Final Environmental Impact Statement

Corporate Average Fuel Economy Standards, Passenger Cars and Light Trucks, Model Years 2012-2016

Summary

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National Highway Traffic Safety Administration

NHTSA

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Summary

Foreword

The National Highway Traffic Safety Administration (NHTSA) prepared this Environmental Impact Statement (EIS) to analyze and disclose the potential environmental impacts of the proposed model years (MYs) 2012–2016 Corporate Average Fuel Economy (CAFE) standards for the total fleet of passenger and non-passenger automobiles (hereinafter referred to as passenger cars and light trucks, respectively) and reasonable alternative standards for the NHTSA CAFE program pursuant to Council on Environmental Quality (CEQ) regulations implementing the National Environmental Policy Act (NEPA), U.S. Department of Transportation (DOT) Order 5610.1C, and NHTSA regulations.[1] This EIS compares the potential environmental impacts of alternative mile-per-gallon (mpg) levels NHTSA will consider for the final rule, including the Preferred Alternative (*i.e.*, the proposed standards) and a No Action Alternative. It also analyzes direct, indirect, and cumulative impacts and analyzes impacts in proportion to their significance.

Background

The Energy Policy and Conservation Act of 1975 (EPCA) established a program to regulate automobile fuel economy and provided for the establishment of average fuel economy standards for passenger cars and separate standards for light trucks.[2] As part of that Act, the CAFE program was established to reduce national energy consumption by increasing the fuel economy of passenger cars and light trucks. The Act directs the Secretary of Transportation to set and implement fuel economy standards for passenger cars and light trucks sold in the United States. The Secretary delegated responsibility for implementing the CAFE program to NHTSA.[3]

In December 2007, Congress passed the Energy Independence and Security Act of 2007 (EISA),[4] amending the EPCA CAFE program requirements and providing DOT additional rulemaking authority and responsibilities. Pursuant to EPCA, as amended by EISA, on April 22, 2008, NHTSA proposed CAFE standards for MYs 2011–2015 passenger cars and light trucks in a Notice of Proposed Rulemaking (NPRM).[5]

On October 10, 2008, NHTSA submitted to the U.S. Environmental Protection Agency (EPA) its Final Environmental Impact Statement, Corporate Average Fuel Economy Standards, Passenger Cars and Light Trucks, Model Years 2011–2015.[6] On March 30, 2009, NHTSA issued a final rule adopting CAFE standards for MY 2011.[7]

On April 1, 2009, NHTSA published a Notice of Intent (NOI) to prepare an EIS for proposed MYs 2012–2016 CAFE standards.[8] The NOI described the statutory requirements for the standards, provided initial information about the NEPA process, and initiated scoping by requesting public input on the scope of the environmental analysis to be conducted.[9]

On May 19, 2009, President Obama announced a National Fuel Efficiency Policy aimed at both increasing fuel economy and reducing greenhouse gas (GHG) emissions for all new cars and trucks sold in the United States, while also providing a predictable regulatory framework for the automotive industry. The policy seeks to set harmonized federal standards to regulate both fuel economy and GHG emissions. The policy covers MY 2012 to MY 2016 and ultimately requires the equivalent of an average fuel economy of 35.5 mpg in 2016, if all carbon dioxide (CO_2) reductions were achieved through fuel economy improvements. In conjunction with the President's announcement, on May 19, 2009, DOT and EPA issued a Notice of Upcoming Joint Rulemaking to propose coordinated fuel economy and GHG standards for MYs 2012–2016 light-duty vehicles.

On September 28, 2009, NHTSA and EPA announced in the *Federal Register* the Proposed Rulemaking To Establish Light-Duty Vehicle Greenhouse Gas Emission Standards and Corporate Average Fuel Economy Standards. The proposed rule calls for a strong and coordinated federal GHG and fuel economy program for passenger cars, light-duty trucks, and medium-duty passenger vehicles (hereinafter light-duty vehicles), referred to in this rulemaking as the National Program. The proposed rules would achieve substantial improvements in fuel economy and reductions of GHG emissions from light-duty vehicles, based on technology that is already being commercially applied in most cases and that can be incorporated at a reasonable cost. These joint proposed rules address the closely intertwined challenges of energy independence, energy security, and global warming.

The proposed National Program makes it possible for the standards of two different federal agencies to act in a unified fashion, providing nationwide environmental and energy benefits, cost savings, and administrative efficiencies.[10] Establishing a harmonized approach to regulating light-duty vehicle GHG emissions and fuel economy is critically important, given the interdependent goals of addressing climate change and ensuring energy independence and security.

NEPA directs that "to the fullest extent possible," 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).[11] To inform its development of the new MYs 2012–2016 CAFE standards, NHTSA prepared this EIS to analyze and disclose the potential environmental impacts of a proposed Preferred Alternative and other proposed alternative standards, including the No Action Alternative.

Section 1501.6 of CEQ regulations emphasizes agency cooperation early in the NEPA process and allows a lead agency (in this case, NHTSA) to request the assistance of other agencies that either have jurisdiction by law or have special expertise regarding issues considered in an EIS.[12] NHTSA invited EPA to become a cooperating agency, pursuant to CEQ regulations, because of its special expertise in the areas of climate change and air quality. On May 12, 2009, EPA agreed to become a cooperating agency. The EPA environmental analysis of its proposed rulemaking is summarized and referenced in the appropriate sections of this EIS.

Purpose and Need for the Proposed Action

For purposes of this EIS, the Proposed Action is NHTSA's action to set passenger car and light truck CAFE standards for MYs 2012–2016 in accordance with EPCA, as amended by EISA. NEPA requires that alternatives to a proposed action be developed based on the action's purpose and need.

EPCA and EISA set forth extensive requirements for the rulemaking, and those requirements form the purpose of and need for the standards. The requirements also were the basis for establishing the range of alternatives considered in this EIS. Specifically, the statute requires the Secretary of Transportation to establish average fuel economy standards for each model year at least 18 months before the beginning of that model year and to set them at "the maximum feasible average fuel economy level that the Secretary decides the manufacturers can achieve in that model year."[13]

When setting maximum feasible fuel economy standards, the Secretary is required to "consider 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."[14] NHTSA interprets the statutory factors as including environmental issues and permitting the consideration of other relevant societal issues, such as safety.[15]

EPCA and EISA further direct the Secretary of Transportation, after consultation with the Secretary of Energy and the Administrator of EPA, to establish separate average fuel economy standards for passenger cars and for light trucks manufactured in each model year beginning with MY 2011 "to achieve a combined fuel economy average for MY 2020 of at least 35 miles per gallon for the total fleet of passenger and non-passenger automobiles manufactured for sale in the United States for that model year."[16] In so doing, the Secretary of Transportation is to adopt "annual fuel economy standard increases," but in any single rulemaking, standards may be established for not more than five model years.[17] NHTSA also is acting pursuant to President Obama's memorandum to DOT on January 26, 2009, as described in Section 1.1 of this EIS.

The purpose of this EIS is to identify proposed CAFE standards and regulatory alternatives, and to analyze and disclose the potential environmental impacts of the proposed standards and alternatives for consideration by NHTSA decisionmakers.

Alternatives

NEPA requires an agency to compare the potential environmental impacts of its proposed action and a reasonable range of alternatives. The EPCA fuel economy requirements, including the four statutory factors NHTSA must consider in determining maximum feasible CAFE levels—technological feasibility, economic practicability, the need of the United States to conserve energy, and the effect of other motor vehicle standards of the Government on fuel economy—form the purpose of and need for the MYs 2012–2016 CAFE standards and, therefore, inform the range of alternatives for consideration in this NEPA analysis. The NHTSA decision process balances the four statutory EPCA factors, along with considerations such as environmental impacts and safety. In developing a reasonable range of alternatives, NHTSA identified alternative stringencies that represent the spectrum of potential actions the agency could take. The environmental impacts of these alternatives, in turn, represent the spectrum of potential environmental impacts that could result from NHTSA's action of setting CAFE standards. This EIS analyzes the impacts of eight "action" alternatives as well as the impacts if the CAFE standards imposed no new requirements (the No Action Alternative).

The specific alternatives NHTSA examined, described below and shown in Table S-1 and Table 2.3-1, encompass a reasonable range of alternative actions (*i.e.*, CAFE standards) for which to evaluate the potential environmental impacts under NEPA, in view of EPCA requirements. At one end of this range is the No Action Alternative (Alternative 1), which assumes no action would occur under the National Program.[18] The No Action Alternative assumes that average fuel economy levels in the absence of CAFE standards beyond MY 2011 would equal the higher of the agency's collective market forecast or the manufacturers' required level of average fuel economy for MY 2011. NHTSA also considers eight action alternatives, including NHTSA's Preferred Alternative (Alternative 4), which requires approximately a 4.3-percent average annual increase in mpg from 2012 to 2016. This alternative and the EPA proposed rulemaking together comprise the National Program described in the NPRM.

Alternatives 2, 3, 4, 5, 7, and 8 require average annual increases in mpg ranging from 3 percent (Alternative 2) to 7 percent (Alternative 8) from year to year. [19]

NHTSA added three alternatives to the list first proposed in the NOI: the agency's Preferred Alternative (Alternative 4), an alternative that maximizes net benefits (MNB) (Alternative 6), and an alternative under which the total costs equal the total benefits (TCTB) (Alternative 9). The agency's Preferred Alternative represents the required fuel economy level that NHTSA has tentatively determined to be the maximum feasible level under EPCA, based on balancing the four statutory factors and other relevant considerations. For a detailed explanation of the alternatives, *see* Section 2.3 of this EIS.

The other two alternatives, the MNB and TCTB, represent fuel economy levels that depend on the agency's best estimate of relevant economic variables (*e.g.*, gasoline prices, social cost of carbon, discount rate, and rebound effect). For further discussion of the economic assumptions, *see* Section 2.2.4 of this EIS. The MNB Alternative and TCTB Alternative provide the decisionmaker and the public with useful information about where the standards would be set if costs and benefits were balanced in two different ways.

The 6-Percent Alternative results in a required CAFE level in 2016 that is equal to the required CAFE level under the MNB Alternative, but the required CAFE levels in 2012 through 2015 under the 6-Percent Alternative are actually slightly lower than under the MNB Alternative. In general, the net result is that there is very little substantive difference in the required CAFE level under the 6-Percent and MNB Alternatives. The TCTB Alternative results in a required CAFE level in 2016 that is slightly lower than the required CAFE level under the 7-Percent Alternative, but the required CAFE levels in 2012 through 2015 under the TCTB Alternative are slightly higher than under the 7-Percent Alternative. In general, the net result is that there is very little substantive difference in the required CAFE level under the 7-Percent and TCTB Alternatives.

As discussed in Sections 1.2.2.2 and 2.2 of this EIS, the CAFE levels required under an attribute-based standard depend on the mix of vehicles produced for sale in the United States.[20] The average fuel economy levels actually achieved by passenger cars and light trucks in a given model year may differ from the required CAFE levels for that model year. This occurs because some manufacturers' average fuel economy levels for their vehicles are projected to exceed the applicable CAFE standards during certain model years,[21] while other manufacturers' fuel economy levels are projected to fall short of either the passenger car or light truck CAFE standards during some model years.[22] Table S-1 shows the MY 2016 required fuel economy levels for each alternative. Table 2.3-1 of this EIS shows the required fuel economy levels for each alternative in each model year, from MY 2012 to MY 2016. For additional detail and discussion of how NHTSA considers the EPCA statutory factors and other considerations that guide the agency's determination of "maximum feasible" standards and inform an evaluation of the alternatives, *see* Section IV.F of the NPRM. For detailed calculations and discussions of manufacturer cost impacts and estimated benefits for each of the alternatives, *see* Sections VII and VIII of the NHTSA Preliminary Regulatory Impact Analysis.

Table S-1 also shows the MY 2016 estimated[23] *achieved* fuel economy levels for each alternative. Table 2.3-2 of this EIS shows the estimated achieved fuel economy levels for each alternative in each model year, from MY 2012 to MY 2016. Comparing the MY 2016 achieved levels with the MY 2016 required levels in Table S-1 shows that estimated achieved mpg in 2016 would actually exceed the average required CAFE level under the No Action Alternative, indicating that some manufacturers would increase average mpg levels under the No Action Alternative.

Table S-1: Required and Achieved MPG by Alternative

	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5	Alt. 6	Alt. 7	Alt. 8	Alt. 9
	No Action*	3%/year Increase	4%/year Increase	~4.3%/year Increase Preferred	5%/year Increase	~6.0%/year Increase MNB	6%/year Increase	7%/year Increase	~6.6%/year Increase TCTB
2016 – Required MPG									
Passenger Cars	30.5	35.5	37.2	37.8	39.1	40.9	40.9	42.9	42.3
Light Trucks	24.4	26.9	28.2	28.7	29.6	31.0	31.0	32.6	31.8
Combined	28.1	32.0	33.6	34.1	35.2	36.9	36.9	38.7	38.0
2016 – Achieved MPG									
Passenger Cars	32.4	35.7	37.3	37.7	38.8	40.2	40.3	41.3	41.0
Light Trucks	24.7	26.8	28.0	28.4	29.3	30.5	30.5	31.4	31.1
Combined	29.3	32.1	33.5	33.9	34.9	36.3	36.3	37.2	37.0

*The No Action Alternative assumes that average fuel economy levels in the absence of CAFE standards beyond MY 2011 would equal the higher of the agency's vehicle market forecast or the manufacturers' required level of average fuel economy for MY 2011. The numbers listed under Required MPG are representative of this scenario, but would not be implemented as CAFE standards under this alternative.

Under most of the action alternatives, the estimated achieved mpg levels in 2016 would be somewhat lower than the required mpg levels because some manufacturers are not expected to comply fully with passenger car or light truck standards.

Potential Environmental Consequences

This section describes how the proposed action and alternatives could affect energy use, air quality, and climate, which are the resources for which NHTSA performed a quantitative assessment. This EIS describes potential additional impacts on water resources, vegetation, wildlife, land use and development, safety, hazardous materials and regulated wastes, noise, and environmental justice. NHTSA assesses those resource areas qualitatively.[24]

The effects on energy use, air quality, and climate described in this section include *direct*, *indirect*, and *cumulative* effects. Direct effects occur at about the same time and place as the action. Indirect effects occur later in time or are farther removed in distance. Cumulative effects are the incremental impacts resulting from the action added to those of other past, present, and reasonably foreseeable future actions.

When comparing direct and indirect effects with cumulative effects, it is important to understand that the methodology for evaluating direct effects compares the alternatives against a base case in which no further increases in average new passenger car or light truck mpg occur after 2016, whereas the evaluation of cumulative effects assumes that all the alternatives reach the EISA-mandated minimum level of 35 mpg by the year 2020 and ongoing gains in average new passenger car and light truck mpg through 2030.

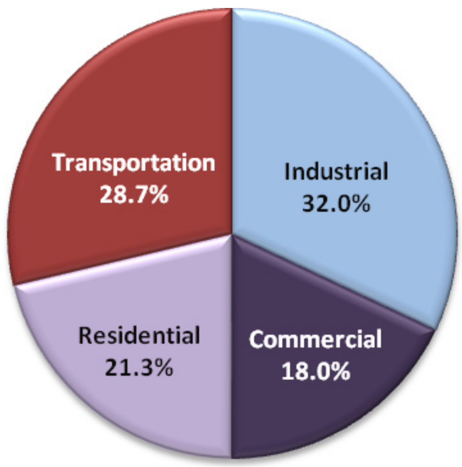
Energy Use

Energy intensity in the United States (energy use per dollar of gross domestic product) has declined steadily at about 2 percent per year since 1973. Despite this continuing improvement in economy-wide energy efficiency, transportation fuel consumption has grown steadily through annual increases, and now represents the major use of petroleum in the U.S. economy.

The transportation sector is the second largest consumer of energy in the United States (after the industrial sector), and as shown in Figure S-1, represents 28.7 percent of U.S. total energy use.[25] This pattern of the industrial and transportation sectors being the first and second largest sectors by energy use, respectively, is also found globally, though at a slightly lower level, with transportation constituting 17.3 percent of non-U.S. world energy use. According to estimates from the U.S. Department of Energy (DOE) Energy Information Administration (EIA), this pattern will continue in the future with U.S. transportation use stabilizing as a percentage of total energy use and non-U.S. consumption increasing as a percentage of total energy use.[26]

Passenger cars and light trucks account for more than half of U.S. energy consumption in this sector, with the remaining consumption spread among heavy trucks, aviation, public transportation, and rail and marine transportation.

Figure S-1. U.S. Energy Consumption by Sector, 2007



Source: http://www.eia.doe.gov/emeu/aer/txt/ptb0201a.html.

As shown in Figure S-2, about 69 percent of the petroleum used in the United States is consumed by the transportation sector. While most U.S. gasoline and diesel is produced domestically, increasing volumes of crude oil are imported for processing in U.S. refineries as domestic crude oil production is steadily declining. Crude oil imports surpassed 10 million barrels per day in 2007, with a high proportion coming from volatile and unstable regions.[27] Despite efforts to increase the use of non-fossil fuels in transportation, fuel use remains largely petroleum based. Biofuels comprise slightly more than 2 percent of fuel use in the U.S. transportation sector and this component is expected to rise to 10 percent by 2030.

To calculate fuel savings for each alternative, NHTSA subtracted fuel consumption under that alternative from the No Action Alternative level. Fuel consumption estimates for 2012 to 2016 are based on the annual mpg increases specified by each alternative.

For 2017 to 2060, the estimates for the direct and indirect effects analysis assume all new vehicles meet the MY 2016 CAFE standards for each action alternative. NHTSA's cumulative effects analysis forces alternatives that are not at least 35 mpg in 2016 to continue to increase so that those alternatives meet the EISA-mandated minimum of 35 mpg by 2020. Once the EISA target is met, the estimates assume the same percent increases in new vehicle mpg for all alternatives through the year 2030. These percent increases are based on average annual mpg projections by the EIA's Annual Energy Outlook (AEO). The AEO forecasts are regarded as the official U.S. government energy projections by both the public and the private sector. The projected mpg increases result from consumer demand and technology advances associated with ongoing projected increases in fuel prices.[28] *See* Sections 3.1.4, 3.2.2, 4.1.3, and 4.2.2 of this EIS for further details about the methodology used for NHTSA's fuel savings calculations.

Key Findings for Energy Use

The fuel consumption figures below are shown for 2060, the year when nearly the entire U.S. fleet is likely to be composed of MY 2016 and later vehicles.

Direct and Indirect Effects

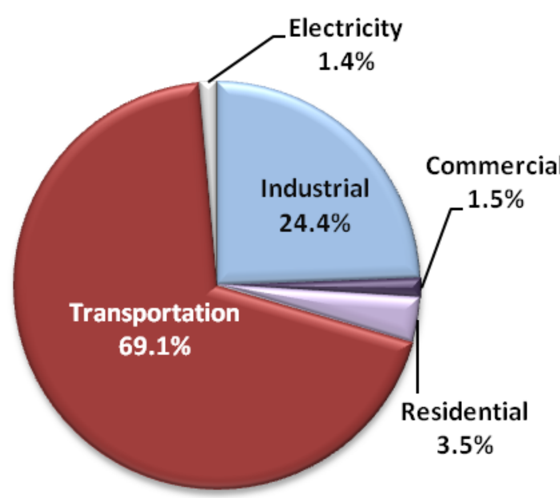
Combined Passenger Cars and Light Trucks

- Total annual fuel savings in 2060 range from **25.5 billion gallons** for Alternative 2 (3-Percent Alternative) **to 59.6 billion gallons** for Alternative 8 (7-Percent Alternative), compared with fuel consumption under the No Action Alternative (Alternative 1).

Passenger Cars

- Annual fuel savings in 2060 range from **17.2 billion gallons** (Alternative 2) **to 39.0 billion gallons** (Alternative 8), compared with fuel consumption under the No Action Alternative.
- Fuel consumption under the No Action Alternative (Alternative 1) is 205.5 billion gallons in 2060. Consumption under the other alternatives ranges from 188.4 billion gallons for Alternative 2 (3-Percent Alternative) to 166.5 billion gallons for Alternative 8 (7-Percent Alternative).

Figure S-2. U.S. Petroleum Consumption by Sector, 2007



Source: http://www.eia.doe.gov/emeu/aer/petro.html.

- Fuel consumption under the Preferred Alternative (Alternative 4) is 179.4 billion gallons in 2060, representing a savings of 26.2 billion gallons, compared with fuel consumption under the No Action Alternative.

Light Trucks

- Annual fuel savings in 2060 range from **8.3 billion gallons** (Alternative 2) **to 20.6 billion gallons** (Alternative 8), compared with fuel consumption under the No Action Alternative.
- Fuel consumption under the No Action Alternative is 113.0 billion gallons in 2060. Fuel consumption under the other alternatives ranges from 104.6 billion gallons for Alternative 2 (3-Percent Alternative) to 92.4 billion gallons for Alternative 8 (7-Percent Alternative).
- Fuel consumption under the Preferred Alternative is 99.4 billion gallons in 2060, representing a savings of 13.5 billion gallons, compared with fuel consumption under the No Action Alternative.

Cumulative Effects

Combined Passenger Cars and Light Trucks

- Total annual fuel savings in 2060 range from **37.5 billion gallons** for Alternative 2 (3-Percent Alternative) to **56.0 billion gallons** for Alternative 8 (7-Percent Alternative), compared with fuel consumption under the No Action Alternative.

Passenger Cars

- Annual fuel savings in 2060 range from **26.0 to 36.9 billion gallons.**
- Fuel consumption under the No Action Alternative is 193.2 billion gallons in 2060. Under the other alternatives, it ranges from 167.3 billion gallons for Alternative 2 (3-Percent Alternative) to 156.3 billion gallons for Alternative 8 (7-Percent Alternative).
- Fuel consumption under the Preferred Alternative is 167.2 billion gallons in 2060, representing a savings of 26.0 billion gallons compared with fuel consumption under the No Action Alternative.

Light Trucks

- Annual fuel savings in 2060 range from **11.5 billion gallons** (Alternative 2) **to 19.1 billion gallons** (Alternative 8).
- Fuel consumption under the No Action Alternative is 103.8 billion gallons in 2060. Under the other alternatives it ranges from 92.2 billion gallons for Alternative 2 (3-Percent Alternative) to 84.6 billion gallons for Alternative 8 (7-Percent Alternative).
- Fuel consumption under the Preferred Alternative is 91.2 billion gallons in 2060, representing a savings of 12.6 billion gallons.

Figure S-3 illustrates each of the alternatives' *direct and indirect effects* on annual fuel savings for passenger cars and light trucks in 2020, 2040, and 2060. For readers interested in additional details about the alternatives' *direct and indirect* effects on annual fuel consumption, *see* Tables 3.2.3-1 and 3.2.3-2 in this EIS and the accompanying discussion. Figure S-4 illustrates each of the alternatives' *cumulative* effects on annual fuel savings for passenger cars and light trucks in 2020, 2040, and 2060. For readers interested in additional details about the alternatives' *cumulative* effects on annual fuel consumption, *see* Tables 4.2.3-1 and 4.2.3-2 in this EIS and the accompanying discussion.

Air Quality

Air pollution and air quality can affect public health, public welfare, and the environment. The alternative MYs 2012–2016 CAFE standards under consideration would affect air pollutant emissions and air quality. This EIS air quality analysis assesses the impacts of the action alternatives in relation to emissions of pollutants of concern from mobile sources and the resulting health effects and monetized health benefits.

Under the authority of the Clean Air Act and its amendments, EPA has established National Ambient Air Quality Standards (NAAQS) for six relatively common air pollutants—known as "criteria" pollutants because EPA regulates them by developing human-health-based and/or environmentally based criteria for setting permissible levels. The criteria pollutants are carbon monoxide, nitrogen dioxide (NO_2), ozone, sulfur dioxide (SO_2), particulate matter (PM_{10} and $PM_{2.5}$), and lead. Ozone is not emitted directly from vehicles, but is formed from emissions of the ozone precursor pollutants nitrogen oxides (NO_x) and volatile organic compounds (VOCs).

In addition to criteria pollutants, motor vehicles emit some substances defined as hazardous air pollutants by the 1990 Clean Air Act Amendments. Hazardous air pollutants include certain VOCs, compounds in PM, pesticides, herbicides, and radionuclides that present tangible hazards, based on scientific studies of human (and other mammal) exposure.

Figure S-3. Annual Fuel Savings of Passenger Cars and Light Trucks by Alternative, Direct and Indirect Impacts

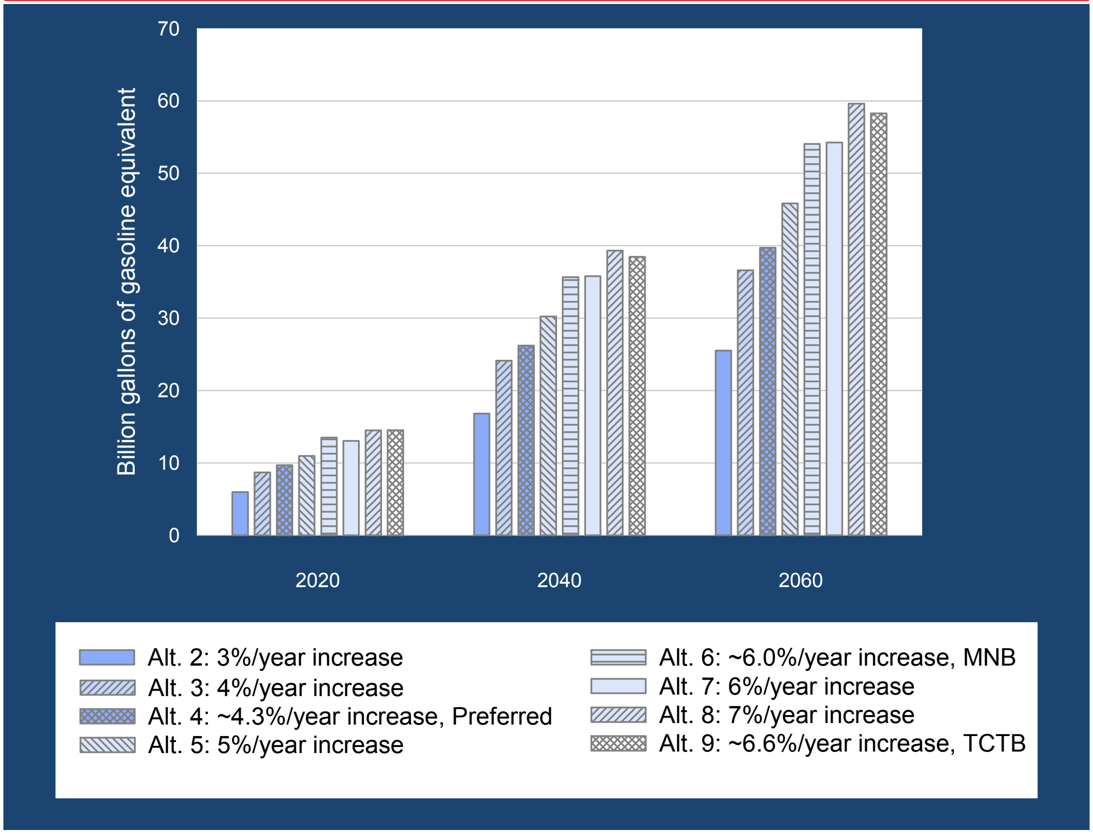
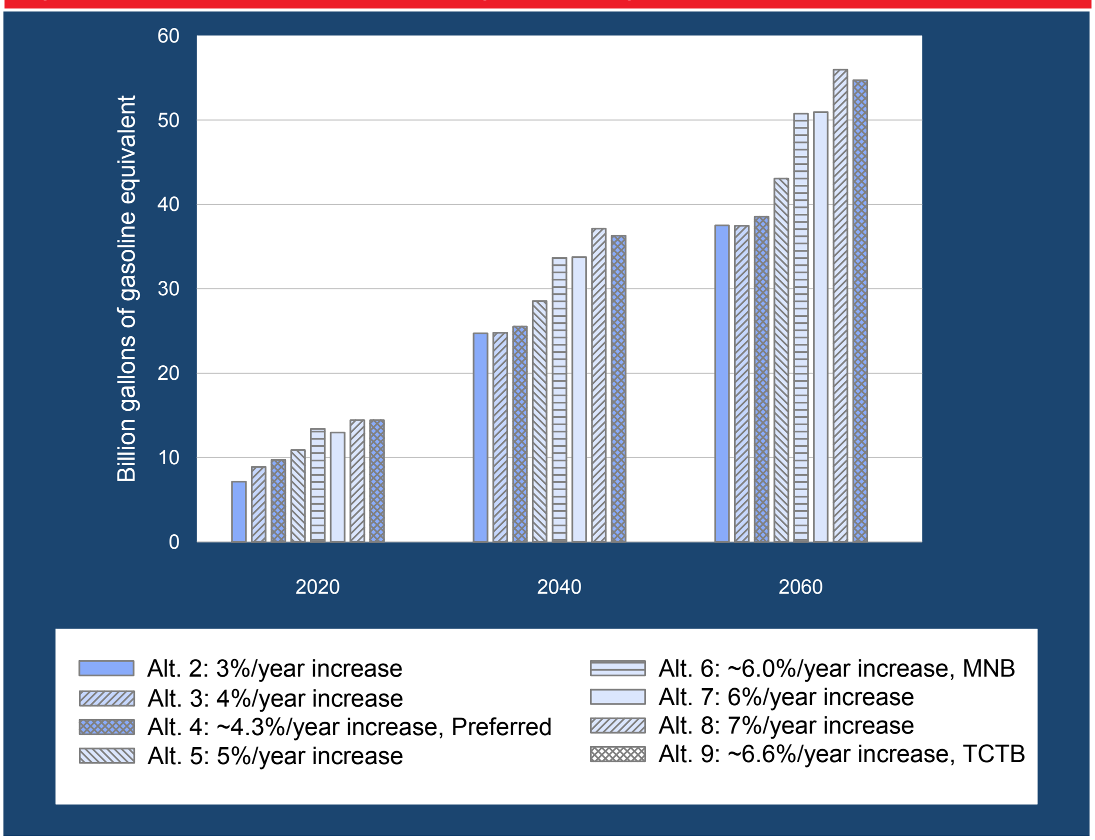


Figure S-4. Annual Fuel Consumption of Passenger Cars and Light Trucks by Alternative, Cumulative Impacts



Hazardous 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. EPA and the Federal Highway Administration (FHWA) have identified these air toxics as the MSATs that typically are of greatest concern for impacts of highway vehicles. DPM is a component of exhaust from diesel-fueled vehicles and falls almost entirely within the $PM_{2.5}$ particle-size class.

Health Effects of the Pollutants

The criteria pollutants assessed in this EIS have been shown to cause a range of health effects at various concentrations and exposures, including:

- Damage to lung tissue (*e.g.*, ozone, particulate matter);
- Reduced lung function (*e.g.*, ozone, nitrogen dioxide, sulfur dioxide, particulate matter);
- Exacerbation of existing respiratory and cardiovascular diseases (*e.g.*, ozone, nitrogen dioxide, particulate matter, sulfur dioxide);
- Difficulty breathing (*e.g.*, ozone, nitrogen dioxide, particulate matter, sulfur dioxide);
- Irritation of the upper respiratory tract (*e.g.*, ozone, nitrogen dioxide, sulfur dioxide);
- Bronchitis and pneumonia (*e.g.*, nitrogen dioxide);
- Reduced resistance to respiratory infections (*e.g.*, nitrogen dioxide);
- Alterations to the body's defense systems against foreign materials (*e.g.*, particulate matter);
- Reduced delivery of oxygen to the body's organs and tissues (*e.g.*, carbon monoxide);
- Impairment of the brain's ability to function properly (*e.g.*, carbon monoxide); and
- Cancer (*e.g.*, particulate matter) and premature death (*e.g.*, ozone, sulfur dioxide).

MSATs are also associated with health effects. For example, acetaldehyde, benzene, 1-3 butadiene, formaldehyde, and certain components of DPM are all classified by EPA as either known or probable human carcinogens. In addition, many MSATs are also associated with noncancer health effects, such as respiratory irritation.

Contribution of the 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 (passenger cars and light trucks) have declined dramatically since 1970 as a result of pollution controls on vehicles and regulation of the chemical content of fuels.

Passenger cars and light trucks remain responsible for about 50 percent of total U.S. emissions of carbon monoxide, 4 percent of $PM_{2.5}$ emissions, and 1 percent of PM_{10} emissions. They also contribute about 21 percent of total nationwide emissions of volatile organic compounds and 32 percent of NO_x, both of which are chemical precursors of ozone. In addition, NO_x is a $PM_{2.5}$ precursor and VOCs can be $PM_{2.5}$ precursors. Passenger cars and light trucks contribute only 1 percent of SO_2, but SO_2 and other oxides of sulfur (SO_x) are important because they contribute to the formation of $PM_{2.5}$ in the atmosphere. With the elimination of lead in gasoline, lead is no longer emitted from motor vehicles in more than negligible quantities, and thus is not assessed in this analysis.

Key Findings for Air Quality

The findings for direct and indirect effects are shown for the year 2030 when most of the fleet in operation would meet at least the MYs 2012–2016 standards. Findings for cumulative effects are shown for the year 2050 when most of the fleet would achieve the average fuel economy levels the agency projects in 2030 based on AEO fuel economy forecasts. The No Action Alternative results in the highest emissions of most criteria pollutants. For hazardous air pollutants (MSATs), some of the alternatives result in slightly higher emissions of some hazardous air pollutants, when compared with emission levels under the No Action Alternative.

With a few exceptions, cumulative emissions reductions are higher than noncumulative emissions reductions for the same combination of pollutant, year, and alternative, due to differences in vehicle miles traveled and fuel consumption under the cumulative case compared with the noncumulative case.

Monetized $PM_{2.5}$-related health benefits, and related incidence of reduced health effects from the emissions reductions, were estimated by multiplying direct $PM_{2.5}$ and $PM_{2.5}$ precursor emission reductions (NO_x, SO_x, and VOCs) by the pollutant-specific benefit-per-ton estimates supplied by EPA. Health outcomes include premature mortality, chronic bronchitis, respiratory emergency room visits, and work-loss days. The economic benefits associated with reductions in health outcomes reflect a valuation of human health, as determined by EPA.

EPA used the Value of Statistical Life (VSL) metric to calculate the economic benefits associated with reducing the risk of premature mortality. An estimated VSL of $6.3 million (in year 2000 dollars), as established by EPA in 2009, was used for this study. For other health-related effects, EPA used Willingness-to-Pay estimates derived from the valuation literature, estimated health care expenses, and lost wages in the valuation of economic benefits.

Direct and Indirect Effects

Criteria Pollutants

- Emissions of $PM_{2.5}$, SO_x, NO_x, and VOCs in 2030 are highest in the No Action Alternative, and **generally decline as fuel economy standards increase** across the alternatives.

- Emissions of carbon monoxide are slightly higher under Alternatives 2 through 4 than under the No Action Alternative, but generally decline as fuel economy standards increase under Alternatives 5 through 9.

- Emissions of carbon monoxide, NO_x, and VOCs in 2030 are lowest under Alternative 8, emissions of SO_x are lowest under Alternative 9, and emissions of $PM_{2.5}$ are lowest under Alternative 4.

Hazardous Air Pollutants

- The changes in toxic air pollutant emissions, whether positive or negative, are **generally small in relation to emission levels under the No Action Alternative.**

- Emissions of acetaldehyde in 2030 increase with each successive alternative from the No Action Alternative to Alternative 4, decline from Alternative 5 to Alternative 8, and then increase slightly with Alternative 9. Acetaldehyde emissions in 2030 are highest under Alternative 4 and lowest under Alternative 8.

- Emissions of acrolein and formaldehyde in 2030 generally increase under each successive alternative from the No Action Alternative to Alternative 9, except for a slight decrease in formaldehyde emissions from the No Action Alternative to Alternative 2.

- Emissions of benzene and diesel particulate matter in 2030 generally decrease under each successive alternative from the No Action Alternative to Alternative 9. Emissions are highest under the No Action Alternative and lowest under Alternative 8.

- Emissions of 1,3-butadiene increase under each successive alternative from the No Action Alternative to Alternative 3 and then generally decrease from Alternative 4 to Alternative 9. Emissions of 1,3-butadiene are lowest under Alternative 8.

Health and Health Benefits

- Alternatives 2 through 9 would **reduce adverse health effects nationwide** compared with the No Action Alternative. Reductions become larger as fuel economy standards increase.

- The monetized benefits also follow the same patterns as reductions in adverse health effects. When estimating quantified and monetized health impacts, EPA relies on results from two $PM_{2.5}$-related premature mortality studies it considers co-equal (Pope *et al.*, 2002 and Laden *et al.*, 2006). EPA recommends that monetized benefits be shown using incidence estimates derived from each of these studies and valued using both a 3-percent and 7-percent discount rate to account for an assumed lag in the occurrence of mortality after exposure (EPA assumes a 20-year distributed "cessation lag"), for a total of four analyses. *See* Sections 3.3.2.4.2, 3.3.3.3.3 of this EIS. Estimated **benefits** in annual health costs **range from $1.2 billion for Alternative 2** (lowest of the four analyses) **to $5.6 billion for Alternative 9** (highest of the four analyses).

Cumulative Effects

Criteria Pollutants

- As with the direct effects, cumulative emissions of $PM_{2.5}$, SO_x, NO_x, and VOCs in 2050 are highest under the No Action Alternative and generally decline (with some exceptions) as fuel economy standards increase across alternatives. **In every case, emissions of these pollutants remain below those of the No Action Alternative.**

- Cumulative emissions of carbon monoxide in 2050 under Alternatives 2 through 4 are slightly higher than those of the No Action Alternative, and are lower than the No Action Alternative under Alternatives 5 through 9.

- Cumulative emissions of carbon monoxide, NO_x, and VOC in 2050 are lowest under Alternative 8, emissions of SO_x are lowest under Alternative 9, and emissions of $PM_{2.5}$ are lowest under Alternative 4.

Hazardous Air Pollutants

- The changes in toxic air pollutant emissions, whether positive or negative, are **generally small in relation to emission levels under the No Action Alternative.**
- Annual cumulative emissions of acetaldehyde in 2050 increase with each successive alternative from the No Action Alternative to Alternative 3 and then decline, though not consistently, from Alternative 4 to Alternative 9. Acetaldehyde emissions in 2050 are highest under Alternative 4 and lowest under Alternative 8.
- Annual cumulative emissions of acrolein and formaldehyde in 2050 generally increase under each successive alternative from the No Action Alternative to Alternative 6, and then decline, though not consistently, from Alternative 6 to Alternative 9. Acrolein emissions are highest under Alternative 8 and lowest under the No Action Alternative. Formaldehyde emissions are highest under Alternative 8 and lowest under Alternative 2.
- Annual cumulative emissions of benzene and diesel particulate matter in 2050 decrease, though not consistently, across the alternatives, and are lowest under Alternative 8.
- Annual cumulative emissions of 1,3-butadiene in 2050 increase from the No Action Alternative to Alternative 2 and then decrease, though not consistently, under each successive alternative from Alternative 3 to Alternative 9.

Health and Health Benefits

- As with the direct effects, Alternatives 2 through 9 would reduce adverse health effects nationwide compared with the No Action Alternative.
- Estimated monetized health benefits range from **$3.36 billion for Alternative 2 to $10.32 billion for Alternative 9** (lowest and highest of the four monetized health benefit analyses as explained above).

For readers interested in additional detail, Tables 3.3.3-1, 3.3.3-3, 3.3.3-4, 3.3.3-6, and 3.3.3-9 of this EIS provide data on direct effect criteria pollutant and hazardous air pollutant emissions, as well as monetized health benefits for the alternatives. Tables 4.3.3-1 through 4.3.3-4 of this EIS provide cumulative effects data on criteria pollutant and hazardous air pollutant emissions. Table 4.3.3-9 of this EIS provides cumulative effects data on monetized health benefits from the alternatives.

Climate

The Earth's natural greenhouse effect makes the planet habitable for life as we know it. *See* Figure S-5. Carbon dioxide (CO_2) and other GHGs trap heat in the troposphere (the layer of the atmosphere that extends from Earth's surface up to about 8 miles above the surface), absorb heat energy emitted by Earth's surface and lower atmosphere, and reradiate much of it back to the surface. Without GHGs in the atmosphere, most of this heat energy would escape back to space.

The amount of CO_2 and other natural GHGs in the atmosphere, such as methane (CH_4), nitrous oxide (N_2O), water vapor, and ozone, has fluctuated over time, but natural emissions of GHGs are largely balanced by natural sinks, such as vegetation (which, when buried and compressed in the Earth over long periods of time, becomes fossil fuel) and the oceans, which remove the gases from the atmosphere.

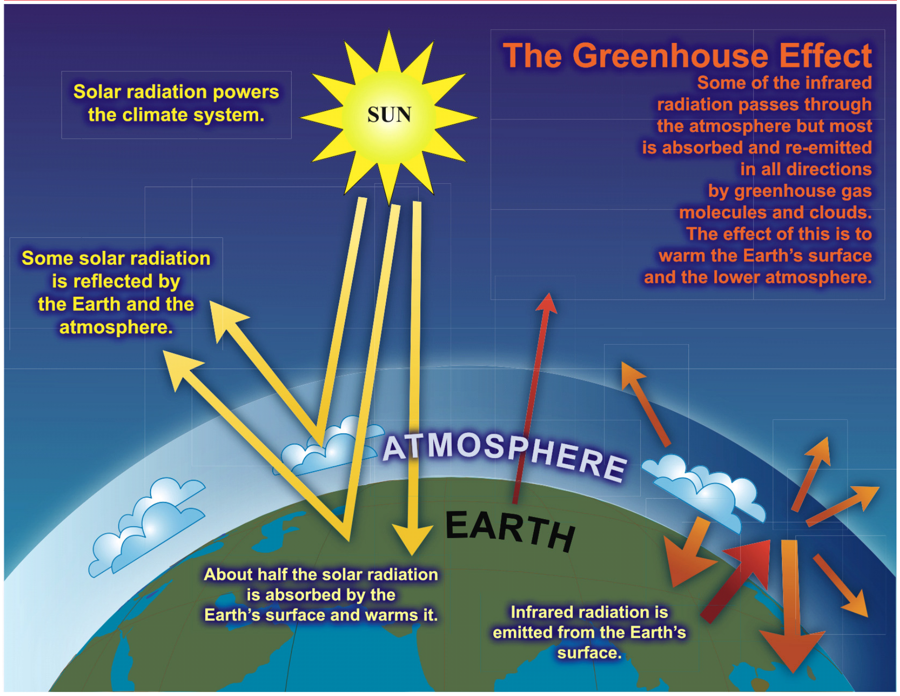
Since the industrial revolution, when fossil fuels began to be burned in increasing quantities, concentrations of GHGs in the atmosphere have increased. CO_2 has increased by more than 38 percent since pre-industrial times, while methane's concentration is now 149 percent above pre-industrial levels.[29]

This buildup of GHGs in the atmosphere is upsetting Earth's energy balance and causing the planet to warm, which in turn affects sea levels, precipitation patterns, cloud cover, ocean temperatures and currents, and other climatic conditions. Scientists refer to this phenomenon as "global climate change."

During the past century, Earth's surface temperature has risen by an average of about 1.3 degrees Fahrenheit (0.74 °Celsius), and sea levels have risen 6.7 inches (0.17 meter), with a maximum rate of about 0.08 inch (2 millimeters) per year over the past 50 years on the northeastern coast of the United States.[30]

Most scientists now agree that climate change is very likely due to GHG emissions from human activities.[31] Human activities, such as the combustion of fossil fuel, the production of agricultural commodities, and the harvesting of trees, can contribute to increased concentrations of these gases in the atmosphere.

Figure S-5. The Greenhouse Effect[32]



Throughout this EIS, NHTSA has relied extensively on findings of the United Nations Intergovernmental Panel on Climate Change (IPCC), the U.S. Climate Change Science Program (CCSP), and EPA. Our discussion relies heavily on the most recent, thoroughly peer reviewed, and credible assessments of global and U.S. climate change – the IPCC Fourth Assessment Report (*Climate Change* 2007), the EPA Endangerment and Cause or Contribute Findings for Greenhouse Gases under Section 202(a) of the Clean Air Act and the accompanying Technical Support Document (TSD), and CCSP and National Science and Technology Council reports that include *Scientific Assessment of the Effects of Global Change on the United States* and Synthesis and Assessment Products. [33] This EIS frequently cites these sources and the studies they review.

Impacts of Climate Change

Climate change is expected to have a wide range of impacts on temperature, sea level, precipitation patterns, severe weather events, and water resources, which in turn could affect human health and safety, infrastructure, food and water supplies, and natural ecosystems.

- Impacts to **freshwater resources** could include changes in precipitation patterns; decreasing aquifer recharge in some locations; changes in snowpack and timing of snowmelt; saltwater intrusion from sea-level changes; changes in weather patterns resulting in flooding or drought in certain regions; increased water temperature; and numerous other changes to freshwater systems that disrupt human use and natural aquatic habitats.
- Impacts to **terrestrial ecosystems** could include shifts in species range and migration patterns, potential extinctions of sensitive species unable to adapt to changing conditions, increases in the occurrence of forest fires and pest infestation, and changes in habitat productivity due to increased atmospheric concentrations of CO_2.
- Impacts to **coastal ecosystems** could include the loss of coastal areas due to submersion and erosion, additional impacts from severe weather and storm surges, and increased salinization of estuaries and freshwater aquifers.
- Impacts to **land use** could include flooding and severe-weather impacts to coastal, floodplain, and island settlements; extreme heat and cold waves; increases in drought in some locations; and weather- or sea-level-related disruptions of the service, agricultural, and transportation sectors.
- Impacts to **human health** could include increased mortality and morbidity due to excessive heat, increases in respiratory conditions due to poor air quality, increases in water and food-borne diseases, changes to the seasonal patterns of vector-borne diseases, and increases in malnutrition.

In addition to its role as a GHG in the atmosphere, CO_2 is transferred from the atmosphere to water, plants, and soil. In water, CO_2 combines with water molecules to form carbonic acid. When CO_2 dissolves in seawater, a series of well-known chemical reactions begins that increases the concentration of hydrogen ions and make seawater more acidic, which has adverse effects on corals and some other marine life.

Increased concentrations of CO_2 in the atmosphere can also stimulate plant growth to some degree, a phenomenon known as the CO_2 fertilization effect. The available evidence indicates that different plants respond in different ways to enhanced CO_2 concentrations.

Contribution of the U.S. Transportation Sector to Climate Change

Contributions to the build-up of GHG in the atmosphere vary greatly from country to country and depend heavily on the level of industrial and economic activity. Emissions from the United States account for about 17.2 percent of total global CO_2 emissions. As shown in Figure S-6, the U.S. transportation sector contributed 31.5 percent of total U.S. CO_2 emissions in 2007, with passenger cars and light trucks accounting for 60.6 percent of total U.S. CO_2 emissions from transportation.[34] Thus, 19.1 percent of total U.S. CO_2 emissions come from passenger cars and light trucks. Viewed globally, passenger cars and light trucks in the United States account for roughly 3.3 percent of total global CO_2 emissions.

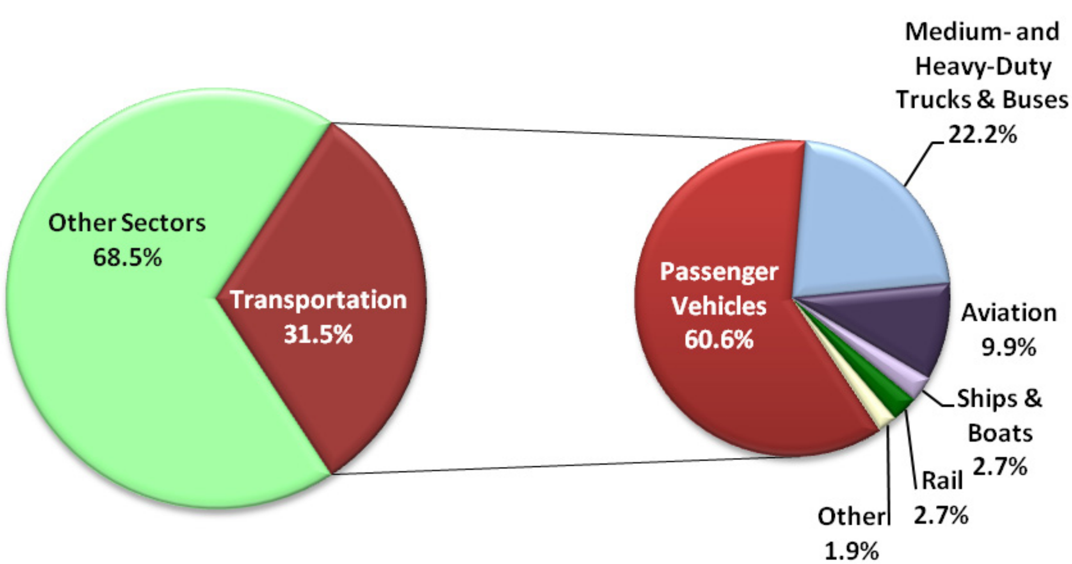
Key Findings for Climate

The proposed action and alternatives have the potential to substantially decrease the growth in GHG emissions, resulting in reductions in the anticipated increases in CO_2 concentrations, temperature, precipitation, and sea level that are otherwise projected to occur. They would also, to a small degree, reduce the impacts and risks of climate change.

Note that under all of the alternatives analyzed in this EIS, growth in the number of passenger cars and light trucks in use throughout the United States, combined with assumed increases in their average use (annual vehicle miles traveled per vehicle), is projected to result in growth in total passenger car and light truck travel. This growth in travel outpaces improvements in fuel economy for each of the action alternatives, resulting in projected increases in total fuel consumption by U.S. passenger cars and light trucks (*see* Figure S-7).

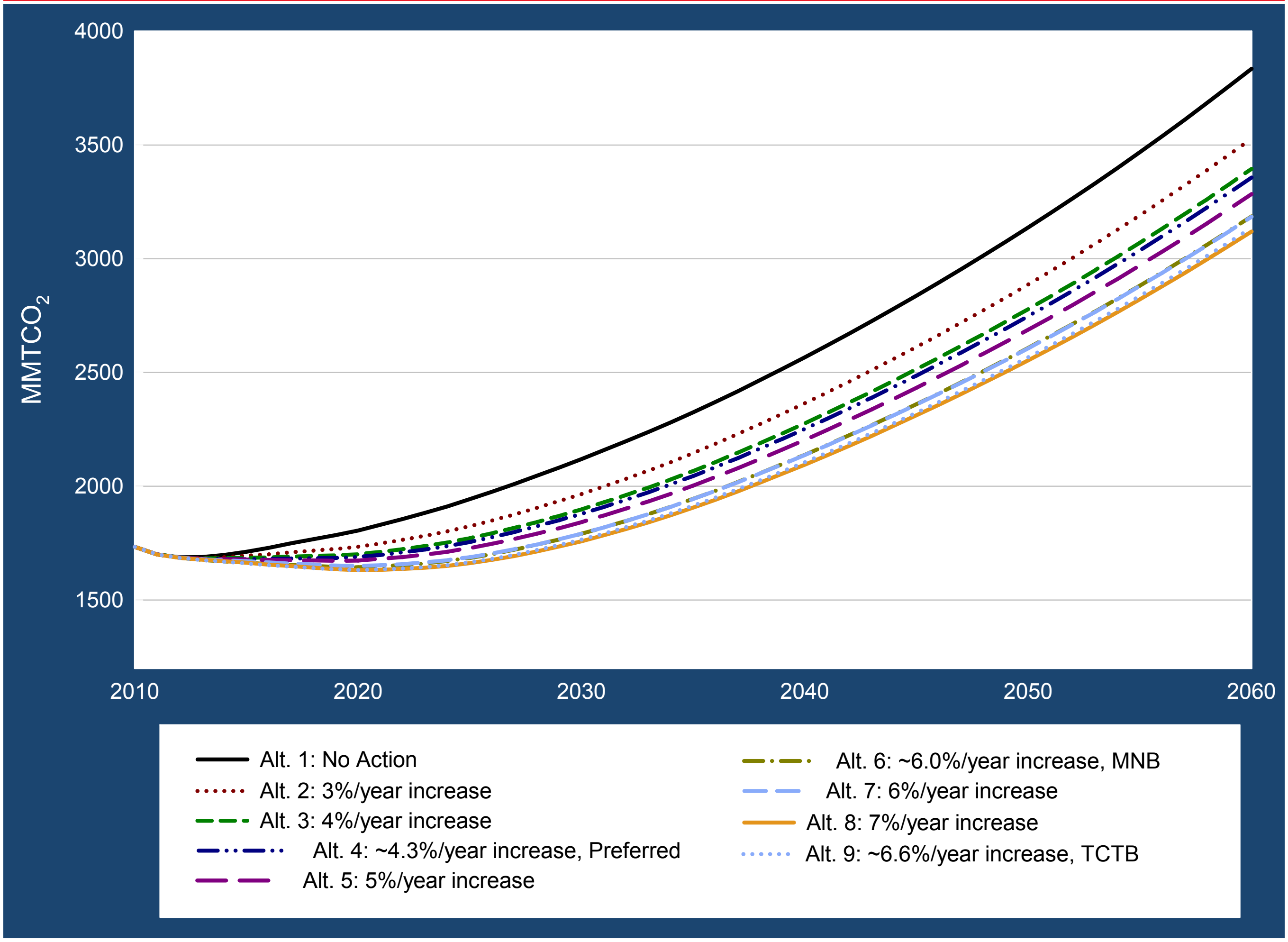
Because CO_2 emissions are a direct consequence of fuel consumption, the same result is projected for total CO_2 emissions from passenger cars and light trucks. NHTSA estimates that the proposed CAFE standards will reduce fuel consumption and CO_2 emissions from what they otherwise are estimated to be in the absence of the CAFE program (*i.e.*, fuel consumption and CO_2 emissions under the "no action" alternative).

Figure S-6. U.S. Transportation Sector's Contribution to U.S. Greenhouse Gas Emissions



Source: Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990–2007.

Figure S-7. Projected Annual Greenhouse Gas Emissions by Alternative, Direct and Indirect Impacts



The global emissions scenario used in the cumulative effects analysis (and described in Chapter 4 of this EIS) differs from the global emissions scenario used for the climate change modeling for direct and indirect effects. In the cumulative analysis, the Reference Case climate change scenario used in the modeling analysis reflects reasonably foreseeable actions in global climate change policy; the global emissions scenario used for the analysis of direct and indirect effects assumes that no significant global controls on GHG emissions are adopted. *See* Section 4.4.3.3 of this EIS for additional explanation of the cumulative effects methodology.

The figures for GHG emissions and reductions below are summed for the period 2012 through 2100 under each of the nine alternatives.

Direct and Indirect Effects

Greenhouse Gas Emissions

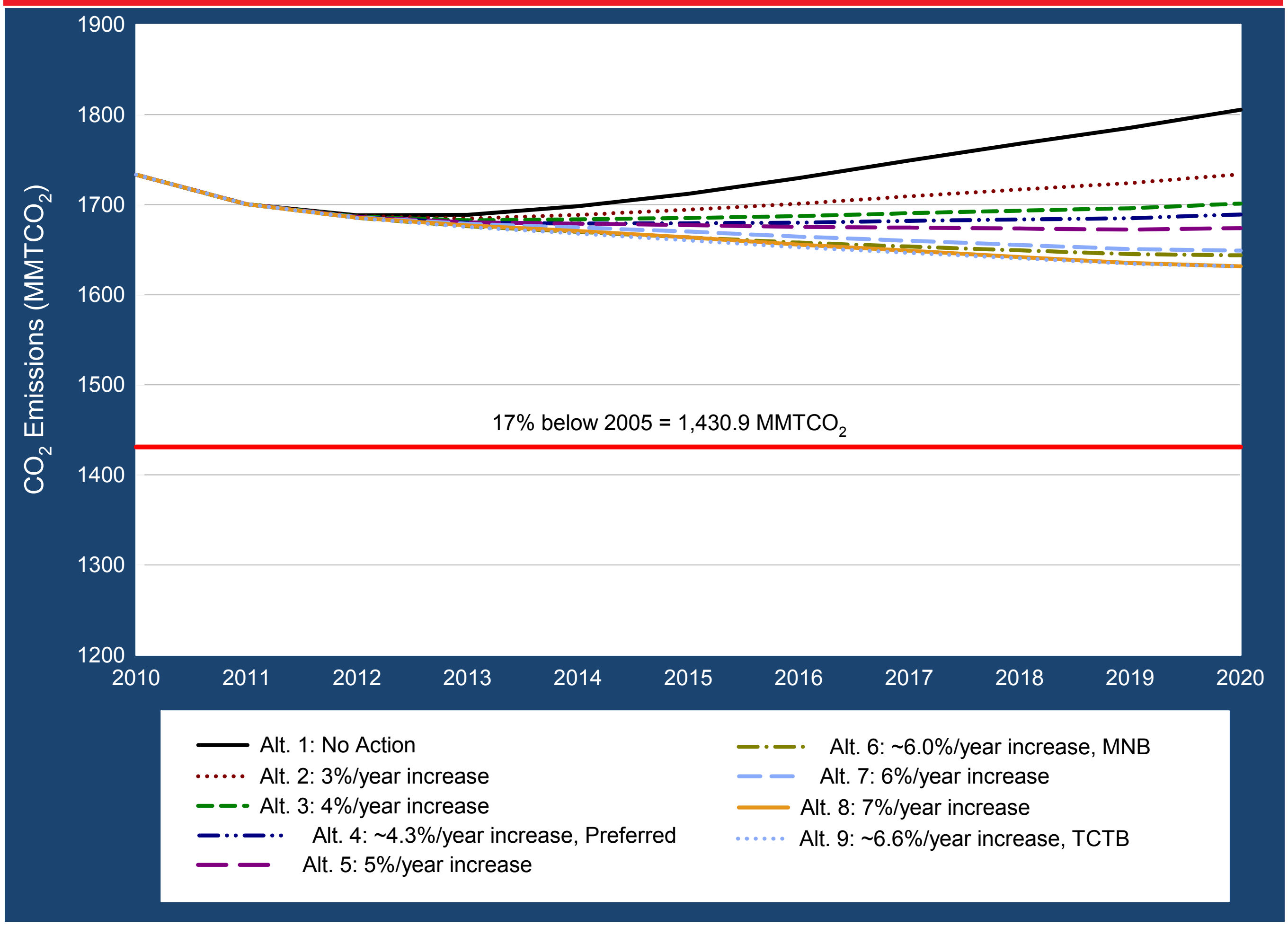
- Compared with total projected U.S. CO_2 emissions in 2100 of 7,886 million metric tons of carbon dioxide equivalent ($MMTCO_2$), the action alternatives would **reduce annual U.S. CO_2 emissions by 3.9 to 9.1 percent in 2100**. *See* Figure S-7.
- Compared with cumulative global emissions of 5,293,896 MMTCO2 over this period, the action alternatives are expected to reduce annual global CO_2 emissions by between 0.4 percent (Alternative 2) and 0.9 percent (Alternative 9).
- Average annual CO_2 emission reductions from the CAFE alternatives range from 232 to 543 $MMTCO_2$ over 2012–2100, **equivalent to the annual CO_2 emissions of 60 to 141 coal-fired power plants.**[35]

- The emissions reductions from the alternatives are equivalent to **the annual emissions of between 3.60 million cars (Alternative 2) and 9.70 million cars (Alternative 9)** in 2016, compared with the No Action Alternative. Emissions reductions in 2016 from the Preferred Alternative (Alternative 4) are equivalent to the annual emissions of 6.26 million cars.

- President Obama recently submitted to the United Nations Framework Convention on Climate Change (UNFCCC) a GHG target for the United States in the range of 17 percent below 2005 levels by 2020,[36] in association with the Copenhagen Accord, and in conformity with anticipated U.S. energy and climate legislation. While this rulemaking contributes to meeting that goal, the alternatives would **result in projected CO_2 emissions from the light duty vehicle sector in 2020 in the range of 0.6 percent above (Alternative 2) to 5.4 percent below (Alternative 9) 2005 levels.** Thus, no alternative would reduce 2020 emissions from cars and light trucks to 17 percent below 2005 levels, due to the fact that total vehicles miles traveled (VMT) increase under all scenarios.[37] *See* Figure S-8.

The President's stated policy goal outlined above does not specify that every emitting sector of the economy must contribute equally proportional emissions reductions. Significantly, the action of setting fuel economy standards does not directly regulate total emissions from passenger cars and light trucks. NHTSA's authority to promulgate new fuel economy standards is limited and does not allow regulation of other factors affecting emissions, including society's driving habits. *See* Section 3.4.4.1 of this EIS for additional discussion relating NHTSA's action to this policy goal.

Figure S-8. Projected Annual CO_2 Emissions by Alternative Compared with 17% below 2005 Levels, Direct and Indirect Impacts



CO_2 Concentration, Global Mean Surface Temperature, Sea-Level Rise, and Precipitation

CO_2 emissions affect the concentration of CO_2 in the atmosphere, which in turn affects global temperature, sea level, and precipitation patterns. The impacts of the proposed action and alternatives on temperature, precipitation, or sea-level rise are small in absolute terms, because the action alternatives result in a small proportional change to the emissions trajectories in the reference scenario to which the alternatives were compared. Although these effects are small, they occur on a global scale and are long-lived.

- Estimated CO_2 concentrations in the atmosphere for the year 2100 range from **778.4 parts per million (ppm) under Alternative 8 to 783.0 ppm under the No Action Alternative.**
- For 2100, the reduction in temperature **for the action alternatives, as compared to the No Action Alternative, ranges from 0.01 °F (0.007 °C) to 0.03 °F (0.018 °C).** *See* Figure S-9.
- Projected sea-level rise in 2100 ranges from 14.96 inches (38.00 centimeters) under the No Action Alternative to 14.89 inches (37.84 centimeters) under the TCTB Alternative. Thus, the action alternatives will result in a **maximum reduction of sea-level rise equal to 0.06 inches (0.16 centimeters) by 2100** from the level projected under the No Action Alternative.

Cumulative Effects

Greenhouse Gas Emissions

- Compared with projected global emissions of 3,919,462 $MMTCO_2$ from 2012 through 2100, the incremental impact of this rulemaking is expected to **reduce global CO_2 emissions by about 0.8 to 1.2 percent** from their projected levels under the No Action Alternative. *See* Figure S-10.
- Projections of emissions reductions over the 2012 through 2100 period due to the MYs 2012–2016 CAFE standards and other reasonably foreseeable future actions (i.e., forecasted fuel economy increases resulting from projected demand for fuel economy) ranged from **30,200 to 45,600 $MMTCO_2$**.

Figure S-9. Reduction in Global Mean Temperature Compared with the No Action Alternative, Direct and Indirect Impacts

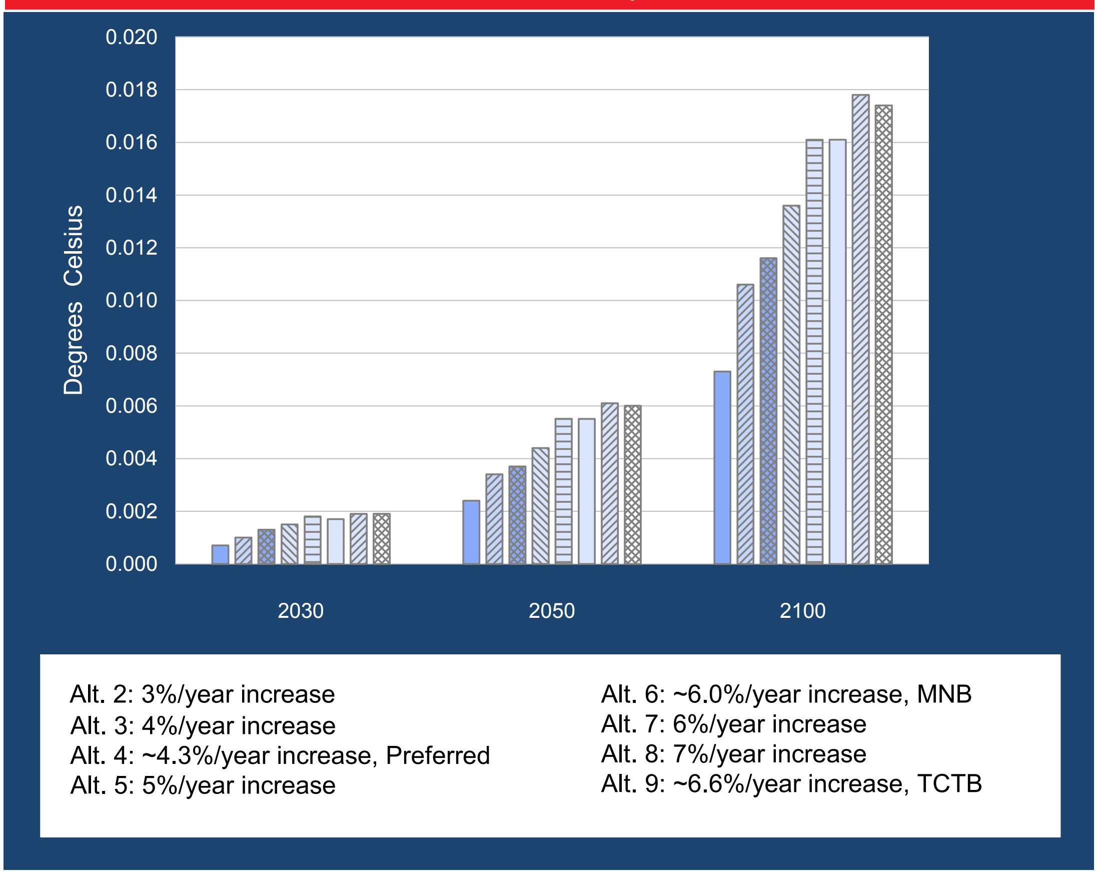
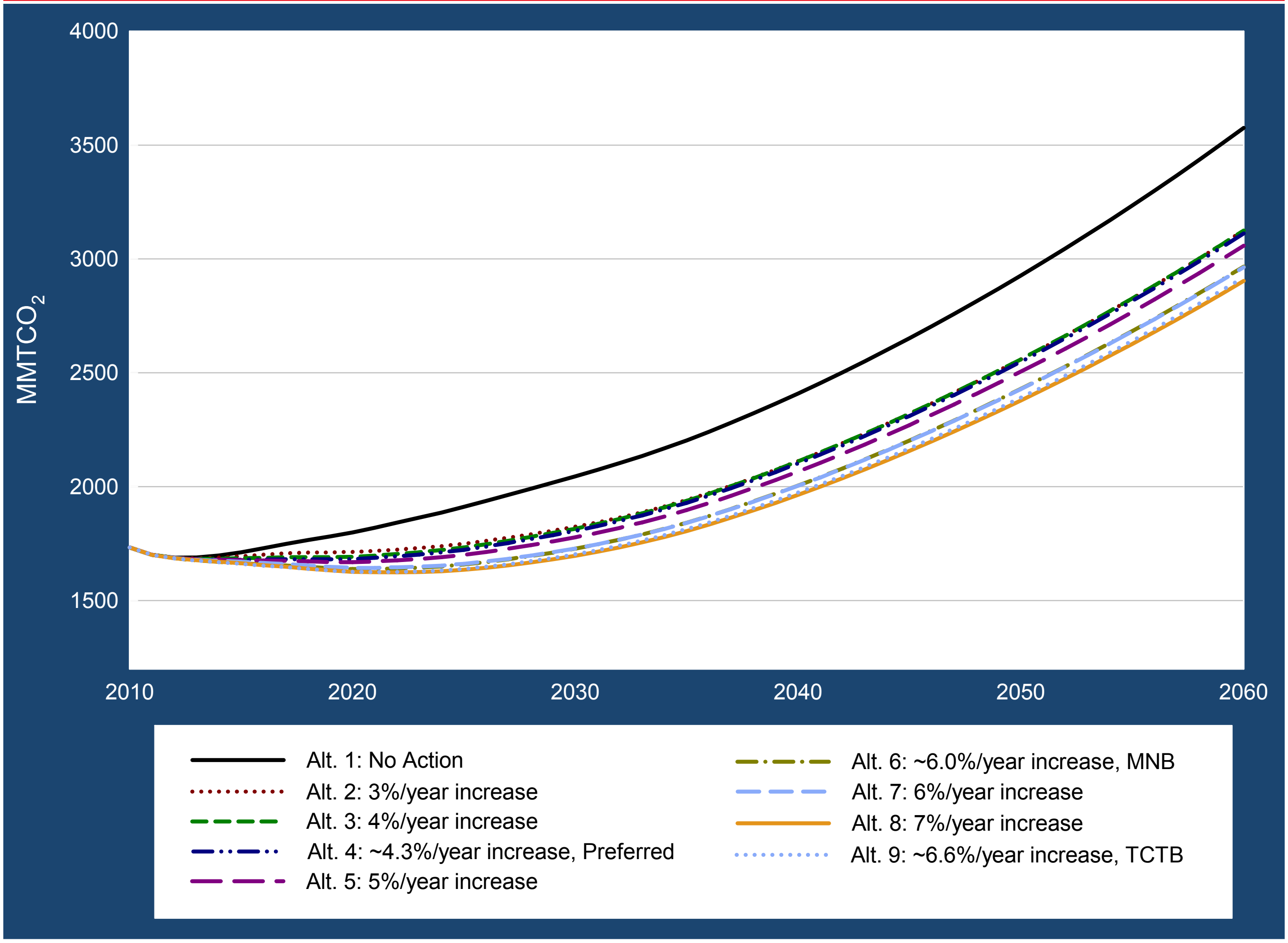


Figure S-10. Projected Greenhouse Gas Emissions by Alternative, Cumulative Impacts



- This action contributes to meeting the President's goal of returning GHG emissions to 17 percent below 2005 levels by 2020. The alternatives would **reduce projected CO_2 emissions from the light duty vehicle sector in 2020 by 0.7 percent (Alternative 2) to 5.7 percent (Alternative 9) below 2005 levels.** *See* Figure S-11.

CO_2 Concentration, Global Mean Surface Temperature, Sea-Level Rise, and Precipitation

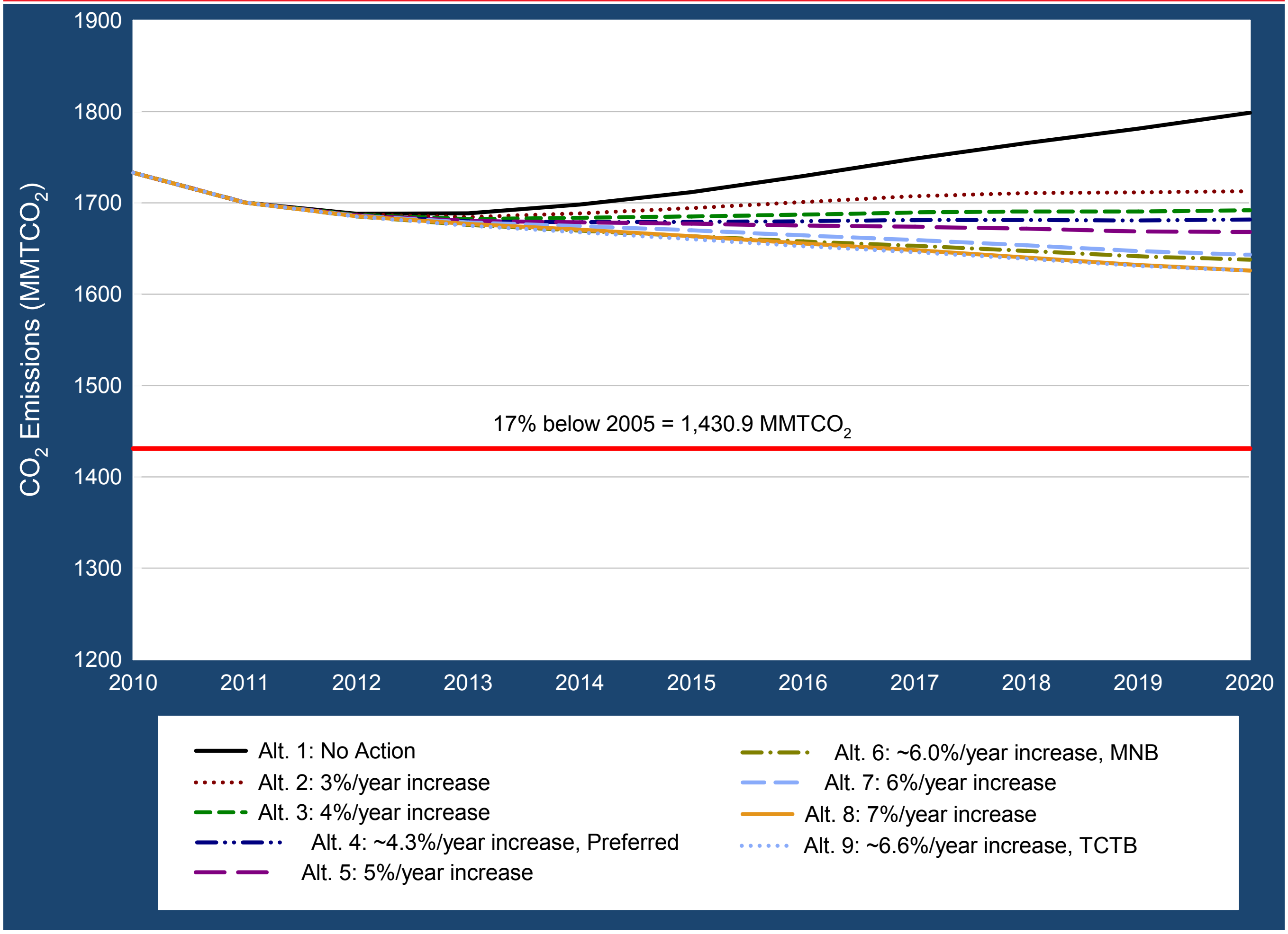
- Estimated CO_2 concentrations in the atmosphere for the year 2100 range from **653.4 ppm under Alternative 8 to 657.4 ppm under the No Action Alternative.**
- For 2100, **the reduction in temperature increase for the action alternatives in relation to the No Action Alternative is about 0.02 to 0.04° F (0.01 to 0.02 °C).** *See* Figure S-12.
- Projected sea-level rise in 2100 ranges from 12.93 inches (32.84 centimeters) under the No Action Alternative to 12.87 inches (32.68 centimeters) under the TCTB Alternative (Alternative 9). Thus, the CAFE action alternatives will result in a maximum **reduction of sea level rise equal to 0.06 inches (0.16 centimeters) by 2100** from the level that would occur under the No Action Alternative.

Readers interested in further details about the direct, indirect, and cumulative climate impacts should consult Sections 3.4 and 4.4 of this EIS.

Health, Societal, and Environmental Impacts of Climate Change

The magnitude of the changes in climate effects that the alternatives would produce (4 ppm of CO_2, a few hundredths of a degree difference in temperature, a small percentage change in the rate of precipitation increase, and 1 or 2 millimeters of sea-level rise) are

Figure S-11. Projected Annual CO_2 Emissions by Alternative Compared with 17% below 2005 Levels, Cumulative Impacts



too small to address quantitatively in terms of their impacts on health, society, and the environment. Given the enormous resource values at stake, these distinctions could be important, but they are too small for current quantitative techniques to resolve. For detailed discussion of climate change's impacts on various resource sectors, *see* Section 4.5 of this EIS.

The changes in non-climate impacts (such as ocean acidification by CO_2) associated with the alternatives are also difficult to assess quantitatively. However, it is clear that a reduction in the rate of increase in atmospheric CO_2, which all the action alternatives would provide to some extent, would reduce the ocean acidification effect and the CO_2 fertilization effect. For additional discussion of non-climate environmental impacts, *see* Section 3.5 of this EIS.

Mitigation

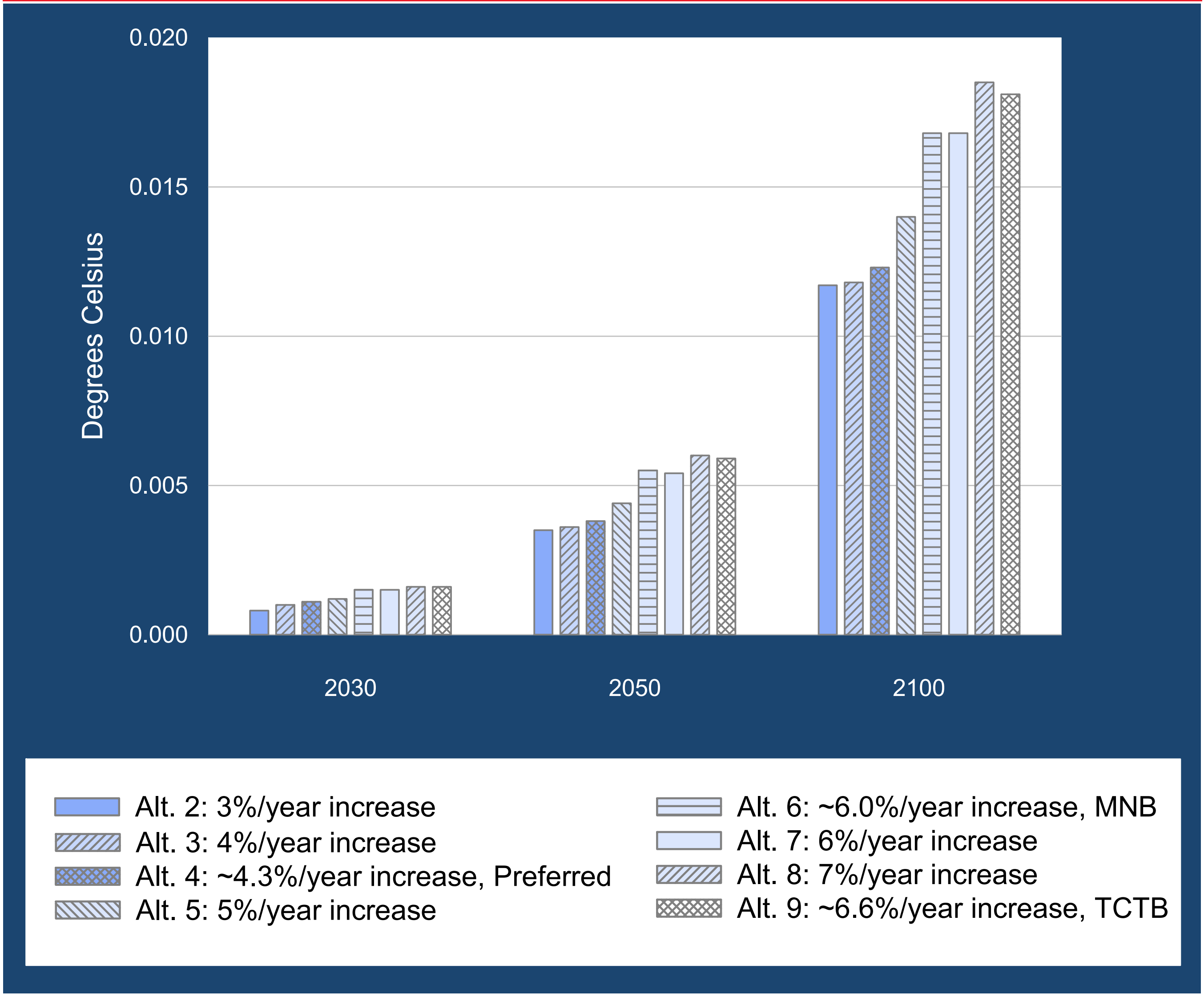
CEQ regulations for implementing the procedural requirements of NEPA require that the discussion of alternatives in an EIS "[i]nclude appropriate mitigation measures not already included in the proposed action or alternatives."[38] In particular, an EIS should discuss the "[m]eans to mitigate adverse environmental impacts."[39]

Under NEPA, an agency does not have to formulate and adopt a complete mitigation plan, but should analyze possible measures that could be adopted. An agency should state in its Record of Decision whether all practicable means to avoid or reduce environmental harm have been adopted into the selected alternative.[40]

Energy and Climate

Each of the action alternatives would reduce energy consumption and GHG emissions from vehicles sold in the United States compared with the No Action Alternative, resulting in a net beneficial effect. Although an agency typically does not propose mitigation measures for an action resulting in a net beneficial effect, NHTSA would like to highlight

Figure S-12. Cumulative Effects on Global Mean Temperature (Reduction Compared with the No Action Alternative)



several other federal programs, which in conjunction with NHTSA CAFE standards, can make significant contributions in further reducing energy consumption and GHG emissions.

The programs described below present the potential for future developments and advances that could provide further beneficial environmental effects.

- EPA administers Renewable Fuel Standards under Section 211(o) of the Clean Air Act. EPA estimates that the greater volumes of biofuel mandated by proposed standards would reduce GHG emissions from transportation by approximately 160 $MMTCO_2$ equivalent per year.
- DOT, in coordination with EPA and the U.S. Department of Housing and Urban Development, announced six livability principles around which the agencies will coordinate agency policies. One of the principles is focused on increasing transportation options, which aims to decrease energy consumption, improve air quality, and reduce GHG emissions.
- DOT is one of more than a dozen agency members of the U.S. Climate Change Technology Program, led by DOE, which is aimed at the development and adoption of technologies designed to reduce the U.S. carbon footprint.[41]
- In furtherance of DOT's high-speed rail initiative, President Obama recently announced DOT's American Recovery and Reinvestment Act High-Speed Intercity Passenger Rail grants to 31 states and the District of Columbia to jump-start high-

speed rail development in the United States. High-speed rail development will help reduce vehicle miles traveled, a critical factor for reducing GHG emissions from the transportation sector.

- The Federal Transit Administration is actively supporting the DOT Livability Initiative and the Federal Sustainable Communities Partnership with its programs to expand mass transit, another travel alternative that will reduce U.S. transportation sector GHG emissions.
- Also within DOT, the Federal Aviation Administration is a sponsor of the Commercial Aviation Fuels Initiative (CAAFI), which is a coalition of the U.S. commercial aviation community that acts as a focal point for engaging the emerging alternative fuels industry. The CAAFI seeks to enhance energy security, and thereby reduce GHG emissions, in the transportation sector by promoting the development of alternative fuel options for use in aviation.
- DOE's Clean Cities Program develops government-industry partnerships designed to reduce petroleum consumption.[42]
- DOE administers the Vehicle Technologies Program, which creates public-private partnerships that enhance energy efficiency and productivity and can bring clean technologies to the marketplace.[43]
- Pursuant to Executive Order (EO) 13514 on Federal Sustainability, DOT and other federal agencies will be working to implement the President's recently announced goal of federal government GHG emissions reductions of 28 percent by 2020. The federal government is the single largest energy consumer in the U.S. economy. As such, the EO 13514 environmental performance goals for federal agencies focus on reducing GHG reductions from government operations and, thereby, leading by example.

Air Pollution

Generally, NHTSA's analysis forecasts emissions from criteria pollutants and mobile source air toxics to decline under the action alternatives, although emissions of carbon monoxide, acetaldehyde, acrolein, 1,3-butadiene, and formaldehyde could increase under certain alternatives and analysis years, compared with the No Action Alternative. While carbon monoxide emissions are projected to increase in some cases, the associated harm might not increase measurably. There have been fewer than three violations of the carbon monoxide National Ambient Air Quality Standards per year since 2002, owing to the success of regulations governing fuel composition and vehicle emissions. Also, vehicle manufacturers can choose which technologies to employ to meet the new CAFE standards. Some of their choices result in higher or lower impacts for these emissions.

There could be increases in criteria and toxic air pollutant emissions in some nonattainment areas as a result of implementation of the CAFE standards under the action alternatives. These increases would represent a slight decline in the rate of reductions achieved by implementation of Clean Air Act standards.

There are several federal programs available to mitigate such impacts. Federal transportation funds administered by the Federal Highway Administration (FHWA) could be available to assist in funding projects to reduce increases in emissions. FHWA provides funding to states and localities specifically to improve air quality under the Congestion Mitigation and Air Quality Improvement (CMAQ) Program. The FHWA and the Federal Transit Administration also provide funding to states and localities under other programs that have multiple objectives, including air quality improvement. Specifically, the Surface Transportation Program provides flexible funding that states may use for projects on any federal-aid highway. As state and local agencies recognize the need to reduce emissions of carbon monoxide, acetaldehyde, acrolein, 1,3-butadiene, and formaldehyde (or other emissions eligible under the CMAQ Program, including the criteria pollutants and mobile source air toxics analyzed in this EIS), they have the ability to apply CMAQ funding to reduce impacts in most areas. Further, under the Clean Air Act, EPA has the authority to continue to improve vehicle emissions standards, which could result in future reductions as EPA promulgates new regulations.

Notes

[1] NEPA is codified at 42 U.S.C. §§ 4321-4347. CEQ NEPA implementing regulations are codified at 40 CFR Parts 1500-1508. NHTSA NEPA implementing regulations are codified at 49 CFR Part 520.

[2] 49 U.S.C. § 32901-32919.

[3] 49 CFR §§ 1.50, 501.2(a)(8).

[4] Pub. L. No. 110-140, 121 Stat. 1492 (Dec. 19, 2007). EISA amends and builds on EPCA by setting out a comprehensive energy strategy for the 21st Century addressing renewable fuels and CAFE standards.

[5] Notice of Proposed Rulemaking, Average Fuel Economy Standards, Passenger Cars and Light Trucks; Model Years 2011–2015, 73 *Federal Register* (*FR*) 24352 (May 2, 2008). At the same time, NHTSA requested updated product plan information from the automobile manufacturers. *See* Request for Product Plan Information, Passenger Car Average Fuel Economy Standards—Model Years 2008–2020 and Light Truck Average Fuel Economy Standards—Model Years 2008–2020, 73 *FR* 21490 (May 2, 2008).

[6] EPA published a Notice of Availability of the Final Environmental Impact Statement (FEIS) in the *Federal Register* on October 17, 2008. Environmental Impact Statements; Notice of Availability, 73 FR 61859 (Oct. 17, 2008).

[7] Final Rule, Average Fuel Economy Standards Passenger Cars and Light Trucks Model Year 2011, 74 *FR* 14196 (Mar. 30, 2009). On January 7, 2009, DOT announced that the Bush Administration would not issue the final rule. The DOT January 7, 2008 statement can be found at: http://www.dot.gov/affairs/dot0109.htm (last accessed Feb. 2, 2009). President Obama issued a memorandum on January 26, 2009, to the Secretary of Transportation and the NHTSA Administrator requesting that NHTSA issue a final rule adopting CAFE standards for MY 2011 only, and to reconsider the standards for years after 2011. Memorandum for the Secretary of Transportation and the Administrator of the National Highway Traffic Safety Administration, 74 *FR* 4907 (Jan. 26, 2009).

[8] *See* Notice of Intent to Prepare an Environmental Impact Statement for New Corporate Average Fuel Economy Standards, 74 *FR* 14857 (Apr. 1, 2009).

[9] Scoping, as defined under NEPA, is an early and open process for determining the scope of issues to be addressed in an EIS and for identifying the significant issues related to a proposed action. *See* 40 CFR § 1501.7.

[10] This would also achieve levels of emissions that would satisfy California's standards.

[11] 42 U.S.C. § 4332.

[12] 40 CFR § 1501.6.

[13] 49 U.S.C. § 32902(a).

[14] 49 U.S.C. § 32902(f).

[15] *See, e.g.*, *Competitive Enterprise Inst. v. NHTSA*, 956 F.2d 321, 322 (D.C. Cir. 1992) (citing *Competitive Enterprise Inst. v. NHTSA*, 901 F.2d 107, 120 n.11 (D.C. Cir. 1990)); and 73 *FR* 24352, 24364 (May 2, 2008).

[16] 49 U.S.C. § 32902(b)(2)(A).

[17] 49 U.S.C. §§ 32902(b)(2)(C), 32902(b)(3)(B).

[18] Although EISA's recent amendments to EPCA direct NHTSA to increase the stringency of CAFE standards and do not permit the agency to take no action on fuel economy, CEQ regulations mandate analysis of a no action alternative. *See* 40 CFR § 1502.14(d). CEQ has explained that "the regulations require the analysis of the no action alternative *even if the agency is under a court order or legislative command to act*." *Forty Most Asked Questions Concerning CEQ's National Environmental Policy Act Regulations*, 46 *FR* 18026 (1981) (emphasis added).

[19] Alternative 2 requires a 3% average annual increase in mpg. Alternative 3 requires a 4% average annual increase in mpg. Alternative 5 requires a 5% average annual increase in mpg. Alternative 7 requires a 6% average annual increase in mpg. Alternative 8 requires a 7% annual increase in mpg.

[20] In this rulemaking, NHTSA and EPA have chosen vehicle footprint as the most appropriate attribute on which to base fuel economy and GHG emissions standards as discussed in the NPRM. Thus, vehicles with larger footprints (*i.e.*, generally larger vehicles) would be subject to less stringent standards than vehicles with smaller footprints (*i.e.*, generally smaller vehicles).

[21] In NHTSA's analysis, "overcompliance" occurs through multi-year planning: manufacturers apply some "extra" technology in early model years to carry that technology forward and thereby facilitate compliance in later model years.

[22] Consistent with EPCA, NHTSA has not accounted for manufacturers' ability to earn CAFE credits for selling flex-fuel vehicles (FFVs), to carry credits forward and back between model years, and to transfer credits between the passenger car and light truck fleets when setting standards. 49 U.S.C. § 32902(h). However, to assist in understanding the extent to which use of credits might reduce manufacturers' compliance costs and the benefits of new CAFE standards, NHTSA does analyze the potential effects of FFV credits. *See* Section 3.1.4.1 of this EIS.

[23] The CAFE level required under an attribute-based standard depends on the mix of vehicles produced for sale in the United States. NHTSA has developed the average mpg levels under each alternative based on the vehicle market forecast that NHTSA and EPA have used to develop and analyze new CAFE and GHG emissions standards.

[24] *See* 42 U.S.C. § 4332 (requiring federal agencies to "identify and develop methods and procedures…which will insure that presently unquantified environmental amenities and values may be given appropriate consideration"); 40 CFR § 1502.23 (requiring an EIS to discuss the relationship between a cost-benefit analysis and any analyses of unquantified environmental impacts, values, and amenities); CEQ, *Considering Cumulative Effects Under the National Environmental Policy Act* (1984), *available at* http://ceq.hss.doe.gov/nepa/ccenepa/ccenepa.htm (last accessed July 22, 2009) (recognizing that agencies are sometimes "limited to qualitative evaluations of effects because cause-and-effect relationships are poorly understood" or cannot be quantified).

[25] U.S. Energy Information Administration, 2009. Annual Energy Review 2008. Report No. DOE/EIA-0384(2008), *available at* http://www.eia.doe.gov/emeu/aer/petro.html

[26] *Id.*

[27] U.S. Energy Information Administration, 2009. Annual Energy Review 2008. Washington, D.C. DOE/EIA-0384(2008). 408 pgs.

[28] The AEO projections anticipate an average annual percentage gain of 0.51 percent in passenger car mpg and 0.86 percent in light truck mpg from 2019 through 2030.

[29] U.S. EPA, Recent Atmospheric Changes page, Climate Change Site, http://www.epa.gov/climatechange/science/recentac.html (last accessed December 17, 2009).

[30] Le Treut, H., R. Somerville, U. Cubasch, Y. Ding, C. Mauritzen, A. Mokssit, T. Peterson, and M. Prather. 2007. Historical Overview of Climate Change. Pgs. 93–128. In: Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change [Solomon, S., D. Qin, M. Manning, Z. Chen, M. Marquis, K.B. Averyt, M. Tignor, and H.L. Miller (Eds.)] Cambridge University Press, Cambridge, United Kingdom and New York, New York. 996 pgs.

[31] EPA (U.S. Environmental Protection Agency). 2009. Technical Support Document for Endangerment and Cause or Contribute Findings for Greenhouse Gases under Section 202(a) of the Clean Air Act. Office of Atmospheric Programs Climate Change Division. U.S. Environmental Protection Agency, Washington, District of Columbia. December 7. 210 pgs.

[32] *See* Note 30.

[33] Synthesis and assessment reports are issued by expert panels that have assessed numerous individual studies in order to draw general conclusions about the state of the science, have been reviewed and formally accepted by, commissioned by, or in some cases authored by U.S. government agencies and individual government scientists and provide assurances that the material has been well vetted by both the climate change research community and the U.S. government.

[34] EPA (U.S. Environmental Protection Agency). 2009. Inventory of U.S. Greenhouse Gas Emissions and Sinks. Washington, D.C. EPA 430-R-09-004. 441 pgs. Last Revised: July 14, 2009. *Available at*: http://www.epa.gov/climatechange/emissions/usinventoryreport.html (last accessed February 17, 2010).

[35] Estimated using EPA's Greenhouse Gas Equivalencies Calculator, *available at*: http://www.epa.gov/cleanenergy/energy-resources/calculator.html (last accessed Feb. 17, 2010).

[36] On January 28, 2010, the United States submitted this target to the U.N. Framework Convention on Climate Change as part of a January 31, 2010 deadline negotiated in Copenhagen in December 2009. *See* http://unfccc.int/home/items/5264.php (last accessed Feb. 1, 2010).

[37] NHTSA may propose more stringent CAFE standards for MYs 2017-2020 that may help to achieve the President's target.

[38] 40 CFR § 1502.14(f).

[39] 40 CFR § 1502.16(h).

[40] 40 CFR § 1505.2(c).

[41] Office of Policy and International Affairs, Department of Energy, *Climate Overview*, *available at* http://www.pi.energy.gov/climateoverview.html (last accessed Jul. 15, 2009).

[42] Office of Energy Efficiency and Renewable Energy, U.S. Department of Energy, Clean Cities: Fact Sheet (2009).

[43] Office of Energy Efficiency and Renewable Energy, U.S. Department of Energy, *About the Program*, *available at* http://www1.eere.energy.gov/ vehiclesandfuels/about/index.html (last accessed Jul. 15, 2009).