U.S. Department
of Transportation

Draft Environmental Assessment

National Highway Traffic Safety Administration Proposed Corporate Average Fuel Economy (CAFE) Standards

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TABLE OF CONTENTS

LIST OF TABLES

EXECUTIVE SUMMARY

This draft environmental assessment (EA) evaluates the potential environmental impacts associated with the National Highway Traffic Safety Administration's (NHTSA) proposed action to set Corporate Average Fuel Economy (CAFE) Standards for Model Year (MY) 2008-2011 light trucks. The National Environmental Policy Act (NEPA), the regulations of the Council on Environmental Quality (40 CFR part 1500), and NHTSA regulations (49 CFR part 520) establish policies and procedures to ensure that information on environmental impacts is available to decision makers, regulatory agencies, and the public regarding Federal actions. This document was prepared in accordance with these policies, and to facilitate public participation. Under NHTSA regulations, the Final EA and associated documents will constitute an "Environmental Review Report."

This document describes the environment and resources that might be affected by the proposed light truck CAFE standards for model years (MYs) 2008-2011. This document assesses estimated impacts of alternative actions in relation to a baseline of 22.2 mpg, the latest year for which light truck standards have been established (MY 2007). Light trucks are defined as vehicles of 8,500 pounds gross vehicle weight rating (GVWR) or less, and include pickup trucks, vans (cargo and passenger), minivans, and sport-utility vehicles (NHTSA 1998).

SUMMARY OF ENVIRONMENTAL CONSEQUENCES

The agency proposes to reform the structure of the corporate average fuel economy (CAFE) program for light trucks and proposes to establish higher corporate average fuel economy (CAFE) standards for model year (MY) 2008-2011 light trucks. Reforming the CAFE program would enable it to achieve larger fuel savings while enhancing safety and minimizing economic consequences. The reform is based on vehicle size.

The notice proposes that the reform begin in MY 2011, but allows earlier transition to it so that manufacturers can gain experience with it. During the transition period of MYs 2008-2010, manufacturers may comply with CAFE standards established in the traditional way (Unreformed CAFE) or with standards established under a reformed structure (Reformed CAFE). In MY 2011, manufacturers would comply with a Reformed CAFE standard.

Under the Unreformed system, NHTSA would set CAFE standards for light trucks at the levels shown in Table ES-1.

Table ES-1. Proposed Fuel Economy Standards for MY 2008-2010 Light Trucks – Unreformed CAFE

Model Year	Standard (mpg[1])
2008	22.5
2009	23.1
2010	23.5

Under the proposed Reformed CAFE system, we would set standards based on a specific vehicle attribute, its footprint. A vehicle's footprint is defined as its average track width multiplied by its wheel base, and is measured in square feet. Vehicles would be divided into categories based on different ranges of footprint, and a target level of average fuel economy would be set for each footprint category. A particular manufacturer's compliance requirement would be calculated as the harmonic average of the fuel economy targets in each size category weighted by that manufacturer's production volumes across the size categories.[2]

Under the Reformed CAFE system, fuel economy targets for each footprint category would be set at levels that maximize net benefits based on the largest seven manufacturers ("optimized targets"). However, during the transition period the Reformed CAFE fuel economy targets in each footprint category would be set at levels that result in the same total compliance costs for the industry's largest manufacturers as the Unreformed standards (referred to as "equal cost" targets).[3]

Table ES-2 shows the proposed Reformed CAFE fuel economy targets for MYs 2008-11. These consist of the "equal cost" targets for each footprint category in MYs 2008-10, and the optimized targets for MY2011.

Table ES-2. Proposed Fuel Economy Targets for MY 2008-2011 Light Trucks – Reformed CAFE

Footprint Category	Fuel Economy Target (mpg)			
	2008	**2009**	**2010**	**2011**
1	26.8	27.4	27.8	28.4
2	25.6	26.4	26.4	27.1
3	22.3	23.5	24.0	24.5
4	22.2	22.7	22.9	23.3
5	20.7	21.0	21.6	21.9
6	20.4	21.0	20.8	21.3

[1] Miles per gallon.
[2] A detailed discussion of the Reformed CAFE system can be found in the notice of proposed rulemaking.
[3] The Reformed and Unreformed standards result in equal total compliance costs for the industry's seven largest manufacturers, which together account for 95 percent of light truck production and sales.

Since the overall fuel economy level resulting from a manufacturer's compliance with the Reformed CAFE fuel economy targets for a MY depends partly on the distribution of its model offerings and their production levels during that year, its compliance obligation cannot be precisely calculated until its final production figures for that MY become known. For further explanation of the Reformed CAFE system, refer to the Reformed CAFE discussion in the notice.

While the agency is statutorily mandated to set fuel economy standards at the maximum feasible level achievable by manufacturers, this document also discusses alternative actions the agency might have considered -- to propose either the Reformed or Unreformed standards as the sole means of compliance, or to extend the MY 2007 standard forward (the No Action alternative). The impacts of proposing these alternative actions are measured in comparison to those that would have resulted if the agency had instead extended the MY 2007 light truck CAFE standard of 22.2 mpg forward for MYs 2008-11.

Under the proposed action, the agency would provide a transition period during which standards would be established under the Reformed and Unreformed CAFE systems) during MYs 2008-2010. Thus the potential environmental impacts of the proposed action are projected to fall within a range of values. The range of potential impacts resulting from the proposed action and reasonable alternatives the agency might have considered is bounded by the estimated impacts of the alternatives identified below:

A. No Action, extend MY 2007 standard (22.2 mpg) through MY 2011

B. Unreformed standards in MY 2008-2010; Reformed standard set at the optimized targets in MY 2011.

C. Reformed standards set at equalized cost with the Unreformed standards in MY 2008-2010; Reformed standard set at the optimized targets in MY 2011.

Alternative A (*i.e.*, the No Action alternative) represents the lower boundary for potential effects and serves as the baseline value for all comparisons. Alternative C is estimated to yield the highest projected fuel savings, and also is estimated to generate the upper boundary of possible environmental effects from the alternatives. The impacts from the alternatives are estimated to be in a narrow range and very small. As stated above, we project that the impacts from the proposed action would be within this range.

Table ES-3 summarizes and compares the potential impacts for the baseline (22.2 mpg) alternative and the other alternatives, measured over the expected lifetimes of MY 2008-11 light trucks. This period extends from 2008, when light trucks of that model year will be produced and sold, through the year 2047, when virtually all light trucks produced during MY 2011 will have been removed from service.

As the table shows, Alternatives B and C are estimated to result in large fuel and energy savings, reductions in emissions of most criteria pollutants, and lower greenhouse gas emissions compared to the No Action alternative. Table ES-3 also shows that the estimated increases in emissions of certain criteria pollutants (or their chemical precursors, in the case of volatile organic compounds (VOC)) projected for Alternatives B and C are extremely small when compared to the baseline level of emissions with the MY 2007 CAFE standard remaining in effect through MY 2011.

Table ES-3. Summary of Potential Environmental Impacts of Model Year 2008-11 Light Truck Standards

Lifetime Impact of MY 2008-11 Light Trucks	Baseline Impact*	Change from Baseline:		Percent Change from Baseline:	
		Alternative B	Alternative C	Alternative B	Alternative C
Fuel Consumption (billion gallons)	364.3	-9.5	-10.2	-2.61%	-2.79%
Energy consumption (quadrillion BTU)	41.73	-1.09	-1.16	-2.61%	-2.79%
CO emissions (million tons)	126.18	0.77	0.83	0.61%	0.65%
VOC emissions (million tons)	3.9190	0.0038	0.0040	0.10%	0.10%
NOx emissions (million tons)	4.2922	-0.0019	-0.0026	-0.04%	-0.06%
PM2.5 emissions (million tons)	0.1586	-0.0014	-0.0015	-0.86%	-0.92%
SO2 emissions (million tons)	0.5609	-0.0122	-0.0130	-2.17%	-2.32%
CO2 emissions (million metric tons, carbon equivalent)	1,341.4	-35.0	-37.4	-2.61%	-2.79%

* Value with MY 2007 light truck CAFE standard of 22.2 mpg remaining in effect for MYs 2008-11.

To evaluate the cumulative effects of the Proposed Action and previous actions under CAFE, we have focused on those impacts estimated to occur since Congressional funding restrictions that had previously held the light truck CAFE standard at a constant level (20.7 mpg) were lifted in 2001. This analysis is thus consistent with our evaluation in 2003 for the MY 2005-2007 standards.

The projected cumulative impacts from the MY 2005-2007 and MY 2008-2011 light truck rulemaking actions are shown in Table ES-4. The table first reports the lifetime environmental impacts of MY 2005-11 light trucks that are estimated to have resulted if the light truck CAFE standard of 20.7 mpg for MY 2004 had simply been extended from MY2005 through MY2011. These represent the lifetime impacts of MY 2005-11 light trucks that are estimated to have occurred if neither the previous action setting CAFE standards for MY 2005-07 light trucks nor the proposed current action were taken.

Next, Table ES-4 shows how the estimated lifetime impacts of MY 2005-11 light trucks might be affected by the alternative actions. The column headed "Baseline" reports the reduction in each environmental impact that is projected to result if the CAFE standard for MY 2007 light trucks of 22.2 mpg were extended for MYs 2008-2011. The columns headed "Alternative B" and "Alternative C" indicate the estimated reductions in impacts expected if either of those alternative actions were taken. As the table shows, the estimated increases in emissions of certain criteria pollutants brought about by the past action increasing CAFE standards for MYs 2005-2007 and by the alternative actions for MYs 2008-2011 are projected to be extremely small.

Table ES-4. Estimated Cumulative Environmental Impacts of MY 2005-11 Light Truck CAFE Standards Compared to a Fuel Economy Standard of 20.7 mpg

Environmental Impact	Lifetime Impact of MY 2005-11 Light Trucks without Previous Action*	Cumulative Change in Lifetime Impact of MY 2005-11 Light Trucks under Alternative Actions for MY 2008-11		
		Baseline**	Alternative B	Alternative C
Fuel Consumption (billion gallons)	537.8	-12.8	-19.6	-20.2
Energy consumption (quadrillion BTU)	61.4	-1.5	-2.2	-2.3
CO emissions (million tons)	109.223	0.616	0.930	0.961
VOC emissions (million tons)	7.5233	0.0123	0.0176	0.0181
NOx emissions (million tons)	7.4804	-0.0009	-0.0027	-0.0029
PM2.5 emissions (million tons)	0.1821	-0.0014	-0.0021	-0.0022
SO2 emissions (million tons)	1.1351	-0.0164	-0.0252	-0.0261
CO2 emissions (million metric tons, carbon equivalent)	1,980	-47	-72	-74

*Lifetime environmental impacts of MY2005-11 light trucks that would have occurred if MY2004 light truck CAFE standard of 20.7 mpg had been extended for MY2005-11.

** Change in lifetime environmental impacts of MY2005-11 light trucks if MY2007 standard of 22.2 mpg remains in effect for MY2008-11.

1.0 PURPOSE AND NEED

INTRODUCTION

This Draft Environmental Assessment (EA) evaluates the potential environmental impacts associated with the National Highway Traffic Safety Administration's (NHTSA or "the agency") Proposed Action to set Corporate Average Fuel Economy (CAFE) Standards for Model Year (MY) 2008-2011 light trucks. Light trucks are defined as vehicles of 8,500 lbs. gross vehicle weight rating (GVWR) or less, and include pickup trucks, vans (cargo and passenger), minivans, and sport-utility vehicles (SUVs) (NHTSA 1998). This document describes how revised CAFE standards might affect the environment and resources and assesses the potential impacts in relation to a baseline of 22.2 miles per gallon (mpg) (the most recent light truck CAFE standard, through MY 2007).

The light truck rulemaking for MYs 2005-2007 was published in April 2003. Standards for MY 2008 must be established at least 18 months before the start of the MY; *i.e.*, by April 1, 2006. It is assumed that the environmental resources described in Chapter 3 of the April 2003 Final EA entitled "Affected Environment" remain those likely to be impacted by the Proposed Action. Therefore, this document focuses on Chapter 4, "Environmental Consequences," including an assessment of the primary energy and air quality effects. It is assumed that the same analysis applies to the secondary effects on water, biological resources, land use and development, and hazardous materials as relied upon in the April 2003 Final EA. Therefore, the environmental resources described in this document will integrate much of the text from the former EA.

The National Environmental Policy Act (NEPA) [4], the regulations of the Council on Environmental Quality (40 CFR part 1500), NHTSA regulations (49 CFR part 520), Order DOT 5610.1C, and NHTSA Order 560-1 establish policies and procedures to ensure that information regarding the environmental impacts of Federal actions is available to decision makers, regulatory agencies, and the public. This document was prepared in accordance with these policies, and to facilitate public participation.

BACKGROUND

In December 1975, in the aftermath of the energy crisis created by the oil embargo of 1973-1974, Congress enacted the Energy Policy and Conservation Act (EPCA). The EPCA established an automotive fuel economy regulatory program by adding Title V, "Improving Automotive Fuel Efficiency," to the Motor Vehicle Information and Cost

[4] 42 U.S.C. § 4321 et seq.

Savings Act. Title V has been codified as Chapter 329 of Title 49 of the United States Code. Section 32902(a) of Chapter 329 requires the Secretary of Transportation to prescribe by regulation CAFE standards for light trucks for each model year, based on the maximum feasible average fuel economy level that the manufacturers can achieve. In determining maximum feasible average fuel economy, the Secretary takes into account four criteria: technological feasibility, economic practicability, the effect of other Government motor vehicle standards on fuel economy, and the need for the United States to conserve energy. The Secretary has delegated the authority to administer the CAFE program to the NHTSA Administrator.

A manufacturer whose light truck fleet does not meet the CAFE standard prescribed for a specific model year is assessed a civil penalty. The penalty is $5.50 multiplied by each tenth of a mile per gallon that the manufacturer's light truck fleet fuel economy falls short of the standard for the given year, multiplied by the number of automobiles produced by the manufacturer to which the standard applied during the model year. The CAFE structure also embodies an incentive system whereby credits are allocated to manufacturers whose vehicle fleets exceed the CAFE standard in a given year. Manufacturers may carry forward previously earned credits and may carry back future credits for up to three years to account for any credit deficit.

The first fuel economy standards for light trucks – for MY 1979 – were established on March 14, 1977 (42 FR 13807). The standards covered light duty vehicles with a GVWR of 6,000 pounds or less. For subsequent model years, NHTSA established the standards for vehicles with a GVWR of up to 8,500 pounds. By law, NHTSA must issue fuel economy standards 18 months prior to the beginning of the affected model year.

On December 29, 2003, the Agency published an Advance Notice of Proposed Rulemaking (ANPRM) in the Federal Register (68 FR 74908) seeking comment on various issues related to the corporate average fuel economy (CAFE) program. The ANPRM requested comments concerning possible enhancements to the CAFE program that would assist in furthering fuel conservation while protecting motor vehicle safety and the economic vitality of the auto industry. The Agency was particularly interested in comments regarding improvements to the structure of the CAFE program authorized under current statutory authority, as distinguished from the specific level selected for a future CAFE standard. The comment period closed on April 27, 2004. The ANPRM and responses can be found on the Department of Transportation Docket Management System (DMS) website at http://dms.dot.gov, searching under Docket No. 16128.

The Agency simultaneously published a Request for Comments (RFC) focused on Product Plan Information in the Federal Register (68 FR 74931; December 29, 2003) in order to acquire information regarding vehicle manufacturers' future product plans. This information was used to help the agency analyze possible reforms to the CAFE program and assess the effect of CAFE reforms on fuel economy, manufacturers, consumers, the economy, and motor vehicle safety. The comment period closed on April 27, 2004. The RFC and its responses can be found on the Department of Transportation Docket

Management System (DMS) website at http://dms.dot.gov, searching under Docket No. 16709.

Following the analysis of the RFC, the Agency analyzed the fuel economy improvement capabilities of light truck manufacturers for MY2008-2011. As a result, the agency published in the Federal Register a notice of proposed rulemaking (NPRM) to set the CAFE standards at the levels shown in the Alternatives section below.

NEED FOR ACTION

In accordance with Chapter 329 of Title 49 of the United States Code, and the delegation of authority from the Secretary of Transportation to the NHTSA Administrator, NHTSA is required to set CAFE standards for light trucks for each model year, at least 18 months in advance of the model year. The MY 2007 standard (22.2 mpg) was set in FY 2003. NHTSA must now take affirmative action to set the light truck standard for following years at the maximum feasible average fuel economy level, based on the four statutory criteria identified above.

SCOPE OF ANALYSIS

This document analyzes the potential environmental impacts associated with the CAFE standards proposed in the NPRM. It assesses the impacts of the Proposed Action against a Baseline of 22.2 mpg (the light truck CAFE standard in place for MY 2007). Finally, the analysis concludes with an examination of the estimated cumulative impacts associated with both the MY 2005-2007 and MY 2008-2011 light truck fuel economy rulemakings.

2.0 ALTERNATIVES

This section outlines the alternatives that are analyzed in detail in this document. These alternatives are discussed within the unique context of the CAFE program and its statutory requirements.

PROPOSED AND ALTERNATIVE ACTIONS

PROPOSED ACTION

The agency proposes to reform the structure of the corporate average fuel economy (CAFE) program for light trucks and proposes to establish higher corporate average fuel economy (CAFE) standards for model year (MY) 2008-2011 light trucks. Reforming the CAFE program would enable it to achieve larger fuel savings while enhancing safety and minimizing economic consequences. The reform is based on vehicle size.

The notice proposes that the reform begin in MY 2011, but allows earlier transition to it so that manufacturers can gain experience with it. During the transition period of MYs 2008-2010, manufacturers may comply with standards established under the Unreformed CAFE system or with standards established under the Reformed CAFE system. Under the Reformed CAFE system, fuel economy targets for each footprint category would be set at levels that maximize net benefits based on the largest seven manufacturers ("optimized targets"). However, during the transition period the Reformed CAFE fuel economy targets in each footprint category would be set at levels that result in the same total compliance costs for the industry's largest manufacturers as the Unreformed standards (referred to as "equal cost" targets). In MY 2011, manufacturers would comply with a Reformed CAFE standard.

Table 2-1. Proposed Fuel Economy Standards for MY 2008-2010 Light Trucks – Unreformed

Model Year	Standard (mpg)
2008	22.5
2009	23.1
2010	23.5

The standard under the Reformed CAFE system (Reformed standard) would be a formula that incorporates target levels of average fuel economy established for a set of categories of vehicles. These categories would be defined by vehicle "footprint" (the average track width, which is the distance between the centerline of the tires on the same axle, multiplied by the wheelbase, which is the distance between the centers of the axles).

The target values would reflect the technological capabilities of the industry within each of the footprint categories. During MY 2008-2010, the targets employed in the Reformed CAFE system would be set to result in equal industry-wide compliance costs with the Unreformed system. In MY 2011, the proposed target levels would be set at an "optimized"[5] level based on the seven largest manufacturers.

Compliance under the Reformed standard would be determined by comparing a manufacturer's overall average fuel economy in each model year with a single fuel economy level calculated from the manufacturer's actual production levels and the category fuel economy targets for that year. Specifically, each manufacturer's required CAFE level for a model year would be the weighted harmonic average of the category fuel economy targets, computed using as weights that manufacturer's production of light truck models in each category.

This required level would then be compared to the actual sales-weighted harmonic average fuel economy of the manufacturer's entire product line, computed using the actual fuel economy levels achieved by each of its light truck models. If the manufacturer's overall average fuel economy level equals or exceeds its required average fuel economy, then that manufacturer would be in compliance with the Reformed CAFE targets. If a manufacturer's actual average fuel economy exceeds its required level in a model year, the manufacturer would earn fuel economy credits that are usable in any of the three preceding or following model years.

The Reformed fuel economy targets are presented in Table 2-2.

Table 2-2. Proposed Fuel Economy Targets for MY 2008-2011 Light Trucks – Reformed CAFE

Footprint Category	Fuel Economy Target (mpg)			
	2008	**2009**	**2010**	**2011**
1	26.8	27.4	27.8	28.4
2	25.6	26.4	26.4	27.1
3	22.3	23.5	24.0	24.5
4	22.2	22.7	22.9	23.3
5	20.7	21.0	21.6	21.9
6	20.4	21.0	20.8	21.3

[5] The "*optimized level*" is the point at which the incremental or marginal change in costs that would result from increasing the target level slightly equals the incremental or marginal change in benefits from doing so.

NO ACTION ALTERNATIVE

The alternative of taking no action is unavailable because 49 U.S.C. § 32902(a) affirmatively requires the Secretary of Transportation to prescribe, by rule, average fuel economy standards for light trucks. The legal effect of inaction would be to contravene the statutory requirement. The closest to a No Action Alternative available to the agency would be to maintain the standard at the MY 2007 level of 22.2 mpg, in which case there would be no new impacts associated with the agency's action relative to the previous rulemaking.[6] Throughout this document we will refer to the 22.2 mpg level as the *baseline.*

OTHER ALTERNATIVES

The agency is statutorily mandated to set fuel economy standards at the maximum feasible level achievable by manufacturers. The Agency has tentatively determined that the fuel economy levels under both the Unreformed CAFE and the Reformed CAFE system are maximum feasible. For purposes of discussion in this document, the agency might have considered alternatives to the Proposed Action of providing manufacturers an option in MY 2008-2010. Reasonable alternatives for discussion would be if the agency were to propose either the Unreformed or Reformed standards as the sole means of compliance.

RANGE OF IMPACTS

We project that the potential impacts from the Proposed Action would fall within a range of potential impacts from the identified alternatives. These alternatives are as follows:

A. No Action, extend MY 2007 standard (22.2 mpg) through MY 2011.

B. Unreformed standards in MY 2008-2010; Reformed standard set at the socially optimal level in MY 2011.

C. Reformed standards set at equalized cost with the Unreformed standards in MY 2008-2010; Reformed standard set at the socially optimal level in MY 2011.

Alternative A (*i.e.*, the No Action alternative) represents the lower boundary for potential effects and serves as the baseline value for all comparisons. Alternative C is estimated to yield the highest projected fuel savings, and is estimated to generate the upper boundary

[6] As explained in the final EA for the MY 2005-2007 rulemaking, the No Action alternative would not satisfy the statutory requirement to set the standard at the maximum feasible average fuel economy level. However, we include this level for purposes of comparison.

of possible environmental effects from the alternatives. The impacts from the alternatives are estimated to be in a narrow range and very small. As discussed previously, we project that the impacts from the proposed action would fall within this range.

3.0 AFFECTED ENVIRONMENT

This Chapter briefly describes the resources that might be affected by the proposed setting of CAFE standards. Impacts on these resources are also discussed to the extent that they augment and clarify the discussion of the affected environment. Chapter 4 includes a comprehensive assessment of potential impacts, with a principal focus on the primary impacts of energy, criteria pollutant emissions, and greenhouse gas emissions.

ENERGY

The Energy Information Administration's International Energy Outlook (2004) (IEO2004)[7] and Annual Energy Outlook (2005) (AEO2005) indicate growing demand for petroleum around the world and in the U.S. In the IEO2004 reference case, world oil demand increases through 2025 at a rate of 1.9 percent annually, from 77 million barrels per day in 2001 to 121 million barrels per day in 2025. Most of this increase would occur in the transportation sector.[8]

Sixty percent of the world increase in demand is projected to occur in the U.S. and the emerging nations in Asia. To meet this projected increase in demand, worldwide productive capacity would have to increase by more than 44 million barrels per day over current levels. OPEC producers are expected to supply nearly 60 percent of the increased production. In contrast, U.S. crude oil production is projected to increase from 5.7 barrels per day in 2003 to 6.2 million in 2009, and then begin declining in 2010, falling to 4.7 million barrels per day in 2025.

Energy is the backbone of our economy and having a strong economy is essential to maintaining and strengthening our national security. Conserving energy, especially reducing the nation's dependence on petroleum, benefits the United States of America in several ways. Reducing total petroleum use and reducing petroleum imports decrease our economy's vulnerability to oil price shocks. Reducing dependence on oil imports from unstable regions enhances our energy security and can reduce the flow of oil profits to certain states now hostile to the U.S. Reducing the growth rate of oil use will help relieve pressures on already strained domestic refinery capacity, decreasing the likelihood of future product price volatility.

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7 http://www.eia.doe.gov/oiaf/ieo/index.html

8 U.S. oil use has become increasingly concentrated in the transportation sector. In 1973, the U.S. transportation sector accounted for 51 percent of total U.S. petroleum use (8.4 of 16.5 million barrels per day (mmbd)). By 2003, transportation's share of U.S. oil had increased to 66 percent (13.2 out of 20.0 mmbd). (USDOE/EIA, Monthly Energy Review, April 2005, Table 11.2) Energy demand for transportation is projected to grow by over 67 percent between 2003 and 2025. (USDOE/EIA, Annual Energy Outlook (Report # DOE/EIA-0383), January 2005) Demand for light-duty vehicle fuels is projected to increase at a similar pace. (Id.)

AIR QUALITY

CRITERIA POLLUTANT EMISSIONS

Air quality is measured by determining the concentration of air pollutants present within the air mass of a region, in parts per million (ppm) or micrograms per cubic meter ($\mu g/m^3$). Air pollutants are a significant cause of concern for both public health and welfare. In response to both of these concerns, Federal regulations have been developed for six criteria pollutants, under the National Ambient Air Quality Standards (NAAQS), that are considered harmful to public health and the environment. The six criteria pollutants are carbon monoxide (CO), lead (Pb), nitrogen dioxide (NO_2), ozone (O_3), sulfur dioxide (SO_2), and particulate matter (PM). Nitrogen dioxide oxidizes in the atmosphere over the course of several hours and is often referred to simply as nitrogen oxides (NO_X).

The ambient concentration of pollutants is compared with the EPA's NAAQS in order to measure air quality. There are two types of standards – primary and secondary. Primary standards protect against adverse health effects; secondary standards protect against adverse welfare effects, such as damage to farm crops and vegetation and damage to buildings. Because different pollutants have different effects, the NAAQS for each pollutant is different. Some pollutants have standards for both long-term and short-term averaging times. The short-term standards were designed to protect against acute, or short-term, health effects, while the long-term standards were established to protect against chronic health effects.

When the levels of the criteria pollutants within a geographic region are below the NAAQS established by the Clean Air Act, that region is called an attainment area; when concentrations of criteria pollutants in the region exceed the standards, it is called a non-attainment area. The EPA continuously monitors ambient air quality within counties and air basins in the U.S.

Transportation sources in the United States account for the highest or second highest levels of emissions for several pollutants. In spite of very significant improvements in transportation emissions over the last 30 years, the transportation sector continues to be a substantial source of criteria pollutants and their chemical precursors at the national level, and are responsible for most of the total CO and NO_X emissions, close to half of the total volatile organic compounds (VOCs)[9], and a quarter of total PM emissions. The contributions to Pb and SO_X emissions from vehicles are relatively less, partly due to their reduced presence in transportation fuels (Pb has essentially been eliminated from gasoline). However, SO_X is formed when fuel that contains sulfur, such as coal and oil, is burned, and when gasoline is extracted from oil in petroleum refineries. Thus, the analysis of criteria pollutant emissions presented in Chapter 4 will focus on the potential effects of setting the CAFE standards on CO, NO_X, VOC, PM, and SO_X emissions.

[9] VOCs are chemical precursors to ozone and PM.

GREENHOUSE GAS EMISSIONS

The transportation sector – specifically, motor-vehicle operation – is also a substantial contributor to greenhouse gas emissions, accounting for approximately one third of all greenhouse gas emissions in the United States. The operation of motor vehicles, including light trucks, accounts for the majority of these emissions. Thus, this document examines the estimated effects of the proposed light truck CAFE standards on the greenhouse gases. Greenhouse gases occur naturally, but also result from human activities, such as fossil fuel combustion, industrial processes, agricultural activities, deforestation, and waste treatment activities.

CO_2 is one of the main products of motor vehicle exhaust and, although it does not directly impair human health and is not regulated, in recent years it has started to be viewed as an issue of concern for its global climate change potential. The analysis includes calculations of estimated changes of CO_2 as representative of emissions of greenhouse gases.

WATER RESOURCES

Water resources include surface water and groundwater. Surface waters are sources open to the atmosphere, such as rivers, lakes, reservoirs, and wetlands. Groundwater is found in natural reservoirs or aquifers below the earth's surface. Sources of groundwater include rainfall and surface water, which penetrate and move through the soil to the water table.

Water quality may be affected by changes in fuel consumption, as fuel consumption determines the level of oil drilling and oil transport activities, which in turn determine the risk of oil spills and leaks, pipeline blowouts, and water contamination during the drilling process. Additionally, fuel consumption determines the need for oil refining and associated oil refinery liquid waste and thermal pollution of waters near refineries (Epstein and Selber 2002). Water quality may also be affected by the frequency, intensity, and distribution of precipitation events, which could be influenced by climate change variability.

In addition, because of wet deposition of air pollutants, changes in air emissions of criteria pollutants could be a source of concern for their potential effects on water quality. The generation of air pollution decreases air quality and adversely impacts water resources through the creation of acid rain. NO_X and SO_X are contributors to the formation of acid rain and acidification of freshwater bodies (EPA 2001). The ecological effects of acid rain are most clearly seen in aquatic environments. Acid rain flows to streams, lakes, and marshes after falling on forests, fields, buildings, and roads. Acid rain also falls directly on aquatic habitats.

BIOLOGICAL RESOURCES

Biological resources consist of all terrestrial and aquatic flora and fauna and the habitats in which they occur. The U.S. Fish and Wildlife Service has jurisdiction over terrestrial and freshwater ecosystems and the National Marine Fisheries Service has jurisdiction over marine ecosystems. Protected biological resources include sensitive habitats and species under consideration for listing (candidate species) or listed as threatened or endangered by the U.S. Fish and Wildlife Service or by individual States. Sensitive habitats include areas protected by legislation or habitats of concern to regulating agencies.

Petroleum drilling, refining, and transport activities, as well as emissions from fuel consumption, have the potential to impact biological resources through habitat destruction and encroachment, and air and water pollution, raising concern about their effects on the preservation of animal and plant populations and their habitats. Oil exploration and extraction result in intrusions into onshore and offshore natural habitats, and may involve construction within natural habitats. Also, oil drilling and transport result in oil spills and pipeline breaks; oil contamination of aquatic and coastal habitats can smother small species and is dangerous to animals and fish through oil ingestion and oil coatings on fur and skin. Similarly, oil-refining activities result in water and thermal pollution, both of which can be harmful to animal and plant populations (Epstein and Selber 2002). Finally, offshore drilling and oil transport from other countries can lead to vessel grounding, vessel collision, and other accidents that could affect plant and animal communities and their environments.

Oil drilling, refining, and transport activities, as well as the burning of fuel during the operation of light trucks, result in air emissions that have an effect on air quality and could have secondary effects on animal and plant populations and their supporting ecosystems. Potential effects on biological resources could be derived from particulate deposition and acid rain effects on water bodies, soils, and vegetation. Because of the interdependence of organisms in an aquatic ecosystem, acid rain and the changes it causes to pH or mineral and metal levels could affect biodiversity as well. In addition, acid rain enhances eutrophication of lakes, estuaries, and coastal environments. Eutrophication, defined as enrichment of a water body with plant nutrients, usually results in communities dominated by phytoplankton, and could result in the contamination of aquatic environments and harmful algal blooms, among other undesirable effects. Acid rain also causes slower growth, injury, or death of forests, and has been linked to forest and soil degradation in many areas of the eastern United States. The acidification of soils can also produce depletion of soil minerals that result in harmful mineral deficiencies for plants and wildlife. Finally, emissions of criteria pollutants and greenhouse gases could result in ozone layer depletion and promote climate change that could affect species and ecosystems.

LAND USE AND DEVELOPMENT

Land use and development refers to human activities that alter land (e.g., industrial and residential construction in urban and rural settings, clearing of forests for agricultural or industrial use) and may affect the amount of carbon or biomass in existing forest or soil stocks in the affected areas. For the purposes of this document, the main concern over land use and development issues is potential manufacturing plant changes that manufacturers may institute to respond to the proposed CAFE standards.

HAZARDOUS MATERIALS

Hazardous materials are solid, liquid, or gaseous materials that because of their quantity, concentration, or physical, chemical, or infectious characteristics may cause or significantly contribute to an increase in mortality or an increase in irreversible illness or pose a substantial hazard to human health or the environment when improperly treated, stored, transported, or disposed of. Hazardous materials are designated by the Secretary of Transportation as posing an unreasonable risk to health, safety, property, and environment. Hazardous materials include hazardous substances, hazardous wastes, marine pollutants, elevated temperature materials, and materials identified by the DOT in the Code of Federal Regulations.

Hazardous wastes are generated during the oil refining process. These wastes include oily sludges, spent caustics, spent catalysts, wastewater, maintenance and materials handling wastes, and other process wastes (Freeman 1995).

4.0 ENVIRONMENTAL CONSEQUENCES

This section addresses the range of estimated environmental effects associated with the Proposed Action and various alternatives. This range is represented by Alternatives A – C. (See Section 2.) Although Alternative A represents the baseline value of 22.2 mpg, and is the value to which other alternatives are compared, it also represents a boundary for the range of estimated environmental effects.

This section is focused on assessing the primary impacts on energy use, and criteria and greenhouse gas emissions. The energy section considers both the refined fuel consumed by the affected motor vehicles and the energy used in the oil extraction, transportation, and refining process.

ASSUMPTIONS, METHODOLOGIES, AND LIMITATIONS

ASSUMPTIONS AND METHODOLOGIES

The following assumptions and methodologies were used to assess and quantify the environmental effects of the alternatives. It is important to note that these assumptions are inherently uncertain. However, the quantitative information presented in this chapter provides reasonable estimates of the approximate impacts of the alternatives. These estimates can also be used for comparison with national level projections.

Key analytical and modeling assumptions are described below.

Baseline. For purposes of this document, it is assumed that under the Baseline alternative, the light truck CAFE standards for MYs 2008-2011 would remain at the 22.2-mpg level. The baseline is used to evaluate the potential effects of the proposed CAFE standards. Some manufacturers' average fuel economy levels already exceed this level, or their product plans indicate that they expect to do so during one or more of the affected MYs. Other manufacturers have indicated that they plan to achieve unadjusted CAFE levels (*i.e.*, CAFE levels that do not account for credit use or adjustments to fuel economy levels for alternative- and flexible-fuel vehicles) below 22.2 mpg.

Technology Use. The analysis assumes that the mix of the light trucks sold will remain unchanged from that indicated in manufacturers' product plans. Thus, fuel economy increases will result only from the application of technology to light trucks. Two major elements of the model methodology include: (1) projections of the technical characteristics and sales volumes of future product offerings, (2) estimates of the applicability, incremental cost, and fuel savings associated with different technologies that might be utilized to improve light truck fuel economy. This information was used together with assumptions about the value of anticipated fuel savings to vehicle purchasers to estimate the level of technology utilization each manufacturer might undertake to reach the CAFE levels required to comply with each alternative. Standard vehicle stock accounting techniques and vehicle emission factors were then used to estimate corresponding future fuel consumption levels, as well as the associated changes in criteria pollutant and carbon emissions.

Vehicle Lifetime and Survival Rates. Environmental impacts resulting from the various alternatives were estimated separately for each model year over its lifespan in the U.S. vehicle fleet, extending from the initial year when the model year is offered for sale through the year when nearly all vehicles from the model year have been retired or scrapped (approximately 26 years). A "survival curve" for light trucks was developed by calculating the proportion of vehicles originally produced during a model year that remain in service at each age, and fitting a smooth curve to these data to improve its ability to represent the expected survival behavior of light trucks produced during future model years.

Lifetime and Annual Data. Fuel consumption and emissions information are generally presented as an undiscounted cumulative total values over the expected 36-year lifetimes of light trucks produced during each model year that would be affected by the action. In addition, the impact of the action on energy use and emissions by the vehicles it would affect is shown for selected future calendar years, in order to facilitate comparison of these impacts to projected energy use and emissions budgets for those years.

Rebound Effect. Tightening CAFE standards reduces the fuel component of the cost of operating light-duty vehicles, leading to an increase in vehicle use. The resulting increase, termed the "rebound effect," offsets part of the reduction in gasoline consumption and petroleum use that results from improved fuel efficiency.

The most recent estimates of the magnitude of the rebound effect for light-duty vehicles fall in the relatively narrow range of 10% to 30%, which implies that increasing vehicle use will offset 10–30% of the fuel savings resulting from an improvement in fuel economy. A rebound effect of 20% was employed after reviewing the literature; this value was selected as reasonable by according greater emphasis to studies that analyze more recent data on light duty vehicle use. The rebound effect produces a corresponding increase in the total number of miles driven for each subsequent calendar year the subject vehicles remain in the fleet.

Fuel Production. The demand for fuel for MY 2008-2011 light trucks was assumed to be met by a combination of imported refined gasoline and domestic refining of crude oil. Based on a review of historical data and on modeling using the National Energy Modeling System (NEMS), we assigned a 50% share to imports of refined gasoline and a 50% share to domestically refined crude oil for the marginal changes in fuel consumption.

Industry-wide Estimates of Environmental Effects. The analysis developed for this document relies on industry-wide estimates of effects, such as changes in fuel consumption and emissions. This level of aggregation is consistent with the estimation of national-scale environmental effects. However, in some cases, this document reports effects on an average per-vehicle basis. Such reporting provides an alternative sense of scale that may make the information more easily accessible to the reader.

Manufacturing Plans. Although current CAFE levels and product plans vary among manufacturers, we tentatively determined that the proposed changes to light truck standards would not require manufacturers to change light trucks in ways that would have important environmental effects unrelated to vehicle use. Rather, all manufacturers would be able to meet the proposed standards through changes in vehicle design (*e.g.*, aerodynamics) and components (*e.g.*, transmissions), neither of which is expected to significantly alter the quantity or mix of materials used for vehicle production.

Criteria Pollutant Emissions Deterioration. The MOBILE 6.2 vehicle emission factor model projects gradual deterioration in emissions over a vehicle's useful life. In particular, the model projects that CO, VOC, and NO_X emission rates would each increase over the useful life of trucks, whereas those of PM and SO2 remain constant. This behavior plays an important role in the evolution of total annual emissions from trucks sold as they age, and also influences the estimates of changes in criteria pollutant emissions associated with the rebound effect.

Greenhouse Gas Emissions. The analysis includes calculations of changes of CO_2 emissions from light trucks resulting from each alternative. Changes in CO_2 emissions are used to represent overall changes in greenhouse gas emissions, because CO_2 accounts for more than 95% of the total greenhouse gas emissions from the transportation sector (EPA 1999a). Additionally, CO_2 emissions result directly from and are directly proportional to the combustion of fuels. The Intergovernmental Panel on Climate Change guidelines also employs CO_2 as representative of greenhouse gas emissions (EPA 2002b).

LIMITATIONS

The emissions estimates presented in this section are dependent on both the rebound effect and the marginal dynamics of petroleum supply, both of which are highly uncertain. If the actual additional vehicle miles driven are smaller or larger than the range assumed for the rebound effect, for example, the model could be over or under-estimating the resulting impacts. Thus, the calculations of net emissions changes are also uncertain. However, the analysis yields estimates of net emissions changes that are, without exception, extremely small relative to aggregate national emissions.

In addition, under any set of reasonable assumptions regarding the marginal petroleum supply, the magnitude of these calculated net changes in criteria pollutants is extremely small. With respect to the impacts on reduced refinery emissions due to decreases in consumption, a recent EIA report states that increases in fuel economy standards, depending on the magnitude and timing of such increases, will yield a similar share of gasoline consumption savings, reflected in reduced imports of gasoline (EIA 2002c).

However, estimates of market responses relating to gasoline imports and domestic refining are variable and highly uncertain, such that other refining/import scenarios are possible.

ENERGY

Table 4-1 summarizes the projected impacts of the various alternatives on light truck fuel use and energy consumption for selected calendar years, and places these projected impacts in the larger context of the Energy Information Administration forecast of total fuel and energy use by the U.S. light truck fleet. As the table indicates, the estimated fuel and energy savings resulting from each alternative are projected to be largest in absolute terms during 2015, when most of the light trucks manufactured under the proposed stricter CAFE standard remain in the fleet, and decline in succeeding years. Alternative C is estimated to result in the largest reductions in fuel and energy use during each year shown in Table 4-1.

Table 4-1. Estimated Change in Light Truck Fuel Use and Energy Consumption vs. EIA Forecast, 2008-2025

Measure	Calendar Year	Baseline**	Alternative B	Alternative C
Fuel Consumption by MY 2008-11 Light Trucks (billion gallons)	2010	23.34	22.87	22.82
	2015	23.77	23.13	23.08
	2020	15.29	14.87	14.85
	2025	7.86	7.63	7.62
Percent Change in Fuel Consumption from Baseline	2010	--	-2.0%	-2.3%
	2015	--	-2.7%	-2.9%
	2020	--	-2.8%	-2.9%
	2025	--	-2.8%	-3.0%
Energy Consumption by MY 2008-11 Light Trucks (quadrillion BTU)	2010	2.674	2.620	2.614
	2015	2.723	2.649	2.644
	2020	1.752	1.703	1.700
	2025	0.900	0.874	0.873
Change in Energy Consumption by MY 2008-11 Light Trucks (quadillion Btu)	2010	--	-0.05	-0.06
	2015	--	-0.07	-0.08
	2020	--	-0.05	-0.05
	2025	--	-0.03	-0.03
Total Energy Consumption by All U.S. Light Trucks (quadrillion Btu)*	2010	10.1	--	--
	2015	11.8	--	--
	2020	13.3	--	--
	2025	14.9	--	--
Percent Change in Total Energy Consumption by All U.S. Light Trucks	2010	--	-0.54%	-0.60%
	2015	--	-0.63%	-0.67%
	2020	--	-0.36%	-0.38%
	2025	--	-0.17%	-0.18%

*Forecast of total energy use by U.S. light trucks with MY2007 light truck CAFE standard remaining in effect for MYs 2008-2025; source: Energy Information Administration, Annual Energy Outlook 2005 (http://www.eia.doe.gov/oiaf/aeo/index.html), Table 33.

** Value with MY 2007 light truck CAFE standard of 22.2 mpg remaining in effect for MYs 2008-11.

Table 4-2 shows the estimated effects of the alternatives on lifetime fuel consumption and energy use by model year 2008-11 light trucks. As it indicates, Alternatives B and C would result in projected lifetime fuel savings for MY 2008-2011 light trucks ranging from 1.3% to 1.7% of their fuel compared to the baseline, corresponding to 4.7-6.0 billion gallons.

These reductions in fuel and energy use are estimated to occur over the period from 2008, when the first light trucks produced under a stricter CAFE standard would be produced and sold, through the year (approximately 2034) when all light trucks subject to that new standard will have been retired from service. The estimated reductions in fuel production and use would also be expected to result in corresponding energy savings from reductions in crude oil extraction, storage, and transportation, as well as from gasoline refining or importation, storage, and distribution.

Table 4-2. Estimated Lifetime Fuel and Energy Use by MY 2008-11 Light Trucks

Model Year(s)	Baseline*	Alternative B	Alternative C
	Lifetime Fuel Consumption (billion gallons)		
2008	90.2	89.4	89.3
2009	90.7	88.8	88.5
2010	91.8	89.0	88.9
2011	91.7	87.5	87.5
2008-11	364.3	354.8	354.2
	Change from Baseline (billion gallons)		
2008	--	-0.8	-0.9
2009	--	-1.9	-2.2
2010	--	-2.7	-2.9
2011	--	-4.1	-4.1
2008-11	--	-9.5	-10.2
	Percent Change from Baseline		
2008	--	-0.92%	-1.04%
2009	--	-2.05%	-2.45%
2010	--	-2.96%	-3.15%
2011	--	-4.48%	-4.48%
2008-11	--	-2.61%	-2.79%
	Lifetime Energy Consumption (quadrillion Btu)		
2008	10.34	10.24	10.23
2009	10.39	10.17	10.13
2010	10.51	10.20	10.18
2011	10.50	10.03	10.03
2008-11	41.73	40.64	40.57
	Change from Baseline (quadrillion Btu)		
2008	--	-0.09	-0.11
2009	--	-0.21	-0.25
2010	--	-0.31	-0.33
2011	--	-0.47	-0.47
2008-11	--	-1.09	-1.16
	Percent Change from Baseline		
2008	--	-0.92%	-1.04%
2009	--	-2.05%	-2.45%
2010	--	-2.96%	-3.15%
2011	--	-4.48%	-4.48%
2008-11	--	-2.61%	-2.79%

* Value with MY 2007 light truck CAFE standard of 22.2 mpg remaining in effect for MYs 2008-11.

AIR QUALITY

CRITERIA POLLUTANT EMISSIONS

Each of the alternatives considered in this analysis is projected to result in extremely modest changes in total nationwide emissions of criteria pollutants and their chemical precursors. Table 4-3 reports estimated lifetime emissions of CO, VOC, NO_X, PM, and SO2, by MY 2008-11 light trucks under each alternative, while Table 4-4 shows the changes in these lifetime emissions that would result under each alternative to the No Action baseline. As these tables show, very slight increases from baseline levels in lifetime emissions of CO and VOC are projected to occur under Alternatives B and C. In contrast, emissions of NO_X, PM, and SO_2 are expected to decline from their level under the No Action alternative under Alternatives B and C.

Because these projected changes in emissions of criteria pollutants are extremely small when compared to total emissions of these pollutants from all sources, we have not attempted to estimate the resulting changes in total emissions or ambient concentrations of these pollutants in specific Nonattainment Areas. There is likely to be significant uncertainty in estimating emission inventories for individual Nonattainment Areas, partly because of the inherent variability in the activities that generate emissions, and partly because of imprecision in measuring the levels of these activities and the rates at which they generate emissions of various pollutants.[10] The increases in total nationwide emissions of CO and VOC projected to result from Alternatives B and C are so small that the associated increases in their emissions within individual Nonattainment Areas are likely to fall well within the range of uncertainty surrounding current estimates of total CO and VOC emissions within these Areas.

Even if they could be measured reliably, any increases in CO or VOC emissions within individual Nonattainment Areas are also likely to be so small that they will not significantly increase total emissions or ambient concentrations of these pollutants.[11] Thus on the basis of this analysis, we believe that any emissions increases associated with the Proposed Action are unlikely to require Nonattainment Areas to adopt additional emissions control measures to offset them, or to complicate in any other way these Areas' efforts to comply with the NAAQS.

[10] See U.S. Environmental Protection Agency, *Evaluating the Uncertainty of Emission Estimates -- Final Report*, July 1996.
[11] VOC is not itself a regulated pollutant, but VOC emissions contribute to the formation of ozone, which is a criteria pollutant.

Table 4-3. Estimated Lifetime Emissions of Criteria Pollutants and Greenhouse Gases by Model Year 2008-2011 Light Trucks

Pollutant or Greenhouse Gas	Model Year	Lifetime Emissions (million tons)		
		Baseline*	Alternative B	Alternative C
Carbon Monoxide (CO)	2008	31.78	31.84	31.85
	2009	31.74	31.89	31.92
	2010	31.58	31.80	31.81
	2011	31.09	31.42	31.42
	2008-11	126.18	126.95	127.00
Volatile Organic Compounds (VOC)	2008	1.0280	1.0285	1.0285
	2009	0.9843	0.9852	0.9853
	2010	0.9669	0.9680	0.9680
	2011	0.9397	0.9412	0.9412
	2008-11	3.9190	3.9228	3.9230
Nitrogen Oxides (NOx)	2008	1.0899	1.0898	1.0896
	2009	1.0809	1.0807	1.0804
	2010	1.0707	1.0702	1.0700
	2011	1.0508	1.0497	1.0497
	2008-11	4.2922	4.2903	4.2896
Fine Particulate Matter (PM 2.5)	2008	0.0391	0.0390	0.0389
	2009	0.0395	0.0392	0.0392
	2010	0.0400	0.0396	0.0396
	2011	0.0400	0.0394	0.0394
	2008-11	0.1586	0.1572	0.1571
Sulfur Dioxide (SO_2)	2008	0.1388	0.1377	0.1376
	2009	0.1398	0.1374	0.1369
	2010	0.1413	0.1378	0.1376
	2011	0.1411	0.1359	0.1359
	2008-11	0.5609	0.5488	0.5479
Carbon Dioxide (CO_2)**	2008	332.3	329.2	328.8
	2009	333.9	327.0	325.7
	2010	337.8	327.8	327.2
	2011	337.4	322.3	322.3
	2008-11	1,341.4	1,306.4	1,304.0

* Value with MY 2007 light truck CAFE standard of 22.2 mpg remaining in effect for MYs 2008-11.

** Carbon dioxide (CO_2) emissions in millions of metric tons of carbon equivalent.

Table 4-4. Estimated Changes in Lifetime Emissions of Criteria Pollutants and Greenhouse Gases by Model Year 2008-2011 Light Trucks

Pollutant or Greenhouse Gas	Model Year	Percent Change in Emissions from Baseline	
		Alternative B	Alternative C
Carbon Monoxide (CO)	2008	0.21%	0.24%
	2009	0.48%	0.57%
	2010	0.70%	0.74%
	2011	1.07%	1.07%
	2008-11	0.61%	0.65%
Volatile Organic Compounds (VOC)	2008	0.05%	0.05%
	2009	0.09%	0.10%
	2010	0.11%	0.11%
	2011	0.15%	0.15%
	2008-11	0.10%	0.10%
Nitrogen Oxides (NOx)	2008	-0.01%	-0.02%
	2009	-0.02%	-0.04%
	2010	-0.05%	-0.07%
	2011	-0.11%	-0.11%
	2008-11	-0.04%	-0.06%
Fine Particulate Matter (PM 2.5)	2008	-0.31%	-0.35%
	2009	-0.68%	-0.81%
	2010	-0.98%	-1.04%
	2011	-1.47%	-1.47%
	2008-11	-0.86%	-0.92%
Sulfur Dioxide (SO_2)	2008	-0.76%	-0.87%
	2009	-1.70%	-2.03%
	2010	-2.46%	-2.62%
	2011	-3.72%	-3.72%
	2008-11	-2.17%	-2.32%
Carbon Dioxide (CO_2)	2008	-0.92%	-1.04%
	2009	-2.05%	-2.45%
	2010	-2.96%	-3.15%
	2011	-4.48%	-4.48%
	2008-11	-2.61%	-2.79%

GREENHOUSE GAS EMISSIONS

Implementing the proposed standards is estimated to result in reduced emissions of CO_2, the predominant greenhouse gas emitted by motor vehicles. As Table 4-3 reports, emissions of CO_2 over the lifetimes of MY 2008-11 light trucks are projected to decline by 25 – 27 million metric tons on a carbon-equivalent basis (MMTCe), depending on whether alternative B or C is implemented. As Table 4-4 shows, however, these potential changes in projected CO_2 emissions are also projected to be extremely small when compared to CO_2 emissions by MY 2008-11 light trucks under the Baseline alternative, or to total CO_2 emissions resulting from motor vehicle use.

WATER RESOURCES

The projected reduction in fuel production and consumption is projected to lead to reductions in contamination of water resources. These include oil spills and leaks, pipeline blowouts, oil refinery liquid waste. The various alternatives are projected to result in overall reductions in NO_X and SO_2 emissions, resulting in benefits to water resources from reduced acid rain generation.

BIOLOGICAL RESOURCES

The estimated reduction in fuel production and consumption is projected to lead to minor reductions in impacts to biological resources. These include habitat encroachment and destruction, air and water pollution, and oil contamination from petroleum refining and distribution.

LAND USE AND DEVELOPMENT

Major changes to manufacturing facilities might have implications for environmental issues associated with land use and development. However, analysis of available technologies and manufacturer capabilities indicates that manufacturers are expected to meet the proposed standards by applying technologies rather than, for example, changing product mix in ways that would lead to manufacturing plant changes. Therefore, the various alternatives are not projected to have an impact on land use or development.

HAZARDOUS MATERIALS

The various alternatives are not projected to alter the existing regulatory framework governing the transportation or storage of hazardous materials. However, the projected reduction in fuel production and consumption may lead to a reduction in the amount of hazardous wastes created by the oil refining process.

SUMMARY OF POTENTIAL ENVIRONMENTAL IMPACTS

Table 4-5 summarizes and compares the projected estimated impacts for the baseline standard (22.2 mpg) and the various alternatives.

Table 4-5. Summary of Estimated Lifetime Environmental Impacts of MY 2008-11 Light Trucks

Resource	Lifetime Impact of MY 2008-11 Light Trucks*	Baseline Impact*	Change from Baseline:		Percent Change from Baseline:	
			Alternative B	Alternative C	Alternative B	Alternative C
Petroleum	**Fuel Consumption (billion gallons)**	364.3	-9.5	-10.2	-2.61%	-2.79%
Energy	**Energy consumption (quadrillion BTU)**	41.73	-1.09	-1.16	-2.61%	-2.79%
Air Quality	**CO emissions (million tons)**	126.2	0.773	0.826	0.61%	0.65%
	VOC emissions (million tons)	3.919	0.0038	0.0040	0.10%	0.10%
	NOx emissions (million tons)	4.292	-0.0019	-0.0026	-0.04%	-0.06%
	PM2.5 emissions (million tons)	0.159	-0.0014	-0.0015	-0.86%	-0.92%
	SO2 emissions (million tons)	0.561	-0.0122	-0.0130	-2.17%	-2.32%
Global Climate	**CO2 emissions (million metric tons, carbon equivalent)**	1,341.4	-35.0	-37.4	-2.61%	-2.79%

* Value with MY 2007 light truck CAFE standard of 22.2 mpg remaining in effect for MYs 2008-11.

CUMULATIVE IMPACTS

Under previous actions, the agency issued EAs to evaluate environmental impacts of CAFE standards, including the cumulative impacts of these past actions, and concluded that these actions would not result in a significant impact on the quality of the human environment. As noted previously, restrictions in the DOT and Related Agencies Appropriations Acts for FY 1996-2001 precluded the agency from setting CAFE standards differing from those in existence prior to the imposition of the restrictions.

The agency's last action prior to these restrictions was taken in 1994 (setting light truck standards for MY 1996 and MY 1997). Thus for the purposes of the Proposed Action, we have focused the evaluation of cumulative impacts on those actions that we have taken since the lifting of the Congressional restrictions. This determination is consistent with our evaluation in 2003 for the MY 2005-2007 standards.

We have assessed the estimated impacts of the alternatives in relation to the standard of 20.7 mpg existing prior to the MY 2005-2007 rulemaking, and included the impacts of both the 2005-2007 and 2008-2011 rulemakings. We have assumed a lifetime of 26 years for the 2005-2011 vehicles, which projects cumulative impacts to the year 2037. Further, we have assessed the estimated impacts of the Proposed Action in relation to the estimated impacts of the Clean Air Act Tier 2 requirements.

With respect to Tier 2, passenger cars, SUVs, pickups, vans, and multi-duty passenger vehicles (MDPVs)[12] are subject to the same national emission standards. Vehicles and fuels are treated as a system, so cleaner vehicles will have low-sulfur gasoline to facilitate greater emission reductions. The Tier 2 emission standards apply to all passenger vehicles, regardless of whether they run on gasoline or diesel fuel. Tier 2 regulations took effect beginning with model year 2004, and will be fully phased in over subsequent model years. The phase-in schedule for MDPVs under the Tier 2 program requires that 50% of the fleet must comply in MY 2008, and 100% by MY 2009.

EPA also regulates MDPVs under "Interim Non-Tier 2" standards, applicable to MDPVs on a phase-in schedule beginning with MY 2004. The phase-in schedule requires compliance at the following levels: 25% in 2004, 50% in 2005, 75% in 2006 and 100% in 2007. Thus, beginning in 2008, half the MDPVs are expected to comply with Tier 2 and the other half with "Interim Non-Tier 2 Standards," with implementation expanding in succeeding years.

EPA projects that with Tier 2/Gasoline Sulfur control, light-duty vehicle NOx and VOC emissions will continue their downward trend past 2020, despite increases in VMT. EPA estimates that by the year 2010, total NOx emissions will be reduced by 1,236 million tons per year from the level that would have occurred in the absence of those controls. This emission reduction will result from the Tier 2-related light-duty vehicle emission reductions, representing the benefits of low sulfur fuel and Tier 2 car and light truck standards.[13] In the larger context of the Tier 2 regulatory program, and its positive effects on mobile source emissions, the estimated small increases in some of the criteria pollutants brought about by increasing CAFE standards under the 2005-2007 and 2008-2011 actions are projected to be very small.

Table 4-6 shows the estimated cumulative effects of the two rules establishing light truck CAFE standards for MY2005-07 and MY2008-11 on lifetime fuel consumption, energy use, emissions of criteria pollutants (and their chemical precursors) and greenhouse gases by MY 2005-11 light trucks. These projected effects are measured by adding the effects identified in the *Final Environmental Assessment: National Highway Traffic Safety Administration Corporate Average Fuel Economy (CAFE) Standards, March 31, 2003, DOT-VNTSC-NHTSA-01-01* to the effects projected to result from the current Proposed Action. The estimated levels of fuel consumption, energy use, and emissions over the lifetimes of MY2005-11 light trucks are compared with those that were projected to have resulted if the less stringent MY 2004 standard of 20.7 mpg had been extended from MY2005 through MY2011.

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[12] Essentially MDPVs are light trucks with a GVWR between 8,500 lb. and 10,000 lb. designed primarily to transport passengers. See, 40 CFR § 86.1803.01.
[13] 65 FR 6698.

Table 4-6. Estimated Lifetime Environmental Impacts of MY 2005-11 Light Trucks

Resource	Environmental Impact	Lifetime Impact of MY 2005-11 Light Trucks without Previous Action*	Lifetime Impact of MY 2005-11 Light Trucks under Alternative Actions for MY 2008-11		
			Baseline**	Alternative B	Alternative C
Petroleum	Fuel Consumption (billion gallons)	537.8	525.0	518.2	517.5
Energy	Energy consumption (quadrillion BTU)	61.4	60.0	59.2	59.1
Air Quality	CO emissions (million tons)	109.223	109.839	110.152	110.184
	VOC emissions (million tons)	7.5233	7.5356	7.5409	7.5414
	NOx emissions (million tons)	7.4804	7.4794	7.4776	7.4774
	PM2.5 emissions (million tons)	0.1821	0.1807	0.1800	0.1799
	SO2 emissions (million tons)	1.1351	1.1187	1.1099	1.1090
Global Climate	CO2 emissions (million metric tons, carbon equivalent)	1,980	1,933	1,908	1,905

*Lifetime environmental impacts of MY2005-11 light trucks if MY2004 standard of 20.7 mpg had remained in effect for MY2005-11.

**Lifetime environmental impacts of MY2005-11 light trucks if MY2007 standard of 22.2 mpg remains in effect for MY2008-11.

Table 4-7 reports estimated changes in lifetime fuel use, energy consumption, and emissions by MY 2005-11 light trucks from the levels that might have resulted from extending the MY 2004 standard through MY 20011. As it indicates, the estimated lifetime environmental impacts of MY 2005-11 light trucks under the baseline alternative for MY 2008-11 are projected to differ from the levels estimated to occur if the MY 2004 standard had been extended through MY 2011. This is because the baseline alternative for MY 2008-11 reflects the higher standards adopted previously for MYs 2005-2007, and would extend the MY 2007 standard of 22.2 mpg for MYs 2008-11.

These changes in the cumulative environmental impacts of MY 2005-11 might increase from their levels under the baseline alternative if either Alternative B or C were adopted for MY 2008-11, since both of those alternatives would require fuel economy levels above the MY 2007 standard for MYs 2008-11. As Table 4-7 shows, the cumulative effects estimated to result from both the 2005-2007 and 2008-2011 light truck rulemakings over the lifetimes of the vehicles they would affect are projected to be very small.

Table 4-7. Estimated Cumulative Effect of MY 2005-07 Standards and 2008-11 CAFE Alternatives in Relation to MY 2004 Standard of 20.7 mpg.

Resource	Environmental Impact	Cumulative Percent Change Resulting from MY2005-11 CAFE Standards under Alternative Actions for MY2008-11*		
		Baseline**	Alternative B	Alternative C
Petroleum	Fuel Consumption	-2.37%	-3.73%	-3.90%
Energy	Energy consumption	-2.37%	-3.73%	-3.90%
Air Quality	CO emissions	0.56%	0.85%	0.87%
	VOC emissions	0.16%	0.23%	0.24%
	NOx emissions	-0.012%	-0.037%	-0.039%
	PM2.5 emissions	-0.76%	-1.17%	-1.22%
	SO2 emissions	-1.45%	-2.25%	-2.35%
Global Climate	CO2 emissions	-2.37%	-3.73%	-3.90%

*Percent changes in lifetime environmental impacts of MY2005-11 light trucks from levels that would have occurred if MY2004 light truck CAFE standard of 20.7 mpg had been extended for MY2005-11.

** Change in lifetime environmental impacts of MY2005-11 light trucks if MY2007 standard of 22.2 mpg remains in effect for MY2008-11.