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# Table of Contents

<b>List of Acronyms and Abbreviations .....</b>	<b>xv</b>
<b>Glossary .....</b>	<b>xviii</b>
<b>Summary .....</b>	<b>S-1</b>
S.1 FOREWORD.....	S-1
S.2 BACKGROUND.....	S-1
S.3 PURPOSE AND NEED FOR THE PROPOSED ACTION .....	S-1
S.4 ALTERNATIVES .....	S-2
S.5 POTENTIAL ENVIRONMENTAL CONSEQUENCES .....	S-5
S.5.1 Direct and Indirect Effects .....	S-8
S.5.2 Cumulative Effects.....	S-18
S.5.3 Other Potential Environmental Consequences.....	S-27
S.5.4 Mitigation Measures and Unavoidable Adverse Impacts .....	S-29
<b>Chapter 1 Purpose and Need for the Proposed Action .....</b>	<b>1-1</b>
1.1 INTRODUCTION .....	1-1
1.2 NEPA PROCESS .....	1-1
1.3 PURPOSE AND NEED .....	1-2
1.3.1 Notice of Intent and Scoping .....	1-3
1.3.2 Summary of Scoping Comments and NHTSA’s Responses.....	1-5
1.3.3 Summary of Public Comments on the DEIS.....	1-18
1.3.4 Submission of the Final EIS and Next Steps .....	1-20
<b>Chapter 2 Proposed Action and Alternatives.....</b>	<b>2-1</b>
2.1 INTRODUCTION .....	2-1
2.2 STANDARDS-SETTING AND BENEFIT-COST ANALYSIS .....	2-1
2.2.1 Volpe Model .....	2-2
2.2.2 Input Scenarios.....	2-3
2.2.3 Technology Assumptions.....	2-4
2.2.4 FEIS Analytical Improvements.....	2-8
2.3 ALTERNATIVES .....	2-9
2.3.1 Preferred Alternative.....	2-12
2.3.2 Alternative 1: No Action.....	2-12
2.3.3 Alternative 2: 25 Percent Below Optimized .....	2-12
2.3.4 Alternative 3: Optimized.....	2-13
2.3.5 Alternative 4: 25 Percent Above Optimized .....	2-13
2.3.6 Alternative 5: 50 Percent Above Optimized .....	2-13
2.3.7 Alternative 6: Total Costs Equal Total Benefits .....	2-13
2.3.8 Alternative 7: Technology Exhaustion .....	2-14
2.4 ALTERNATIVES CONSIDERED BUT NOT ANALYZED IN DETAIL.....	2-14
2.5 COMPARISON OF ALTERNATIVES .....	2-15
2.5.1 Direct and Indirect Effects .....	2-16
2.5.2 Cumulative Effects.....	2-23
2.5.3 Scenario Comparison .....	2-34

**Chapter 3 Affected Environment and Environmental Consequences ..... 3-1**

3.1 INTRODUCTION ..... 3-1

    3.1.1 Direct and Indirect Impacts ..... 3-2

    3.1.2 Areas Not Affected ..... 3-2

    3.1.3 Approach to Scientific Uncertainty and Incomplete Information ..... 3-2

    3.1.4 Common Methodologies ..... 3-3

3.2 ENERGY ..... 3-7

    3.2.1 Affected Environment ..... 3-7

    3.2.2 Methodology ..... 3-8

    3.2.3 Environmental Consequences ..... 3-8

    3.2.4 Input Scenarios ..... 3-10

3.3 AIR QUALITY ..... 3-12

    3.3.1 Affected Environment ..... 3-12

    3.3.2 Methodology ..... 3-18

    3.3.3 Environmental Consequences ..... 3-30

    3.3.4 Input Scenarios ..... 3-46

3.4 CLIMATE ..... 3-61

    3.4.1 Introduction - Greenhouse Gases and Climate Change ..... 3-61

    3.4.2 Affected Environment ..... 3-64

    3.4.3 Methodology ..... 3-69

    3.4.4 Environmental Consequences ..... 3-84

    3.4.5 Input Scenarios ..... 3-104

3.5 OTHER POTENTIALLY AFFECTED RESOURCE AREAS ..... 3-108

    3.5.1 Water Resources ..... 3-108

    3.5.2 Biological Resources ..... 3-111

    3.5.3 Land Use and Development ..... 3-114

    3.5.4 Safety and Other Impacts to Human Health ..... 3-115

    3.5.5 Hazardous Materials and Regulated Wastes ..... 3-118

    3.5.6 Land Uses Protected under Section 4(f) ..... 3-120

    3.5.7 Historic and Cultural Resources ..... 3-121

    3.5.8 Noise ..... 3-121

    3.5.9 Environmental Justice ..... 3-122

**Chapter 4 Cumulative Impacts ..... 4-1**

4.1 INTRODUCTION ..... 4-1

    4.1.1 Approach to Scientific Uncertainty and Incomplete Information ..... 4-1

    4.1.2 Temporal and Geographic Boundaries ..... 4-3

4.2 ENERGY ..... 4-4

    4.2.1 Affected Environment ..... 4-4

    4.2.2 Environmental Consequences ..... 4-4

    4.2.3 Input Scenarios ..... 4-5

4.3 AIR QUALITY ..... 4-8

    4.3.1 Affected Environment ..... 4-8

    4.3.2 Methodology ..... 4-8

    4.3.3 Environmental Consequences ..... 4-9

    4.3.4 Input Scenarios ..... 4-22

4.4 CLIMATE ..... 4-36

    4.4.1 Introduction – Greenhouse Gases and Climate Change ..... 4-37

    4.4.2 Affected Environment ..... 4-37

4.4.3	Methodology .....	4-37
4.4.4	Environmental Consequences .....	4-53
4.4.5	Input Scenarios.....	4-72
4.5	RESOURCE IMPACTS OF CLIMATE CHANGE.....	4-75
4.5.1	Introduction.....	4-75
4.5.2	Methodology .....	4-75
4.5.3	Freshwater Resources .....	4-79
4.5.4	Terrestrial Ecosystems .....	4-92
4.5.5	Coastal Systems and Low-lying Areas .....	4-106
4.5.6	Food, Fiber, and Forest Products .....	4-116
4.5.7	Industries, Settlements, and Society .....	4-126
4.5.8	Human Health .....	4-143
4.6	ENVIRONMENTAL JUSTICE .....	4-153
4.6.1	Affected Environment.....	4-153
4.6.2	Environmental Consequences .....	4-153
4.7	NON-CLIMATE CUMULATIVE IMPACTS OF CO <sub>2</sub> .....	4-156
4.7.1	Affected Environment.....	4-156
4.7.2	Environmental Consequences .....	4-157
<b>Chapter 5 Mitigation .....</b>		<b>5-1</b>
<b>Chapter 6 Unavoidable Adverse Impacts; Short-term Uses and Long-term Productivity; Irreversible and Irretrievable Commitment of Resources .....</b>		<b>6-1</b>
6.1	UNAVOIDABLE ADVERSE IMPACTS .....	6-1
6.2	THE RELATIONSHIP BETWEEN LOCAL SHORT-TERM USES OF THE ENVIRONMENT AND THE MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY .....	6-1
6.3	IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES UNDER THE ACTION ALTERNATIVES.....	6-2
<b>Chapter 7 Preparers .....</b>		<b>7-1</b>
7.1	NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION .....	7-1
7.2	CONSULTANT TEAM .....	7-3
<b>Chapter 8 References.....</b>		<b>8-1</b>
<b>Chapter 9 Distribution List.....</b>		<b>9-1</b>
9.1	FEDERAL AGENCIES .....	9-1
9.2	STATE AGENCIES .....	9-2
9.3	ELECTED OFFICIALS .....	9-3
9.4	NATIVE AMERICAN TRIBES .....	9-4
9.5	COUNTY/LOCAL GOVERNMENTS .....	9-5
9.6	STAKEHOLDERS .....	9-5
<b>Chapter 10 Responses to Public Comments .....</b>		<b>10-1</b>
10.1	PURPOSE AND NEED .....	10-7

10.1.1	NEPA Process .....	10-11
10.1.2	Timing of NEPA Process/Public Participation .....	10-12
10.1.3	Document Structure/Readability .....	10-14
10.1.4	NHTSA’s Decision to Prepare an EIS .....	10-17
10.1.5	Functional Equivalence Doctrine.....	10-19
10.1.6	Transboundary Effects .....	10-22
10.2	PROPOSED ACTION AND ALTERNATIVES .....	10-26
10.2.1	General Context Comments .....	10-26
10.2.2	Volpe Model .....	10-46
10.2.3	Alternatives .....	10-120
10.3	AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES .....	10-160
10.3.1	Introduction.....	10-160
10.3.2	Air Quality .....	10-168
10.3.3	Climate.....	10-184
10.3.4	Resource Impacts of Climate Change.....	10-201
10.3.5	Non-Climate Cumulative Impacts of CO <sub>2</sub> Emissions .....	10-205
10.3.6	Other Potentially Affected Resources Areas .....	10-207
10.3.7	Cumulative Impacts - General .....	10-217
10.4	OTHER COMMENTS ON THE DEIS .....	10-219
10.4.1	Mitigation.....	10-219
10.4.2	List of Preparers.....	10-220
10.4.3	Appendix C Cost-Benefit Analysis Excerpt from the Preliminary Regulatory Impact Analysis .....	10-221
10.4.4	Additional Comments .....	10-223
10.4.5	Rulemaking.....	10-224

## List of Appendices

The appendices to this Draft Environmental Impact Statement (DEIS) have been provided electronically on the accompanying CD.

- Appendix A Sources Identified in Scoping Comments
- Appendix B Modeling Data
  - B-1 Air Emissions Modeling Data
  - B-2 Climate Modeling Data
- Appendix C FEIS Benefit-Cost Information, October 2, 2008
- Appendix D Comments Received on the Draft EIS

## List of Tables

Table S-1	Reference Case Alternative CAFE Standards in MY 2015 MPG.....	S-3
Table S-2	Reference Case and High Scenario Economic Model Inputs .....	S-4
Table S-3	High Scenario Alternative CAFE standards in MY 2015 MPG .....	S-4
Table S-4	Reference Case Passenger Car and Light Truck Annual Fuel Consumption and Fuel Savings (billion gallons).....	S-9
Table S-5	High Scenario Passenger Car and Light Truck Annual Fuel Consumption and Fuel Savings (billion gallons).....	S-9
Table S-6	Reference Case Alternative CAFE Standards Nationwide Criteria Pollutant Emissions and Toxic Air Pollutant Emissions from Passenger Cars and Light Trucks (tons/year, Calendar Year 2035).....	S-11
Table S-7	High Scenario Alternative CAFE Standards Nationwide Criteria Pollutant Emissions and Toxic Air Pollutant Emissions from Passenger Cars and Light Trucks (tons/year, Calendar Year 2035).....	S-12
Table S-8	Reference Case Emissions and Emissions Reductions Due to the MY 2011-2015 CAFE Standards from 2010-2100 (MMTCO <sub>2</sub> ) .....	S-13
Table S-9	Reference Case MY 2011-2015 Alternative CAFE Standards Impact on CO <sub>2</sub> Concentration, Global Mean Surface Temperature Increase, and Sea-level Rise in 2100 Using MAGICC (A1B).....	S-14
Table S-10	Reference Case MY 2011-2015 CAFE Alternatives: Impact on Reductions in Global Mean Precipitation based on A1B SRES Scenario Using Increases in Global Mean Surface Temperature Simulated by MAGICC.....	S-15
Table S-11	High Scenario Emissions and Emissions Reductions Due to the MY 2011-2015 CAFE Standards from 2010-2100 (MMTCO <sub>2</sub> ) .....	S-16
Table S-12	High Scenario 2011-2015 CAFE Alternatives Impact on CO <sub>2</sub> Concentration and Global Mean Surface Temperature Increase, and Sea-level Rise in 2100 Using MAGICC (A1B) .....	S-17
Table S-13	Reference Case Passenger Car and Light Truck Cumulative Annual Fuel Consumption and Cumulative Fuel Savings (billion gallons) .....	S-18
Table S-14	High Scenario Passenger Car and Light Truck Cumulative Annual Fuel Consumption and Cumulative Fuel Savings (billion gallons) .....	S-19
Table S-15	Reference Case MY 2011-2015 Standards and Potential MY 2016-2020 Standards Cumulative Impacts on Nationwide Criteria Pollutant Emissions and Toxic Air Pollutant Emissions from Passenger Cars and Light Trucks (tons/year, Calendar Year 2035) ..	S-20
Table S-16	High Scenario MY 2011-2015 Standards and Potential MY 2016-2020 Standards Cumulative Impacts on Nationwide Criteria Pollutant Emissions and Toxic Air Pollutant Emissions from Passenger Cars and Light Trucks (tons/year, Calendar Year 2035) ..	S-21

Table S-17	Reference Case MY 2011-2015 Standards and Potential MY 2016-2020 Standards Cumulative Emissions and Emissions Reductions Projected for 2010-2100 (MMTCO <sub>2</sub> ) .....	S-22
Table S-18	Reference Case MY 2011-2015 Standards and Potential MY 2016-2020 Standards Cumulative Impact on CO <sub>2</sub> Concentration, Surface Temperature Increase, and Sea-level Rise in 2100 Using MAGICC (A1B) .....	S-23
Table S-19	Reference Case MY 2011-2015 Standards and Potential MY 2016-2020 Standards Cumulative Impact on Reductions in Global Mean Precipitation Based on A1B SRES Scenario, Using Increases in Global Mean Surface Temperature Simulated by MAGICC .....	S-26
Table S-20	High Scenario Alternative CAFE Standards Cumulative Emissions and Emissions Reductions Due to the MY 2011-2015 Standards and Potential MY 2016-2020 Standards for 2010 through 2100 (MMTCO <sub>2</sub> ) .....	S-27
Table S-21	High Scenario MY 2011-2015 Standards and Potential MY 2016-2020 Standards Cumulative Impact on CO <sub>2</sub> Concentration, Global Mean Surface Temperature Increase, and Sea-level Rise in 2100 Using MAGICC (A1B) .....	S-28
Table 2.2-1	Economic Model Input Scenarios .....	2-4
Table 2.3-1	Reference Case Alternative CAFE Standards MY 2015 Required MPG .....	2-10
Table 2.3-2	MY 2015 Required MPG for Passenger Cars by Alternative and Model Input Scenario .....	2-11
Table 2.3-3	MY 2015 Required MPG for Light Trucks by Alternative and Model Input Scenario .....	2-11
Table 2.3-4	MY 2015 Required MPG for Passenger Cars and Light Trucks by Alternative and Model Input Scenario .....	2-11
Table 2.5-1	Reference Case Passenger Car and Light Truck Annual Fuel Consumption and Fuel Savings (billion gallons) .....	2-17
Table 2.5-2	High Scenario Passenger Car and Light Truck Annual Fuel Consumption and Fuel Savings (billion gallons) .....	2-18
Table 2.5-3	Reference Case Alternative CAFE Standards Nationwide Criteria Pollutant Emissions and Toxic Air Pollutant Emissions from Passenger Cars and Light Trucks (tons/year) (Calendar Year 2035) .....	2-19
Table 2.5-4	High Scenario Alternative CAFE Standards Nationwide Criteria Pollutant Emissions and Toxic Air Pollutant Emissions from Passenger Cars and Light Trucks (tons/year) (Calendar Year 2035) .....	2-19
Table 2.5-5	Reference Case Emissions and Emissions Reductions Due to the MY 2011-2015 CAFE Standards from 2010-2100 (MMTCO <sub>2</sub> ) .....	2-21
Table 2.5-6	Reference Case MY 2011-2015 Alternative CAFE Standards Impact on CO <sub>2</sub> Concentrations, Global Mean Surface Temperature Increase, and Sea-level Rise in 2100 Using the MAGICC Model (A1B) .....	2-21

Table 2.5-7	Reference Case MY 2011-2015 CAFE Alternatives: Impact on Reductions in Global Mean Precipitation based on A1B SRES Scenario Using Increases in Global Mean Surface Temperature Simulated by MAGICC for 2020, 2055, and 2090.....	2-22
Table 2.5-8	High Scenario Emissions and Emissions Reductions Due to the MY 2011-2015 CAFE Standards from 2010-2100 (MMTCO <sub>2</sub> ) .....	2-23
Table 2.5-9	High Scenario 2011-2015 CAFE Alternatives Impact on CO <sub>2</sub> Concentration, Global Mean Surface Temperature Increase, and Sea-level Rise in 2100 Using the MAGICC Model (A1B).....	2-24
Table 2.5-10	Reference Case Passenger Car and Light Trucks Cumulative Fuel Consumption and Cumulative Fuel Savings (billion gallons).....	2-24
Table 2.5-11	High Scenario Passenger Car and Light Trucks Cumulative Fuel Consumption and Cumulative Fuel Savings (billion gallons).....	2-25
Table 2.5-12	Reference Case Alternative CAFE Standards Nationwide Criteria Pollutant Emissions and Toxic Air Pollutant Emissions from Passenger Cars and Light Trucks (tons/year) Cumulative Effects with MY 2011-2015 Standards and Potential MY 2016-2020 Standards.....	2-26
Table 2.5-13	High Scenario Alternative CAFE Standards Nationwide Criteria Pollutant Emissions and Toxic Air Pollutant Emissions from Passenger Cars and Light Trucks (tons/year) Cumulative Effects with MY 2011-2015 Standards and Potential MY 2016-2020 Standards.....	2-27
Table 2.5-14	Reference Case Cumulative Emissions and Emissions Reductions Due to the MY 2011-2015 Standards and Potential MY 2016-2020 CAFE Standards Projected for 2010-2100 (MMTCO <sub>2</sub> ) .....	2-28
Table 2.5-15	Reference Case MY 2011-2015 Standards and Potential MY 2016-2020 CAFE Standards Cumulative Impact on CO <sub>2</sub> Concentration, Surface Temperature Increase, and Sea-level Rise in 2100 Using MAGICC (A1B).....	2-28
Table 2.5-16	Reference Case MY 2011-2015 Standards and Potential MY 2016-2020 CAFE Standards: Cumulative Impact on Reductions in Global Mean Precipitation Based on A1B SRES Scenario, Using Increases in Global Mean Surface Temperature Simulated by MAGICC .....	2-31
Table 2.5-17	High Scenario Alternative CAFE Standards Cumulative Emissions and Emissions Reductions Due to the MY 2011-2015 Standards and Potential MY 2016-2020 Standards for 2010 through 2100 (MMTCO <sub>2</sub> ) .....	2-33
Table 2.5-18	High Scenario Alternative CAFE Standards MY 2011-2015 and Potential MY 2016-2020 Standards Cumulative Impact on CO <sub>2</sub> Concentrations, Global Mean Surface Temperature Increase, and Sea-level Rise in 2100 Using the MAGICC Model (A1B) .....	2-33
Table 2.5-19	Volpe Model Scenario Inputs and Outputs for Optimized Alternative.....	2-34
Table 2.5-20	Volpe Model Scenario Inputs and Outputs for Optimized Alternative.....	2-35
Table 3.2-1	Energy Consumption By Sector.....	3-7

Table 3.2-2	Reference Case Passenger Car Annual Fuel Consumption and Fuel Savings (billion gallons).....	3-9
Table 3.2-3	Reference Case Light Truck Annual Fuel Consumption and Fuel Savings (billion gallons).....	3-9
Table 3.2-4	High Scenario Passenger Car Annual Fuel Consumption and Fuel Savings (billion gallons).....	3-10
Table 3.2-5	High Scenario Light Truck Annual Fuel Consumption and Fuel Savings (billion gallons).....	3-11
Table 3.3-1	National Ambient Air Quality Standards.....	3-13
Table 3.3-2	Nonattainment Areas for Ozone and PM <sub>2.5</sub> .....	3-22
Table 3.3-3	Reference Case Alternative CAFE Standards Nationwide Criteria Pollutant Emissions from Passenger Cars and Light Trucks (tons/year) .....	3-31
Table 3.3-4	Reference Case Alternative CAFE Standards Nationwide Criteria Pollutant Emissions in 2035 from Passenger Cars and Light Trucks, by Vehicle Type (tons/year) .....	3-33
Table 3.3-5	Reference Case Alternative CAFE Standards Nationwide Changes in Criteria Pollutant Emissions from Passenger Cars and Light Trucks (tons/year).....	3-34
Table 3.3-6	Reference Case Alternative CAFE Standards Nationwide Toxic Air Pollutant Emissions from Passenger Cars and Light Trucks (tons/year) .....	3-35
Table 3.3-7	Reference Case Alternative CAFE Standards Nationwide Toxic Air Pollutant Emissions in 2035 from Passenger Cars and Light Trucks, by Vehicle Type (tons/year) .....	3-37
Table 3.3-8	Reference Case Alternative CAFE Standards Nationwide Changes in Toxic Air Pollutant Emissions from Passenger Cars and Light Trucks (tons/year).....	3-38
Table 3.3-9	Reference Case Alternative CAFE Standards Changes in Criteria Pollutant Emissions from Passenger Cars and Light Trucks, Maximum Changes by Nonattainment Area.....	3-39
Table 3.3-10	Reference Case Alternative CAFE Standards Nationwide Changes in Health Outcomes from Criteria Pollutant Emissions from Passenger Cars and Light Trucks (cases/year) .....	3-40
Table 3.3-11	Reference Case Alternative CAFE Standards Nationwide Changes in Health Costs from Criteria Pollutant Emissions from Passenger Cars and Light Trucks (U.S. million dollars/year) .....	3-41
Table 3.3-12	Reference Case Alternative CAFE Standards Changes in Toxic Air Pollutant Emissions from Passenger Cars and Light Trucks, Maximum Changes by Nonattainment Area.....	3-42
Table 3.3-13	High Scenario Alternative CAFE Standards Nationwide Criteria Pollutant Emissions from Passenger Cars and Light Trucks (tons/year) .....	3-47

Table 3.3-14	High Scenario Alternative CAFE Standards Nationwide Changes in Criteria Pollutant Emissions from Passenger Cars and Light Trucks (tons/year).....	3-48
Table 3.3-15	High Scenario Alternative CAFE Standards Nationwide Toxic Air Pollutant Emissions from Passenger Cars and Light Trucks (tons/year) .....	3-49
Table 3.3-16	High Scenario Alternative CAFE Standards Nationwide Changes in Toxic Air Pollutant Emissions from Passenger Cars and Light Trucks (tons/year).....	3-50
Table 3.3-17	High Scenario Alternative CAFE Standards Changes in Criteria Pollutant Emissions from Passenger Cars and Light Trucks, Maximum Changes by Nonattainment Area.....	3-51
Table 3.3-18	High Scenario Alternative CAFE Standards Changes in Toxic Air Pollutant Emissions from Passenger Cars and Light Trucks, Maximum Changes by Nonattainment Area.....	3-52
Table 3.3-19	High Scenario Alternative CAFE Standards Nationwide Changes in Health Outcomes from Criteria Pollutant Emissions from Passenger Cars and Light Trucks (cases/year) .....	3-53
Table 3.3-20	High Scenario Alternative CAFE Standards Nationwide Changes in Health Costs from Criteria Pollutant Emissions from Passenger Cars and Light Trucks (U.S. million dollars/year) .....	3-54
Table 3.4-1	Reference Case Emissions and Emissions Reductions Due to the MY 2011-2015 CAFE Standards from 2010-2100 (MMTCO <sub>2</sub> ) .....	3-85
Table 3.4-2	Reference Case Nationwide Emissions of Greenhouse Gases from Passenger Cars and Light Trucks under Alternative CAFE Standards for MY 2011-2015 (MMT per Year).....	3-87
Table 3.4-3	Sensitivity of Reference Case Results to Changes in Economic Assumptions .....	3-91
Table 3.4-4	Sensitivity of Mid-2 Scenario Results to Changes in Economic Assumptions .....	3-91
Table 3.4-5	Comparison of MAGICC Modeling Results and Reported IPCC Results (IPCC 2007a) .....	3-94
Table 3.4-6	Reference Case MY 2011-2015 Standards Impact on CO <sub>2</sub> Concentrations, Global Mean Surface Temperature Increase, and Sea-level Rise in 2100 Using MAGICC (A1B) .....	3-95
Table 3.4-7	Summary of Regional Changes to Warming and Seasonal Temperatures Extracted from the IPCC Fourth Assessment Report (Christensen et al. 2007) .....	3-98
Table 3.4-8	Global Mean Precipitation Change (scaled, % per °C) (Meehl et al. 2007) .....	3-100
Table 3.4-9	Reference Case MY 2011-2015 Alternative CAFE Standards: Impact on Reductions in Global Mean Precipitation Based on A1B SRES Scenario (percent change), Using Increases in Global Mean Surface Temperature Simulated by MAGICC .....	3-101
Table 3.4-10	Summary of Regional Changes to Precipitation Extracted from the IPCC Fourth Assessment Report (Christensen et al. 2007).....	3-102

Table 3.4-11	High Scenario Emissions and Emissions Reductions Due to the MY 2011-2015 CAFE Standards from 2010-2100 (MMTCO <sub>2</sub> ) .....	3-104
Table 3.4-12	High Scenario MY 2011-2015 Impacts of Alternative CAFE Standards on CO <sub>2</sub> Concentrations, Global Mean Surface Temperature Increase, and Sea-level Rise in 2100 Using MAGICC (A1B).....	3-107
Table 4.2-1	Reference Case Passenger Car Cumulative Annual Fuel Consumption and Cumulative Fuel Savings (billion gallons) .....	4-6
Table 4.2-2	Reference Case Light Truck Cumulative Annual Fuel Consumption and Cumulative Fuel Savings (billion gallons) .....	4-6
Table 4.2-3	High Scenario Passenger Car Cumulative Annual Fuel Consumption and Cumulative Fuel Savings (billion gallons) .....	4-7
Table 4.2-4	High Scenario Light Truck Annual Cumulative Fuel Consumption and Cumulative Fuel Savings (billion gallons) .....	4-7
Table 4.3-1	Reference Case Alternative CAFE Standards Nationwide Criteria Pollutant Emissions from Passenger Cars and Light Trucks (tons/year) Cumulative Effects with MY 2011-2015 Standards and Potential MY 2016-2020 Standards .....	4-10
Table 4.3-2	Reference Case Alternative CAFE Standards Nationwide Criteria Pollutant Emission Changes from Passenger Cars and Light Trucks (tons/year) Cumulative Effects with MY 2011-2015 Standards and Potential MY 2016-2020 Standards .....	4-11
Table 4.3-3	Reference Case Alternative CAFE Standards Nationwide Toxic Air Pollutant Emissions from Passenger Cars and Light Trucks (tons/year) Cumulative Effects with MY 2011-2015 Standards and Potential MY 2016-2020 Standards .....	4-13
Table 4.3-4	Reference Case Alternative CAFE Standards Nationwide Changes in Toxic Air Pollutant Emissions from Passenger Cars and Light Trucks (tons/year) Cumulative Effects with MY 2011-2015 Standards and Potential MY 2016-2020 Standards.....	4-14
Table 4.3-5	Reference Case Alternative CAFE Standards Nationwide Changes in Health Outcomes from Criteria Air Pollutant Emissions from Passenger Cars and Light Trucks (cases/year) Cumulative Effects with MY 2011-2015 Standards and Potential MY 2016-2020 Standards .....	4-15
Table 4.3-6	Reference Case Alternative CAFE Standards Nationwide Changes in Health Costs from Criteria Air Pollutant Emissions from Passenger Cars and Light Trucks (U.S. million dollars/year) Cumulative Effects with MY 2011-2015 Standards and Potential MY 2016-2020 Standards .....	4-16
Table 4.3-7	High Scenario Alternative CAFE Standards Nationwide Criteria Pollutant Emissions from Passenger Cars and Light Trucks (tons/year) Cumulative Effects with MY 2011-2015 Standards and Potential MY 2016-2020 Standards.....	4-23

Table 4.3-8	High Scenario Alternative CAFE Standards Nationwide Criteria Pollutant Emission Changes from Passenger Cars and Light Trucks (tons/year) Cumulative Effects with MY 2011-2015 Standards and Potential MY 2016-2020 Standards.....	4-24
Table 4.3-9	High Scenario Alternative CAFE Standards Nationwide Toxic Air Pollutant Emissions from Passenger Cars and Light Trucks (tons/year) Cumulative Effects with MY 2011-2015 Standards and Potential MY 2016-2020 Standards.....	4-25
Table 4.3-10	High Scenario Alternative CAFE Standards Nationwide Changes in Toxic Air Pollutant Emissions from Passenger Cars and Light Trucks (tons/year) Cumulative Effects with MY 2011-2015 Standards and Potential MY 2016-2020 Standards.....	4-26
Table 4.3-11	High Scenario Alternative CAFE Standards Nationwide Changes in Health Outcomes from Criteria Air Pollutant Emissions from Passenger Cars and Light Trucks (cases/year) Cumulative Effects with MY 2011-2015 Standards and Potential MY 2016-2020 Standards.....	4-27
Table 4.3-12	High Scenario Alternative CAFE Standards Nationwide Changes in Health Costs from Criteria Air Pollutant Emissions from Passenger Cars and Light Trucks (U.S. million dollars/year) Cumulative Effects with MY 2011-2015 Standards and Potential MY 2016-2020 Standards .....	4-28
Table 4.4-1	Reference Case Cumulative Emissions and Emissions Reductions Due to the MY 2011-2015 Standards and Potential MY 2016-2020 Standards Projected for 2010-2100 (MMTCO <sub>2</sub> ) .....	4-54
Table 4.4-2	Comparison of MAGICC Results and Reported IPCC Results (IPCC 2007a).....	4-57
Table 4.4-3	Reference Case MY 2011-2015 Standards and Potential MY 2016-2020 Standards Cumulative Impact on CO <sub>2</sub> Concentrations, Surface Temperature Increase, and Sea-level Rise Using MAGICC (A1B).....	4-58
Table 4.4-4	Summary of Regional Changes to Warming and Seasonal Temperatures Extracted from the IPCC Fourth Assessment Report (Christensen et al. 2007) .....	4-62
Table 4.4-5	Global Mean Precipitation Change (scaled, % per °C) (Meehl et al. 2007) .....	4-64
Table 4.4-6	Reference Case MY 2011-2015 Standards and Potential MY 2016-2020 Standards Cumulative Impact on Reductions in Global Mean Precipitation based on A1B SRES Scenario (% change), Using Increases in Global Mean Surface Temperature Simulated by the MAGICC Model .....	4-65
Table 4.4-7	Summary of Regional Changes to Precipitation Extracted from the IPCC Fourth Assessment (Christensen et al. 2007).....	4-66
Table 4.4-8	Reference Case MY 2011-2015 Standards and Potential MY 2016-2020 Standards: Cumulative Impact on CO <sub>2</sub> Concentration (ppm) for Varying Climate Sensitivities and SRES Scenarios .....	4-70
Table 4.4-9	Reference Case MY 2011-2015 Standards and Potential MY 2016-2020 Standards: Cumulative Impact on Global Mean Surface Temperature Increase (°C) for Varying Climate Sensitivities and SRES Scenarios.....	4-71

Table 4.4-10	Reference Case MY 2011-2015 Standards and Potential MY 2016-2020 Standards: Cumulative Impact on Sea-level Rise (cm) for Varying Climate Sensitivities and SRES Scenarios .....	4-72
Table 4.4-11	High Scenario MY 2011-2015 Standards and Potential MY 2016-2020 Standards Cumulative Emissions and Emissions Reductions for 2010 through 2100 (MMTCO <sub>2</sub> ) .....	4-73
Table 4.4-12	High Scenario MY 2011-2015 Standards and Potential MY 2016-2020 Standards Cumulative Impact on CO <sub>2</sub> Concentrations, Global Mean Surface Temperature Increase, and Sea-level Rise in 2100 Using MAGICC (A1B) .....	4-73
Table 4.5-1	Common Coastal Ecosystem .....	4-108

## List of Figures

Figure S-1	Reference Case MY 2011-2015 Standards and Potential MY 2016-2020 Standards Cumulative Impact on CO <sub>2</sub> (ppm) Concentrations Using MAGICC.....	S-23
Figure S-2	Reference Case MY 2011-2015 Standards and Potential MY 2016-2020 Standards Cumulative Impact on Global Mean Surface Temperature Increase (°C) Using MAGICC.....	S-24
Figure S-3	Reference Case MY 2011-2015 Standards and Potential MY 2016-2020 Standards Cumulative Impact on the Reduction in the Growth of CO <sub>2</sub> Concentrations (ppm) Using MAGICC .....	S-24
Figure S-4	Reference Case MY 2011-2015 Standards and Potential MY 2016-2020 Standards Cumulative Impact on the Reduction in the Growth of Global Mean Temperature (°C) Using MAGICC.....	S-25
Figure 2.5-1	Reference Case MY 2011-2015 Standards and Potential MY 2016-2020 Standards Cumulative Impact on CO <sub>2</sub> Concentrations Using the MAGICC Model (A1B).....	2-29
Figure 2.5-2	Reference Case MY 2011-2015 Standards and Potential MY 2016-2020 Standards Cumulative Impact on the Increase in Global Mean Surface Temperature Using MAGICC (A1B) .....	2-29
Figure 2.5-3	Reference Case MY 2011-2015 Standards and Potential MY 2016-2020 Standards Cumulative Impact on the Reduction in the Growth of CO <sub>2</sub> Concentrations Using MAGICC (A1B).....	2-30
Figure 2.5-4	Reference Case MY 2011-2015 Standards and Potential MY 2016-2020 Standards Cumulative Impact on the Reduction in the Growth of Global Mean Temperature Using MAGICC (A1B) .....	2-30
Figure 2.5-5	MY 2015 Required MPG for Passenger Cars and Light Trucks by Alternative and Input Scenario .....	2-34
Figure 3.3-1	Vehicle Miles Traveled (VMT) vs. Vehicle Emissions.....	3-17

Figure 3.3-2	Reference Case Alternative CAFE Standards Nationwide Criteria Pollutant Emissions from Passenger Cars and Light Trucks for 2035 (tons/year).....	3-32
Figure 3.3-3	Reference Case Alternative CAFE Standards Nationwide Toxic Air Pollutant Emissions from Passenger Cars and Light Trucks for 2035 (tons/year).....	3-36
Figure 3.4-1	Changes in Temperature, Sea Level, and Northern Hemisphere Snow Cover .....	3-62
Figure 3.4-2	The Greenhouse Effect (source: Le Treut et al. 2007).....	3-63
Figure 3.4-3	Cascade of Uncertainty in Climate Change Simulations .....	3-70
Figure 3.4-4	Average GDP Growth Rates (1990 to 2030) .....	3-75
Figure 3.4-5	Global CO <sub>2</sub> Emissions from Fossil Fuel Use .....	3-75
Figure 3.4-6	World Primary Energy Use Forecast .....	3-76
Figure 3.4-7	OECD90 Primary Energy Use Forecast .....	3-76
Figure 3.4-8	Reference Case Emissions and Emissions Reductions Due to the MY 2011-2015 CAFE Standards from 2010 to 2100 (MMTCO <sub>2</sub> ).....	3-86
Figure 3.4-9	Projected Reference Case Annual Emissions Under the MY 2011-2015 Alternative CAFE Standards (MMTCO <sub>2</sub> ).....	3-87
Figure 3.4-10	Reference Case MY 2011-2015 Standards Impact on CO <sub>2</sub> Concentrations (ppm) Using MAGICC (A1B).....	3-96
Figure 3.4-11	Reference Case MY 2011-2015 Standards Impact on Global Mean Surface Temperature Increase (°C) Using MAGICC (A1B) .....	3-96
Figure 3.4-12	Reference Case MY 2011-2015 Standards Impact on the Reduction in the Increase of CO <sub>2</sub> Concentrations (ppm) Using MAGICC (A1B) .....	3-97
Figure 3.4-13	Reference Case MY 2011-2015 Standards Impact on the Reduction in the Increase of Global Mean Temperature Using MAGICC (A1B).....	3-97
Figure 3.4-14	Comparison of Emissions under the Reference Case and High Scenario Due to the MY 2011-2015 CAFE Standards from 2010-2100 (MMTCO <sub>2</sub> ).....	3-106
Figure 3.4-15	Comparison of Emissions Reductions under the Reference Case and High Scenario Due to the MY 2011-2015 CAFE Standards from 2010-2100 (MMTCO <sub>2</sub> ) .....	3-106
Figure 4.4-1	Cascade of Uncertainty in Climate Change Simulations .....	4-38
Figure 4.4-2	Average GDP Growth Rates (1990 to 2030) .....	4-43
Figure 4.4-3	Global CO <sub>2</sub> Emissions from Fossil Fuel Use.....	4-44
Figure 4.4-4	World Primary Energy Use Forecast .....	4-44
Figure 4.4-5	OECD 90 Primary Energy Use Forecast .....	4-45
Figure 4.4-6	Reference Case Cumulative Annual Emissions Under the MY 2011-2015 Standards and Potential MY 2016-2020 Standards (MMTCO <sub>2</sub> ).....	4-55

Figure 4.4-7 Reference Case MY 2011-2015 Standards and Potential MY 2016-2020 Standards Cumulative Impact on CO<sub>2</sub> Concentrations Using MAGICC (A1B) .....4-58

Figure 4.4-8 Reference Case MY 2011-2015 Standards and Potential MY 2016-2020 Standards Cumulative Impact on the Global Mean Surface Temperature Increase Using MAGICC (A1B) .....4-59

Figure 4.4-9 Reference Case MY 2011-2015 Standards and Potential MY 2016-2020 Standards Cumulative Impact on the Reduction in the Growth of CO<sub>2</sub> Concentrations Using MAGICC (A1B).....4-59

Figure 4.4-10 Reference Case MY 2011-2015 Standards and Potential MY 2016-2020 Standards Cumulative Impact on the Reduction in the Growth of Global Mean Temperature Using MAGICC (A1B) .....4-60

Figure 4.4-11 Comparison of Cumulative Emissions under the Reference Case and High Scenario Due to the MY 2011-2020 CAFE Standards from 2010-2100 (MMTCO<sub>2</sub>) .....4-74

Figure 4.4-12 Comparison of Cumulative Emissions Reductions under the Reference Case and High Scenario Due to the MY 2011-2020 CAFE Standards from 2010-2100 (MMTCO<sub>2</sub>) .....4-75

Figure 4.5-1 Ecozones and Biomes of the World.....4-94

Figure 4.5-2 Level I Ecoregions in the North America .....4-97

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## List of Acronyms and Abbreviations

$\mu\text{g}/\text{m}^3$	micrograms per cubic meter of air
APA	Administrative Procedures Act
AEO	Annual Energy Outlook
AER	Annual Energy Review
AAM	Alliance of Automobile Manufacturers
AMFA	Alternative Motor Fuels Act
AMOC	Atlantic Meridional Overturning Circulation
AMT	Automated Shift Manual Transmission
AOGCM	atmospheric-ocean general circulation models
BTU	British thermal unit
CAA	Clean Air Act
CAFE	Corporate Average Fuel Economy
CARB	California Air Resources Board
CBD	Center for Biological Diversity
CDC	Centers for Disease Control and Prevention
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CH <sub>4</sub>	methane
cm	centimeter
CMAQ	Congestion Mitigation and Air Quality Improvement
CNG	compressed natural gas
CO	carbon monoxide
CO <sub>2</sub>	carbon dioxide
CO <sub>2</sub> e	carbon dioxide equivalent
DEIS	Draft Environmental Impact Statement
DOE	U.S. Department of Energy
DOT	U.S. Department of Transportation
DPM	diesel particulate matter
EA	environmental assessment
EIA	Energy Information Administration
EIS	Environmental Impact Statement
EISA	Energy Independence and Security Act
ENSO	El Niño Southern Oscillation
EO	Executive Order
EPA	U.S. Environmental Protection Agency
EPCA	Energy Policy and Conservation Act
EU	European Union
EV	electric vehicle
FAO	United Nations Food and Agriculture Organization
FEIS	Final Environmental Impact Statement
FFV	flexible fuel vehicle
FONSI	Finding of No Significant Impact
FHWA	Federal Highway Administration
FMCSA	Federal Motor Carrier Safety Administration
FR	Federal Register
FRIA	Final Regulatory Impact Analysis
FTA	Federal Transit Administration
GAO	General Accounting Office

GDP	Gross Domestic Product
GHG	greenhouse gases
GREET	Greenhouse Gases, Regulated Emissions, and Energy Use in Transportation
GtC/year	gigatons carbon per year
GWP	global warming potential
HEV	hybrid electric vehicle
HFC	hydrofluorocarbons
HOP	high oil price
LNG	liquefied natural gas
IEO	International Energy Outlook
IPCC	Intergovernmental Panel on Climate Change
ka	kiloannum
LDV	light-duty vehicles
LTV	light trucks and vans
MAGICC	Model for Assessment of Greenhouse Gas-induced Climate Change
mg/L	milligrams per liter
mg/m <sup>3</sup>	milligrams per cubic meter
mm	millimeter
MMTCO <sub>2</sub>	million metric tons of carbon dioxide
MOC	Meridional Overturning Circulation
MOP	moderate oil price
mpg	miles per gallon
MSAT	mobile source air toxics
MTBE	methyl tertiary butyl ether
MY	model year
N <sub>2</sub>	nitrogen
N <sub>2</sub> O	nitrous oxide
NAAQS	National Ambient Air Quality Standards
NADA	National Automobile Dealers Association
NCD	National County Database
NEPA	National Environmental Policy Act
NESCCAF	Northeast States Center for a Clean Air Future
NESCAUM	Northeast States for Coordinated Air Use Management
NERA	National Environmental Research Associates
NGO	non-governmental organization
NHTSA	National Highway Traffic Safety Administration
NMIM	National Mobile Inventory Model
NO	nitric oxide
NO <sub>2</sub>	nitrogen dioxide
NOI	Notice of Intent
NOAA	National Oceanic and Atmospheric Administration
NO <sub>x</sub>	nitrogen oxides
NPRM	Notice of Proposed Rulemaking
NRDC	Natural Resources Defense Council
NYS DOT	New York State Department of Transportation
OECD	Organization for Economic Cooperation and Development
OPEC	Organization of Petroleum Exporting Countries
OMB	Office of Management and Budget
PFC	perfluorocarbons
PHEV	Plug-In Hybrid Electric Vehicle
PM	particulate matter

PM10	particulate matter 10 microns diameter or less
PM2.5	particulate matter 2.5 microns diameter or less
ppm	parts per million
PRIA	Preliminary Regulatory Impact Analysis
RFS	Renewable Fuels Standard
RGGI	Regional Greenhouse Gas Initiative
RIA	Regulatory Impact Analysis
RPE	retail price equivalent
SAP	Synthesis and Assessment Product
SCC	social cost of carbon
SF <sub>6</sub>	sulfur hexafluoride
SIP	State Implementation Plan
SO	sulfur oxide
SO <sub>x</sub>	sulfur oxides
SO <sub>2</sub>	sulfur dioxide
SRES	Special Report on Emission Scenarios
SUV	sport utility vehicle
T&S&D	Transportation, Storage, and Distribution
TB	total benefits
TC	total cost
THC	thermohaline circulation
U.S.C.	United States Code
UCS	Union of Concerned Scientists
UMD	University of Maryland
USCCSP	United States Climate Change Science Program
USGS	United States Geological Survey
VMT	vehicle-miles traveled
VOC	volatile organic compound
Volpe Center	Volpe National Transportation Systems Center
WCI	Western Climate Initiative
WGI	IPCC Work Group I
WGII	IPCC Work Group II
WHO	World Health Organization
WMO	World Meteorological Organization

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# Glossary

To help readers more fully understand this Final Environmental Impact Statement, NHTSA has provided the following list of definitions for technical and scientific terms, as well as plain English terms used differently in the context of this FEIS.

Term	Definition
<b>25 Percent Above Optimized Alternative (Alternative 4)</b>	Alternative regulatory measure reflecting standards that exceed the Optimized Alternative by 25 percent of the interval between the Optimized Alternative and an alternative based on applying technologies until total costs equal total benefits.
<b>25 Percent Below Optimized Alternative (Alternative 2)</b>	Alternative regulatory measure reflecting standards that fall below the Optimized Alternative by the same absolute amount by which the 25 percent above Optimized Alternative exceeds the Optimized Alternative.
<b>50 Percent Above Optimized Alternative (Alternative 5)</b>	Alternative regulatory measure reflecting standards that exceed the Optimized Alternative by 50 percent of the interval between the Optimized Alternative and an alternative based on applying technologies until total costs equal total benefits.
<b>Adaptation</b>	Initiatives and measures to reduce the vulnerability of natural and human systems against actual or expected climate change effects. Various types of adaptation exist, including anticipatory and reactive, private and public, and autonomous and planned.
<b>Afforestation</b>	Planting of new forests on lands that historically have not contained forests (for at least 50 years).
<b>Anthropogenic</b>	Resulting from or produced by human beings.
<b>Aquaculture</b>	Farming of plants and animals that live in water.
<b>Baseline Alternative</b>	See “No Action Alternative.”
<b>Benthic</b>	Describing habitat or organisms occurring at the bottom of a body of water.
<b>Biosphere</b>	The part of the Earth system comprising all ecosystems and living organisms, in the atmosphere, on land (terrestrial biosphere) or in the oceans (marine biosphere), including dead organic matter, such as litter, soil organic matter, and oceanic detritus.
<b>Carbon sink</b>	Any process, activity, or mechanism that removes a greenhouse gas, an aerosol, or a precursor of a greenhouse gas or aerosol from the atmosphere.
<b>Coral bleaching</b>	The paling in color that results if a coral loses its symbiotic, energy providing, organisms.
<b>Criteria pollutants</b>	Carbon monoxide (CO), airborne lead (Pb), nitrogen dioxide (NO <sub>2</sub> ), ozone (O <sub>3</sub> ), sulfur dioxide (SO <sub>2</sub> ), and fine particulate matter (PM).
<b>Cryosphere</b>	The portion of Earth’s surface that is frozen water, such as snow, permafrost, floating ice, and glaciers.

Term	Definition
<b>Dansgaard-Oeschger events</b>	Very rapid climate changes—up to 7 °C in some 50 years—during the Quaternary geologic period, and especially during the most recent glacial cycle.
<b>Ecosystem</b>	A system of living organisms interacting with each other and their physical environment. The boundaries of what could be called an ecosystem are somewhat arbitrary, depending on the focus of interest or study. Thus, the extent of an ecosystem may range from very small spatial scales to, ultimately, the entire Earth.
<b>El Niño-Southern Oscillation</b>	The term El Niño was initially used to describe a warm-water current that periodically flows along the coast of Ecuador and Peru, disrupting the local fishery. It has since become identified with a basinwide warming of the tropical Pacific east of the international dateline. This oceanic event is associated with a fluctuation of a global-scale tropical and subtropical surface pressure pattern called the Southern Oscillation. This coupled atmosphere-ocean phenomenon, with preferred time scales of two to about seven years, is collectively known as El Niño-Southern Oscillation, or ENSO. During an ENSO event, the prevailing trade winds weaken, reducing upwelling and altering ocean currents such that the sea surface temperatures warm, further weakening the trade winds.
<b>Emission rates</b>	Rate at which contaminants are discharged from a particular source, usually in weight unit per time period.
<b>Endemic</b>	Restricted to a region.
<b>EPCA factors for setting “maximum feasible” CAFE standards</b>	Technological feasibility, economic practicability, the effect of other motor vehicle standards of the government on fuel economy, and the need of the Nation to conserve energy.
<b>Eutrophication</b>	Enrichment of a water body with plant nutrients.
<b>Evapotranspiration</b>	The combined process of water evaporation from the Earth’s surface and transpiration from vegetation.
<b>GREET model</b>	Model developed by Argonne National Laboratory that provides estimates of the energy and carbon contents of fuels as well as energy use in various phases of fuel supply.
<b>High Scenario</b>	Model input scenario that uses the Energy Information Administration’s high fuel price forecast of \$3.33 per gallon, a global social cost of carbon of \$33.00 per ton with a 3 percent discount rate, a 3 percent overall discount rate, and a value of \$0.116 per gallon for oil import externalities.
<b>Hydrology</b>	The science dealing with the occurrence, circulation, distribution, and properties of the Earth’s water.
<b>Hydrosphere</b>	The component of the climate system comprising liquid surface and subterranean water, such as oceans, seas, rivers, freshwater lakes, and underground water.
<b>Kiloannum</b>	A unit of time equal to 1000 years. Abbreviated symbol is “ka.”
<b>Lake stratification</b>	The layering of warmer, less dense water over colder, denser water.

Term	Definition
<b>Lifetime fuel consumption</b>	Total volume of fuel used by a vehicle over its lifetime.
<b>Maximum lifetime of vehicles</b>	The age after which less than 2 percent of the vehicles originally produced during a model year remains in service.
<b>Mid-1 Scenario</b>	An intermediate model input scenario that uses a fuel price forecast of \$3.33 per gallon, a global social cost of carbon of \$33.00 per ton with 3 percent discount rate, a 7 percent discount rate overall, and a value of \$0.116 per gallon for oil import externalities.
<b>Mid 2 Scenario</b>	An intermediate model input scenario that uses a fuel price forecast of \$3.33 per gallon, a domestic social cost of carbon of \$2.00 per ton with a 3 percent discount rate, a 7 percent overall discount rate, and a value of \$0.382 per gallon for oil import externalities.
<b>MOBILE6.2</b>	EPA's motor vehicle emission factor model.
<b>NEPA scoping process</b>	An early and open process for determining the scope of issues to be addressed and for identifying the significant issues related to a proposed action.
<b>No Action Alternative (Alternative 1)</b>	The No Action Alternative assumes that NHTSA would not issue a rule regarding CAFE standards. The No Action Alternative assumes that average fuel economy levels in the absence of CAFE standards beyond 2010 would equal the higher of a manufacturer's product plans or the manufacturer's required level of average fuel economy for MY 2010. The MY 2011 fuel economy in mpg (27.5 mpg and 23.3 mpg for passenger cars and light trucks, respectively) represents the standard the agency believes manufacturers would continue to achieve, assuming that the agency does not issue a rule.
<b>Nonattainment area</b>	Regions where concentrations of criteria pollutants exceed federal standards. Nonattainment areas are required to develop and implement plans to comply with the National Ambient Air Quality Standards within specified time periods.
<b>Ocean acidification</b>	A decrease in the pH of sea water due to the uptake of anthropogenic carbon dioxide.
<b>Optimized Alternative (Alternative 3)</b>	Alternative regulatory measures reflecting the optimized standards.
<b>Optimized standards</b>	Standards set at levels such that the cost of the last technology application (using the Volpe model) equals the benefits of the improvement in fuel economy resulting from that application, thereby maximizing net benefits (benefits minus costs).
<b>Overexploitation of species</b>	Exploitation of species to the point of diminishing returns.
<b>Paleoclimatology</b>	The study of climate change through the physical evidence left on earth of historical global climate change (prior to the widespread availability of records to temperature, precipitation, and other data).
<b>Pathways of fuel supply</b>	Imports to the United States of refined gasoline and other transportation fuels, domestic refining of fuel using imported petroleum as a feedstock, and domestic fuel refining from crude petroleum produced within the United States.

Term	Definition
<b>Permafrost</b>	Ground (soil or rock and included ice and organic material) that remains at or below zero degrees Celsius for at least two consecutive years.
<b>Phenology</b>	The study of natural phenomena in biological systems that recur periodically (development stages, migration) and their relationship to climate and seasonal changes.
<b>Rebound effect</b>	A situation in which improved fuel economy reduces the fuel cost of driving and leads to additional use of passenger cars and light trucks and thus increased emissions of criteria pollutants by passenger cars and light trucks.
<b>Reference Case</b>	Model input scenario that uses the Energy Information Administration's reference case fuel price forecast of \$2.41 per gallon, a domestic social cost of carbon of \$2.00 per ton with a 3 percent discount rate, a 7 percent overall discount rate, and a value of \$0.326 per gallon for oil import externalities.
<b>Reformed CAFE Program</b>	Consists of two basic elements: (1) a process that sets fuel economy targets for different values of vehicle footprint; and (2) a Reformed CAFE standard for each manufacturer, which is equal to the production-weighted harmonic average of the fuel economy targets corresponding to the footprint values of each light truck model it produces.
<b>Saltwater intrusion</b>	Displacement of fresh surface water or groundwater by the advance of saltwater due to its greater density. This process usually occurs in coastal and estuarine areas due to reducing land-based influence (either from reduced runoff and associated groundwater recharge, or from excessive water withdrawals from aquifers) or increasing marine influence (relative sea-level rise).
<b>Silviculture</b>	The management of forest resources.
<b>Survival rate</b>	The proportion of vehicles originally produced during a model year that are expected to remain in service at the age they will have reached during each subsequent year.
<b>Thermohaline circulation</b>	The physical driving mechanism of ocean circulation, resulting from fluxes of heat and freshwater across the sea surface, subsequent interior mixing of heat and salt, and geothermal heat sources.
<b>Total Costs Equal Total Benefits Alternative (Alternative 6)</b>	Alternative reflecting standards based on applying technologies until total costs equal total benefits (zero net benefits).
<b>Technologies</b>	Engine technologies, transmission, vehicle, electrification/accessory and hybrid technologies that influence fuel economy.
<b>Technology Exhaustion Alternative (Alternative 7)</b>	Alternative in which NHTSA applied all feasible technologies by progressively increasing the stringency of the standard in each model year until every manufacturer (among those without a history of paying civil penalties) exhausted technologies estimated to be available during MY 2011-2015.

Term	Definition
<b>Thermohaline circulation</b>	This term refers to the physical driving mechanism of ocean circulation, resulting from fluxes of heat and freshwater across the sea surface, subsequent interior mixing of heat and salt, and geothermal heat sources.
<b>Tipping point</b>	A situation where the climate system reaches a point at which there is a strong and amplifying positive feedback from only a moderate additional change in a driver, such as CO <sub>2</sub> or temperature increase.
<b>Total vehicle miles</b>	Total number of miles each vehicle will be driven over its lifetime.
<b>Track width</b>	The lateral distance between the centerlines of the base tires at ground, including the camber angle.
<b>Transpiration</b>	Water loss from plant leaves.
<b>Turbidity</b>	A decrease in the clarity of water due to the presence of suspended sediment.
<b>Vehicle footprint</b>	The product of track width times wheelbase divided by 144.
<b>Vehicle miles traveled</b>	Total number of miles driven.
<b>Volpe model</b>	CAFE Compliance and Effects Model developed by the U.S. Department of Transportation's Volpe Center, that, for any given year, applies technologies to the manufacturer's fleet until the manufacturer achieves compliance with the standard under consideration.
<b>Wheelbase</b>	The longitudinal distance between front and rear wheel centerlines.