

**Energy Independence and Security Act of 2007**  
**Title I—Energy Security through Improved Vehicle Fuel Economy**  
**Subtitle A—Increased Corporate Average Fuel Economy Standards**

**Policy Description**

Subtitle A of Title I of the Energy Independence and Security Act of 2007 (EISA) includes new corporate average fuel economy (CAFÉ) standards, beginning with the 2011 model year vehicles. The average combined fuel economy of automobiles will be at least 35 mpg by 2020, with separate standards applying to passenger and non-passenger automobiles. The standards will be phased in, starting with the 2011 model year, so that the CAFÉ increases each year until the average fuel economy of 35 mpg is reached by 2020. From 2021 through 2030, the maximum feasible average fuel economy standard will apply for each fleet and model year. Additionally, fuel economy standards are required to be developed for commercial medium and heavy-duty highway vehicle and work trucks. Credits for the manufacture of flexible-fueled vehicles will be phased out by 2020.

**Policy Design**

**Goals:** The overall goal of the new CAFÉ standards is to increase CAFÉ to 35 mpg by 2020.

- **Timing:** The requirements begin with the 2011 model year, with phase-in through 2020, and additional maximum fuel economy requirements for 2021 through 2030 model year vehicles.
- **Parties Involved:** Specific fuel economy standards are to be prescribed by the US Secretary of Transportation, in consultation with the US Secretary of Energy and the Administrator of the US Environmental Protection Agency. Auto manufacturers will be involved in complying with the standards.

**Implementation Mechanisms**

National standards.

**Related Policies/Programs in Place**

CAFÉ standards were originally established in 1975 in response to the Arab oil embargo. The original goal was to double fuel economy by 1985 to 27.5 mpg. The CAFÉ standard for passenger cars has remained at 27.5 mpg since the 1990 model year. The most recent light truck CAFÉ standards have been set at 21.0 mpg for the 2005 model year, 21.6 mpg for the 2006 model year, and 22.2 mpg for the 2007 model year.

**Types(s) of GHG Reductions**

Net reduction in CO<sub>2</sub> emissions resulting from reduced fuel consumption.

## Estimated GHG Reductions and Costs (or Cost Savings)

### Data Sources:

Energy Information Administration, US Department of Energy, *Annual Energy Outlook 2008 (Early Release)*, Report # DOE/EIA-0383(2008), released date December 2007, <http://www.eia.doe.gov/oiaf/archive/earlyrelease08/index.html>.

Energy Information Administration, US Department of Energy, *Annual Energy Outlook 2008 (Revised Early Release)*, Report # DOE/EIA-0383(2008), released date March 2008 (revised), <http://www.eia.doe.gov/oiaf/aeo/index.html>.

Environmental Protection Agency, Office of Transportation and Air Quality, MOBILE6 Vehicle Emission Modeling Software and “User’s Guide to MOBILE6.1 and MOBILE6.2 Mobile Source Emission Factor Model,” EPA420-R-03-010, August 2003, <http://www.epa.gov/otaq/m6.htm>.

### Quantification Methods:

Fuel economy data by model year were obtained from the 2008 versions of the Annual Energy Outlook (AEO2008 and AEO2008Revised). Baseline fuel consumption data were taken from the AEO2008 and the fuel economy data incorporating the effects of the new CAFÉ standards were taken from the AEO2008Revised. The analysis was performed for passenger cars, light trucks, and commercial light trucks (those with a gross vehicle weight rating [GVWR] of 8,501 lbs to 10,000 lbs). The fuel economy data used were the fuel economies that had been adjusted for on-road performance (as opposed to the tested fuel economy values). The onroad adjusted fuel economies were only provided in AEO2008Revised for the with CAFÉ scenario. Therefore, the deterioration factors used to adjust the tested fuel economy values to on-road fuel economy values in the CAFÉ case were applied to the tested fuel economy values in the base (without new CAFÉ standards) case. Additionally, the fuel economy values for commercial light trucks were tested fuel economy values for both the baseline and With CAFÉ cases in the AEO2008. Therefore, the deterioration factors calculated for the light-duty trucks were applied to the commercial light trucks in both the baseline and with new CAFÉ cases. Tables 1, 2, and 3 display the tested and adjusted on-road fuel economies by model year for the baseline and the With New CAFÉ case for passenger cars, light trucks, and light commercial trucks, respectively.

**Table 1. New Passenger Car Fuel Economy Values by Model Year**

Model Year	Tested (mpg)		Deterioration Factor	On-Road (mpg)	
	Baseline	New CAFÉ		Baseline	New CAFÉ
2009	30.1	31.1	0.817	25.4	24.6
2010	30.4	31.5	0.818	25.7	24.9
2011	30.8	32.1	0.819	26.3	25.2
2012	30.9	32.3	0.820	26.5	25.3
2013	31.0	32.4	0.821	26.6	25.4
2014	31.1	33.7	0.822	27.7	25.5
2015	31.3	34.9	0.823	28.7	25.7
2016	31.5	36.5	0.824	30.1	25.9

2017	31.7	37.9	0.825	31.2	26.2
2018	32.0	39.5	0.826	32.6	26.4
2019	32.3	40.7	0.827	33.6	26.7
2020	32.5	42.0	0.828	34.7	26.9

**Table 2. New Light Truck Fuel Economy Values by Model Year**

Model Year	Tested (mpg)		Deterioration Factor	On-Road (mpg)	
	Baseline	New CAFÉ		Baseline	New CAFÉ
2009	23.5	19.0	0.807	23.0	18.6
2010	23.7	19.2	0.808	23.4	18.9
2011	24.5	19.8	0.809	23.9	19.3
2012	25.3	20.5	0.810	24.0	19.4
2013	26.1	21.1	0.811	24.1	19.5
2014	26.7	21.7	0.812	24.2	19.6
2015	27.7	22.5	0.813	24.4	19.8
2016	28.2	23.0	0.814	24.5	20.0
2017	29.0	23.6	0.815	24.7	20.1
2018	29.8	24.3	0.816	24.9	20.3
2019	30.4	24.8	0.817	25.1	20.5
2020	31.4	25.7	0.818	25.3	20.7

**Table 3. New Commercial Light Truck Fuel Economy Values by Model Year**

Model Year	Tested (mpg)		Deterioration Factor	On-Road (mpg)	
	Baseline	New CAFÉ		Baseline	New CAFÉ
2009	15.3	15.6	0.807	12.3	12.6
2010	15.5	15.7	0.808	12.6	12.7
2011	15.9	16.2	0.809	12.8	13.1
2012	15.9	16.6	0.810	12.9	13.5
2013	16.0	17.1	0.811	12.9	13.9
2014	16.0	17.5	0.812	13.0	14.2
2015	16.1	18.1	0.813	13.1	14.7
2016	16.2	18.3	0.814	13.2	14.9
2017	16.3	18.7	0.815	13.3	15.2
2018	16.4	19.1	0.816	13.4	15.6
2019	16.5	19.3	0.817	13.5	15.8
2020	16.6	19.8	0.818	13.6	16.2

Using the fuel economy values in the tables above, the general methodology applied to estimate the benefits of the new CAFÉ standards involved first distributing the South Carolina VMT projections used in developing the South Carolina reference case GHG transportation emission inventory by model year, and then dividing the VMT by the corresponding fuel economy values to obtain gallons of fuel consumed. The percentage change in the fuel consumption in the base case and With New CAFÉ case by calendar year (aggregating the fuel consumption from all model years being used in a given calendar year) was then applied to the reference case CO<sub>2</sub> emissions from the onroad

gasoline and diesel vehicles. Note that these reductions were not applied to the CH<sub>4</sub> or N<sub>2</sub>O emissions as these are calculated as a function of vehicle miles traveled, while CO<sub>2</sub> is calculated as a function of fuel consumed.

Data from EPA’s MOBILE6 onroad emission factor model were used to distribute South Carolina’s projected VMT by model year. Default MOBILE6 vehicle registration data mileage accumulation rates, both by age and vehicle type, were used. The default MOBILE6 vehicle registration distribution fractions are shown in Table 4. The data in this table represent the fraction of all vehicles of a particular type registered in a given calendar year that are of the age listed. The default MOBILE5 mileage accumulation rates by vehicle type and age are shown in Table 5. The data in this table represent the mileage that would accumulated by a typical vehicle of a given age over the course of a year. Using these MOBILE6 data from Tables 4 and 5, default normalized VMT distributions by model year and vehicle type were calculated. The total VMT by vehicle type in a given calendar year was then multiplied by the normalized VMT distribution by model year for that vehicle type to estimate the VMT in a given calendar year contributed by each model year operating during the calendar year. These VMT values by model year were then divided by the corresponding fuel economy values to obtain the gallons of fuel consumed.

**Table 4. Default MOBILE6 Vehicle Registration Distribution Fractions by Vehicle Age**

<b>Vehicle Age</b>	<b>Light-Duty Vehicles (Passenger Cars)</b>	<b>Light-Duty Trucks 1&amp;2 (6,000 lb GVWR and under)</b>	<b>Light-Duty Trucks 3&amp;4 (6,001-8,500 lb GVWR)</b>	<b>Heavy-Duty Vehicles Class 2B (8,501-10,000 lb GVWR) (Commercial Light Trucks)</b>
24+	0.0102	0.0359	0.0732	0.0499
23	0.0036	0.0069	0.0156	0.0114
22	0.0045	0.0072	0.0167	0.0126
21	0.0057	0.0075	0.0179	0.0138
20	0.0072	0.0078	0.0192	0.0152
19	0.0090	0.0081	0.0206	0.0167
18	0.0114	0.0085	0.0221	0.0184
17	0.0144	0.0107	0.0237	0.0202
16	0.0181	0.0147	0.0255	0.0222
15	0.0228	0.0195	0.0274	0.0244
14	0.0288	0.0249	0.0294	0.0268
13	0.0363	0.0309	0.0315	0.0294
12	0.0458	0.0372	0.0338	0.0324
11	0.0539	0.0436	0.0363	0.0356
10	0.0588	0.0498	0.0390	0.0391
9	0.0627	0.0557	0.0419	0.0430
8	0.0655	0.0610	0.0449	0.0472
7	0.0676	0.0656	0.0482	0.0519
6	0.0689	0.0693	0.0518	0.0571
5	0.0698	0.0723	0.0556	0.0627
4	0.0703	0.0745	0.0597	0.0690
3	0.0705	0.0760	0.0640	0.0758
2	0.0706	0.0769	0.0688	0.0833
1	0.0706	0.0774	0.0738	0.0916
0	0.0530	0.0581	0.0594	0.0503

<b>Total</b>	<b>1.0000</b>	<b>1.0000</b>	<b>1.0000</b>	<b>1.0000</b>
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**Table 5. Default MOBILE6 Mileage Accumulation Rates (miles per year)**

<b>Vehicle Age</b>	<b>Light-Duty Vehicles</b>	<b>Light-Duty Gas Trucks 1&amp;2</b>	<b>Light-Duty Gas Trucks 3&amp;4</b>	<b>Light-Duty Diesel Trucks 1&amp;2</b>	<b>Light-Duty Diesel Trucks 3&amp;4</b>	<b>Heavy-Duty Gas Vehicles Class 2B</b>	<b>Heavy-Duty Diesel Vehicles Class 2B</b>
24+	4,427	2,470	3,862	2,225	3,745	4,533	3,221
23	4,656	2,777	4,148	2,469	4,060	4,822	3,520
22	4,898	3,120	4,454	2,740	4,402	5,129	3,847
21	5,152	3,497	4,782	3,040	4,772	5,456	4,204
20	5,420	3,909	5,135	3,374	5,174	5,804	4,595
19	5,701	4,357	5,514	3,744	5,609	6,174	5,021
18	5,997	4,839	5,921	4,155	6,081	6,568	5,488
17	6,308	5,356	6,358	4,610	6,593	6,986	5,997
16	6,636	5,909	6,827	5,116	7,148	7,432	6,554
15	6,980	6,496	7,331	5,678	7,749	7,905	7,163
14	7,342	7,118	7,872	6,301	8,402	8,409	7,828
13	7,723	7,775	8,453	6,992	9,109	8,946	8,555
12	8,124	8,467	9,077	7,759	9,875	9,516	9,349
11	8,546	9,194	9,747	8,610	10,706	10,122	10,217
10	8,989	9,955	10,466	9,555	11,607	10,768	11,166
9	9,456	10,752	11,239	10,603	12,584	11,454	12,203
8	9,947	11,584	12,068	11,766	13,643	12,184	13,336
7	10,463	12,451	12,959	13,057	14,791	12,961	14,575
6	11,006	13,352	13,915	14,490	16,036	13,787	15,928
5	11,577	14,289	14,942	16,079	17,385	14,666	17,407
4	12,178	15,260	16,044	17,843	18,848	15,601	19,024
3	12,810	16,267	17,228	19,801	20,434	16,596	20,791
2	13,475	17,308	18,500	21,973	22,154	17,654	22,721
1	14,174	18,384	19,865	24,384	24,018	18,779	24,831
0	14,910	19,496	21,331	27,059	26,040	19,977	27,137

**Results:**

Results from this analysis are shown in Tables 6, 7, and 8. Table 6 shows the baseline South Carolina transportation emission inventory. Note that onroad gas and diesel have been combined here, as the analysis did not distinguish between gas and diesel vehicles. The fuel economy standards applied to weight categories rather than fuel categories. Table 7 shows the South Carolina transportation GHG emission inventory when the new CAFÉ standards are accounted for. Finally, Table 8 shows the percentage reduction in the onroad emissions and in the total transportation emissions as a result of the new CAFÉ standards.

**Table 6. Baseline South Carolina Transportation Inventory**

<b>Emission Totals (MMtCO<sub>2</sub>e)</b>	<b>1990</b>	<b>1995</b>	<b>2000</b>	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>
Onroad Gas and Diesel	20.28	22.08	25.77	29.11	33.03	36.00	39.79
Jet Fuel/Av. Gas	1.19	0.46	0.77	0.68	0.72	0.74	0.77
Boats and Ships - Ports/Inshore	0.27	0.35	0.51	0.66	0.75	0.88	1.01
Boats and Ships - Offshore	0.57	0.59	1.02	1.12	1.33	1.53	1.74
Rail	0.30	0.07	0.16	0.12	0.12	0.12	0.12
Other	0.13	0.12	0.13	0.12	0.13	0.14	0.15
<b>Total</b>	<b>22.74</b>	<b>23.66</b>	<b>28.35</b>	<b>31.82</b>	<b>36.08</b>	<b>39.42</b>	<b>43.57</b>

**Table 7. South Carolina Transportation Inventory with New CAFÉ Standards**

<b>Emission Totals (MMtCO<sub>2</sub>e)</b>	<b>1990</b>	<b>1995</b>	<b>2000</b>	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>
Onroad Gas and Diesel	20.28	22.08	25.77	29.11	32.83	34.71	36.28
Jet Fuel/Av. Gas	1.19	0.46	0.77	0.68	0.72	0.74	0.77
Boats and Ships - Ports/Inshore	0.27	0.35	0.51	0.66	0.75	0.88	1.01
Boats and Ships - Offshore	0.57	0.59	1.02	1.12	1.33	1.53	1.74
Rail	0.30	0.07	0.16	0.12	0.12	0.12	0.12
Other	0.13	0.12	0.13	0.12	0.13	0.14	0.15
<b>Total</b>	<b>22.74</b>	<b>23.66</b>	<b>28.35</b>	<b>31.82</b>	<b>35.88</b>	<b>38.13</b>	<b>40.06</b>

**Table 8. Percentage Reductions in Emissions due to New CAFÉ Standards**

<b>Percentage Reductions in MMtCO<sub>2</sub>e</b>	<b>1990</b>	<b>1995</b>	<b>2000</b>	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>
Onroad Gas and Diesel	0.00%	0.00%	0.00%	0.00%	0.61%	3.58%	8.82%
Total Transportation Inventory	0.00%	0.00%	0.00%	0.00%	0.55%	3.27%	8.06%

### **Key Assumptions:**

Key assumptions in this analysis would be those built into the modeling performed for the AEO2008 analyses determining the fuel economy values that were used in this analysis. The AEO2008 modeling includes assumptions about consumer choice of vehicles and technologies that affect the resulting fuel economy values.

Note that cost data have not been quantified for the new CAFÉ standards.

### **Key Uncertainties**

One of the primary uncertainties in this analysis is the first model year in which fuel economy improvements will be seen as a result of the new CAFÉ standards. In this analysis, the first model year affected by the new CAFÉ standards was the 2009 model year. Although the AEO data show changes in fuel economy between the baseline and with CAFÉ scenarios in earlier model years, for this analysis, the 2009 model year was selected since the EISA was passed in 2007 and model year 2008 vehicles would already have been in production at that time. The EISA does not require that new CAFÉ standards be implemented until the 2011 model year. However, vehicles meeting the new CAFÉ standards are already available and demand for these vehicles may increase relative to the baseline case prior to the 2011 model year.

Use of the MOBILE6 default registration data also adds some uncertainty to this analysis. Fleet turnover rates are important in determining the overall reduction from the increased fuel economy standards. If South Carolina's turns over at a slower rate than the MOBILE6 defaults, then reductions would be overestimated, while if the fleet turns over more rapidly, greater emission reductions would be achieved.

#### **Additional Benefits and Costs**

The new CAFÉ standards will lead to reduced fuel consumption, and as a result, savings in fuel costs.

#### **Feasibility Issues**

TBD

#### **Status of Group Approval**

TBD

#### **Level of Group Support**

TBD

#### **Barriers to Consensus**

TBD