



Fact Sheet

Vehicle Efficiency and Emissions Standards

August 2015

Transporting people and goods accounts for **1.8 trillion tons**, or 27 percent, of **U.S. greenhouse gas (GHG) emissions** and approximately 70 percent of all U.S. oil use (or about **13.1 million barrels of oil per day**, excluding biofuels). With the burning of **gasoline and diesel accounting for 59 percent and 24 percent** of the transportation sector's emissions, respectively, significant reductions in auto and truck emissions are essential to climate change mitigation efforts. Fleet electrification coupled with renewable electricity generation are gradually gaining traction, along with cleaner alternative fuels, but increasing the fleet's energy efficiency remains critical. Increasing vehicle fuel efficiency is a cost-effective way to significantly lower the transportation sector's emissions and reduce vehicle lifecycle cost without requiring major infrastructure adaptations. In addition, fuel efficiency standards can have beneficial health effects as they lower other forms of harmful emissions, such as air toxics and ultrafine particulates.

Medium and heavy-duty vehicles, powered by diesel fuel, represent only 5 percent of the vehicles on the road but currently account for more than 20 percent of transportation emissions, as trucks are typically driven much greater distances than cars. Therefore, while auto standards are important because of the volume of vehicles on the road, truck standards are just as important because increasing the efficiency of one truck has a much greater impact than increasing the efficiency of a single car.

The National Highway Transportation Safety Administration (NHTSA) and the Environmental Protection Agency (EPA) have estimated that the standards listed in the timeline below will save consumers over \$1.9 trillion at the pump, reduce oil consumption by 14.3 billion barrels, and eliminate 7.3 billion metric tons of GHG pollution by 2027. The benefits of the light-duty vehicle standards alone are the equivalent of **reducing gas prices by \$1 per gallon, cutting OPEC oil imports in half, and reducing emissions** by more than the **total amount U.S. CO2 emissions in 2014**.

This fact sheet will provide a timeline of federal fuel efficiency actions under the *Energy Independence and Security Act of 2007*, and the anticipated benefits of these measures.

Timeline of Vehicle Fuel Efficiency and CO2 Emissions Standards (2007-2015)

The first Corporate Average Fuel Economy (CAFE) standards were implemented in 1975 following the Arab Oil Embargo-induced energy crisis, and increased auto fuel efficiency from 18 to 27.5 miles per gallon between 1978 and 1990, where it remained for 20 years. In 2007, the landmark *Energy Independence and Security Act* (EISA) was enacted, with several vehicle fuel efficiency provisions, including:

- Instructing the Department of Transportation (DOT) to prescribe fuel economy standards for passenger and non-passenger automobiles (a.k.a. cars and light-duty trucks) sold in the United States for each model year from 2011 to 2030;
- Setting a minimum standard of 35 miles per gallon for cars and light trucks for model year 2020;
- Requiring the maximum feasible standard to be set for model years 2021-2030;
- Directing the National Academy of Sciences (NAS) to evaluate vehicle fuel economy standards, including for medium and heavy duty trucks; and,
- Requiring DOT to study fuel efficiency of work trucks and commercial medium and heavy-duty trucks.

The table below summarizes the actions that have been taken by the Courts and Administration shortly before and since enactment of the *Energy Independence and Security Act* in 2007.

April 2, 2007	The Supreme Court rules in <i>Massachusetts v. EPA</i> that EPA has the authority to regulate greenhouse gases as air pollutants under the <i>Clean Air Act</i> .
December 19, 2007	President Bush signs the <i>Energy Independence and Security Act (EISA)</i> of 2007 into law, including a national fuel economy standard target of 35 miles per gallon by 2020.
April 17, 2009	Responding to the April 2007 Supreme Court ruling, EPA finds that emissions of six greenhouse gases—carbon dioxide (CO ₂), methane (CH ₄), sulfur hexafluoride (SF ₆), nitrous oxide (N ₂ O), hydrofluorocarbons (HFCs), and perfluorocarbons (PFCs)—threaten the public health and welfare of current and future generations. Additionally, EPA finds that new motor vehicles contribute to this pollution.
May 19, 2009	President Obama announces the National Fuel Efficiency Policy , integrating CAFE standards with efforts to reduce GHG emissions for the first time. The Policy results from an unprecedented collaboration between the world’s largest auto manufacturers, the Department of Transportation, EPA, the United Auto Workers, leaders in the environmental community, and several state governments. It establishes fuel economy standards for the years 2012-2016, resulting in an average fuel economy standard of 35.5 mpg in 2016. These new standards surpass those passed by Congress in the EISA of 2007, which required an average fuel economy of 35 mpg in 2020.
September 28, 2009	NHTSA and EPA jointly publish a proposed rule to establish the first-ever national vehicle GHG emissions standards, and to increase the CAFE standards for light-duty vehicles in model years 2012-2016. The standards would require vehicles, on average, to emit 250 grams or less of CO ₂ per mile, and achieve 35.5 miles per gallon in the year 2016.
December 7, 2009	EPA Administrator Lisa Jackson signs the GHG endangerment finding , stating that new motor vehicles, including medium and heavy-duty vehicles, endanger public health, which authorizes the regulation of vehicular GHG emissions.
May 7, 2010	The EPA and NHSTA jointly publish the final 2012-2016 light duty vehicle standards . They project a reduction of 960 million metric tons of CO ₂ emissions and 1.8 billion barrels of oil over the life of vehicles built for the 2012 to 2016 model years.
October 25, 2010	After obtaining the support of the truck manufacturers industry , the EPA and NHSTA announce the first-ever joint proposed rule to set GHG emission and fuel economy standards for medium and heavy-duty vehicles for model years 2014-2018. The standards would achieve a 20 percent reduction in emissions and fuel consumption for combination tractors, 7 to 10 percent for vocational vehicles, 17 percent for diesel-fueled heavy duty pickup trucks and vans, and 12 percent for gasoline-fueled ones.
August 9, 2011	The EPA and NHSTA announce the final medium and heavy-duty vehicle standards . They project a reduction of 270 million metric tons of CO ₂ emissions, and 530 million barrels of oil over the life of vehicles built for the 2014 to 2018 model years, which would save vehicle owners more than \$50 billion in fuel costs.

November 16, 2011 After obtaining [the support of national and international auto manufacturers](#), the [EPA](#) and [NHSTA](#) announce the [proposed rule](#) extending light-duty vehicle emissions and fuel economy standards from model years 2017 to 2025.

August 28, 2012 [EPA](#) and [NHSTA](#) announce the [final rule](#) extending light-duty vehicle emissions and fuel economy standards from model years 2017 to 2025, increasing the average fuel economy of light-duty vehicles to 54.5 mpg by model year 2025. These standards, **combined with previous light-duty vehicle standards**, will save consumers over \$1.7 trillion at the gas pump, cut oil consumption by 12 billion barrels, and reduce GHG emissions by 6 billion metric tons over the life of 2012-2025 vehicles.

	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Grams CO2 per mile	295	286	276	263	250	243	232	222	213	199	190	180	171	163
MPG	30.1	31.1	32.2	33.8	35.5	36.6	38.3	40	41.7	44.7	46.8	49.4	52	54.5

February 18, 2014 President Obama [directs the EPA and NHTSA](#) to issue phase two of the medium and heavy-duty vehicle standards by March 2016.

June 19, 2015 The [EPA](#) and [NHSTA](#) announce a [joint proposed rule](#) to set emissions and fuel economy standards for medium and heavy-duty vehicles for model years 2018-2027. The proposed Phase 2 program would cut GHG emissions by 1 billion metric tons, conserve 1.8 billion barrels of oil, and lower fuel costs by about \$170 billion over the lifetime of the vehicles sold in model years 2018-2027. Comments due to EPA and NHTSA by September 17, 2015.

Phase Two: Medium and Heavy-Duty Vehicle Standards

On June 19, 2015, EPA and NHTSA announced proposed rules for the second phase of fuel economy standards for medium and heavy-duty vehicles. The phase two standards, which were outlined as a key strategy in [President Obama's Climate Action Plan](#), call for an 8 to 24 percent increase in fuel efficiency, depending on the vehicle's size and purpose, between the years 2018 and 2027. The standards are projected to save 1.8 billion barrels of oil, or 75 billion gallons of fuel, over the lifetime of the vehicles sold during model years 2018-2027, saving vehicle owners \$170 billion. The economic benefits do not end with the vehicle owner. Since the trucking industry hauls 70 percent of all U.S. goods, and the standards will significantly reduce trucking costs, the EPA concludes that the average U.S. household will save nearly \$150 a year by 2030 and \$275 by 2040.

Additionally, the standards will cut carbon emissions by 1 billion tons over the lifetime of the vehicles sold during model years 2018-2027, which is "roughly equivalent to the GHG emissions associated with the electricity and power use from all U.S. residences for one year." Tackling carbon emissions from trucks is becoming ever more urgent: according to the EPA, "heavy-duty trucks are the second largest and fastest growing segment of the U.S. transportation sector in terms of emissions and energy use" and, globally, greenhouse gas emissions from heavy-duty vehicles are growing so rapidly that they are expected to surpass emissions from passenger vehicles by the year 2030.

Just as the Obama Administration gained broad support for its light-duty vehicle standards, including from the [auto industry](#), the Administration is building broad support for its medium and heavy-duty vehicle standards, including from the trucking industry. Bill Graves, President and CEO of the American Trucking Associations (ATA) [stated](#), "Fuel is an enormous expense for our industry – and carbon emissions carry an enormous cost for our planet. That's why our industry supported the Obama Administration's historic first round of greenhouse gas and fuel efficiency standards for medium and large trucks and why we support the aims of this second round of standards."

Different Standards for Different Classes of Medium and Heavy-Duty Vehicles

The three overarching medium and heavy-duty vehicle categories defined in the rule are: (1) **heavy-duty pickup trucks and vans**, (2) **vocational vehicles**, and (3) **combination tractors**.

These are further subdivided using category-specific attributes which significantly impact strategies for emissions reduction. The fuel efficiency and emissions standards for heavy-duty pickup trucks and vans are mileage-based, whereas the targets for the other two categories of trucks are based on ton-miles, reflecting the significant impact of the freight load being hauled by those types of vehicles. A ton-mile is a standard unit of measurement, equivalent to carrying a one-ton load for a mile. Note that heavier trucks are generally more efficient per ton-mile than lighter trucks, so their standards are more stringent than those for lighter trucks.

The two tables at the end of this fact sheet detail the standards for each specific type of vehicle, both for carbon emissions (Table 2) and for fuel efficiency (Table 3).

Combination Tractors and Trailers (commonly known as big rigs or semi-trucks)

- The 2014-2018 standards addressed the cab (front) portion of the truck, while the proposed rule establishes standards for both the cab and trailer.
- The proposed rule sets trailer standards for 2018-2027, while the cab standards increase from the phase one 2018 standards starting in 2021.
- Separate standards are set for combination tractor sleeper cabs and day cabs, with further differentiation based on weight class and roof height.
- Trailer standards are set separately for dry and refrigerated boxes, and further differentiated by length.

Vocational Vehicles (includes delivery trucks, buses, garbage trucks, etc...)

- Phase 1 standards for vocational vehicles were set for light, medium and heavy duty vehicles, while proposed phase two standards are more granular.
- Phase 2 standards become more stringent beginning in 2021.
- There are separate phase 2 standards for vehicles differentiated by diesel and gasoline engines, vehicle weight class (light, medium, heavy), and vehicle purpose (urban, multi, regional...).

Heavy-duty Pickup Trucks and Vans (weighing between 8,500 and 14,000 pounds)

- There are separate standards for vehicles powered by diesel and gasoline.
- The emissions reductions and fuel efficiency standards are structured like those for light-duty vehicles except they take into account “work factor,” which considers the vehicle's cargo capacity, towing capabilities, and whether it has 4-wheel drive.
- 2018 standards were set, varying on the work factor; and interim 2014-2017 standards are 15, 20, 40, and 60 percent improvements from the baseline to the 2018 standard.
- The proposed rule's standards become 2.5 percent more stringent each year from 2021 to 2027.
- NOTE: These standards could not be fully represented, and so are not included, in the table format below.

Conclusion

Meeting the goals of the Climate Action Plan requires concurrent and persistent pursuit of multiple strategies in the transportation sector. These include fleet electrification, alternative/biofuels, and infrastructure investment to enable the most energy efficient mode to be used for each trip, in addition to increasing vehicle fuel efficiency standards. Fuel efficiency standards need to be set to be a challenging “stretch”, but still feasible, since everything must be done to expedite integration of cleaner, more efficient vehicles into the operating fleet.

The timeline above shows clearly that the Obama administration has diligently pursued such standards from its first year. With the comment period on the June 2015 proposed rule setting medium and heavy-duty vehicle standards for 2017-2025 closing in September of 2015, the administration continues to work with stakeholders toward establishing standards which will maximize emissions reduction.

TABLE 2: 2014 - 2027 Medium- and Heavy-Duty Vehicle Emissions Standards								
CO2 grams per ton-mile ¹				2014-16	2017	2021	2024	2027
Combination Tractors	Day Cab	Class 7 26,000-33,000 lbs	Low Roof <120"	107	104	97	90	87
			Mid Roof	119	115	107	100	96
			High Roof >148"	124	120	109	101	96
		Class 8 >33,000 lbs	Low Roof <120"	81	80	78	72	70
			Mid Roof	88	86	84	78	76
			High Roof >148"	92	89	86	79	76
	Sleeper Cab	Class 8 >33,000 lbs	Low Roof <120"	68	66	70	64	62
			Mid Roof	76	73	78	71	69
			High Roof >148"	75	72	77	70	67
				2018-2020	2021-23	2024-26	2027	
Trailers	Dry Box	Long (>50')		83	81	79	77	
		Short (<50')		144	142	141	140	
	Refrigerated Box	Long		84	82	81	80	
		Short		147	146	144	144	
				2014	2017	2021	2024	2027
Vocational Vehicles	CI Engines (Diesel)	Light Heavy Duty (Class 2b - 5) 8,501-19,500 lbs	Urban	388	373	296	284	272
			Multi-purpose			305	292	280
			Regional			318	304	292
		Medium Heavy Duty (Class 6-7) 19,501-33,000 lbs	Urban	234	225	188	179	172
			Multi-purpose			190	181	174
			Regional			186	178	170
		Heavy Heavy Duty (Class 8) >33,000 lbs	Urban	226	222	198	190	182
			Multi-purpose			200	192	183
			Regional			189	182	174
	SI Engines (Gasoline)	Light Heavy Duty (Class 2b - 5) 8,501-19,500 lbs	Urban	388	373	320	312	299
			Multi-purpose			329	321	308
			Regional			343	334	321
		Medium Heavy Duty (Class 6-7) 19,501-33,000 lbs	Urban	234	225	203	197	189
			Multi-purpose			205	199	191
			Regional			201	196	187
		Heavy Heavy Duty (Class 8) >33,000 lbs	Urban	226	222	214	208	196
			Multi-purpose			216	210	198
			Regional			204	199	188
CO2 grams per brake horsepower-hour ²				2014	2017	2021	2024	2027
Combination Tractor Engine	Medium Heavy Duty			502	487	479	469	466
	Heavy Heavy Duty			475	460	453	443	441
Vocational Diesel Engine	Light Heavy Duty			600	576	565	556	553
	Medium Heavy Duty			600	576	565	556	553
	Heavy Heavy Duty			567	555	544	536	533

Source: [Greenhouse Gas Emissions and Fuel Efficiency Standards for Medium- and Heavy-Duty Engines and Vehicles—Phase 2 \[proposed rule\]](#)

¹ i.e. carrying a one ton load for a mile, 10 ton load for 1/10 of a mile, etc.

² Brake horsepower (BHP) is the amount of power generated by a motor without taking into consideration any of the various auxiliary components that may slow down the actual speed of the motor. (www.wisegeek.org)

TABLE 3: 2014 - 2027 Medium- and Heavy-Duty Vehicle Fuel Efficiency Standards								
Gallons of Fuel per 1000 ton-mile ¹				2014-16	2017	2021	2024	2027
Combination Tractors	Day Cab	Class 7 26,000-33,000 lbs	Low Roof <120"	10.5	10.2	9.5285	8.8409	8.5462
			Mid Roof	11.7	11.3	10.5108	9.8232	9.4303
			High Roof >148"	12.2	11.8	10.7073	9.9214	9.4303
		Class 8 >33,000 lbs	Low Roof <120"	8	7.8	7.662	7.0727	6.8762
			Mid Roof	8.7	8.4	8.2515	7.6621	7.4656
			High Roof >148"	9	8.7	8.4479	7.7603	7.4656
	Sleeper Cab	Class 8 >33,000 lbs	Low Roof <120"	6.7	6.5	6.8762	6.2868	6.0904
			Mid Roof	7.4	7.2	7.6621	6.9745	6.778
			High Roof >148"	7.3	7.1	7.5639	6.8762	6.5815
				2018-2020	2021-23	2024-26	2027	
Trailers	Dry Box	Long (>50')		8.1532	7.9568	7.7603	7.5639	
		Short (<50')		14.1454	13.9489	13.8507	13.7525	
	Refrigerated Box	Long		8.2515	8.055	7.9568	7.8585	
		Short		14.4401	14.3418	14.1454	14.1454	
				2016	2017	2021	2024	2027
Vocational Vehicles	CI Engines (Diesel)	Light Heavy Duty (Class 2b - 5) 8,501-19,500 lbs	Urban	38.1	36.7	29.0776	27.8978	26.7191
			Multi-purpose			29.9607	28.6837	27.5049
			Regional			31.2377	29.8625	28.6837
		Medium Heavy Duty (Class 6-7) 19,501-33,000 lbs	Urban	23	22.1	18.4676	17.5835	16.8959
			Multi-purpose			18.466	17.78	17.0923
			Regional			18.2711	17.4853	16.6994
		Heavy Heavy Duty (Class 8) >33,000 lbs	Urban	22.2	21.8	19.4499	18.664	17.8782
			Multi-purpose			19.6464	18.8605	17.9764
			Regional			18.5658	17.8782	17.0923
	SI Engines (Gasoline)	Light Heavy Duty (Class 2b - 5) 8,501-19,500 lbs	Urban	38.1	36.7	36.0077	35.1075	33.6446
			Multi-purpose			37.0204	36.1202	34.6574
			Regional			38.5957	37.583	36.1202
		Medium Heavy Duty (Class 6-7) 19,501-33,000 lbs	Urban	23	22.1	22.8424	22.1672	21.267
			Multi-purpose			23.0674	22.3923	21.4921
			Regional			22.6173	22.0547	21.042
		Heavy Heavy Duty (Class 8) >33,000 lbs	Urban	22.2	21.8	24.0801	23.405	22.0547
			Multi-purpose			24.3052	23.63	22.2797
			Regional			22.9549	22.3923	21.1545
Gallons of fuel per 100 brake horsepower-hour ²				2014	2017	2021	2024	2027
Combination Tractor Engine	Medium Heavy Duty			4.93	4.78	4.7053	4.6071	4.5776
	Heavy Heavy Duty			4.67	4.52	4.4499	4.3517	4.332
Vocational Diesel Engine	Light Heavy Duty			5.89	5.66	5.5501	5.4617	5.4322
	Medium Heavy Duty			5.89	5.66	5.5501	5.4617	5.4322
	Heavy Heavy Duty			5.57	5.45	5.3438	5.2652	5.2358

Source: Greenhouse Gas Emissions and Fuel Efficiency Standards for Medium- and Heavy-Duty Engines and Vehicles—Phase 2 [proposed rule]

¹ i.e. carrying a one ton load for 1000 miles, 10 ton load for 100 miles, etc.

² Brake horsepower (BHP) is the amount of power generated by a motor without taking into consideration any of the various auxiliary components that may slow down the actual speed of the motor. (www.wisegeek.org)

This fact sheet is available electronically (with hyperlinks) at www.eesi.org/papers.

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