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Heavy-Duty Vehicles, Air Pollution, and Climate Change

On August 5, 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, “Strengthening American Leadership in Clean Cars and Trucks,” 86 *Federal Register* 43583). The first rule, to be promulgated by the U.S. Environmental Protection Agency (EPA) and slated to be finalized in 2022, applies to heavy-duty vehicles starting in model year (MY) 2027. The rule would set new standards for nitrogen oxides (NO_x) emissions for the sector as well as targeted updates to the current GHG emission standards. A second rule, to be promulgated by EPA and the National Highway Traffic Safety Administration (NHTSA), would set more stringent GHG emission and fuel efficiency standards for new medium- and heavy-duty vehicles and engines beginning with MY2030.

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). NO_x reacts in the atmosphere to form ground-level ozone (i.e., smog) and particulate matter (i.e., soot). 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

MY2007 Emission Standards

In January 2001, EPA finalized the current set of emission standards for criteria, or common, pollutants from heavy-duty vehicles and engines (66 *Federal Register* 5002) through its authorities under the Clean Air Act (CAA). The rule included two components: (1) MY2007 and later medium- and heavy-duty engine emission standards, and (2) diesel fuel regulations.

The emission standards included new, more stringent limits for particulate matter (0.01 grams per brake horsepower-hour (g/bhp·hr, a unit of work)) and NO_x (0.20 g/bhp·hr)—an approximately 90% reduction from the prior standards. The particulate matter emission standard took full effect in MY2007. The NO_x standard was phased in between MY2007 and MY2010. The standards were based on the use of high-efficiency catalytic exhaust emission control

devices or comparably effective advanced technologies. Because many of these devices are damaged by sulfur, EPA simultaneously promulgated a new fuel standard. The fuel standard limited the sulfur content in on-highway diesel fuel to 15 parts per million (ppm), down from the previous 500 ppm. Refiners were required to start producing the 15 ppm “ultra-low sulfur diesel” (ULSD) fuel beginning in June 2006. The MY2007 rule provided flexibilities for refiners, especially small refiners, and for manufacturers of engines and vehicles, to aid them in implementing the new requirements in the most cost-efficient manner.

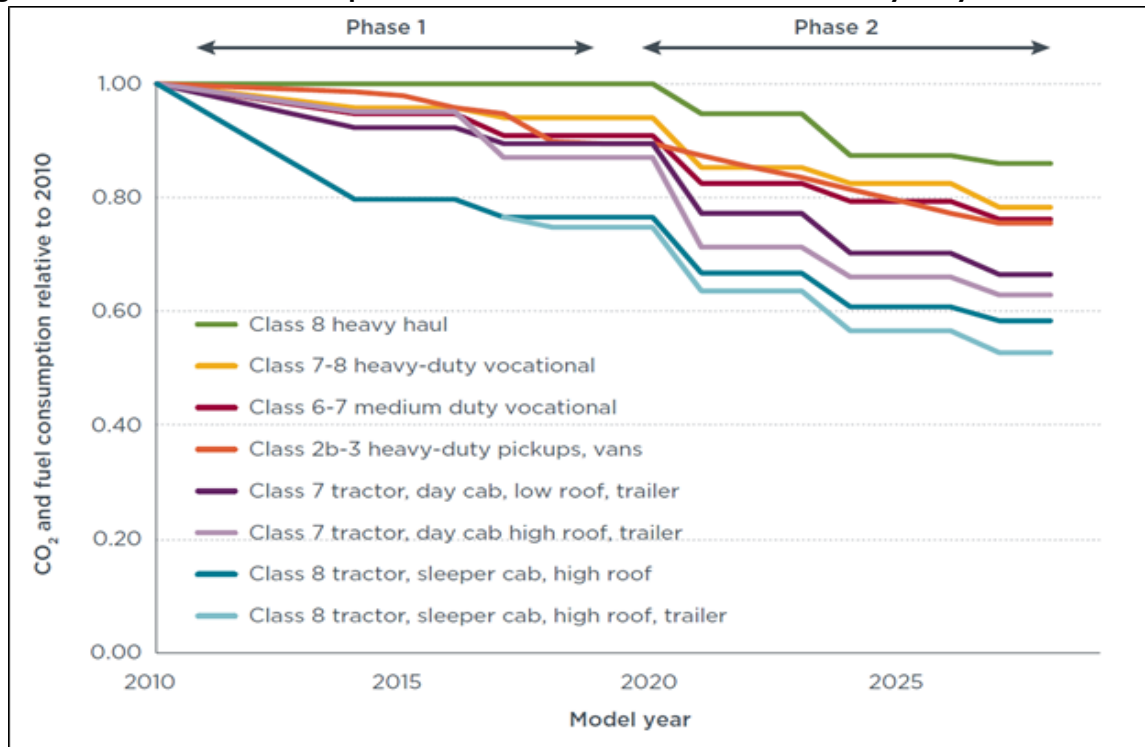
Phase 2 GHG Standards

In October 2016, EPA and NHTSA jointly published the current, second phase 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). The rule 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.

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 now under development or not yet widely deployed.” These could include advancements in the engine, transmission, driveline, aerodynamic design, lower rolling resistance tires, and extended idle reduction technologies.

MY2027 Proposal

On March 28, 2022, EPA proposed new heavy-duty vehicle and engine emission standards for MY2027 and later (87 *Federal Register* 17414) as required by Executive Order 14037. The proposal would strengthen the heavy-duty NO_x standard (a 50% to 90% reduction from the existing standard, depending upon the proposed option, MY, engine type, and duty cycle) and adopt new requirements for engine test cycle, regulatory useful life, emission-related warranty, and other requirements. Further, the proposal would make targeted adjustments to the Phase 2 GHG standards based on future sales projections.

Figure 1. CO₂ and Fuel Consumption Reductions from the 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. Final briefs in the case are due on March 30, 2022.

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.

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