Draft Supplemental Environmental Impact Statement

Safer Affordable Fuel-Efficient (SAFE) Vehicles Rule III for Model Years 2022 to 2031 Passenger Cars and Light Trucks

Summary **December 2025**

U.S. Department of Transportation
National Highway Traffic Safety Administration

NHTSA

SUMMARY

Foreword

Pursuant to the National Environmental Policy Act (NEPA) and U.S. Department of Transportation (DOT) Order 5610.1D,[1] the National Highway Traffic Safety Administration (NHTSA) has prepared this Draft Supplemental Environmental Impact Statement (SEIS) to analyze and disclose certain potential environmental impacts of the Safer Affordable Fuel-Efficient (SAFE) Vehicles Rule III standards for passenger cars and light trucks for model years (MYs) 2022–2026 and 2027–2031.

This Draft SEIS compares the potential environmental impacts of the No-Action Alternative and three action alternatives for setting fuel economy standards for MY 2022–2026 and 2027–2031 passenger cars and light trucks. This Draft SEIS analyzes the reasonably foreseeable environmental impacts of each Corporate Average Fuel Economy (CAFE) action alternative relative to the No-Action Alternative. The agency's discussion in this Draft SEIS of scientific and technical literature does not necessarily constitute an endorsement by the agency of that literature. The agency welcomes comment on any literature or analysis in this Draft SEIS or submission of any additional relevant information.

NHTSA prepared this Draft SEIS in line with the Supreme Court's recent decision in *Seven County Infrastructure Coalition v. Eagle County, Colorado* and its progeny.[2] Agencies are granted substantial deference to determine the scope of the environmental impacts that they address and may decide to evaluate environmental impacts from separate projects upstream or downstream from this action.[3] This Proposed Action amends standards for model years for which CAFE standards have previously been established. Accordingly, the agency has decided to retain in this Draft SEIS certain aspects of the analytical frame of prior CAFE Environmental Impact Statements (EISs). Specifically, this Draft SEIS includes a discussion of potential environmental impacts of sectors other than those the agency regulates, where changes in those impacts are linked to the action and alternatives under consideration here. *In Seven County*, the Court clarified that NEPA analysis beyond the direct regulatory effect at issue is not

[1] The NEPA statute is codified at 42 U.S.C. 4321 et seq.; DOT Order 5610.1D, 90 FR 29621 (Jul. 3, 2025), is available at https://www.transportation.gov/mission/dots-procedures-considering-environmental-impacts; and NHTSA-specific NEPA implementing procedures are contained in Subpart D of DOT Order 5610.1D.

[2] *Seven Cnty. Infrastructure Coal. v. Eagle Cnty., Colorado*, 145 S. Ct. 1497 (2025); see also *Sierra Club v. FERC*, 145 F.4th 74, 88-9 (D.C. Cir. 2025).

[3] See *Seven Cnty. Infrastructure Coal. v. Eagle Cnty., Colorado*, 145 S. Ct. 1497, 1504 (2025) ("Courts should defer to agencies' discretionary decisions about where to draw the line when considering indirect environmental effects and whether to analyze effects from other projects separate in time or place. See *Department of Transportation v. Public Citizen*, 541 U.S. 752, 767, 124 S. Ct. 2204, 159 L.Ed.2d 60. In sum, when assessing significant environmental effects and feasible alternatives for purposes of NEPA, an agency will invariably make a series of fact-dependent, context-specific, and policy-laden choices about the depth and breadth of its inquiry—and also about the length, content, and level of detail of the resulting EIS. Courts should afford substantial deference and should not micromanage those agency choices so long as they fall within a broad zone of reasonableness.").

required in an EIS.[4] While NHTSA is not required to assess impacts that are not a direct result of changes in CAFE standards and has determined that analyses of such impacts are not necessary for NHTSA to undertake reasoned decision-making pursuant to its authority under the Energy Policy and Conservation Act of 1975 (EPCA), as amended by the Energy Independence and Security Act of 2007 (EISA),[5] the agency nonetheless provides discussion of those impacts solely for informational purposes.

NHTSA solicits comment on the required scope of NEPA analysis in connection with a CAFE standards rulemaking, including whether NHTSA has any statutory authority to take environmental consequences of such a rulemaking into account when exercising its statutory authority, and, to the extent that it lacks such authority, whether NHTSA is required to undertake any NEPA analysis in connection with a CAFE standards rulemaking.

Background

EPCA mandates that NHTSA establish and implement a regulatory program for motor vehicle fuel economy, known as the CAFE program, to reduce national energy consumption. As codified in Chapter 329 of Title 49 of the U.S. Code (U.S.C.) and as amended by EISA, EPCA sets forth specific requirements concerning the establishment of average fuel economy standards for passenger cars and light trucks, which are motor vehicles with a gross vehicle weight rating less than 8,500 pounds and medium-duty passenger vehicles with a gross vehicle weight rating less than 10,000 pounds. The Secretary of Transportation has delegated responsibility for implementing the CAFE program to NHTSA.[6]

To inform its development of the new CAFE standards and pursuant to NEPA,[7] NHTSA prepared this Draft SEIS to evaluate the potential environmental impacts of a reasonable range of alternatives the agency is considering for MY 2022–2026 and 2027–2031 CAFE standards. NEPA directs that Federal agencies proposing “major federal actions significantly affecting the quality of the human environment” must prepare a detailed statement on the environmental impacts of the proposed action (including alternatives to the proposed action).[8] In this Draft SEIS, NHTSA analyzes, discloses, and compares the potential environmental impacts of a reasonable range of alternatives for CAFE standards, including a No-Action Alternative and a Preferred

[4] At issue in *Seven County* was the scope of analysis required under NEPA when an agency issues a permit authorizing construction of a segment of linear infrastructure; our discussion here applies that case’s holding to the current context, where NHTSA is undertaking NEPA analysis in connection with a regulatory standards rulemaking.

[5] Public Law (Pub. L.) No. 110-140, 121 Stat. 1499 (2007).

[6] The Secretary of Transportation has delegated the responsibility for implementing the CAFE program to NHTSA (49 Code of Federal Regulations [CFR] 1.95(a)). Accordingly, the Secretary, DOT, and NHTSA are often used interchangeably in this Draft SEIS.

[7] 42 U.S.C. 4321–4347.

[8] 42 U.S.C. 4332.

Alternative.[9] This Draft SEIS analyzes reasonably foreseeable environmental impacts and discusses impacts in proportion to their significance.

Purpose and Need for the Action

In accordance with EPCA, as amended by EISA, as well as NHTSA's June 2025 interpretive rule,[10] the purpose of NHTSA's rulemaking is to set CAFE standards for MY 2022–2026 and 2027–2031 passenger cars and light trucks to reflect "the maximum feasible average fuel economy level that the Secretary [of Transportation] decides the manufacturers can achieve in that model year."[11] When determining the maximum feasible levels manufacturers can achieve in each model year, EPCA requires that NHTSA consider the four statutory factors of technological feasibility, economic practicability, the effect of other motor vehicle standards of the government on fuel economy, and the need of the United States to conserve energy. In addition, when determining the maximum feasible levels, the agency considers relevant safety and environmental factors. NHTSA is prohibited from considering the availability of alternative fuel technologies (e.g., electric vehicles [EVs] or plug-in hybrid EV electric operation) or compliance credits when setting standards.[12]

NHTSA must establish separate average fuel economy standards for passenger cars and light trucks for each model year.[13] Standards must be "based on [one] or more vehicle attributes related to fuel economy" and "express[ed]…in the form of a mathematical function."[14]

Proposed Action and Alternatives

NHTSA's action is a rulemaking to set fuel economy standards for passenger cars and light trucks. NHTSA has selected a reasonable range of alternatives to evaluate the potential environmental impacts of the CAFE standards and alternatives under NEPA. In addition to proposing new standards, NHTSA's Proposed Action also includes a proposed change to NHTSA's vehicle classification regulations (at 49 Code of Federal Regulations part 523) starting in MY 2028, which would result in vehicles currently classified as light trucks being reclassified as passenger cars, to align better with the original intent expressed in the statute. NHTSA is proposing MY 2022–2026 and 2027–2031 CAFE standards but, because no change in manufacturer behavior is possible for MY 2022–2026 passenger car and light truck fleets, this

[9] NHTSA's identification of a Preferred Alternative is consistent with DOT Order 5610.1D, Section 13.e. The Preferred Alternative is the alternative identified as the favored course of action by the lead agency during the NEPA process. For a given set of standards (CAFE), the "Proposed Action and alternatives" constitute the entire range of alternatives evaluated by NHTSA and include the agency's Preferred Alternative. Consistent with DOT Order 5610.1D, Section 13.e., this Draft SEIS presents the environmental impacts of the Proposed Action and alternatives in comparative form so that reviewers may evaluate their comparative merits.

[10] Resetting the Corporate Average Fuel Economy Program; Interpretive Rule, 90 FR 24518, 24519 (June 11, 2025).

[11] 49 U.S.C. 32902(a).

[12] 49 U.S.C. 32902(h).

[13] 49 U.S.C. 32902(b)(1)-(2).

[14] 49 U.S.C. 32902(b)(3)(A).

Draft SEIS analyzes environmental impacts associated only with the proposed MY 2027–2031 CAFE standards.

No-Action and Action Alternatives

The No-Action Alternative for MYs 2027–2031 assumes that the MY 2027–2031 CAFE standards finalized in 2024[15] remain in effect. The No-Action Alternative also assumes that manufacturers would make production decisions in response to estimated market demand for fuel economy, considering estimated fuel prices, estimated product development cadence, and estimated availability, applicability, cost, and effectiveness of fuel-saving technologies.

The No-Action Alternative provides an analytical baseline against which to compare the environmental impacts of the action alternatives. It is important to note for this analysis that NHTSA promulgated the 2022 and 2024 final standards, which represent the baseline, based on consideration of EVs and credit trading, but such consideration is impermissible pursuant to EPCA. In addition, NHTSA has concluded that manufacturers are not, as discussed in the preamble, able to achieve those standards with the gasoline- and diesel-powered vehicles in their fleet. Therefore, the effects relative to the baseline may be less than presented in this document.

NHTSA has analyzed a range of CAFE action alternatives with fuel economy stringencies that increase, depending on the model year and alternative, between 0.25 percent and 1.5 percent annually from the MY 2022 standards for both passenger cars and light trucks. In most cases stringencies represent a multiplicative shift in the target function used to compute standards. However, in MY 2028, NHTSA is proposing a reclassification of some models from the light truck fleet to the passenger car fleet. As part of this reclassification, NHTSA is using updated function parameters (slope, intercept, minimum, and maximum) based on estimates conducted using the updated fleets. As a result, between MY 2027 and MY 2028, the change in stringency reflects a change in the average standard value for each class between the two years. Though NHTSA's action alternatives are described in terms of increasing stringency from the previous year, all of NHTSA's action alternatives would require standards in a given year to be lower than the standards under the No-Action Alternative that, as noted above, represents standards set impermissibly based on consideration of EVs and credit trading. Each of the action alternatives is derived from a different MY 2022 compliance fit for passenger cars and light trucks, as noted under each alternative below. A compliance fit percentage is used to estimate what portion of the vehicle fleet would comply with a standard. For example, a 75 percent compliance fit means the standard is calibrated such that 75 percent of vehicles in a regulatory class would meet or exceed their fuel economy target, accounting for technological feasibility, cost, and market behavior. This range of the No-Action Alternative and action alternatives encompasses

[15] Corporate Average Fuel Economy Standards for Passenger Cars and Light Trucks for Model Years 2027 and Beyond and Fuel Efficiency Standards for Heavy-Duty Pickup Trucks and Vans for Model Years 2030 and Beyond; Final Rule, 89 FR 52540 (June 24, 2024). Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles; Final Rule, 89 FR 27842 (Apr. 18, 2024).

a spectrum of possible standards NHTSA could determine is the maximum feasible based on the different ways the agency could weigh EPCA's four statutory factors.

Throughout this Draft SEIS, potential impacts are shown for the No-Action Alternative and three action alternatives that illustrate different ranges of estimated average annual percentage increases in fuel economy for both passenger cars and light trucks, as detailed in Table S-1.

Table S-1. Regulatory Alternatives Under Consideration for MY 2022–2031 Passenger Car and Light Truck Standards

Name of Alternative	Passenger Car Stringency Changes	Light Truck Stringency Changes
No-Action Alternative	1.50% for MY 2023 8.00% per year for MYs 2024–2025 10.00% for MY 2026 2.00% per year for MYs 2027–2031	1.50% for MY 2023 8.00% per year for MYs 2024–2025 10.00% for MY 2026 0% per year for MYs 2027–2028 2.00% per year for MYs 2029–2031
Alternative 1	80% compliance fit [a] MY 2022 0.50% per year for MYs 2023–2026 0.10% for MY 2027 0.30% for MY 2028 [b] 0.25% per year for MYs 2029–2031	80% compliance fit [a] MY 2022 0.50% per year for MYs 2023–2026 0.80% for MY 2027 0.60% for MY 2028 [b] 0.25% per year for MYs 2029–2031
Alternative 2 (Preferred)	75% compliance fit [a] MY 2022 0.50% per year for MYs 2023–2026 0.35% for MY 2027 0.25% for MY 2028 [b] 0.25% per year for MYs 2029–2031	70% compliance fit [a] MY 2022 0.50% per year for MYs 2023–2026 0.70% for MY 2027 0.25% for MY 2028 [b] 0.25% per year for MYs 2029–2031
Alternative 3	70% compliance fit [a] MY 2022 0.50% per year for MYs 2023–2026 1.40% for MY 2027 1.50% for MY 2028 [b] 1.00% per year for MYs 2029–2031	50% compliance fit [a] MY 2022 0.50% per year for MYs 2023–2026 0.40% for MY 2027 0.20% for MY 2028 [b] 1.00% per year for MYs 2029–2031

Notes:
[a] Compliance fits were determined based on the production-weighted share of vehicles that met or exceeded their target function value for each regulatory alternative in MY 2022.
[b] Stringency change reflects the growth rate in class average standard value from MYs 2027–2028.

Table S-2 shows the estimated average required fleet-wide fuel economy forecasts by model year for each alternative.

Table S-2. Projected Average Required Fleet-Wide Fuel Economy (mpg) for Combined U.S. Passenger Cars and Light Trucks by Model Year and Alternative

Model Year	No-Action	Alt. 1	Alt. 2	Alt. 3
2027	47.5	29.9	30.7	32.6
2028	47.7	33.4	34.3	36.5
2029	48.7	33.5	34.4	36.9
2030	49.8	33.6	34.5	37.3
2031	50.9	33.7	34.6	37.7

Notes:
mpg = miles per gallon.

These alternatives reflect, among other things, differences in the degree of technology adoption across the fleet, costs to manufacturers and consumers, and conservation of oil and related reductions in non-criteria emissions (NCEs).[16] As part of this analysis, NHTSA considered relevant safety and environmental factors. The alternatives evaluated in this Draft SEIS therefore provide decision-makers the ability to select among and between a wide range of alternatives analyzed in this Draft SEIS, which begin with the No-Action Alternative, are adjusted to account for a specific MY 2022 compliance fit for passenger cars and light trucks, and then increase up to 1.5 percent. Within this range, stringencies could remain the same or differ year to year between and among regulatory classes.

Environmental Consequences

This section describes how the reasonably foreseeable impacts from the Proposed Action could affect energy use, air quality, and climate, as reported in Chapter 3, *Energy*; Chapter 4, *Air Quality*; and Chapter 5, *Non-Criteria Emissions*, of this Draft SEIS, respectively. Air quality and NCE impacts are reported for the entire light-duty (LD) vehicle fleet (passenger cars and light trucks combined[17]) for the No-Action Alternative and three action alternatives; results are reported separately for passenger cars and light trucks in Appendix B, *U.S. Passenger Car and Light Truck Results Reported Separately*. No quantifiable, alternative-specific impacts were identified for the other resource areas discussed in Chapter 6, *Life-Cycle Assessment Implications of Vehicle Materials*, and Chapter 7, *Historic and Cultural Resources;* as a result, these resource areas are summarized at a high level here and not included in the discussion of impacts below.

Chapter 6, *Life-Cycle Assessment Implications of Vehicle Materials,* describes the life-cycle environmental implications related to the vehicle cycle phase considering the materials and

[16] In this Draft SEIS, the term *non-criteria emissions* (NCEs) refers specifically to carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, sulfur hexafluoride, and nitrogen trifluoride, which are not classified as criteria pollutants under the Clean Air Act.

[17] Passenger cars and light trucks also are referred to as LD vehicles. The terms *passenger automobile*, *light truck*, and *medium-duty passenger vehicle* are defined in 49 CFR part 523.

technologies that vehicle manufacturers might use to comply with the CAFE standards. The chapter discusses the impacts related to raw material extraction for materials used for vehicle manufacture, material processing for materials used for vehicle manufacture, component manufacture and vehicle assembly, and vehicle end of life (i.e., disposal and recycling) that might be applied by manufacturers to improve fuel economy to comply with the rulemaking. Manufacturers can choose how to respond to the proposed standards and, depending on vehicle manufacturers' responses in using the various materials or technologies, impacts would vary substantially. As discussed in Chapter 6, Section 6.1, *Introduction,* manufacturers may rely on the different materials or technologies assessed in Chapter 6 and fuel sources assessed in Chapter 3, *Energy*, and as a result, NHTSA cannot quantitatively distinguish between action alternatives in terms of life-cycle implications of vehicle materials. Chapter 6, *Life-Cycle Assessment Implications of Vehicle Materials*, further notes that the magnitude of life-cycle NCE impacts associated with materials and technologies is smaller in comparison with the emissions reductions from avoided fuel consumption during vehicle use.

Chapter 7, *Historic and Cultural Resources*, qualitatively describes potential impacts on historic and cultural resources, such as deterioration due to acid deposition. The Proposed Action and alternatives would not result in significant impacts on historic and cultural resources. In general, impacts under the Proposed Action and alternatives are not quantifiable because it is not possible to distinguish between acid deposition deterioration impacts that would result from the proposed rule and acid deposition deterioration impacts resulting from other activities, as well as deterioration impacts from natural weathering (rain, wind, temperature, and humidity) on historic buildings and structures and the varying impact of a specific geographic location on any particular historic property or sacred site or object.

The potential impacts on energy use, air quality, and climate discussed in the main chapters of this Draft SEIS include reasonably foreseeable environmental impacts from the Proposed Action. Reasonably foreseeable environmental impacts mean changes to the human environment from the Proposed Action or alternatives that are sufficiently likely to occur such that a person of ordinary prudence would take them into account in reaching a decision[18] and have a reasonably close causal relationship to the Proposed Action or alternatives.

To derive the reasonably foreseeable environmental impacts of the action alternatives, NHTSA compares each CAFE alternative to the No-Action Alternative, which reflects trends that would be expected in the absence of any regulatory action by NHTSA. Because NHTSA is required to set CAFE standards for each model year, environmental impacts would also depend on future standards established by NHTSA that cannot be quantified at this time.

Energy

NHTSA's CAFE standards regulate fuel economy and, therefore, affect U.S. transportation fuel consumption. Transportation fuel accounts for a large portion of total U.S. energy consumption and energy imports and has a significant impact on the functioning of the energy sector as a

[18] DOT Order 5610.1D, Section 26.t.

whole. Though U.S. energy efficiency increased and the U.S. share of worldwide energy consumption declined over previous decades, total U.S. energy consumption increased over that same period. Until a decade ago, most of this increase was driven by rising energy imports, largely for use in the transportation sector. However, in recent years, higher domestic oil and gas production, additional electricity generation, and improved energy efficiency have made the United States a net energy exporter, resulting in declining transportation fuel consumption and imports.

Petroleum is the largest source of energy used in the transportation sector, and transportation accounts for the largest share of total U.S. petroleum consumption. The Energy Information Administration's Annual Energy Outlook (AEO) 2025, developed in 2024, shows that the transportation sector accounted for 74.0 percent of total U.S. petroleum consumption and projects it to decrease to 67.6 percent of total U.S. petroleum consumption by 2050.

Given that the transportation sector is projected to account for the majority of U.S. petroleum consumption, U.S. net petroleum imports in 2050 are expected primarily to be attributed to fuel consumption by LD and heavy-duty (HD) vehicles. The United States is expected to continue to be a net energy exporter through 2050, due to a combination of improvements in vehicle fuel economy, combined with increases in U.S. petroleum production, which have substantially reduced U.S. oil imports, resulting in declining net petroleum imports.

In the foreseeable future, the transportation sector would continue to be the largest consumer of U.S. petroleum and the second-largest consumer of total U.S. energy, after the industrial sector, according to AEO 2025. AEO projects that the fuel consumed by LD vehicles would consist predominantly of gasoline derived from petroleum for the foreseeable future due to conventional gasoline cars continuing to make up the majority of LD vehicle stock through 2050.[19] Detailed discussion of this information can be found in the relevant sections of Appendix D, *Energy*.

Other sources of energy used in the U.S. transportation sector include electricity, diesel and biofuels, natural gas, and hydrogen.

- **Electricity.** Electricity currently makes up 0.8 percent of LD vehicle fuel consumption, but the CAFE Model projects this proportion to increase to 11.2 percent across all LD vehicles by 2050, representing the largest share of fuel consumption outside of gasoline.
- **Diesel.** Diesel currently makes up 0.6 percent of fuel consumption for LD vehicles and the CAFE Model projects this proportion to decrease to 0.3 percent by 2050.
- **Biofuels.** Biofuels, including ethanol (E85), biodiesel, and renewable diesel, currently make up 1.9 percent of transportation energy consumption. AEO 2025 projects this share to increase through 2050 due to projected growth of renewable diesel and gasoline as a transportation fuel.
- **Natural gas.** Natural gas currently makes up less than 0.01 percent of fuel consumption for LD vehicles. AEO 2025 projects LD natural gas consumption to decrease through 2050.

[19] Discussions about national energy consumption within this Draft SEIS are generally based on data from AEO 2025, while reference to vehicle type-specific energy consumption is generally based on the CAFE Model.

- **Hydrogen.** LD fuel cell vehicle hydrogen consumption is less than 0.01 percent of total LD fuel consumption. The CAFE Model projects hydrogen to increase to 0.08 percent of LD fuel consumption by 2050.

Reasonably Foreseeable Impacts from the Proposed Action

To calculate the impacts on fuel consumption for each action alternative, NHTSA subtracted projected fuel consumption under the relevant No-Action Alternative from the level under each action alternative. While total fuel consumption decreases as the action alternatives become more stringent, all action alternatives result in higher total fuel consumption compared to the No-Action Alternative. Table S-3 displays these relationships, showing that the increase in fuel consumption relative to the No-Action Alternative is smallest under the most stringent alternative.[20] This table reports total 2024 to 2050 fuel consumption under the No-Action Alternative in gasoline gallon equivalents, including diesel, gasoline, electricity, hydrogen, and biofuel, for passenger cars and light trucks and the incremental fuel use changes for the action alternatives relative to the No-Action Alternative. Gasoline is expected to account for 88.4 percent of energy consumption by passenger cars and light trucks in 2050.

Table S-3. Fuel Consumption (for the No-Action Alternative) and Change in Fuel Consumption by Alternative for all Light-Duty Vehicles (Passenger Cars and Light Trucks) (billion gasoline gallon equivalent total for calendar years 2024–2050)

No-Action	Alt. 1	Alt. 2	Alt. 3
Fuel Consumption	Change in Fuel Use Compared to the CAFE No-Action Alternative		
2,867	+77 (+3%) [a]	+77 (+3%) [a]	+71 (+2%)

Notes:
[a] The estimated fuel consumption is the same under Alternative 1 and Alternative 2 (Preferred Alternative) because starting with MY 2027, vehicle manufacturers are assumed to offer vehicles using the same fuel economy technologies under either Alternative 1 or Alternative 2 (Preferred Alternative), and the resulting fuel consumption would be the same for both alternatives.

Air Quality

The Proposed Action and alternatives would affect air pollutant emissions and air quality, which, in turn, would affect public health and welfare and the natural environment. The air quality analysis in Chapter 4, *Air Quality*, assesses the Proposed Action impacts on emissions of pollutants of concern from mobile sources, and the resulting impacts on human health. The changes in emissions would vary by pollutant, calendar year, and action alternative.

Under the authority of the Clean Air Act and its amendments, the U.S. Environmental Protection Agency (EPA) has established National Ambient Air Quality Standards for six relatively common air pollutants known as *criteria pollutants*: carbon monoxide (CO), nitrogen dioxide, ozone, sulfur dioxide (SO_2), lead, and particulate matter (PM) with an aerodynamic

[20] NHTSA used 2050 as the end year for its analysis because it is the year by which nearly the entire U.S. vehicle fleet will be composed of MY 2027–2031 or later LD vehicles.

diameter equal to or less than 10 microns (PM10) and 2.5 microns (PM2.5, or fine particles). Ozone is not emitted directly from vehicles but is formed in the atmosphere from emissions of ozone precursor pollutants such as nitrogen oxides (NO_X) and volatile organic compounds (VOCs).

Toxic air pollutants from vehicles are known as mobile source air toxics (MSATs). The MSATs included in this analysis are acetaldehyde, acrolein, benzene, 1,3-butadiene, diesel particulate matter (DPM), and formaldehyde. DPM is a component of exhaust from diesel-fueled vehicles and falls almost entirely within the PM2.5 particle-size class.

Criteria pollutants and MSATs have been shown to have health effects on individuals at various concentrations and exposures; for more information see Chapter 4, Section 4.1.1.1, *Health Effects of Criteria Pollutants and Mobile Source Air Toxics.* In addition to criteria pollutants, motor vehicles emit some substances defined by the 1990 Clean Air Act amendments as toxic air pollutants.

Contribution of U.S. Transportation Sector to Air Pollutant Emissions

The U.S. transportation sector is a major source of emissions of certain criteria pollutants or their chemical precursors. Emissions of these pollutants from on-road mobile sources have declined since 1970 because of pollution controls on vehicles and regulation of the chemical content of fuels, despite continuing increases in vehicle travel and fuel consumption. Nevertheless, the U.S. transportation sector remains a major source of emissions of certain criteria pollutants or their chemical precursors. As noted in Chapter 4, *Air Quality*, in 2024, on-road mobile sources were responsible for emitting 12.322 million tons[21] per year of CO (27 percent of total U.S. emissions), 66,972 tons per year (1 percent) of PM2.5, and 188,636 tons per year (1 percent) of PM10. In 2026, passenger cars and light trucks will contribute 84 percent of U.S. highway emissions of CO, 49 percent of highway emissions of PM2.5, and 64 percent of highway emissions of PM10. Almost all the PM in motor vehicle exhaust is PM2.5; therefore, this analysis focuses on PM2.5 rather than PM10. In 2024, on-road mobile sources also emitted 895,989 tons per year (7 percent of total U.S. emissions) of VOCs and 1.745 million tons per year (25 percent) of NO_X, both of which are chemical precursors of ozone. In 2026, passenger cars and light trucks will emit 78 percent of U.S. highway emissions of VOCs and 31 percent of U.S. highway emissions of NO_X. NO_X is a PM2.5 precursor, and VOCs can be PM2.5 precursors. SO_2 and other oxides of sulfur are important because they contribute to the formation of PM2.5 in the atmosphere; however, on-road mobile sources account for less than 1 percent of U.S. SO_2 emissions.

Key Findings for Air Quality

This Draft SEIS provides findings for air quality impacts for 2035 and 2050. In 2035, emissions of SO_2 decrease, and emissions of CO, NO_X, PM2.5, and VOCs increase under all action alternatives, compared to the No-Action Alternative. In 2050, emissions of CO, NO_X, PM2.5, SO_2, and VOCs increase under all action alternatives, compared to the No-Action Alternative. The estimated

[21] The term *ton(s)* as used in this chapter refers to U.S. tons (2,000 pounds).

emissions are the same under Alternative 1 and Alternative 2 (Preferred Alternative) because starting with MY 2027, vehicle manufacturers are assumed to offer vehicles using the same fuel economy technologies under either Alternative 1 or Alternative 2 (Preferred Alternative), and the resulting emissions would be the same for both alternatives.

The changes in emissions are small in relation to total criteria pollutant emissions levels during this period and, overall, the health effects due to changes in criteria pollutant emissions through 2050 are projected to increase. The directions and magnitudes of the changes in total emissions are not consistent across all pollutants. This reflects the complex interactions between tailpipe emissions rates of the various vehicle types; the technologies assumed to be incorporated by manufacturers in response to the standards; upstream emissions rates; the relative proportions of gasoline, diesel, and other fuels in total fuel consumption changes; and changes in vehicle miles traveled (VMT) from the rebound effect.[22] Other CAFE Model inputs and assumptions, discussed at length in Section II of the proposed rule preamble and Chapters 2 through 5 of the Technical Support Document, including the rate at which new vehicles are sold, will also affect these air quality impact estimates.[23] It is important to stress that changes in these assumptions would alter the air pollution estimates.

Criteria Pollutants

The air quality analysis identified the following impacts on criteria air pollutants.

- Modeled increases under the action alternatives in 2035 were small relative to the emissions under the No-Action Alternative. Emissions of CO, NO_X, PM2.5, and VOC increase slightly under all action alternatives compared to the No-Action Alternative, while emissions of SO_2 decrease slightly. Relative to the No-Action Alternative, the modeling results suggest CO, NO_X, and VOC emissions increases are smaller under Alternative 3 (the most stringent alternative in terms of estimated required miles per gallon) than under Alternatives 1 and 2 (Preferred Alternative), whereas the emissions increases of PM2.5 are unchanged across the action alternatives relative to the No-Action Alternative. The decreases in SO_2 emissions relative to the No-Action Alternative reflect the projected decrease in EV use across all action alternatives, which would result in reduced emissions from fossil-fueled power plants to generate the electricity for charging the EVs. Upstream sources constitute over 90 percent of SO_2 emissions but less than 90 percent of emissions of other criteria pollutants.
- Modeled increases under the action alternatives in 2050 were small relative to the emissions under the No-Action Alternative. Emissions of CO, NO_X, PM2.5, SO_2, and VOC increase under all action alternatives compared to the No-Action Alternative. Relative to the

[22] The rebound effect refers to the increase in vehicle use resulting from improved fuel economy.

[23] DOT has continued its ongoing effort to refine and expand the capabilities of the CAFE Model for use in analyzing regulatory alternatives as considered in this Draft SEIS. Any analysis of regulatory actions that will be implemented several years in the future, the benefits and costs of which accrue over decades, requires many assumptions. Over such time horizons, many, perhaps even most, of the relevant assumptions in such an analysis are inevitably uncertain. To help address this, NHTSA updates the assumptions used in each successive CAFE analysis to reflect the current state of the world more accurately and to apply the best current estimates of future conditions.

No-Action Alternative, the modeling results suggest NO_X, PM2.5, SO_2, and VOC emissions increases are smaller under Alternative 3 than under Alternatives 1 and 2 (Preferred Alternative), while CO emissions increases are larger under Alternative 3 than under Alternatives 1 and 2 (Preferred Alternative), due to increased tailpipe emissions of CO. Decreases in EV use relative to the No-Action Alternative are projected in 2050, but they are smaller decreases than in 2035, such that the projected increases in vehicle gasoline consumption lead to projected slight increases in overall SO_2 emissions (through increases in tailpipe emissions of SO_2 and increases in upstream SO_2 emissions from increased fuel refining).

- Under each action alternative compared to the No-Action Alternative, the largest relative increases in emissions (as a percentage) among the criteria pollutants would occur for VOCs, for which emissions would increase by as much as 3.9 percent under Alternatives 1 and 2 (Preferred Alternative) in 2050 compared to the No-Action Alternative. Percentage increases in emissions of CO, NO_X, and PM2.5 would be less. The smaller increases in CO, NO_X, and PM2.5 are not expected to lead to measurable changes in concentrations of criteria pollutants in the ambient air. The larger increases in VOCs could lead to changes in ambient pollutant concentrations.

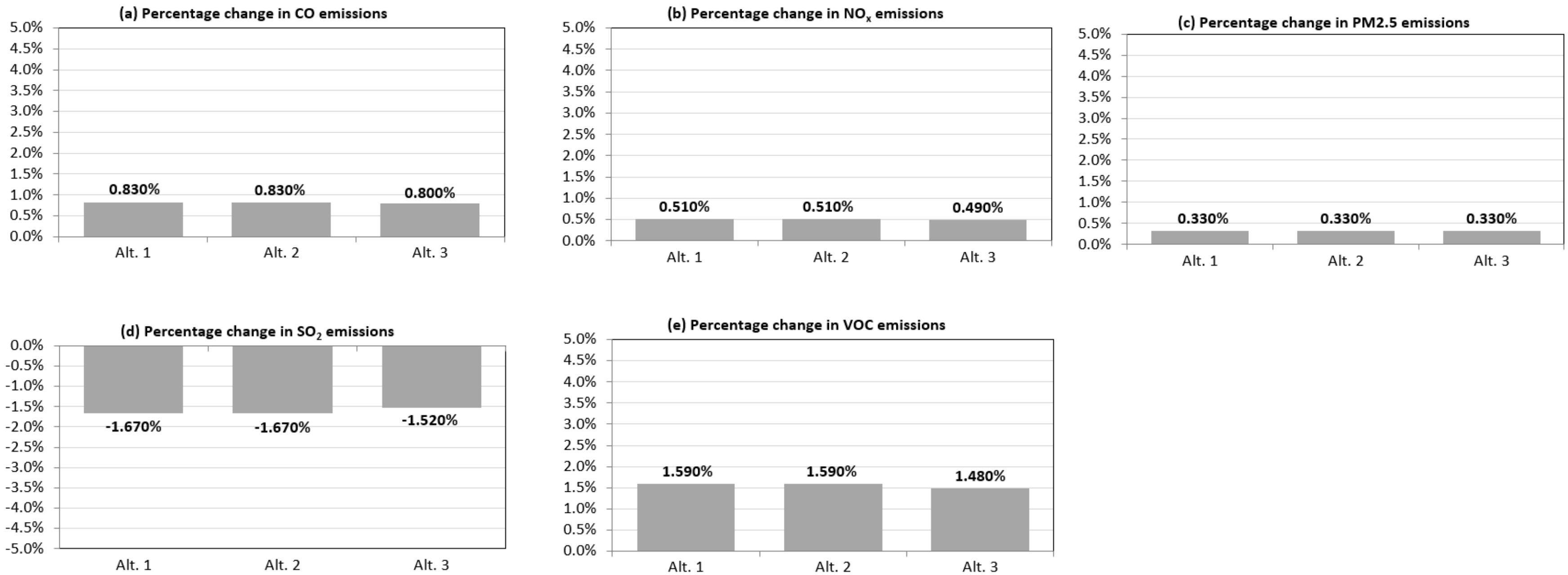
Mobile Source Air Toxics

The air quality analysis identified the following impacts on MSATs.

- MSAT emissions across the action alternatives increase in 2035 and 2050 relative to the No-Action Alternative (increases in 2035 are slight). The increases stay the same or get larger from Alternatives 1 and 2 (Preferred Alternative) to Alternative 3 for acetaldehyde (in 2050), acrolein (in 2035 and 2050), and 1,3-butadiene (in 2035 and 2050), but get smaller for acetaldehyde (in 2035), benzene (in 2035 and 2050), DPM (in 2035 and 2050), and formaldehyde (in 2035 and 2050).
- The largest relative increases in emissions (as a percentage) generally would occur for formaldehyde for which emissions would increase by as much as 3.8 percent under Alternatives 1 and 2 (Preferred Alternative) in 2050 compared to the No-Action Alternative. Percentage increases in emissions of acetaldehyde, acrolein, 1,3-butadiene, benzene, and DPM would be less. The smaller increases are not expected to lead to measurable changes in concentrations of MSATs in the ambient air. For such small changes, the impacts of those action alternatives would be essentially equivalent. The larger increases in emissions could lead to changes in ambient pollutant concentrations.

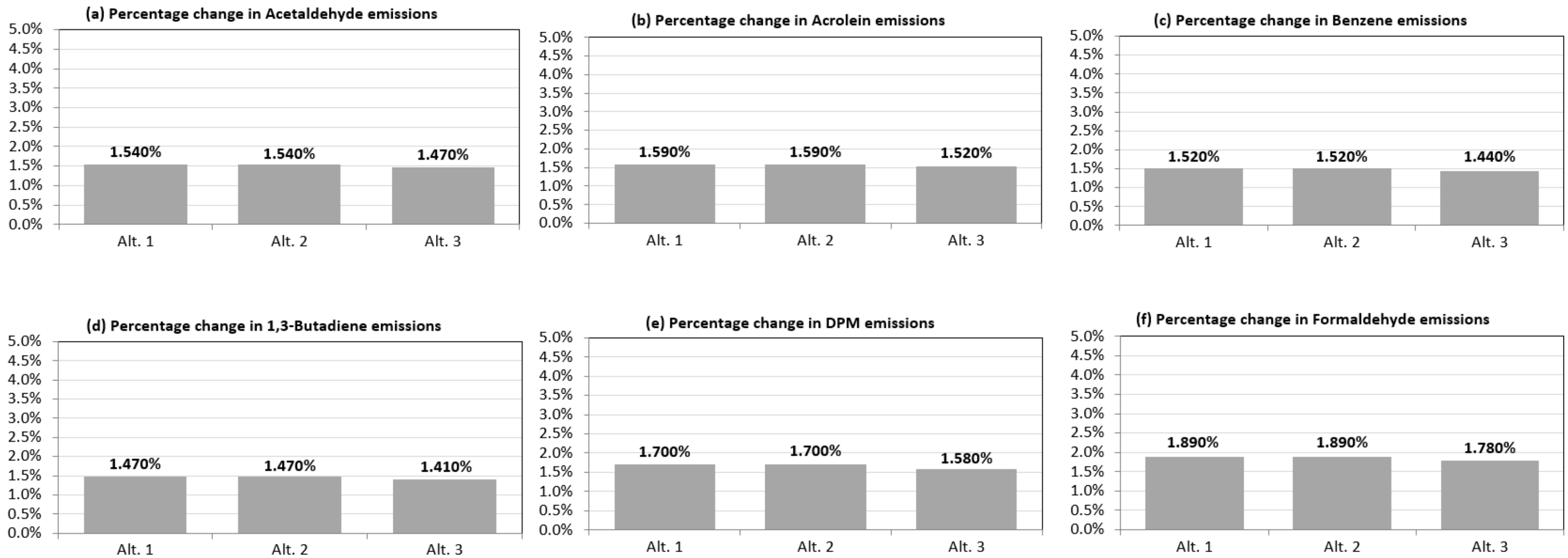
Changes in criteria pollutant emissions in 2035 are shown by action alternative in Figure S-1. Changes in MSAT emissions in 2035 are shown by action alternative in Figure S-2.

Figure S-1. Nationwide Percentage Changes in Criteria Pollutant Emissions from U.S. Passenger Cars and Light Trucks for 2035 by Action Alternative Compared to the No-Action Alternative, Proposed Action Impacts



Notes:
The vertical (percentage) scale differs by pollutant.
Negative values indicate emissions decreases; positive values are emissions increases.
CO = carbon monoxide; NO_X = nitrogen oxides; PM2.5 = particulate matter 2.5 microns or less in diameter; SO_2 = sulfur dioxide; VOCs = volatile organic compounds.

Figure S-2. Nationwide Percentage Changes in Mobile Source Air Toxic Emissions from U.S. Passenger Cars and Light Trucks for 2035 by Action Alternative Compared to the No-Action Alternative, Proposed Action Impacts



Notes:
Positive values indicate emissions increases.
DPM = diesel particulate matter.

Non-Criteria Emissions

This section describes how the Proposed Action and alternatives could affect NCEs. In this Draft SEIS, the discussion of reasonably foreseeable impacts of NCEs focuses on impacts associated with increases in NCEs from the Proposed Action and alternatives as compared to projected NCEs under the relevant No-Action Alternative.

Contribution of the U.S. Transportation Sector to Carbon Dioxide Emissions

Human activities that emit NCEs into the atmosphere include fossil fuel production and combustion. Isotopic- and inventory-based studies have indicated that the rise in the global CO_2 concentration is largely a result of the release of carbon that has been stored underground through the combustion of fossil fuels (coal, petroleum, and natural gas) used to power motor vehicles, among other uses (as discussed in Appendix E, Section E.3.3.5, *Global Emissions Scenarios*).

In 2022, the U.S. transportation sector was the single leading source of CO_2 emissions from fossil fuels, contributing over one-third of total U.S. CO_2 emissions from fossil fuels, with passenger cars and light trucks accounting for 57 percent of total U.S. CO_2 emissions from transportation (EPA 2024a). From 1990 to 2022, CO_2 emissions from passenger cars and light trucks increased by 10 percent, which is attributed to a 47 percent increase in VMT by LD motor vehicles (passenger cars and light trucks) driven by population growth, economic growth, and low fuel prices (EPA 2024a).

Key Findings for Emissions

The Proposed Action and alternatives would increase both U.S. passenger car and light truck fuel consumption and CO_2 emissions compared with the relevant No-Action Alternative, resulting in minor increases to the anticipated increases in global CO_2 concentrations, temperature, precipitation, sea level, and ocean acidification that would otherwise occur.[24]

Estimates of NCEs and increases are presented for each of the action alternatives for CAFE standards. The impacts of the Proposed Action and alternatives on global mean surface temperature, precipitation, sea level, and ocean pH would be small in relation to global emissions trajectories because of the global and multi-sectoral nature of climate trends.

As discussed further in Appendix E, Section E.3.1, *Uncertainty in Climate Modeling*, the potential climate impacts of the Proposed Action and alternatives involve uncertainty inherent in all projections of future climate conditions and cannot reliably be determined with complete accuracy.

[24] Uncertainty exists regarding the magnitude of impact. The methods used to characterize NCEs and climate impacts consider multiple sources of uncertainty. Scientific understanding of the climate system is incomplete; like any analysis of complex, long-term changes to support decision-making, evaluating reasonably foreseeable impacts on the human environment involves many assumptions and uncertainties. This Draft SEIS uses methods and data to analyze climate impacts that represent the best and most current information available on this topic.

For the analysis of reasonably foreseeable impacts from the Proposed Action, NHTSA selected a global emissions reference scenario to represent the No-Action Alternative in the modeling runs. NHTSA also modeled other global emissions scenarios (see Appendix E, *Air Quality and NCE Methodology and Other Information,* Section E.3.4, *Environmental Consequences: Other Associated Potential Impacts*). More information on global emissions scenarios used in this analysis can be found in Appendix E, *Air Quality and NCE Methodology and Other Information,* Section E.3.3.5, *Global Emissions Scenarios.*

Non-Criteria Emissions

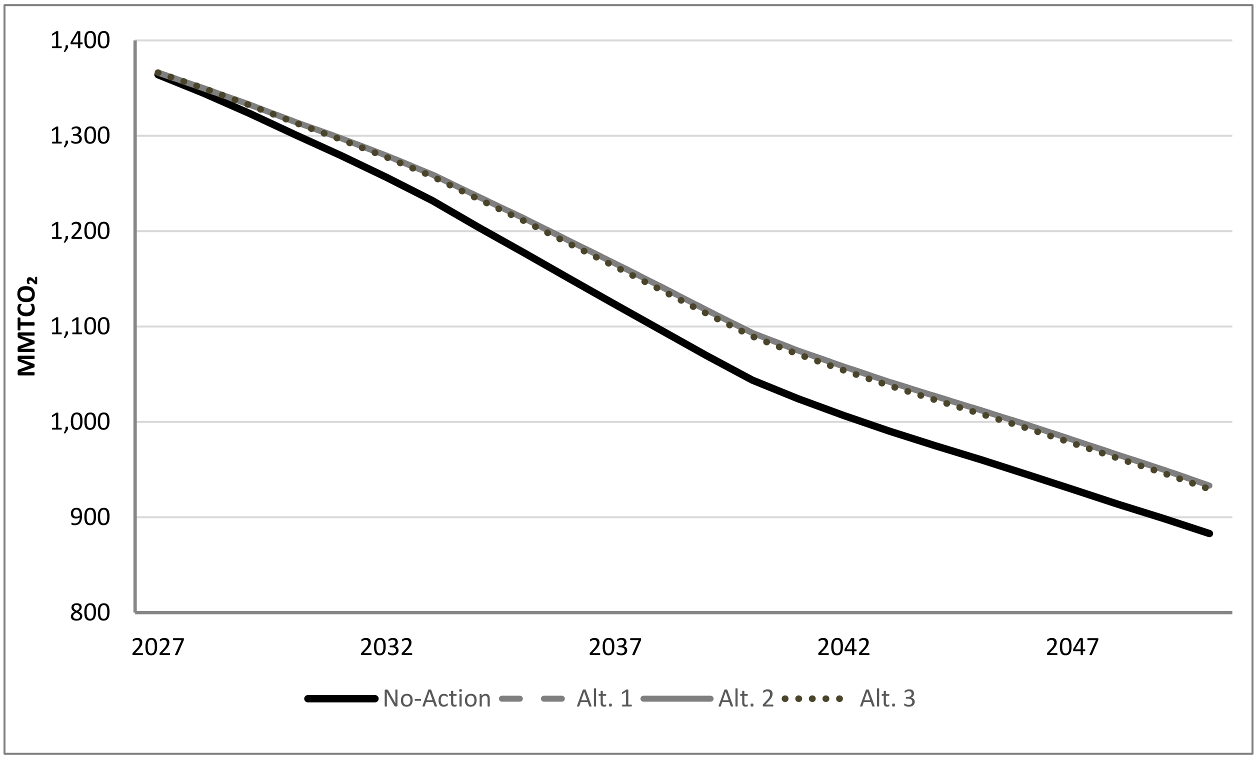
The alternatives would have the following impacts related to NCEs.

Figure S-3 shows projected annual CO_2 emissions from passenger cars and light trucks under all alternatives. Passenger cars and light trucks are projected to emit 69,400 million metric tons of carbon dioxide ($MMTCO_2$) from 2027 through 2100 under the No-Action Alternative. Alternative 1 and Alternative 2 (Preferred Alternative) would increase these emissions by 4.90 percent by 2100, while Alternative 3 would increase these emissions by 4.47 percent. Emissions would be highest under Alternatives 1 and 2 (Preferred Alternative). The estimated emissions are the same under Alternative 1 and Alternative 2 (Preferred Alternative) because starting with MY 2027, vehicle manufacturers are assumed to offer vehicles using nearly the same fuel economy technologies under either Alternative 1 or Alternative 2 (Preferred Alternative), and the resulting emissions would be the same for both alternatives.[25]

- Compared with total projected CO_2 emissions of 811 $MMTCO_2$ from all passenger cars and light trucks under the No-Action Alternative in the year 2100, the action alternatives are expected to increase CO_2 emissions from passenger cars and light trucks in the year 2100 by 5.7 percent under Alternatives 1 and 2 (Preferred Alternative), and 5.3 percent under Alternative 3.
- Compared to the total global reference scenario CO_2 emissions projection of 4,991,547 $MMTCO_2$ under the No-Action Alternative from 2027 through 2100, the action alternatives are expected to increase slightly global CO_2 by 0.07 percent under Alternatives 1 and 2 (Preferred Alternative), and 0.06 percent under Alternative 3 by 2100.
- The emissions increases from all passenger cars and light trucks in 2035 compared with emissions under the No-Action Alternative are approximately equivalent to the annual emissions from 7,727,819 vehicles under Alternatives 1 and 2 (Preferred Alternative), and 7,143,671 vehicles under Alternative 3. (A total of 252,733,312 passenger cars and light trucks are projected to be on the road in 2035 under the No-Action Alternative.)

[25] All CO_2 emissions estimates associated with the action alternatives include upstream emissions.

Figure S-3. Projected Annual Carbon Dioxide Emissions ($MMTCO_2$) from All U.S. Passenger Cars and Light Trucks by Alternative



$MMTCO_2$ = million metric tons of carbon dioxide.

Climate Indicators

CO_2 emissions affect the concentration of CO_2 in the atmosphere, which in turn affects global temperature, sea level, precipitation, and ocean pH. However, by 2100, each action alternative would only slightly increase CO_2 concentrations, global mean surface temperature, sea level, and precipitation, and would only slightly decrease ocean pH, compared to the No-Action Alternative.

Comparison of Alternatives

Reasonably Foreseeable Impacts from the Proposed Action

Table S-4 summarizes the reasonably foreseeable impacts of the action alternatives on each resource. The results are based on a climate analysis using the SSP3-7.0 global emissions reference scenario where noted.

Table S-4. Reasonably Foreseeable Impacts from the Proposed Action and Alternatives

No-Action [a]	Alt. 1 (Change)	Alt. 2 (Change)	Alt. 3 (Change)
Energy: Combined U.S. Passenger Car and Light Truck Fuel Consumption and Change in Fuel Consumption for 2024–2050 (billion gasoline gallon equivalent)			
2,867	+77 (+3%)	+77 (+3%)	+71 (+2%)
Air Quality: Criteria Air Pollutant Emissions in 2035 (tons per year)			
CO: 6,522,972 NO_X: 305,340 PM2.5: 20,274 SO_2: 62,128 VOCs: 823,686	Decrease: SO_2 (-1,036). Increase: CO (54,129), NO_X (1,556), PM2.5 (66), and VOCs (13,100).	Decrease: SO_2 (-1,036); emissions equal to Alt. 1. Increase: CO (54,129), NO_X (1,556), PM2.5 (66), and VOCs (13,100); emissions equal to Alt. 1.	Decrease: SO_2 (-941); emissions larger than Alts. 1 and 2. Increase: CO (51,915), NO_X (1,500), PM2.5 (66), and VOCs (12,202); emissions equal to Alts. 1 and 2 (for PM2.5) or less than Alts. 1 and 2 (for CO, NO_X, and VOCs).
Air Quality: Criteria Air Pollutant Emissions in 2050 (tons per year)			
CO: 3,602,777 NO_X: 174,815 PM2.5: 10,608 SO_2: 45,426 VOCs: 549,795	Decrease: None. Increase: CO (95,198), NO_X (4,567), PM2.5 (242), SO_2 (293), and VOCs (21,296).	Decrease: None; emissions equal to Alt. 1. Increase: CO (95,198), NO_X (4,567), PM2.5 (242), SO_2 (293), and VOCs (21,296); emissions equal to Alt. 1.	Decrease: None. Increase: CO (95,678), NO_X (4,287), PM2.5 (221), SO_2 (227), and VOCs (20,184); emissions greater than Alts. 1 and 2 (for CO) or less than Alts. 1 and 2 (for NO_X, PM2.5, SO_2, and VOCs).
Air Quality: Mobile Source Air Toxic Emissions in 2035 (tons per year)			
Acetaldehyde: 2,273 Acrolein: 128 Benzene: 8,335 1,3-butadiene: 846 DPM: 55,690 Formaldehyde: 1,763	Decrease: None. Increase: Acetaldehyde (35), acrolein (2), benzene (127), 1,3-butadiene (12), DPM (949), and formaldehyde (33).	Decrease: None. Increase: Acetaldehyde (35), acrolein (2), benzene (127), 1,3-butadiene (12), DPM (949), and formaldehyde (33); emissions equal to Alt. 1.	Decrease: None. Increase: Acetaldehyde (33), acrolein (2), benzene (120), 1,3-butadiene (12), DPM (882), and formaldehyde (31); emissions equal to Alts. 1 and 2 (for acrolein and 1,3-butadiene, when rounded to the nearest ton) or less than Alts. 1 and 2 (for acetaldehyde, benzene, DPM, and formaldehyde).

No-Action [a]	Alt. 1 (Change)	Alt. 2 (Change)	Alt. 3 (Change)
Air Quality: Mobile Source Air Toxic Emissions in 2050 (tons per year)			
Acetaldehyde: 1,420 Acrolein: 78 Benzene: 5,309 1,3-butadiene: 534 DPM: 48,030 Formaldehyde: 1,108	Decrease: None. Increase: Acetaldehyde (41), acrolein (2), benzene (175), 1,3-butadiene (15), DPM (1,380), and formaldehyde (42).	Decrease: None. Increase: Acetaldehyde (41), acrolein (2), benzene (175), 1,3-butadiene (15), DPM (1,380), and formaldehyde (42); emissions equal to Alt. 1.	Decrease: None. Increase: Acetaldehyde (42), acrolein (2), benzene (173), 1,3-butadiene (16), DPM (1,251), and formaldehyde (41); emissions greater than Alts. 1 and 2 (for acetaldehyde and 1,3-butadiene), equal to Alts. 1 and 2 (for acrolein, when rounded to the nearest ton), or less than Alts. 1 and 2 (for benzene, DPM, and formaldehyde).
Climate: Combined U.S. Passenger Car and Light Truck Carbon Dioxide Emissions and Carbon Dioxide Emissions Changes for U.S. Passenger Cars and Light Trucks for 2027–2100 ($MMTCO_2$)			
69,400	+3,400	+3,400	+3,100
Climate: Changes in Atmospheric Carbon Dioxide Concentrations in 2100 (ppm) [b]			
-0.04	+0.32	+0.32	+0.30
Climate: Changes in Global Mean Surface Temperature Increase by 2100 in °C (°F) [b]			
-0.000°C (-0.000°F)	+0.001°C (+0.002°F)	+0.001°C (+0.002°F)	+0.001°C (+0.002°F)
Climate: Changes in Global Sea-Level Rise by 2100 in centimeters (inches) [b]			
-0.00 (-0.00)	+0.03 (+0.01)	+0.03 (+0.01)	+0.02 (+0.01)
Climate: Changes in Global Mean Precipitation Increase by 2100 [b,c]			
-0.00%	0.00%	0.00%	0.00%
Climate: Changes in Ocean Acidification in 2100 (pH) [b]			
0.0000	-0.0002	-0.0002	-0.0001

Notes:

The numbers in this table have been rounded for presentation purposes. Therefore, the increases might not reflect the exact difference of the values in all cases.

[a] Except where otherwise noted, these values represent the totals for the No-Action Alternative.

[b] Results based on a climate analysis utilizing the global emissions reference scenario. Values for the No-Action Alternative represent the difference between the Preferred Alternative (PC2LT002) and the No-Action Alternative in the Final Environmental Impact Statement for Corporate Average Fuel Economy Standards for Passenger Cars and Light Trucks, Model Years 2027 and Beyond, and Fuel Efficiency Standards for Heavy-Duty Pickup Trucks and Vans, Model Years 2030 and Beyond (NHTSA 2024). Values reported as 0.00, 0.000, or 0.0000 are greater than zero. Values reported as -0.00, -0.000, or -0.0000 are less than zero. NHTSA's Proposed Action also includes proposed changes to its vehicle classification regulations starting in MY 2028, which reconsiders how light trucks are classified; therefore, the two data sets used here will differ in the types of vehicles

included. See Section VI of the proposed rule preamble and Chapter 3 of the Preliminary Regulatory Impact Analysis for additional detail regarding the effect of NHTSA's proposed fleet reclassification.
[c] The Proposed Action and alternatives are projected to increase precipitation by less than 0.01 percent for all alternatives based on the scaling factor from the global emissions reference scenario.
°C = degrees Celsius; °F = degrees Fahrenheit; CAFE = Corporate Average Fuel Economy; CO = carbon monoxide; DPM = diesel particulate matter; $MMTCO_2$ = million metric tons of carbon dioxide; NO_X = nitrogen oxides; PM2.5 = particulate matter 2.5 microns or less in diameter; ppm = parts per million; SO_2 = sulfur dioxide; VOCs = volatile organic compounds.