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 (CAFE) 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 CAFE 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 CAFE standards is to increase CAFE 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.

Implementation Mechanisms

Federal law and accompanying DOT regulations.

Related Policies/Programs in Place

CAFE standards were originally established in 1975 in response to the Arab oil embargo. The original goal was to double fuel economy to 27.5 mpg by 1985. The CAFE standard for passenger cars has remained at 27.5 mpg since the 1990 model year. The most recent light truck CAFE 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_2 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), release 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), release 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:

A brief overview of the process used for estimating CO_2 reductions due to the new CAFE standards is listed below:

- Allocate the projected VMT from light-duty vehicles and trucks and commercial light trucks from each calendar year to each of the model years being used in that calendar year (assumed to be the most recent 25 model years).
- Convert the VMT by vehicle type and model year in each calendar year, starting with 2008, to fuel consumption by dividing the VMT by the model-year specific fuel economy for both the baseline scenario (assumes no new CAFE standards) and a new CAFE standards scenario.
- Calculate the percentage reduction in total onroad (gasoline plus diesel) fuel consumption between the baseline scenario and the new CAFE scenario for each calendar year.
- This percentage reduction in fuel consumption is then multiplied by the baseline CO_2 emissions from onroad gas and diesel vehicles to give the emissions reduction for the calendar year from the new CAFE standards.

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 CAFE 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 new CAFE scenario. Therefore, the adjustment factors used to adjust the tested fuel economy values to on-road fuel economy values in the CAFE case were applied to the tested fuel economy values in the base (without new CAFE standards) case. Additionally, the fuel economy values for commercial light trucks were tested fuel economy values for both the baseline and new CAFE cases in the AEO2008. Therefore, the adjustment factors calculated for the light-duty trucks were applied to the commercial light trucks in both the baseline and with new CAFE cases. Tables 1, 2, and 3 display the

tested and adjusted on-road fuel economies by model year for the baseline and the new CAFE case for passenger cars, light trucks, and light commercial trucks, respectively.

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

Model	Tested (mpg)		Adjustment	On-Road (mpg)	
Year	Baseline	New CAFE	Factor	Baseline	New CAFE
2009	30.1	31.1	0.817	24.6	25.4
2010	30.4	31.5	0.818	24.9	25.7
2011	30.8	32.1	0.819	25.2	26.3
2012	30.9	32.3	0.820	25.3	26.5
2013	31.0	32.4	0.821	25.4	26.6
2014	31.1	33.7	0.822	25.5	27.7
2015	31.3	34.9	0.823	25.7	28.7
2016	31.5	36.5	0.824	25.9	30.1
2017	31.7	37.9	0.825	26.2	31.2
2018	32.0	39.5	0.826	26.4	32.6
2019	32.3	40.7	0.827	26.7	33.6
2020	32.5	42.0	0.828	26.9	34.7
2021	32.8	42.1	0.829	27.2	34.9
2022	33.0	42.1	0.830	27.4	34.9
2023	33.4	42.1	0.831	27.7	35.0
2024	33.7	42.1	0.832	28.0	35.0
2025	34.0	42.1	0.833	28.3	35.1

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

Model	Tested (mpg)		Adjustment	On-Road (mpg)	
Year	Baseline	New CAFE	Factor	Baseline	New CAFE
2009	23.0	23.5	0.807	18.6	19.0
2010	23.4	23.7	0.808	18.9	19.2
2011	23.9	24.5	0.809	19.3	19.8
2012	24.0	25.3	0.810	19.4	20.5
2013	24.1	26.1	0.811	19.5	21.1
2014	24.2	26.7	0.812	19.6	21.7
2015	24.4	27.7	0.813	19.8	22.5
2016	24.5	28.2	0.814	20.0	23.0
2017	24.7	29.0	0.815	20.1	23.6
2018	24.9	29.8	0.816	20.3	24.3
2019	25.1	30.4	0.817	20.5	24.8
2020	25.3	31.4	0.818	20.7	25.7
2021	25.4	31.5	0.819	20.8	25.8
2022	25.6	31.6	0.820	21.0	26.0
2023	25.8	31.9	0.821	21.2	26.2
2024	26.0	32.0	0.822	21.4	26.3
2025	26.3	32.2	0.823	21.6	26.5

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

Model	Tested (mpg)		Adjustment	On-Road (mpg)	

Year	Baseline	New CAFE	Factor	Baseline	New CAFE
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
2021	16.7	19.9	0.819	13.7	16.3
2022	16.8	20.0	0.820	13.8	16.4
2023	16.9	20.1	0.821	13.9	16.5
2024	17.1	20.1	0.822	14.0	16.6
2025	17.2	20.2	0.823	14.1	16.6

Using the fuel economy values in the tables above, the general methodology applied to estimate the benefits of the new CAFE standards involved first distributing the Iowa VMT projections used in developing the Iowa 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 baseline scenario and new CAFE scenario 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_2 emissions from the onroad gasoline and diesel vehicles. Note that these reductions were not applied to the CH_4 or N_2O emissions as these are calculated as a function of vehicle miles traveled, while CO_2 is calculated as a function of fuel consumed.

Data from EPA's MOBILE6 onroad emission factor model were used to distribute Iowa'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

Vehicle Age	Light-Duty Vehicles (Passenger Cars)	Light-Duty Trucks 1&2 (6,000 lb GVWR and under)	Light-Duty Trucks 3&4 (6,001-8,500 lb GVWR)	Heavy-Duty Vehicles Class 2B (8,501-10,000 lb GVWR) (Commercial Light Trucks)
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
Total	**1.0000**	**1.0000**	**1.0000**	**1.0000**

Table 5. Default MOBILE6 Mileage Accumulation Rates (miles per year)

Vehicle Age	Light-Duty Vehicles	Light-Duty Gas Trucks 1&2	Light-Duty Gas Trucks 3&4	Light-Duty Diesel Trucks 1&2	Light-Duty Diesel Trucks 3&4	Heavy-Duty Gas Vehicles Class 2B	Heavy-Duty Diesel Vehicles Class 2B
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 Iowa 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 Iowa transportation GHG emission inventory when the new CAFE 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 CAFE standards.

Table 6. Baseline Iowa Transportation Inventory

Emission Totals (MMTCO2e)	**1990**	**1995**	**2000**	**2005**	**2010**	**2015**	**2020**	**2025**
Onroad Gas and Diesel	15.37	15.57	17.47	18.65	20.70	22.81	24.95	27.18
Jet Fuel/Av. Gas	0.39	0.45	0.34	0.45	0.48	0.47	0.45	0.42
Marine	0.58	0.70	0.84	0.84	0.85	0.91	0.97	1.03
Rail	0.31	0.54	0.26	0.56	0.56	0.56	0.56	0.56
Other	0.23	0.22	0.23	0.20	0.23	0.25	0.27	0.29
Total	**16.88**	**17.48**	**19.13**	**20.69**	**22.82**	**25.00**	**27.20**	**29.47**

Table 7. Iowa Transportation Inventory with New CAFE Standards

Emission Totals (MMTCO2e)	**1990**	**1995**	**2000**	**2005**	**2010**	**2015**	**2020**	**2025**
Onroad Gas and Diesel	15.37	15.57	17.47	18.65	20.59	22.09	23.03	24.38
Jet Fuel/Av. Gas	0.39	0.45	0.34	0.45	0.48	0.47	0.45	0.42
Marine	0.58	0.70	0.84	0.84	0.85	0.91	0.97	1.03
Rail	0.31	0.54	0.26	0.56	0.56	0.56	0.56	0.56
Other	0.23	0.22	0.23	0.20	0.23	0.25	0.27	0.29
Total	**16.88**	***17.48***	***19.13***	***20.69***	**22.71**	**24.28**	**25.27**	**26.68**

Table 8. Percentage Reductions in Emissions due to New CAFE Standards

Percentage Reductions in MMtCO2e	1990	1995	2000	2005	2010	2015	2020	2025
Onroad Gas and Diesel	0.00%	0.00%	0.00%	0.00%	0.53%	3.16%	7.73%	10.29%
Total Transportation Inventory	0.00%	0.00%	0.00%	0.00%	0.48%	2.88%	7.09%	9.49%

Key Assumptions:

Key assumptions in this analysis include 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 costs have not been quantified for the new CAFE 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 CAFE standards. In this analysis, the first model year affected by the new CAFE standards was the 2009 model year. Although the AEO data show changes in fuel economy between the baseline and with CAFE 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 CAFE standards be implemented until the 2011 model year. However, vehicles meeting the new CAFE 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 Iowa'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 CAFE 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