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Automobiles, Air Pollution, and Climate Change

On August 5, 2021, President Biden signed Executive Order 14037, “Strengthening American Leadership in Clean Cars and Trucks” (86 *FR* 43583). The order required, among other items, executive agencies to revisit and amend the federal standards that regulate air pollution emissions, greenhouse gas (GHG) emissions, and fuel economy of new passenger cars and light trucks. These standards include the Motor Vehicle Emission and Fuel Standards promulgated by the U.S. Environmental Protection Agency (EPA), the Light-Duty Vehicle GHG Emissions Standards promulgated by EPA, and the Corporate Average Fuel Economy (CAFE) Standards promulgated by the National Highway Traffic Safety Administration (NHTSA). The order also included a nonbinding electrification goal that “50 percent of all new passenger cars and light trucks sold in 2030 be zero-emissions vehicles, including battery electric, plug-in hybrid electric, or fuel cell electric vehicles.” EPA published its proposal—the “Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles”—on May 5, 2023 (88 *FR* 29184), and announced the final rule on March 20, 2024. NHTSA published its proposal—the “Corporate Average Fuel Economy Standards for Passenger Cars and Light Trucks for Model Years 2027–2032”—on August 17, 2023 (88 *FR* 56128).

Emissions from Automobiles

The light-duty vehicle (LDV) and medium-duty vehicle (MDV) sectors (defined at 40 C.F.R. §86 and 49 C.F.R. §523) generally include passenger cars, light trucks, and most sport utility vehicles; as well as class 2b and class 3 trucks such as large pickups and vans. EPA reports that these vehicles contribute to air pollution, such as “ozone, particulate matter, and air toxics, which are linked with premature death and other serious health impacts, including respiratory illness, cardiovascular problems, and cancer.” The agency estimates that LDVs and MDVs currently account for approximately 11% of the United States’ annual anthropogenic emissions of nitrogen oxides (NO_x), 8% of volatile organic compounds (VOC), and 1% of fine particulate matter (PM_{2.5}). Further, according to EPA’s Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990–2022 (published April 2024), LDVs emitted over 1 billion metric tons of GHGs in 2022, or about 16% of the United States’ annual anthropogenic emissions of GHGs.

Agency Authorities

EPA’s Air Pollution Standards

Section 202 of the Clean Air Act Amendments of 1970 (CAA; P.L. 91-604, as amended) requires EPA to establish standards for emissions of air pollutants from new motor vehicles which, in the Administrator’s judgment, cause or contribute to air pollution which may reasonably be anticipated to endanger public health or welfare (42 U.S.C. §7521). Standards under Section 202 must also consider

issues such as technological feasibility, the cost of compliance, and industry lead time, among other items. EPA has since promulgated standards for emissions of nonmethane organic gases (NMOG), NO_x, PM, carbon monoxide (CO), and formaldehyde (an air toxic).

EPA’s GHG Standards

In the 2007 decision *Massachusetts v. EPA*, the Supreme Court held that EPA has the authority to regulate GHGs from new motor vehicles as “air pollutants” under CAA Section 202. In the 5-4 decision, the Court’s majority concluded that EPA must decide whether GHG emissions from new motor vehicles contribute to air pollution that may reasonably be anticipated to endanger public health or welfare or provide a reasonable explanation why it cannot or will not make that decision. In December 2009, EPA promulgated findings that GHGs endanger both public health and welfare and that GHG emissions from new motor vehicles contribute to that endangerment (74 *FR* 66495). With these findings, the CAA required EPA to establish standards.

NHTSA’s CAFE Standards

The Energy Policy and Conservation Act of 1975 (EPCA; P.L. 94-163) established CAFE standards for passenger cars beginning in model year (MY) 1978 and for light trucks beginning in MY1979 (49 U.S.C. Chapter 329). The standards are designed primarily to conserve petroleum. They require each auto manufacturer to meet a target for the sales-weighted fuel economy of its entire fleet of vehicles sold in the United States in each model year. Under EPCA, CAFE standards and new vehicle fuel economy rose steadily through the late 1970s and early 1980s. After 1985, Congress did not revise the legislated standard for passenger cars for several decades, and it remained at 27.5 miles per gallon (mpg) until 2011. The light truck standard was increased to 20.7 mpg in 1996, where it remained until 2005. In 2007, Congress enacted the Energy Independence and Security Act (P.L. 110-140), mandating a phase-in of higher CAFE standards reaching 35 mpg by 2020. This was the last legislation on CAFE passed by Congress.

Prior Standards

Air Pollution Standards

EPA’s prior air pollution standards for LDVs (Tier 3, 79 *FR* 23414) were finalized in March 2014, to be phased-in between 2017 and 2025, and closely align with California’s Low-Emission Vehicle (LEV) III program. Manufacturers must meet fleet-average tailpipe emissions standards for NMOG + NO_x, PM, CO, and formaldehyde in a given model year across several different test cycles. Tier 3 also includes standards for low-sulfur fuel, evaporative emissions, and on-board diagnostics, as well as compliance flexibilities such as an emissions averaging, banking, and trading program.

CAFE and GHG Standards: Rulemakings

EPA's prior set of GHG emissions standards (86 *FR* 74434), promulgated in December 2021, extends through MY2026, culminating in a projected industry fleet-wide GHG compliance target of 161 grams/mile (g/mi). NHTSA's current set of fuel economy standards (87 *FR* 25710) also extends through MY2026, culminating in a projected industry fleet-wide fuel economy target of 49 mpg.

CAFE and GHG Standards: Attributes

The agencies' fuel economy and GHG standards apply to the new fleet of passenger cars and light trucks sold by a manufacturer within the United States during a given model year. Starting with the standards finalized in 2010, the agencies have used the concept of a vehicle's "footprint" (i.e., the measured area enclosed by the four tires) to set differing targets for different-sized vehicles, all of which increase in stringency year after year. Generally, the larger the vehicle footprint, the lower the corresponding fuel economy target and the higher the CO₂-equivalent emissions target. This concept differs from the original CAFE standards, which grouped domestic passenger cars, imported passenger cars, and light trucks into three broad categories. The newer, "attribute-based standards" enable manufacturers to produce a range of vehicle sizes rather than designing a lighter and smaller vehicle fleet overall to meet categorical targets.

Manufacturers must report vehicle characteristics sold each model year. These data allow EPA and NHTSA to calculate each manufacturer's CAFE and GHG targets under the standards given the specific pattern of sales. The agencies then compare the calculated targets against the vehicles' fuel economy and emissions results from EPA-approved test cycles to determine compliance. To facilitate compliance, the agencies provide manufacturers various flexibilities. A manufacturer's fleet-wide performance (as measured on the test cycles) can be adjusted through the use of alternative fuel vehicles, air conditioning efficiency improvements, and "off-cycle" technologies (e.g., active aerodynamics, thermal controls, and idle reduction). Further, manufacturers can generate credits for over-compliance with the standards in a given year. They can bank, borrow, and transfer these credits within their own fleets or trade them with other manufacturers to achieve compliance.

NHTSA's 2023 Proposal

NHTSA's 2023 proposal includes new fuel economy standards for passenger cars and light trucks for MY2027-MY2031, as well as augural standards for MY2032, that would increase at a rate of 2% per year for passenger cars and 4% per year for light trucks. The agency projects that the proposed standards would require an industry fleet-wide average for passenger cars and light trucks of roughly 58 mpg in MY2032. NHTSA projects that the proposed standards would reduce U.S. gasoline consumption by a total of 88 billion gallons and would reduce average fuel outlays by \$1,043 per vehicle over the lifetimes of the LDVs under compliance.

EPA's 2024 Final Rule

Air Pollution Standards. EPA's 2024 final rule for LDVs (Tier 4) includes NMOG + NO_x standards that phase-down

to a fleet average of 15 milligrams (mg)/mi by MY2032, representing a 50% reduction from the Tier 3 standards. The MDV standards would see a 58% and 70% reduction compared to Tier 3, for class 2b and 3 vehicles, respectively. EPA also finalized a PM standard of 0.5 mg/mi for both LDVs and MDVs.

GHG Standards. EPA's 2024 final rule for LDV GHG standards increases in stringency each year from MY2027 to MY2032. The agency projects the standards would result in an industry-wide average target of 85 g/mi of CO₂ in MY2032, representing about a 50% reduction relative to the MY2026 standards. Additional components of the standards include, among other items, narrowing the difference in stringency between passenger cars and light trucks, phasing out the off-cycle credit programs, and rescinding regulations that would consider upstream power sector emissions tied to electric vehicle use, which were to start in MY2027. The MDV standards are projected to result in an average target of 274 g/mile of CO₂ by MY2032, representing a 44% reduction compared to MY2026.

EPA states the final standards are projected "to accelerate the transition to clean vehicle technologies," estimating that from MYs 2030-2032, manufacturers may choose to produce battery electric vehicles for about 30% to 56% of new LDV sales and about 20% to 32% of new MDV sales. Manufacturers also are expected to use other vehicle technologies, including hybrid electric and less emitting internal combustion engines.

EPA estimates that the total benefits of the 2024 final rule 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. Further, EPA projects cumulative CO₂ reductions of approximately 7.2 billion metric tons and cumulative air pollution reductions of 8,700 U.S. tons of PM, 36,000 U.S. tons of NO_x, and 150,000 U.S. tons of NMOG, providing \$13 billion in annual health benefits through 2055. In addition, EPA estimates consumers will 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.

EPA contends that its rule builds upon announcements by automakers that collectively signal a rapidly growing shift away from internal combustion engine technologies and toward zero-emission technologies, including electrification. For support, the agency points to actions taken by Congress, such as P.L. 117-58 (the Infrastructure Investment and Jobs Act) and P.L. 117-169 (commonly referred to as the Inflation Reduction Act), which provide investment to accelerate the development of and market for zero-emission technology. Others, including some Members of Congress, have expressed concerns over the rule's implicit mandate for vehicle electrification, increased industry costs, reduced consumer choice, and dependence on foreign markets for critical minerals.

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