Chapter 5.

POLICY

Page

Contents

Federal Tax Credits Encourage the Purchase of Advanced Technology Vehicles 111
The Cash for Clunkers Program Took Inefficient Vehicles off the Road 112
The Cash for Clunkers Program Raised the Nation's Fuel Economy 113
EPA and NHTSA Redesigned Window Stickers for Model Year 2013 114
Corporate Average Fuel Economy: Historical Standards and Values 115
Corporate Average Fuel Economy: Manufacturers' Ups and Downs 116
Corporate Average Fuel Economy: Flex-Fuel Vehicle Credits 117
Corporate Average Fuel Economy: Average Fleet-wide Fuel Economies for Future Cars and Light Trucks 118
Corporate Average Fuel Economy: Sliding Scale Standards for New Cars and Light Trucks 119
Vehicle Footprints are Used for Corporate Average Fuel Economy 120
Fuel Consumption Standards Set for Heavy Pickups and Vans 121
Fuel Consumption Standards Set for Combination Tractors 122
Fuel Consumption Standards Set for Vocational Vehicles 123
Diesel Engine Fuel Consumption Standards are Set 124
Energy Policy Act Encourages Idle Reduction Technologies 125
Idle Reduction Technologies Excluded From Federal Excise Taxes 126
Longer Combination Trucks are Only Permitted on Some Routes 127
Heavy Truck Speed Limits are Inconsistent 128
Fuel Sulfur Standards Provide Cleaner Gasoline and Diesel 129
Emission Standards on Diesel Engines are More Strict 130
Effect of Emission Standards on Heavy Truck Sales 131

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Federal Tax Credits Encourage the Purchase of Advanced Technology Vehicles

The Federal Government encourages the use of different transportation fuels by allowing tax credits on vehicle purchases. Traditional (non-plug-in) hybrid vehicles were eligible for a tax credit of up to $3,400 from 2005 through 2010. Diesels, which are more efficient than gasoline vehicles, were eligible for a similar tax credit, as were alternative-fuel vehicles. All of those credits were discontinued at the end of calendar year 2010. Now, electric vehicles and plug-in hybrid-electric vehicles are the only ones for which a Federal tax credit is available – up to $7,500.

TABLE 20. Federal Government Tax Incentives for Advanced Technology Vehicles

Vehicle Type	Calendar Year in which the Vehicle was Purchased	Maximum Credit Amount	Vehicles Currently Eligible for a Tax Credit	
Plug-in Hybrid-Electric Vehicles	2010 - on	$7,500		2011 Chevrolet Volt
Electric Vehicles (Requirements for this credit changed between 2009 and 2010.)	2009 - on	$7,500		2010 Coda Sedan
				2011 Ford Transit Connect EV
				2011 Nissan Leaf
				2011 Smart ForTwo EV
				2008-2010 Tesla Roadster
				2011 Wheego LiFe
Hybrids	2005 - 2010	$3,400	Purchases made after December 31, 2010 are not eligible for the tax credit.	
Diesels	2005 - 2010	$3,400		
Compressed Natural Gas	2005 - 2010	$3,400		
Liquefied Natural Gas	2005 - 2010	$3,400		
Liquefied Petroleum Gas	2005 - 2010	$3,400		
Hydrogen	2005 - 2010	$3,400		
M85 (85% Methanol)	2005 - 2010	$3,400		

Source:

U.S. Department of Energy and U.S. Environmental Protection Agency, www.fueleconomy.gov website, June 2011. http://www.fueleconomy.gov/feg/taxcenter.shtml

The Cash for Clunkers Program Took Inefficient Vehicles off the Road

The Car Allowance Rebate System, also known as Cash for Clunkers, provided Federal rebate money for consumers who traded old vehicles with an EPA combined fuel economy rating of 18 miles per gallon or less for brand new vehicles with improved fuel economy. The program was active from July 1 to August 24, 2009 and handled more than 677,000 transactions for a total of $2.85 billion.

TABLE 21. Top Ten List of Trade-in and Purchased Vehicles in the Cash for Clunkers Program

Top 10 Trade-in Vehicles	*Top 10 New Vehicles Purchased*
1. Ford Explorer 4WD	1. Toyota Corolla
2. Ford F150 Pickup 2WD	2. Honda Civic
3. Jeep Grand Cherokee 4WD	3. Toyota Camry
4. Ford Explorer 2WD	4. Ford Focus FWD
5. Dodge Caravan/Grand Caravan 2WD	5. Hyundai Elantra
6. Jeep Cherokee 4WD	6. Nissan Versa
7. Chevrolet Blazer 4WD	7. Toyota Prius
8. Ford F150 Pickup 4WD	8. Honda Accord
9. Chevrolet C1500 Pickup 2WD	9. Honda Fit
10. Ford Windstar FWD Van	10. Ford Escape FWD

Vehicles purchased under the program are, on average, 19% above the average fuel economy of all new vehicles at that time, and 59% above the average fuel economy of vehicles that were traded in.

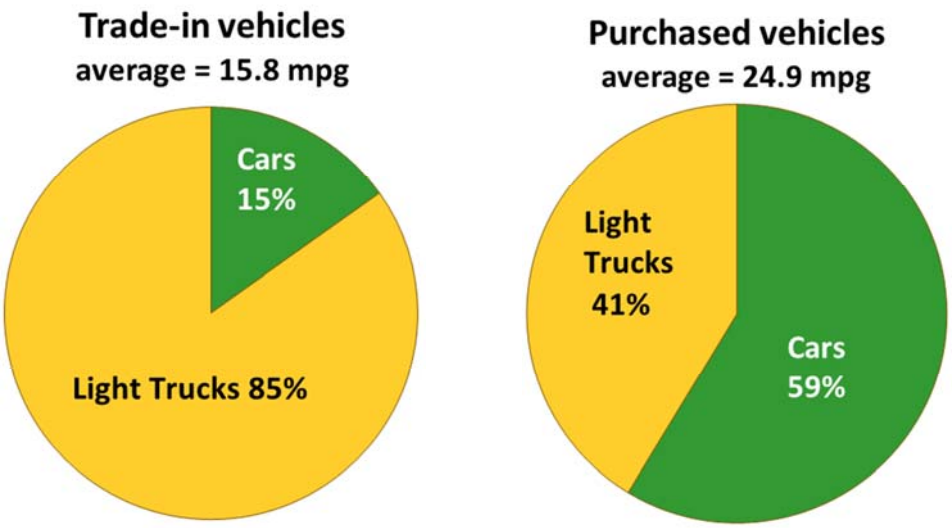


FIGURE 87. Share of Cars and Light Trucks Traded and Purchased under the Cash for Clunkers Program

Source:
National Highway Traffic Safety Administration, http://www.cars.gov

The Cash for Clunkers Program Raised the Nation's Fuel Economy

The Car Allowance Rebate System, also known as Cash for Clunkers, was successful in taking inefficient vehicles off of the road and replacing them with new, more fuel efficient vehicles. The average difference between the fuel economy of the vehicles traded-in and the fuel economy of the vehicles purchased under the program is shown in the map below. In California where the price of fuel is typically high, consumers purchased vehicles that averaged more than 10 miles per gallon (mpg) over what they traded.

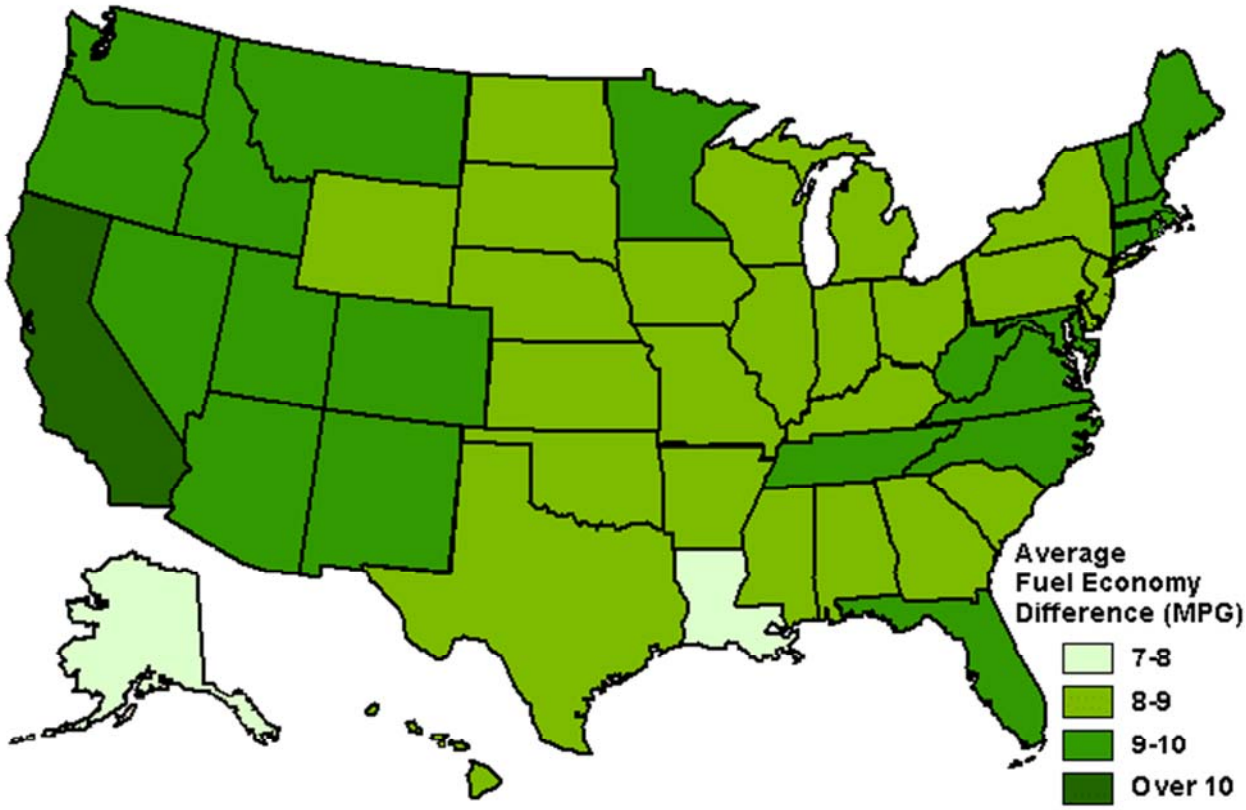


FIGURE 88. Average Fuel Economy Difference between Vehicles Traded and Vehicles Purchased in the Cash for Clunkers Program

Source:
National Highway Traffic Safety Administration, http://www.cars.gov

EPA and NHTSA Redesigned Window Stickers for Model Year 2013

In May 2011, the U.S. Environmental Protection Agency (EPA) and the National Highway Traffic Safety Administration (NHTSA) unveiled the most dramatic overhaul to fuel economy labels since they were introduced 35 years ago. The new labels address many of the challenges presented by a growing number of drivetrains and fuel types. The new labels also provide consumers with new information including:

- New ways to compare energy use and cost between vehicles with diverse fuel types.
- An estimate of how much fuel or electricity it takes to drive 100 miles.
- Information on driving range and charging times for electric vehicles.
- An estimate of how much consumers will spend or save over a five year period on fuel versus the average vehicle.
- Tailpipe emission ratings for pollutants and greenhouse gas emissions expressed in grams per mile.
- A QR code that allows users with smartphones to quickly access online information about the vehicle.

These new labels will be mandatory for the 2013 model year; however, automakers may voluntarily begin using the new labels for the 2012 model year.

FIGURE 89. Window Stickers for Model Year 2013 Cars and Light Trucks

Note: There are different labels for each fuel type. Above are two examples of the new labels: one for a conventional gasoline vehicle and one for a plug-in Hybrid Vehicle. The Plug-in Hybrid label above shows the efficiency in electric mode only expressed in Miles per Gallon equivalent and also in gasoline mode. Labels for vehicles with fuel types that provide significantly less range than conventionally fueled vehicles have range bars showing consumers the range that they can expect.

Sources:

U.S. Environmental Protection Agency, *A New Generation of Labels for a New Generation of Vehicles,* September 2011. http://www.epa.gov/carlabel/basicinformation.htm

U.S. Department of Energy and U.S. Environmental Protection Agency, Fuel Economy Guide website, *Learn About the New Label*, September 2011. http://www.fueleconomy.gov/feg/label/

Corporate Average Fuel Economy: Historical Standards and Values

The Corporate Average Fuel Economy (CAFE) is the sales-weighted harmonic mean fuel economy of a manufacturer's fleet of new cars or light trucks in a certain model year (MY). First enacted by Congress in 1975, the standards for cars began in MY 1978 and for light trucks in MY 1979. In general, the average of all cars and all light trucks has met or exceeded the standards each year. However, standards must be met on a manufacturer level – some manufacturers fall short of the standards while others exceed them. Legislation passed in December 2007 raised the CAFE standards beginning in MY 2011 – for cars, this was the first increase since 1990.

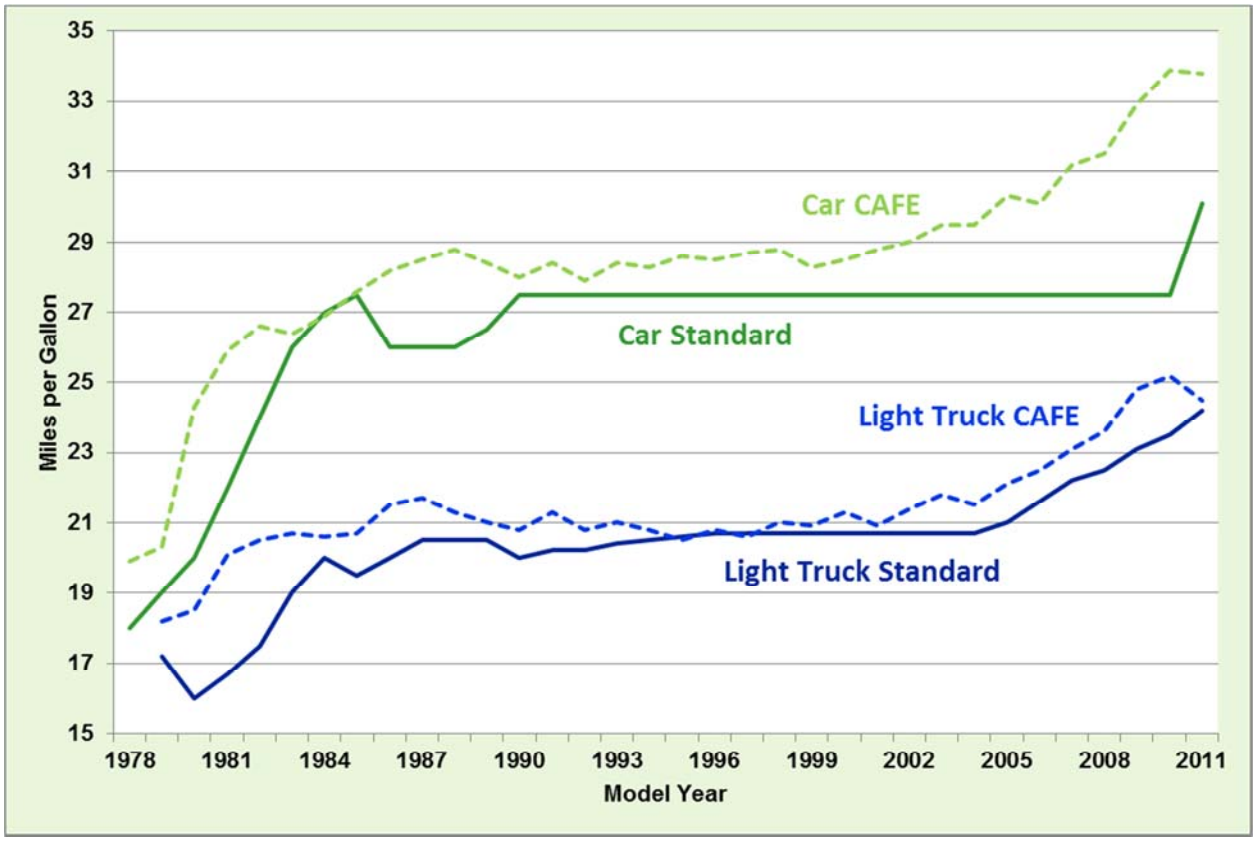


FIGURE 90. Corporate Average Fuel Economy for Cars and Light Trucks, 1978-2011

Note: Light truck standards for MY 2008-2010 are based on "unreformed" standards. MY 2011 data are estimates based on product plans.

Source:

National Highway Traffic Safety Administration, "Summary of Fuel Economy Performance," October 2011. http://www.nhtsa.gov/staticfiles/rulemaking/pdf/cafe/October_2011_Public.pdf

Corporate Average Fuel Economy: Manufacturers' Ups and Downs

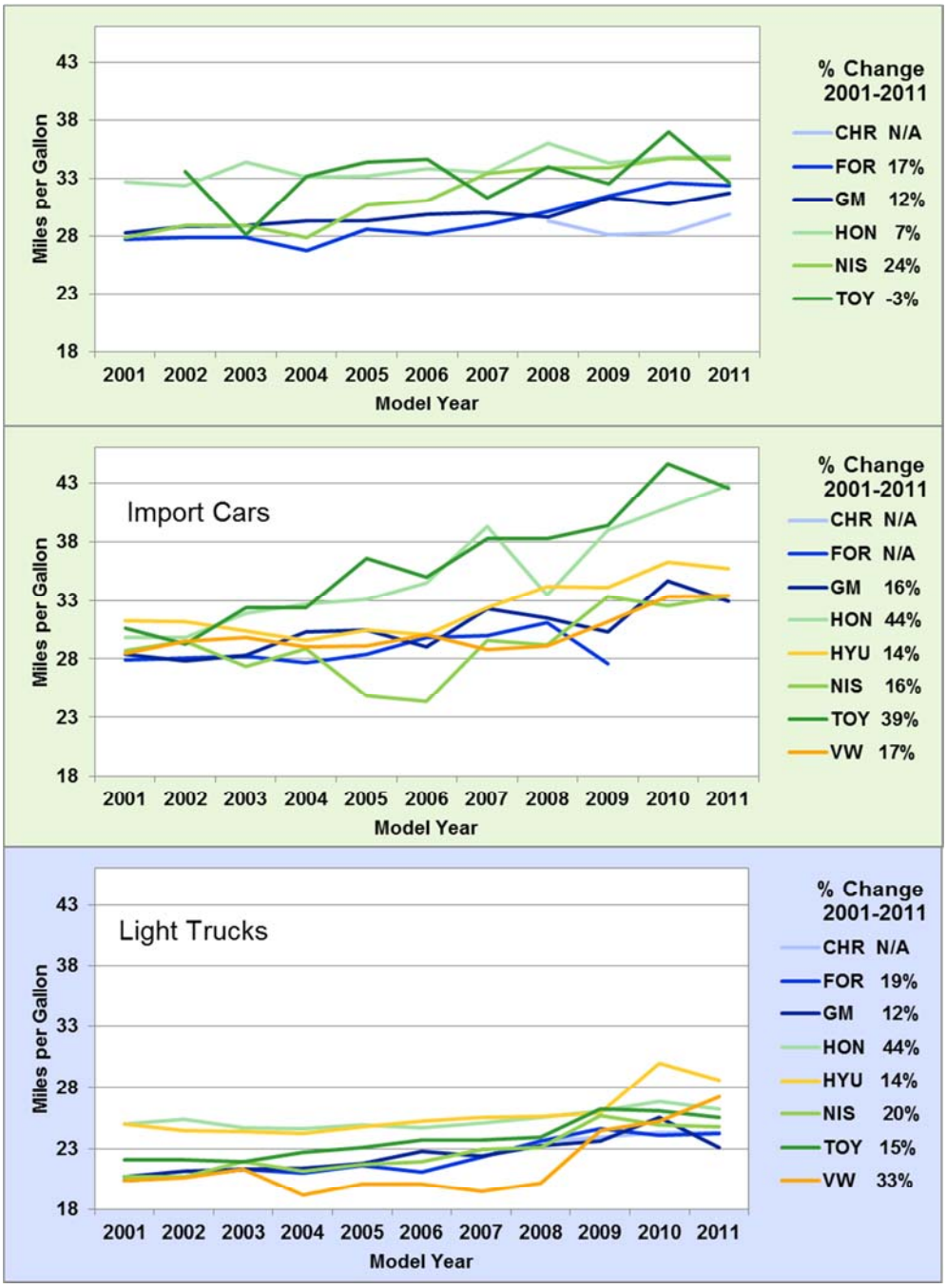


FIGURE 91. CAFE for Domestic and Import Cars and Light Trucks by Manufacturer, 2001-2011

Note: Data for Chrysler begin in 2008 after the merger with Daimler ended. Percent change for Toyota domestic cars is for 2002 – 2011. Ford has no import cars past 2009.

Source:

National Highway Traffic Safety Administration, "Summary of Fuel Economy Performance," October 2011. http://www.nhtsa.gov/staticfiles/rulemaking/pdf/cafe/October_2011_Public.pdf

Corporate Average Fuel Economy: Flex-Fuel Vehicle Credits

The Alternative Motor Fuels Act (AMFA) of 1988 enabled manufacturers to increase their calculated Corporate Average Fuel Economy (CAFE) by producing flex-fuel vehicles. The act encourages the production of motor vehicles capable of operating on alternative fuels. It gives a manufacturer a credit of up to 1.2 miles per gallon (mpg) toward the manufacturer's CAFE. GM has taken full advantage of the credit in both cars and light trucks for the last five years. Ford received the full credit beginning in model year (MY) 2008 for both cars and light trucks. Chrysler received full credit for light trucks beginning in MY 2008, but never received full credit for cars until MY 2011. Nissan is the only other manufacturer to receive AMFA credits. In MY 2008 and 2011 Nissan received full credit for light trucks.

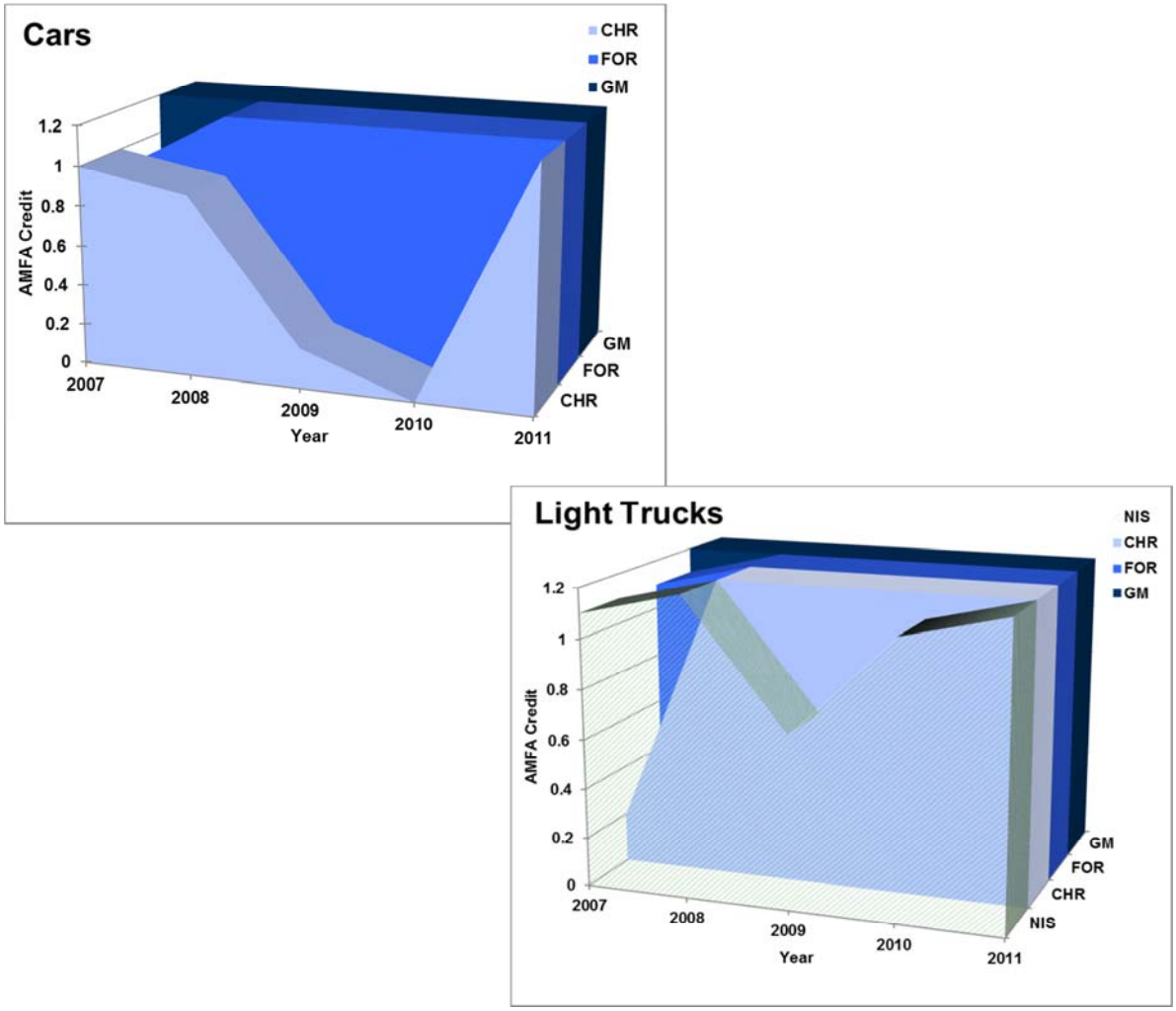


Figure 92. Flex Fuel Vehicle CAFE Credits

Source:

National Highway Traffic Safety Administration, "Fuel Economy Performance With and Without AMFA," April 2011.
http://www.nhtsa.gov/staticfiles/rulemaking/pdf/Flexible_Fuel_Credits_2003_2010.pdf

Corporate Average Fuel Economy: Average Fleet-wide Fuel Economies for Future Cars and Light Trucks

The average fleet-wide fuel economies required to meet the Corporate Average Fuel Economy (CAFE) standards are shown below. In May 2010, the final standards were set for model years (MY) 2012 through 2016. In November 2011, the National Highway Traffic Safety Administration proposed standards for MY 2017 through 2025. These standards apply to cars and pickup trucks less than 8,500 lbs. gross vehicle weight rating (GVWR), and sport utility vehicles and passenger vans less than 10,000 lbs. GVWR.

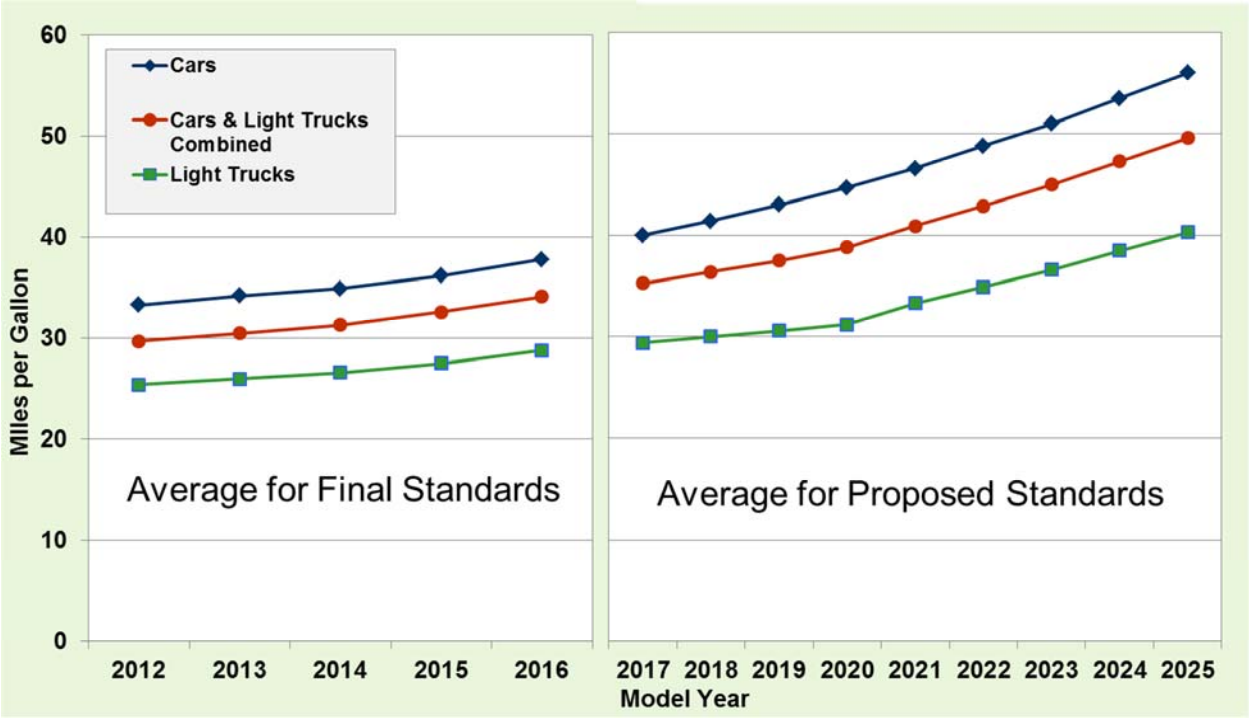


FIGURE 93. Average CAFE Standards for MY 2012-2025

Sources:

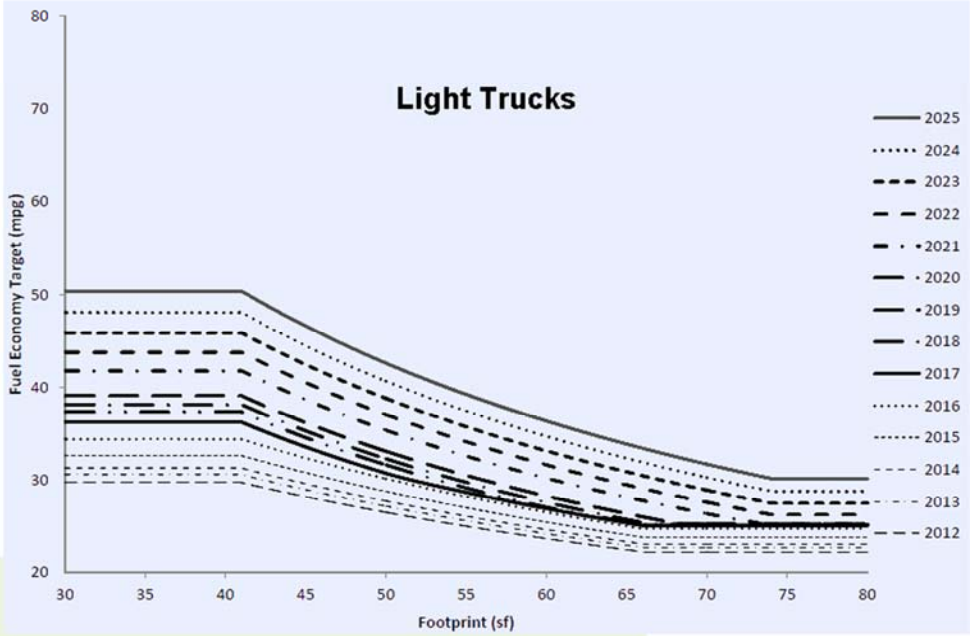
Federal Register, Vol. 75, No. 88, May 7, 2010, pp. 25324-25728.

Notice of Proposed Rulemaking, Docket No. NHTSA-2010-0131, November 16, 2011.

Corporate Average Fuel Economy: Sliding Scale Standards for New Cars and Light Trucks

Beginning in 2012, the Corporate Average Fuel Economy (CAFE) standards are based on a vehicle's footprint, where each vehicle has a different fuel economy target depending on its footprint. The footprint is calculated as the vehicle's track width times the wheelbase (i.e., the distance between the wheels [width] multiplied by the distance between the axles [length]). In general, as the vehicle footprint increases, the fuel economy standard the vehicle has to meet decreases. Footprint-based standards help to distribute the burden of compliance across all vehicles and manufacturers.

Note:
Standards from 2017 to 2025 are proposed standards.



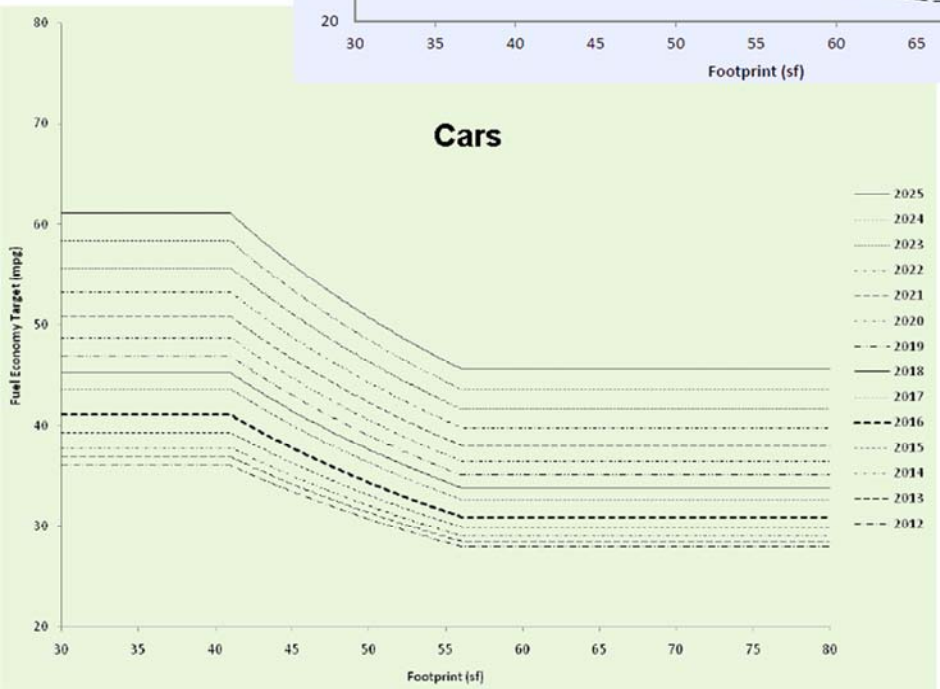


FIGURE 94. CAFE Standards for Cars and Light Trucks, MY 2012-2025

Source:
Notice of Proposed Rulemaking, Docket No. NHTSA-2010-0131, November 16, 2011.

Vehicle Footprints are Used for Corporate Average Fuel Economy

The vehicle footprint is the area defined by the four points where the tires touch the ground. It is calculated as the product of the wheelbase and the average track width of the vehicle. The upcoming Corporate Average Fuel Economy (CAFE) Standards have fuel economy targets based on the vehicle footprint. The average footprint for all cars sold in model year (MY) 2010 was 45.2 square feet (sq. ft.), down just 0.2 sq. ft. from MY 2008. The average footprint for light trucks was higher – 54.0 in 2010. The table shows selected vehicles and their MY 2008 footprint.

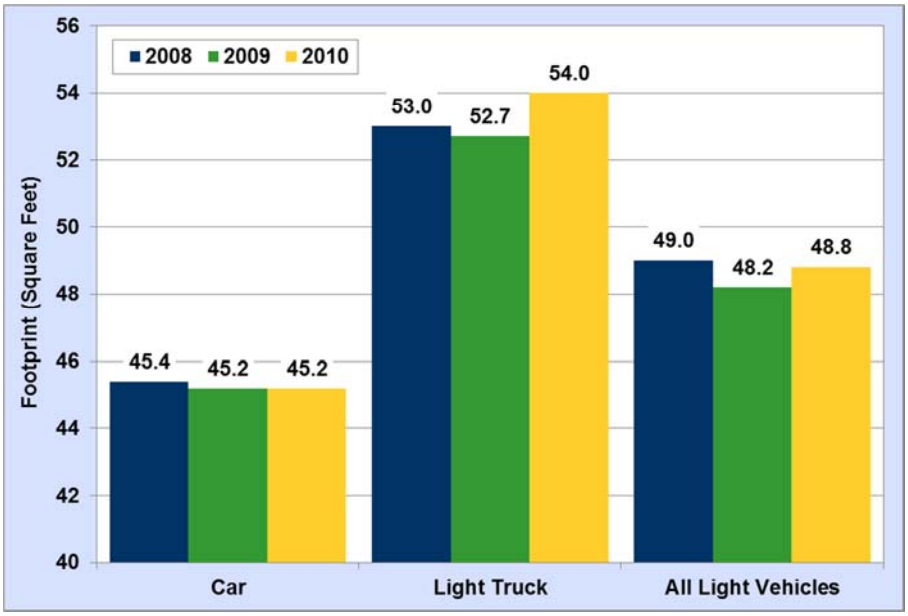


FIGURE 95. Average Vehicle Footprint, MY 2008-2010

TABLE 22. Vehicle Footprint and Fuel Economy Target, MY 2008

Vehicle Type	Example Model (MY 2008 Vehicles)	Footprint (Sq. Ft.)	MY 2016 Fuel Economy Target (mpg)
Cars			
Compact	Honda Fit	40	41.1
Midsize	Ford Fusion	46	37.1
Fullsize	Chrysler 300	53	32.6
Light Trucks			
Small Sport Utility	Ford Escape 4WD	44	32.9
Midsize Crossover	Nissan Murano	49	30.6
Minivan	Toyota Sienna	55	28.2
Large Pickup Truck	Chevrolet Silverado	67	24.7

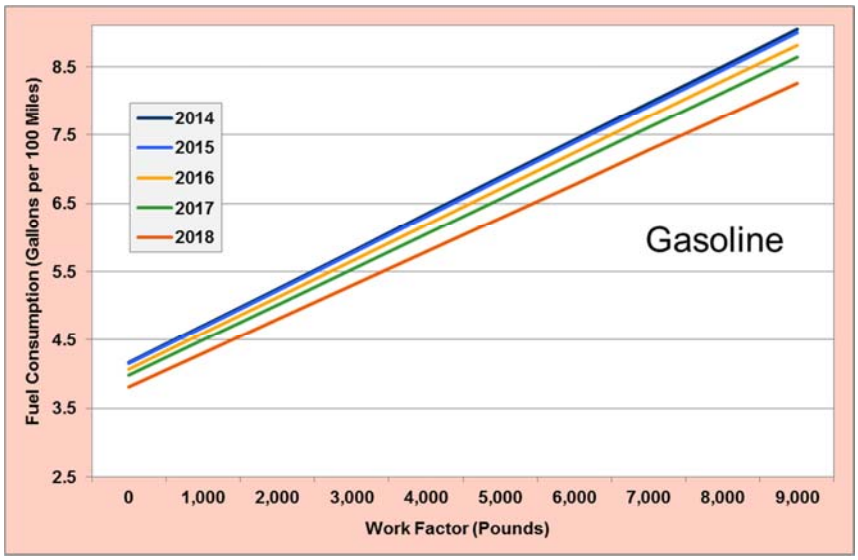
Sources:

U.S. Environmental Protection Agency, *Light-Duty Automotive Technology, Carbon Dioxide Emissions, and Fuel Economy Trends: 1975 Through 2010*, EPA420-R-10-023, November 2010. http://www.epa.gov/otaq/fetrends.htm

Federal Register, Vol. 75, No. 88, May 7, 2010, p. 25338.

Fuel Consumption Standards Set for Heavy Pickups and Vans

In September 2011 the National Highway Traffic Safety Administration issued the final rule to set standards regulating the fuel use of new vehicles heavier than 8,500 lbs. gross vehicle weight. Included in the new standards are pickup trucks over 8,500 lbs., cargo trucks over 8,500 lbs., and passenger vans over 10,000 lbs. Standards were set separately for gasoline and diesel vehicles, on a scale that depends on a "work factor." The work factor, which is expressed in pounds, takes into account the vehicle's payload capacity, towing capacity, and whether or not the vehicle is four-wheel drive (see note below for work factor details). Standards for model years 2014 and 2015 are voluntary, but standards are mandatory thereafter.



Note: Work factor is a weighted average of 25% towing capacity and 75% payload capacity. An additional 500 lbs. is added to payload capacity when the vehicle is four-wheel drive.

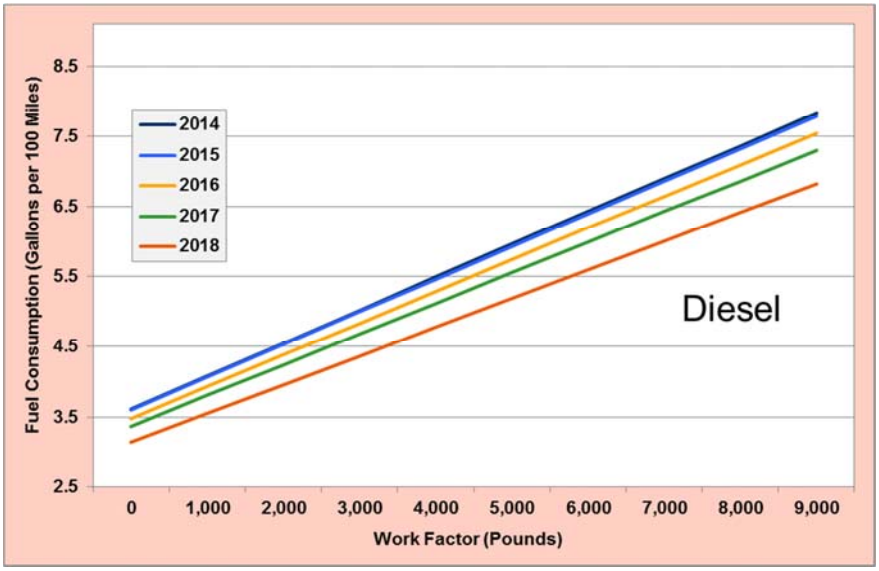


FIGURE 96. Fuel Consumption Target Standards for Gasoline and Diesel Heavy Pickups and Vans

Source:
Federal Register, Vol. 76, No. 179, September 15, 2011, pp. 25324 - 25728.

Fuel Consumption Standards Set for Combination Tractors

The National Highway Traffic Safety Administration published a final rule setting fuel consumption standards for heavy trucks in September 2011. For tractor-trailers, the standards focus on the gallons of fuel per thousand ton-miles. Ton-miles are equal to the weight of a shipment transported multiplied by the distance hauled. Because differences in the tractors create differences in the fuel used, standards were set for varying roof height (low, mid, and high), gross vehicle weight rating (class 7 and 8), and types of tractor (day cab, sleeper cab).

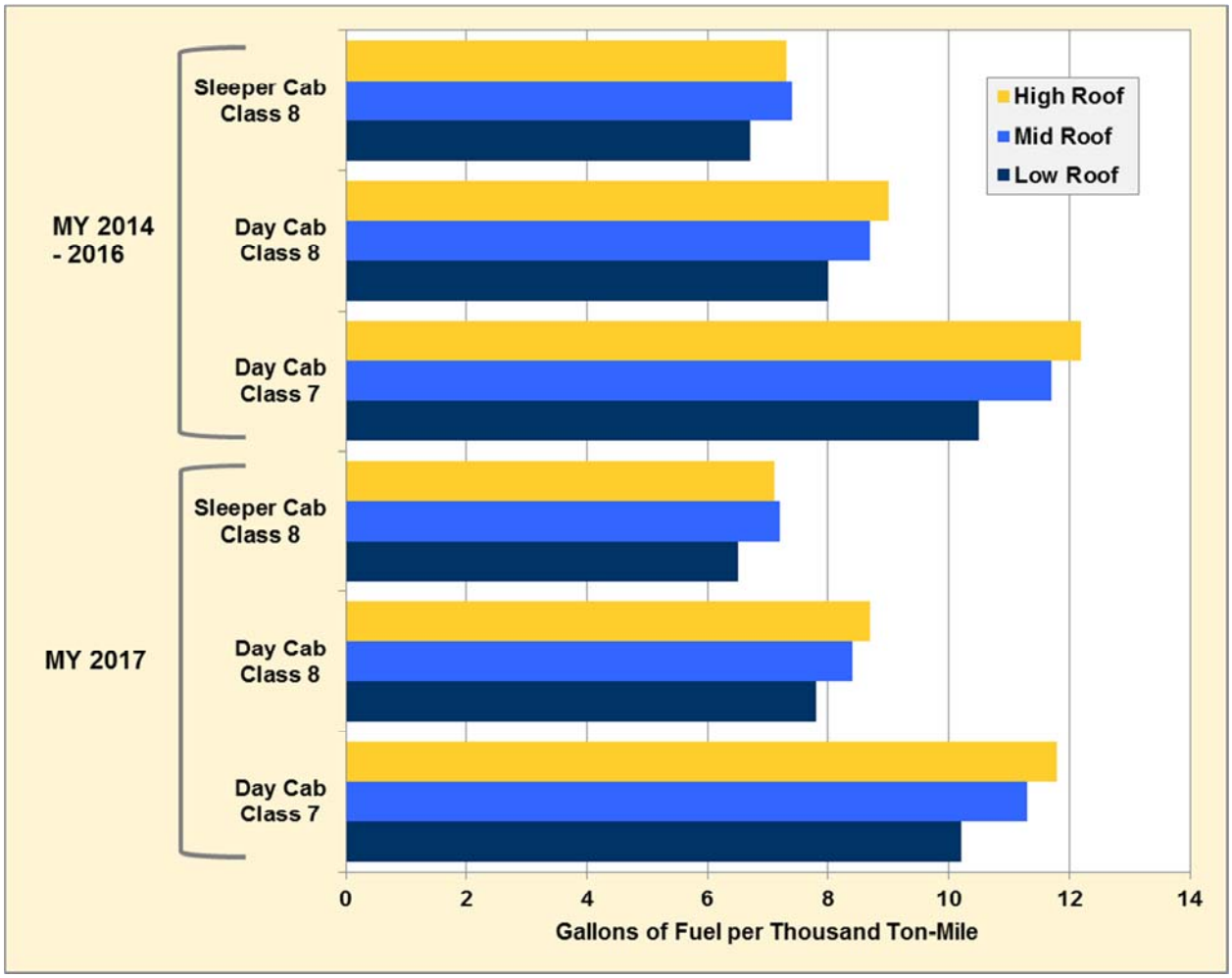


FIGURE 97. Fuel Consumption Standards for Combination Tractors

Note: The standards for 2014 and 2015 are voluntary. Class 7 trucks have a gross vehicle weight rating between 26,000 and 33,000 lbs. Class 8 trucks have a gross vehicle weight rating over 33,000 lbs.

Source:
Federal Register, Vol. 76, No. 179, September 15, 2011, pp. 25324 - 25728.

Fuel Consumption Standards Set for Vocational Vehicles

The National Highway Traffic Safety Administration recently published final fuel consumption standards for heavy vehicles called "vocational" vehicles. A vocational vehicle is generally a single-unit work vehicle over 8,500 lbs. gross vehicle weight rating (GVWR) or a passenger vehicle over 10,000 lbs. GVWR. These vehicles vary in size, and include smaller and larger van trucks, utility ''bucket'' trucks, tank trucks, refuse trucks, urban and over-the-road buses, fire trucks, flat-bed trucks, dump trucks, and others. Often, these trucks are built as a chassis with an installed engine purchased from one manufacturer and an installed transmission purchased from another manufacturer. The chassis is typically then sent to a body manufacturer, which completes the vehicle by installing the appropriate feature—such as dump bed, delivery box, or utility bucket—onto the chassis. Because of the complexities associated with the wide variety of body styles, NHTSA decided to finalize a set of standards beginning in 2016 for the chassis manufacturers of vocational vehicles (but not the body builders).

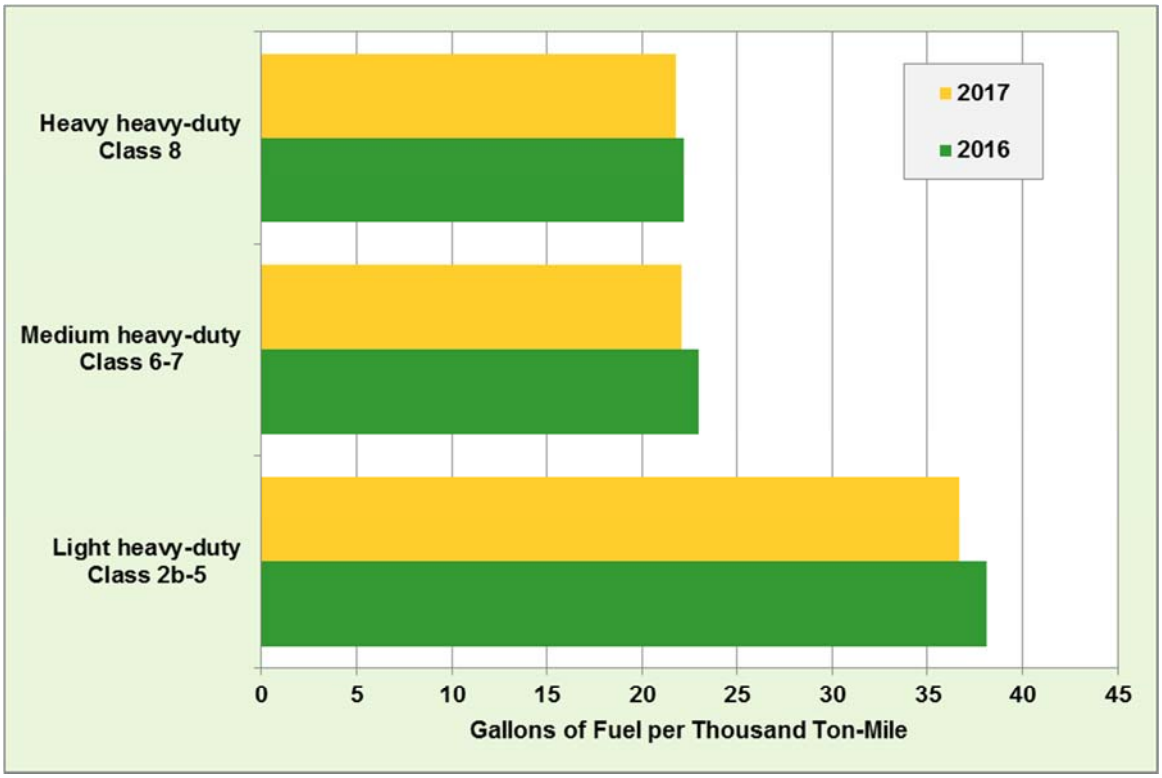


FIGURE 98. Vocational Vehicle Fuel Consumption Standards

Note: Vehicles in classes 2b – 5 are between 8,500 and 19,500 lbs. GVWR. Vehicles in class 6-7 are between 19,500 and 33,000 lbs. GVWR. Vehicles in class 8 are above 33,000 lbs. GVWR. A ton-mile is a measure of shipment weight multiplied by distance traveled.

Source:
Federal Register, Vol. 76, No. 179, September 15, 2011, pp. 25324 - 25728.

Diesel Engine Fuel Consumption Standards are Set

In addition to the combination truck and vocational truck fuel consumption standards, the National Highway Traffic Safety Administration (NHTSA) set fuel consumption standards for diesel engines installed in truck-tractors and vocational vehicles. The standards are set in gallons of fuel used per brake-horsepower hour, which is a measure of an engine's horsepower before the loss in power caused by the gearbox, alternator, differential, water pump, and other auxiliary components for one hour. These standards are voluntary from 2014 through 2016 and mandatory thereafter.

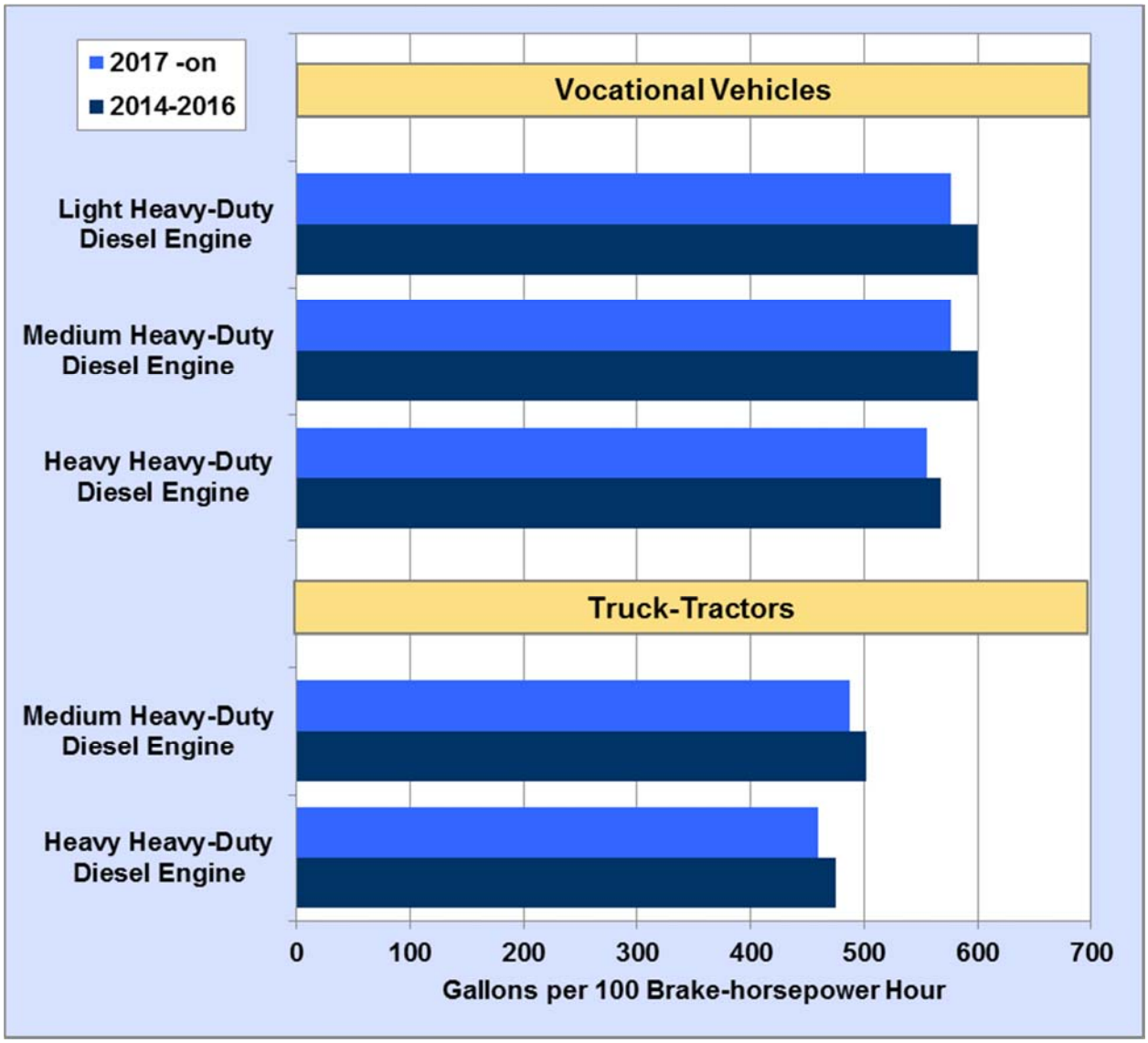


FIGURE 99. Fuel Standards for New Diesel Engines

Note: Light Heavy-Duty (Class 2b–5); Medium Heavy-Duty (Class 6–7); and Heavy Heavy-Duty (Class 8).

Source:
Federal Register, Vol. 76, No. 179, September 15, 2011, pp. 25324 - 25728.

Energy Policy Act Encourages Idle Reduction Technologies

In order to encourage the use of idling reduction devices in large trucks, the Energy Policy Act of 2005 allowed for a 400-pound weight exemption for the additional weight of idling reduction technology. States were given the discretion of adopting this exemption without being subjected to penalty.

Since then, most States have passed laws which allow trucks to exceed the maximum gross vehicle weight limit by an additional 400 lbs. (dark green) Other States have a 400-lb weight allowance which is granted by enforcement personnel (light green). Massachusetts has legislation pending at this time while another five States plus the District of Columbia have not adopted the weight exemption (gold).

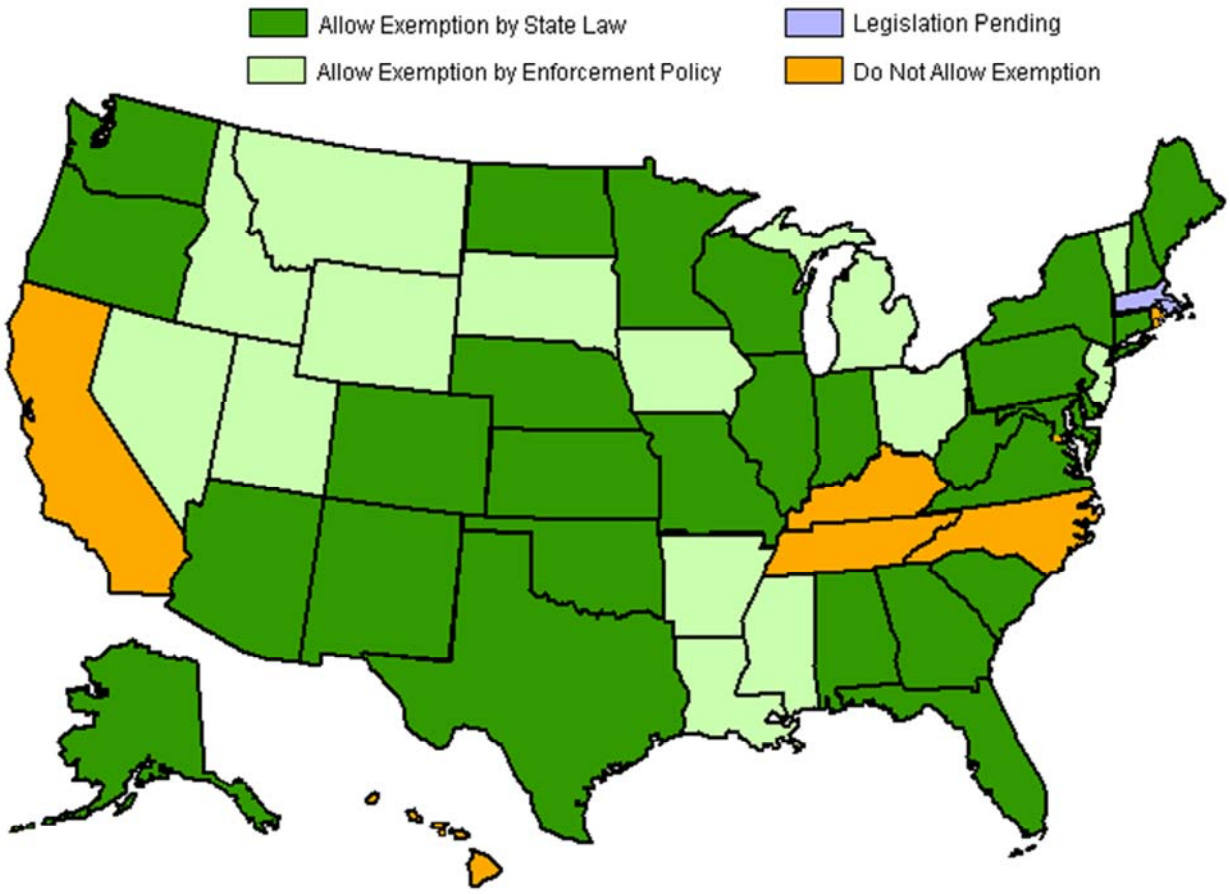


FIGURE 100. States Adopting 400-Pound Weight Exemption for Idling Reduction Devices, 2011

Source:

U.S. Department of Energy, Energy Efficiency & Renewable Energy, *National Idling Reduction News*, October 2011. http://www1.eere.energy.gov/vehiclesandfuels/pdfs/idling_news/oct11_network_news.pdf

Idle Reduction Technologies Excluded From Federal Excise Taxes

With the passage of the Energy Improvement and Extension Act of 2008, certain idling reduction devices are excluded from Federal excise taxes. The Environmental Protection Agency (EPA) certifies products that are eligible for the exemption. The exemption is only available for EPA-certified idling reduction devices installed on truck tractors. The companies that have devices certified with the EPA are shown below.

Auxiliary Power Units/ Generator Sets

- Aux Generators Inc.
- Auxiliary Power Dynamics, LLC
- Black Rock Systems
- Carrier Transicold
- Centramatics
- Comfort Master
- Cummins
- Diamond Power
- Double Eagle Industries
- Dunamis Power Systems
- Flying J Inc
- Frigette Truck Systems
- Gates Corporation
- Hodyon LP
- Idle Solutions
- Idlebuster
- Kohler
- Kool-Gen
- Mantis Metalworks, LLC
- Mechron Power Systems
- Midwest Power Generators
- Navistar
- Parks Industries
- Pony Pack
- Power Technology Southeast
- RigMaster Power Systems, Inc
- Star Class
- Thermo King
- TRIDAKO Energy Systems
- Truck Gen
- Volvo
- Willis Power Systems

Thermal Storage Systems

- Autotherm Division Enthal Sys, Inc
- Webasto

Shore Connection Systems

- Comfort
- Freightliner
- Phillips and Temro Industries
- Shurepower, LLC
- Teleflex, Inc.
- Volvo
- Xantrex Technology

Fuel Operated Heaters

- Espar
- Teleflex
- Volvo
- Webasto

Battery Air Conditioning/ Heating Systems

- AuraGen
- Bergstrom, Inc
- DC Power Systems APU
- Dometic Corporation
- Driver Comfort System
- EnergyXtreme
- Freightliner
- Glacier Bay
- Hammond Air Conditioning, LTD
- Indel B Sleeping Well
- Idle Free Systems
- Kenworth Truck Company
- Navistar
- Paddock Solar
- Peterbuilt
- Safer Corporation
- Sun Power Technologies
- Volvo

Figure 101. Idle Reduction Technologies Which are Granted Exemption from Federal Excise Taxes

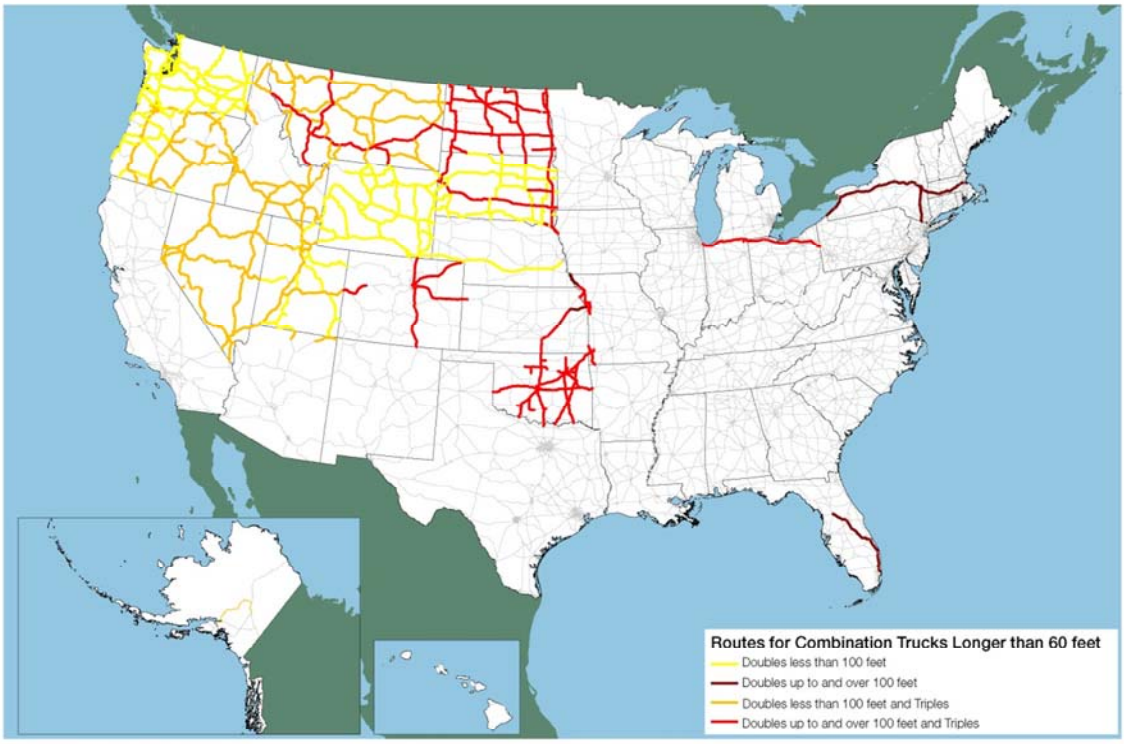
Source:

U.S. Environmental Protection Agency, SmartWay Technology Program. August 2011.
http://www.epa.gov/smartway/technology/excise-tax.htm#exempt

Longer Combination Trucks are Only Permitted on Some Routes

Although all States allow the conventional combinations consisting of a 28-foot semi-trailer and a 28-foot trailer, only 14 States and six State turnpike authorities allow longer combination vehicles (LCVs) on at least some parts of their road networks. LCVs are tractors pulling a semi-trailer and trailer, with at least one of them – the semi-trailer, the trailer, or both – longer than 28 feet. The routes that these LCVs can travel are shown in the map below.

Permitted Longer Combination Vehicles on the National Highway System: 2009



Note: Empty triples are allowed on I-80 in Nebraska.
Source: U.S. Department of Transportation, Federal Highway Administration, Office of Freight Management and Operations, special compilation by the Freight Operations and Technology Team, 2009.

FIGURE 102. Routes where Longer Combination Vehicles are Permitted, 2009

Source:

U.S. Department of Transportation, Federal Highway Administration, *Freight Facts and Figures 2010,* FHWA-HOP-10-058, November 2010. http://ops.fhwa.dot.gov/freight/freight_analysis/nat_freight_stats/docs/10factsfigures

Heavy Truck Speed Limits are Inconsistent

Ranging from a speed limit of 55 miles per hour (mph) to 80 mph, the maximum speed limit for trucks varies from State to State and sometimes from year to year. Currently, California and Oregon have the most conservative maximum speed limit – 55 mph. At the other end of the spectrum, Utah and Texas both have some roads where the truck speed limit is 80 mph. Because of the varying limits, there is not one common highway speed at which trucks travel. This precludes truck manufacturers from engineering truck engines that peak in efficiency after reaching the speed at which the vehicles most commonly travel. Instead, manufacturers design the vehicle to perform well over the entire range of speeds, which in turn limits engine efficiency.

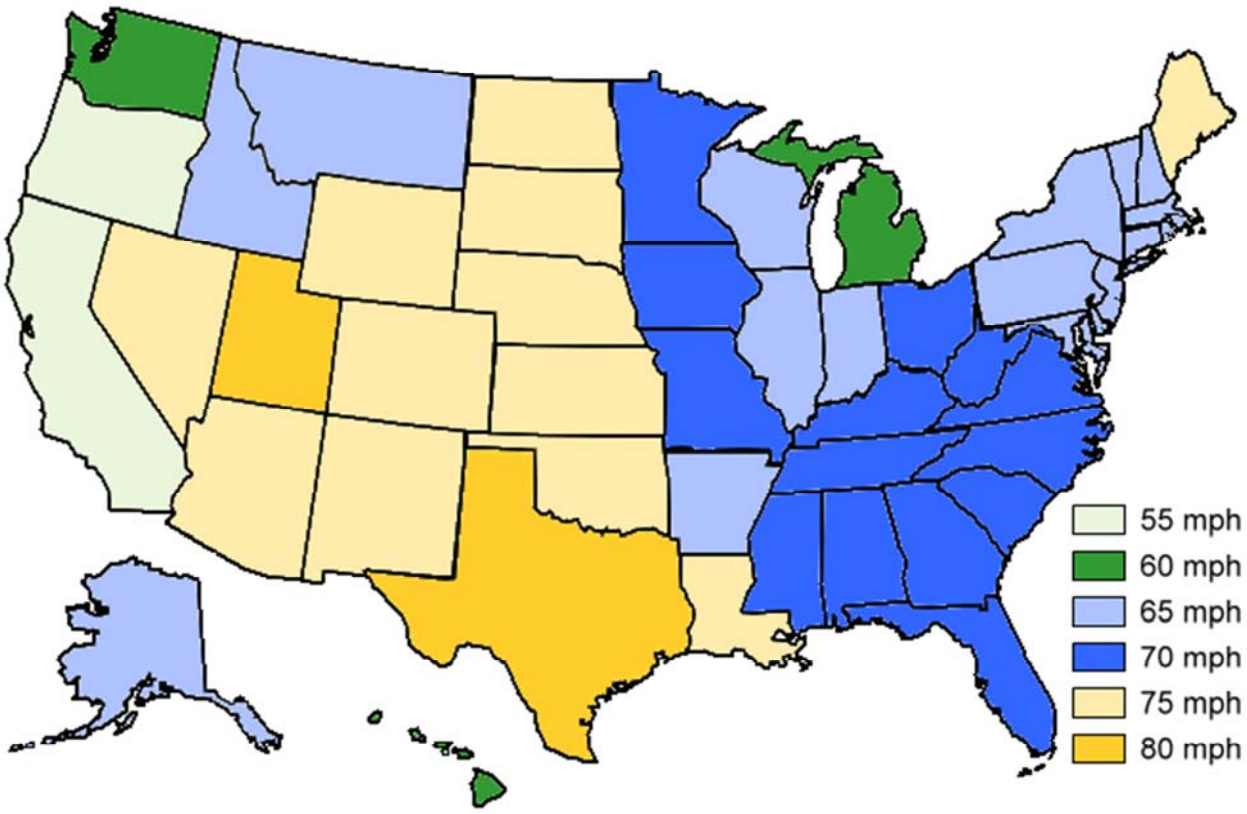


FIGURE 103. Maximum Daytime Truck Speed Limits by State

Source:

Insurance Institute for Highway Safety, Highway Loss Data Institute, November 2011.
http://www.iihs.org/laws/speedlimits.aspx

Fuel Sulfur Standards Provide Cleaner Gasoline and Diesel

Sulfur naturally occurs in gasoline and diesel fuel, contributing to pollution when the fuel is burned and reducing the effectiveness of vehicle emission controls. Beginning in 2004, standards were set on the amount of sulfur in gasoline (Tier 2 standards). Separate standards were set for different entities, such as large refiners, small refiners, importers, downstream wholesalers, etc., and in the case of diesel fuel, highway and non-highway fuel was held to separate standards. Low-sulfur diesel (500 parts per million (ppm)) began in 1993 as a result of the 1990 Clean Air Act Amendments. By October 2006, 80% of the diesel fuel produced was ultra-low sulfur diesel (15 ppm) and by 2010, all diesel fuel must be ultra-low sulfur. The standards for large refineries are shown here; see the Environmental Protection Agency website for additional details on sulfur standards.

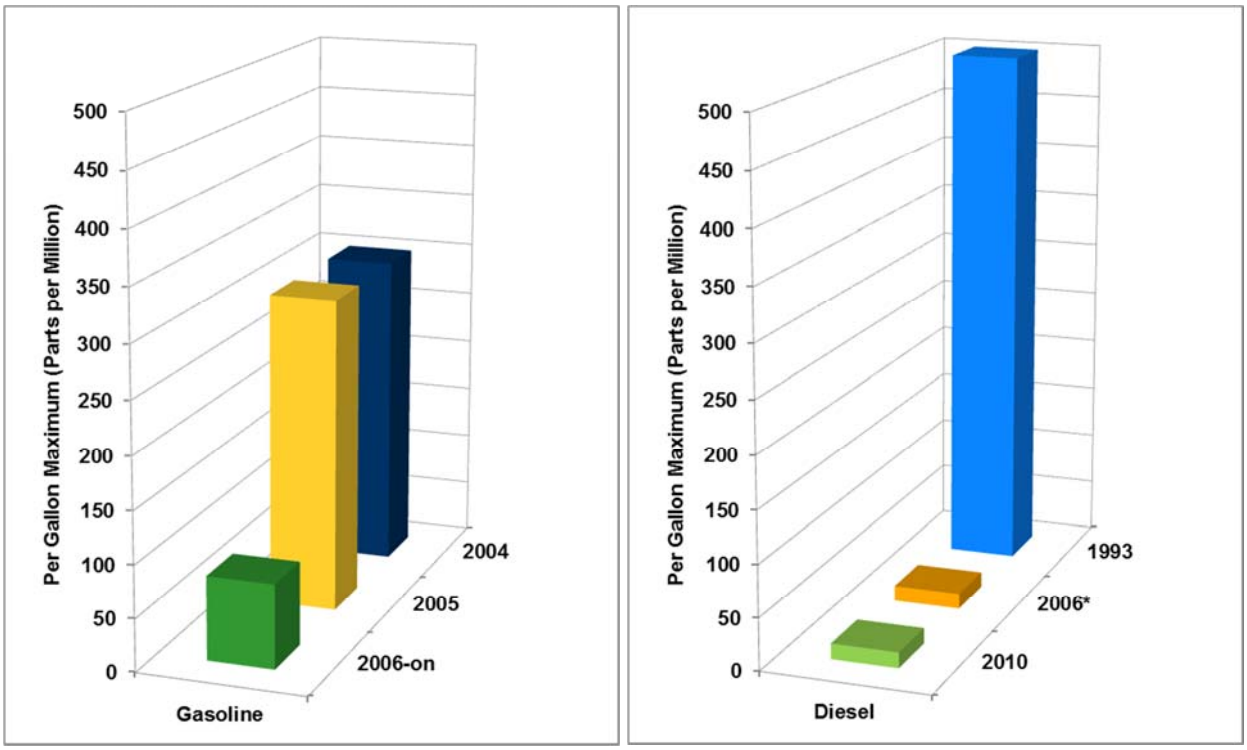


FIGURE 104. Gasoline and Diesel Sulfur Standards

***** By October 2006 80% of the diesel fuel produced must be 15 ppm. In 2010, 100% produced must be 15 ppm.

Source:

U.S. Environmental Protection Agency, http://www.epa.gov/otaq/fuels/gasolinefuels/tier2/index.htm and http://www.epa.gov/otaq/highway-diesel/regs/2007-heavy-duty-highway.htm

Emission Standards on Diesel Engines are More Strict

In 1994, the emission standards for new heavy-duty highway diesel vehicles was five grams per horsepower-hour (g/HP-hr) of nitrogen oxides (NOx) and 0.1 g/HP-hr of particulate matter (PM). The units of measure, g/HP-hr, describes the grams of the pollutant as a result of the use of the energy equivalent to 1 horsepower for one hour. Since 1994, the standards for NOx have been reduced four times, in 1998, 2002, 2007, and 2010. By 2010, the NOx standard was reduced to 0.2 g/HP-hr. For PM, the standards changed from 0.1 g/HP-hr in 2002 to 0.01 g/HP-hr in 2007 and beyond. New medium and heavy trucks are meeting these standards by using technologies such as selective catalytic reduction and exhaust gas recirculation in combination with diesel particulate filters.

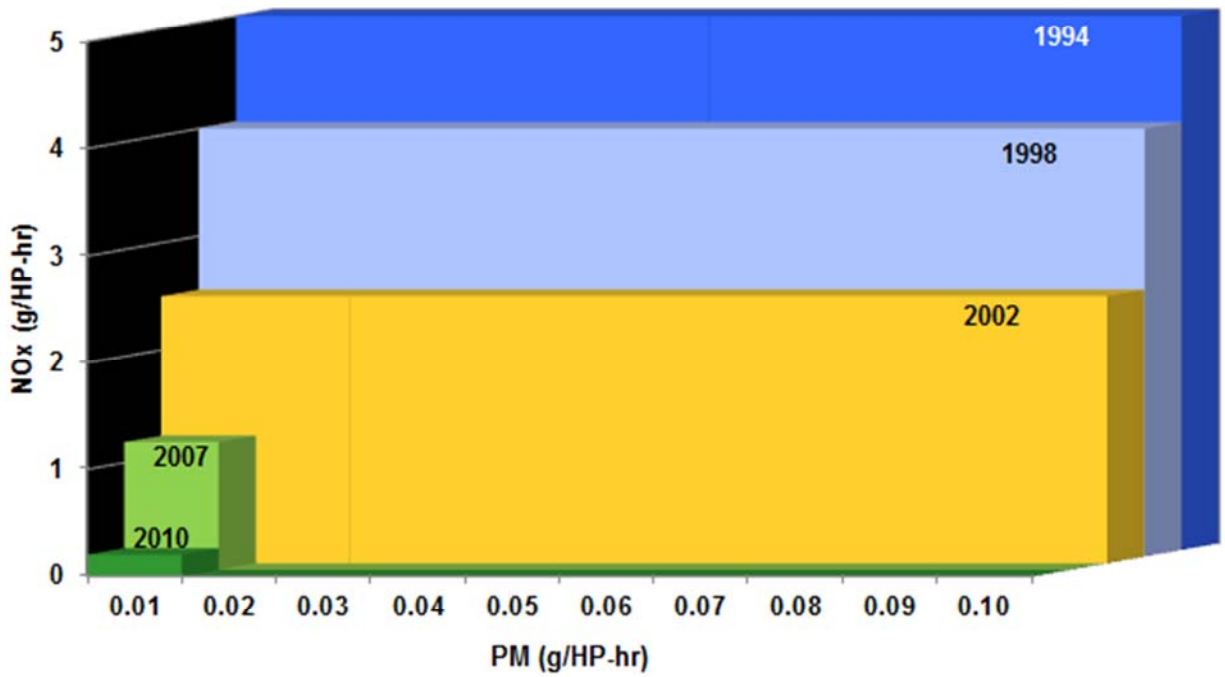


FIGURE 105. Diesel Emission Standards, 1994-2010

Note: All standards apply to vehicle model years, not calendar years.

Source:
U.S. Environmental Protection Agency, http://www.epa.gov/otaq/hd-hwy.htm .

Effect of Emission Standards on Heavy Truck Sales

It is often thought that stricter emission standards on diesel engines largely affect the sales of heavy trucks. Companies may purchase a greater amount of new heavy trucks just before the stricter emission standard takes effect, thus avoiding the added expense of new engines which meet the regulations. Though this purchase pattern is surely true for many companies, the overall annual sales patterns do not reflect this trend, likely due to the fact that the economy's impact on truck sales dwarfs the effect from emission standards. Also, the calendar year sales may not show the effects of regulations that apply to model years.

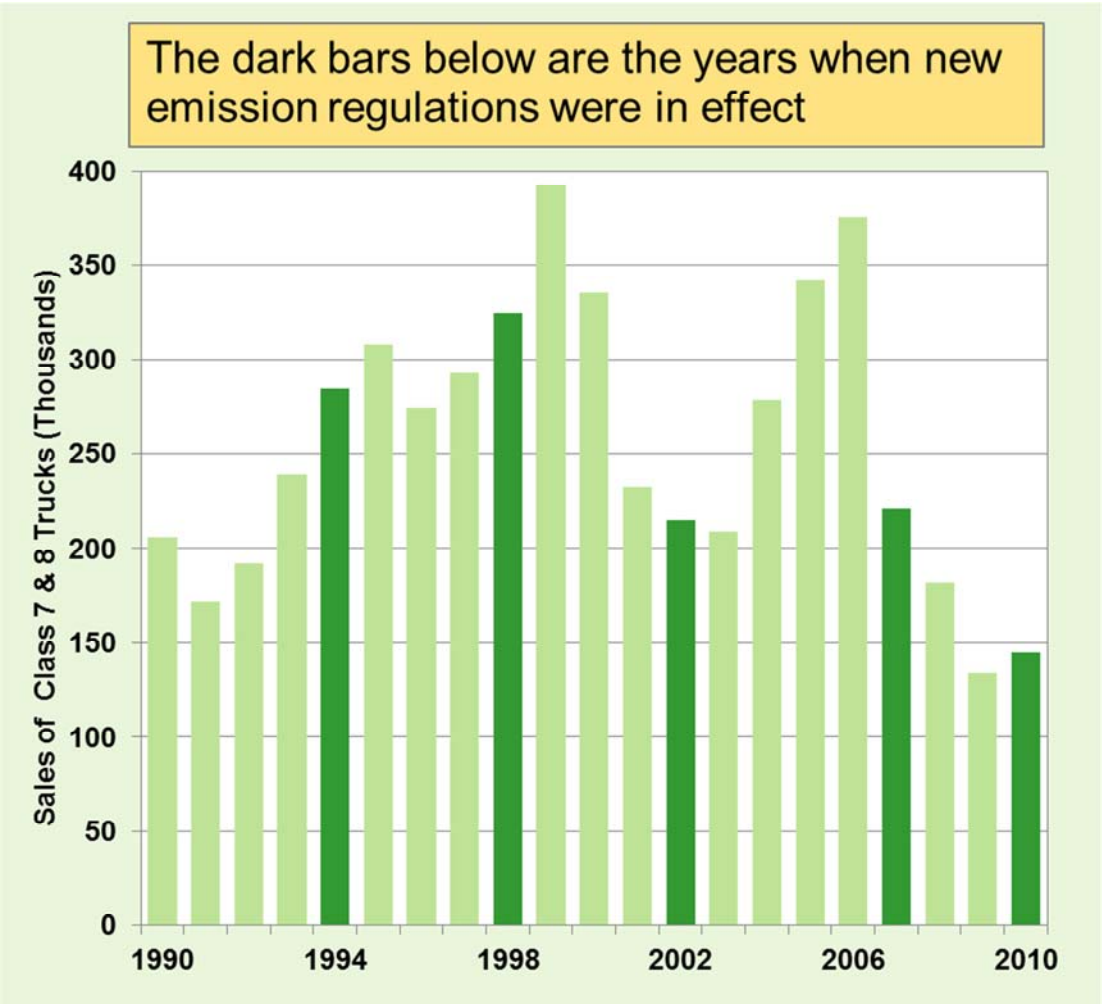


FIGURE 106. Class 7 and 8 Truck Sales, 1990-2010

Source:

Ward's Automotive Group, *Motor Vehicle Facts and Figures 2011*, Southfield, MI, 2011.
http://wardsauto.com