars and Trucks,” 86 *Federal Register* 43583). The first rule, promulgated by the U.S. Environmental Protection Agency (EPA) in January 2023, set new standards for nitrogen oxides (NO_x) and other criteria pollutant emissions for new medium- and heavy-duty vehicles and engines starting in model year (MY) 2027. A second rule, to be promulgated by EPA and the National Highway Traffic Safety Administration (NHTSA), is expected to set more stringent GHG emission and fuel efficiency standards for the sector beginning with MY2027.

Emissions from Heavy-Duty Vehicles

The medium- and heavy-duty vehicle and engine sector (defined at 40 C.F.R. §1037 and 49 C.F.R. §523) generally includes tractor-trailers, vocational vehicles, buses, and heavy-duty pickup trucks and vans. EPA reports that “pollution from heavy-duty trucks contributes to poor air quality and health across the country, especially in overburdened and underserved communities.” These vehicles are the largest contributor to mobile source emissions of NO_x (about 32% in 2017, the most recently available inventory; NO_x reacts in the atmosphere to form ground-level ozone, or smog), as well as particulate matter, carbon monoxide, and air toxics. Further, according to EPA’s *Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990–2019* (published April 2021), medium- and heavy-duty vehicles emitted 456.6 million metric tons of carbon dioxide (CO₂) in 2019 (about 25% of total CO₂ emissions from the U.S. transportation sector).

Current Standards

Criteria Pollutant Emission Standards

In January 2023, EPA finalized the current set of emission standards for criteria, or common, pollutants from heavy-duty vehicles and engines (88 *Federal Register* 4269) through its authorities under the Clean Air Act (CAA). The new standards, to begin in MY2027, would require original equipment manufacturers to reduce tailpipe emissions of NO_x by approximately 80% and particulate matter by 50%, compared with the previous standards, and increase the regulatory useful life period of vehicles by 1.5-2.5 times and the emissions warranty period by 2.8-4.5 times, depending on the class of vehicle. The rule requires manufacturers to better ensure engines and emission control systems work properly on the road for a longer period of time and to demonstrate that engines are designed to

prevent vehicle drivers from tampering with emission control devices. EPA estimated that by 2045, the rule would result in, inter alia, up to 2,900 fewer premature deaths; 18,000 fewer cases of childhood asthma; and \$29 billion in annual net benefits. EPA also estimated the technology required to meet the new rule will cost between \$2,500 and \$8,300 per vehicle.

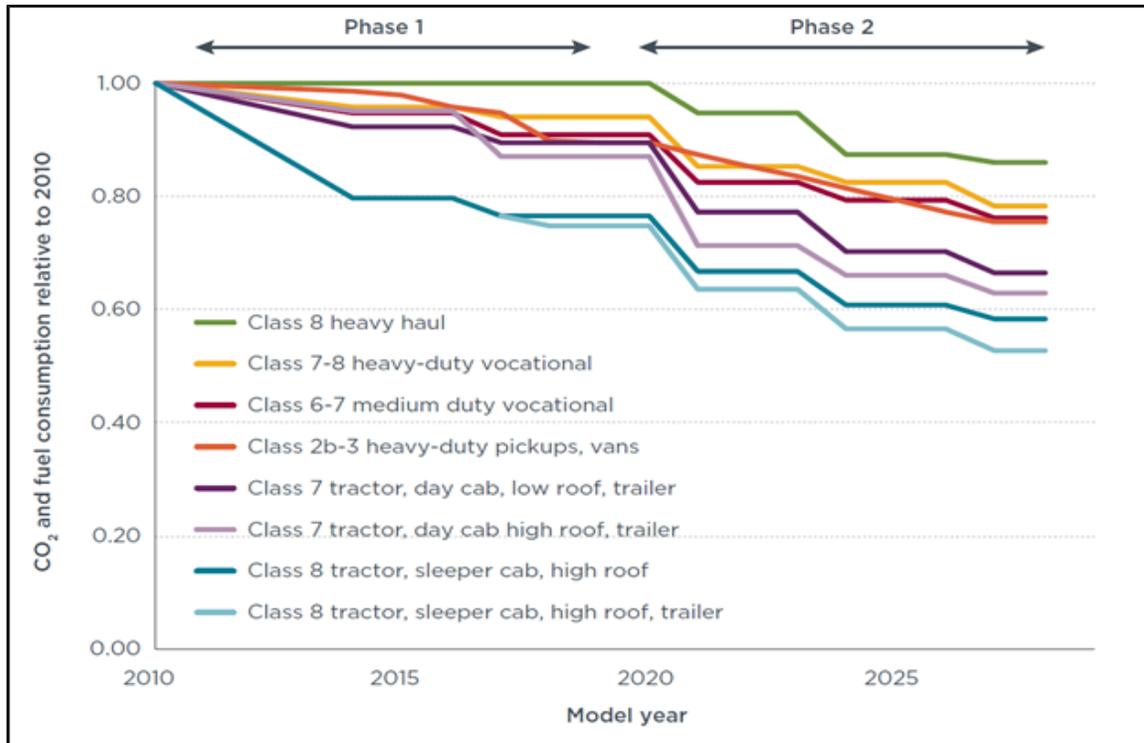
On February 9, 2023, S.J.Res. 11 was introduced in Congress, providing for disapproval of EPA’s January 2023 heavy-duty vehicles rule under the Congressional Review Act. Sponsors of the resolution state that the new standards are overly challenging to implement, would make the cost of new trucks prohibitive for small business owners (potentially increasing pollution by incentivizing operators to keep older, higher-emitting trucks on the road for longer), and would increase supply chain costs.

Greenhouse Gas Emission Standards

In October 2016, EPA and NHTSA jointly published the current set of GHG emission and fuel efficiency standards for medium- and heavy-duty vehicles and engines (81 *Federal Register* 73478) through their authorities under the CAA and the Energy Independence and Security Act of 2007 (EISA, P.L. 110-140). These standards, referred to as Phase 2, expanded on the Phase 1 standards (promulgated in September 2011, for MY2014 through MY2018; 76 *Federal Register* 57106) and introduced first-ever controls on trailers (the part of the vehicle pulled by the tractor—since vacated) and glider vehicles (a new chassis combined with an older engine). The standards phase-in between MY2021 and MY2027 for engines and vehicles and between MY2018 and MY2027 for gliders (see **Figure 1**).

The Phase 2 rule maintained the underlying regulatory structure developed in Phase 1, such as the general categorization of medium- and heavy-duty vehicles and the separate standards for engines and vehicles. It also retained the Phase 1 averaging, banking, and trading compliance provisions and its flexibilities for small businesses. However, unlike Phase 1, the rule established “technology-advancing standards”—standards based not only on currently available technologies but also on utilization of technologies under development or not widely deployed. These could include advancements in the engine, transmission, driveline, aerodynamic design, lower rolling resistance tires, and extended idle reduction technologies.

The Phase 3 proposal, announced in Executive Order 14037, is scheduled for release in the spring of 2023.

Figure 1. CO₂ and Fuel Consumption Reductions from the Phase 2 Medium- and Heavy-Duty Vehicle Standards

Source: Courtesy of International Council on Clean Transportation, under a Share Alike license of Creative Commons.

Notes: Classifications defined at 49 C.F.R. §523.2 and 49 C.F.R. §565.15.

Selected Issues

Some selected issues from the Phase 2 GHG rulemaking that have remained of interest to Congress include the following:

Trailer Provisions

The Phase 2 rule included standards for both engine emissions and the vehicle as a whole, including requirements for improvements to the aerodynamics of freight trailers. In November 2021, the U.S. Court of Appeals for the D.C. Circuit granted the Truck Trailer Manufacturing Association’s petition for review, holding that EPA cannot regulate trailers under CAA Section 202(a) because trailers are not “self-propelled” motor vehicles. A majority of the three-judge panel also held that NHTSA does not have authority to regulate trailers under EISA because trailers use no fuel.

Racecar Provisions

In the Phase 2 proposal, EPA included language that was intended to clarify tampering provisions with respect to nonroad vehicles. Industry groups claimed that the provisions would prevent owners from modifying motor vehicles used exclusively for racing. EPA removed the language from the final rule. Nevertheless, some argue that the underlying compliance uncertainty remains. Legislation to clarify it has been proposed in several Congresses (most recently H.R. 3281/S. 2736 in the 117th Congress). In December 2016, the Racing Enthusiasts and Suppliers Coalition filed a petition with the D.C. Circuit to address the uncertainty. On August 12, 2022, the three-judge panel dismissed the petition for review.

Glider Kit and Glider Vehicle Provisions

The term *glider kit* is used in the vehicle industry to describe a chassis and cab assembly that is produced without a new engine, transmission, or rear axle. A third party then typically installs used parts to complete the assembly. Historically, gliders have been used as a means to salvage valuable components from vehicles that were badly damaged in collisions. Prior to the Phase 2 rulemaking, EPA and NHTSA observed a sharp increase in glider sales, suggesting to them that gliders were being used to circumvent standards for safety and emissions (e.g., NO_x and particulates). For this reason, EPA moved to apply current emission standards to gliders under the Phase 2 rule.

In July 2017, several glider kit manufacturers filed a petition for reconsideration with EPA, arguing that gliders should not be considered “new motor vehicles” under the CAA, and that EPA thus lacked the authority to regulate them. In November 2017, EPA issued a proposed repeal of the requirements (82 *Federal Register* 53442). Upon review, the White House Office of Information and Regulatory Affairs reportedly informed EPA that the agency needed a regulatory impact analysis before it could finalize the repeal. In July 2018, EPA announced an 18-month enforcement pause on the Phase 2 production limits for glider vehicles as it reconsidered the rule. No further action has been taken since.

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