Chapter 5

POLICY

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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. Between 2005 and 2010, those who purchased hybrid vehicles or vehicles that ran on alternative fuels, such as natural gas, methanol, and hydrogen, received Federal tax credits. Now, electric vehicles and plug-in hybrid-electric vehicles are the only vehicles for which a Federal tax credit is available – up to $7,500. There are 23 electric vehicles that currently qualify for a credit.

TABLE 43. Federal Government Tax Incentives for All-Electric Vehicles

Calendar Year in which the Vehicle was Purchased	Maximum Credit Amount	Vehicles Currently Eligible for a Tax Credit
2010-on	$7,500	2012 AMP GCE Electric Vehicle
		2012 AMP MLE Electric Vehicle
		2014–16 BMW i3 Sedan
		2012–15 BYD e6 Electric Vehicle
		2010, 2012 CODA Sedan
		2010 Electric Mobile Cars E36 7 Passenger Wagon
		2010 Electric Mobile Cars E36t Pickup Truck
		2010 Electric Mobile Cars E36v Utility Van
		2013–16 Fiat 500e
		2012–16 Ford Focus EV
		2011–12 Ford/Azure Dynamics Transit Connect EV
		2014–16 Chevrolet Spark EV
		2015–16 Kia Soul Electric
		2014–15 Mercedes-Benz B-Class EV
		2012, 2014, 2016 Mitsubishi i-MiEV
		2011–16 Nissan Leaf
		2011, 2013–16 Smart fortwo electric vehicle
		2012–15 Tesla Model S
		2008–11 Tesla Roadster
		2011 Think City EV
		2012–14 Toyota RAV4 EV
		2015–16 VW e-Golf
		2011 Wheego LiFe

Source:
U.S. Department of Energy, Fuel Economy data, http://www.fueleconomy.gov/feg/taxcenter.shtml. Data accessed March 15, 2016.

Battery Capacity Determines Maximum Federal Tax Credit for Plug-In Hybrid Electric Vehicles

The Federal Government encourages the use of plug-in hybrid electric vehicles by allowing tax credits on vehicle purchases. The maximum amount of credit is dependent on the vehicle's battery capacity. There are 19 plug-in hybrid electric vehicles that currently qualify for a credit—eight of them qualify for the highest credit amount of $7,500.

TABLE 44. Federal Government Tax Incentives for Plug-In Hybrid Electric Vehicles

Calendar Year in which the Vehicle was Purchased	Maximum Credit Amount	Vehicles Currently Eligible for a Tax Credit
2010-on	$2,500	2012–15 Toyota Prius Plug-in Hybrid
	$3,626	2014 Honda Accord Plug-in Hybrid
	$3,667	2015 Porsche 918 Spyder
	$3,793	2014–15 BMW i8
	$4,007	2013–16 Ford C-Max Energi
	$4,007	2013–16 Ford Fusion Energi
	$4,042.90	2015 Mercedes-Benz S500e Plug-in Hybrid
	$4,585	2016 Volvo XC-90 T8 Twin Engine Plug in Hybrid
	$4,668	2016 BMW X5 xDrive40e
	$4,751.80	2014–15 Porsche Panamera S E-Hybrid
	$5,335.60	2015 Porsche Cayenne S E-Hybrid
	$7,500	2014–16 BMW i3 Sedan w/ Range Extender
		2012 Fisker Karma Sedan
		2014, 2016 Cadillac ELR
		2011–16 Chevrolet Volt
		2014 2500 VIA Extended Range Electric Passenger Van
		2014 1500 VIA Extended Range Electric Truck 4WD
		2014 2500 Extended Range Electric Cargo Van
		2014 1500 VIA Extended Range Electric Truck 2WD

Source:
U.S. Department of Energy, Fuel Economy data, http://www.fueleconomy.gov/feg/taxcenter.shtml. Data accessed March 15, 2016.

Colorado Had the Highest State Incentive for Plug-In Vehicles in 2015

In addition to a Federal government tax credit up to $7,500, consumers who purchase plug-in electric vehicles (PEVs) may also receive state government incentives which vary by state. Shown below are state incentives that can be quantified, such as tax credits and rebates, sales and use tax exemptions, reduced license taxes, title tax exemptions, and reduced registration fees. Colorado, Connecticut and Louisiana have the highest incentives for tax credits. New Jersey offers the only sales and use tax exemptions; and DC offers the only title tax exemption and reduced registration fee.

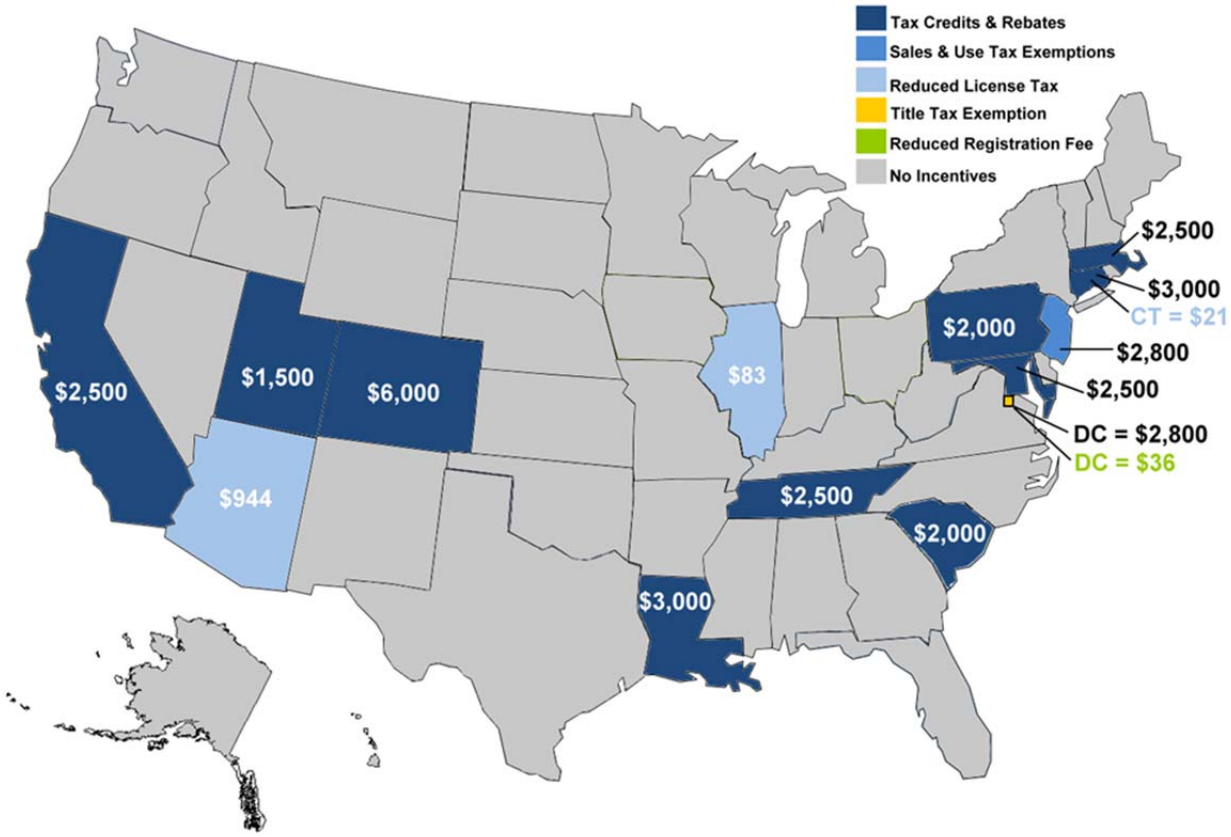


FIGURE 127. Plug-In Electric Vehicle Incentives by State, July 2015

Notes: For calculation purposes, e.g., sales tax exemptions, the vehicle was assumed to have a value of $40,000, a weight of 3,500 lbs., and a 20 kWh battery capacity. Other state incentives, such as high-occupancy vehicle lane exemptions and reduced toll rates are not included. Also, incentives on the charging equipment, electricity discounts, etc., are not included.

Source:
Alternative Fuels Data Center, accessed July 20, 2015. http://www.afdc.energy.gov/laws
Data compiled by SRA International, Inc.

States Tax Gasoline at Varying Rates

In addition to the 18.4 cents per gallon federal gasoline tax, the states also tax gasoline at varying rates. Some states have sales taxes added to gasoline taxes while others have inspection fees, environmental fees, leaking underground storage tank (LUST) taxes, etc. The Federation of Tax Administrators has estimated the gasoline excise taxes, along with other state taxes and fees, to arrive at an estimate of the amount consumers are paying per gallon in each state. According to those estimates, Pennsylvania currently has the highest per gallon tax rate for gasoline; the Pennsylvania rate includes the Oil Franchise Tax for Maintenance and Construction, a variable rate tax adjusted annually. Alaska, with an 8-cent gasoline tax rate, has by far the lowest gasoline tax rate of any state.

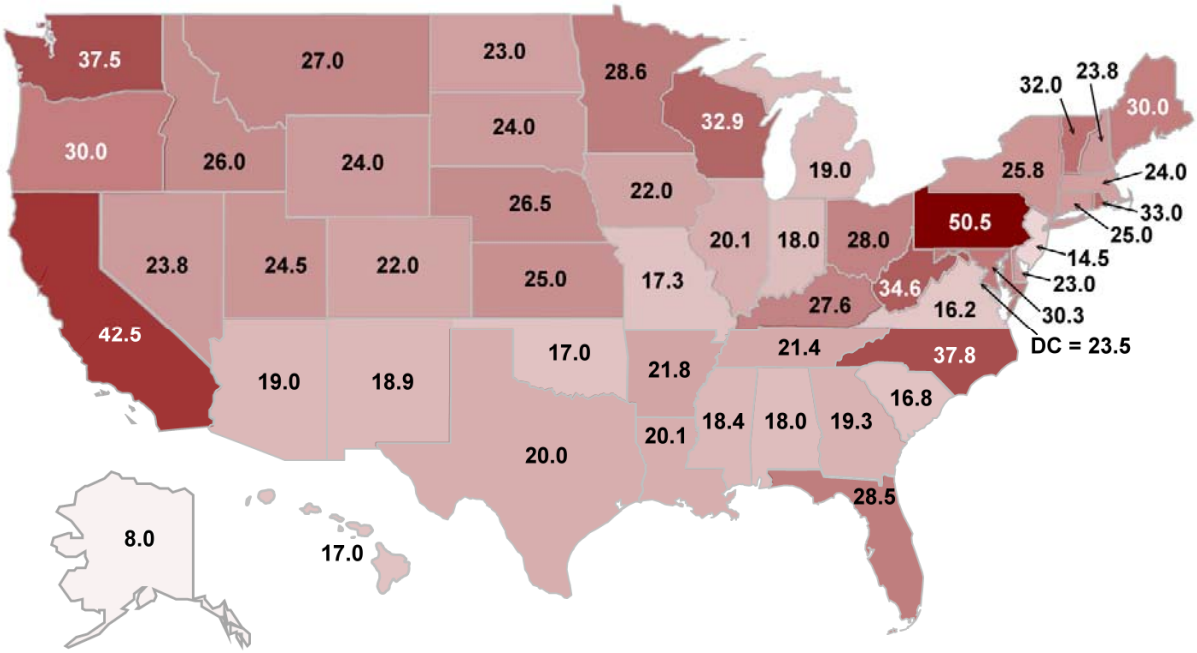


FIGURE 128. State Gasoline Tax Rates, 2015 (Cents per Gallon)

Note: See source for additional specifics on individual state rates.

Source:
Compiled by Federation of Tax Administrators from various sources, January 2015. Data accessed September 29, 2015. http://www.taxadmin.org/tax-rates

States Assessing Fees on Electric Vehicles in an Attempt to Make Up for Lost Fuel Tax Revenue

The maintenance of our highways has traditionally been funded from a combination of Federal and state taxes collected at the pump from the sale of motor fuels. Because plug-in electric vehicles (PEVs or EV) do not refuel at pumps that collect state and Federal fuel taxes, they do not contribute to the upkeep of the highways. This has caused many states to rethink how funds are collected to support the highway infrastructure. Eleven states currently assess fees on electric vehicle owners in lieu of traditional fuel taxes. Georgia has the highest annual fee among states that have currently enacted fees for electric vehicles.

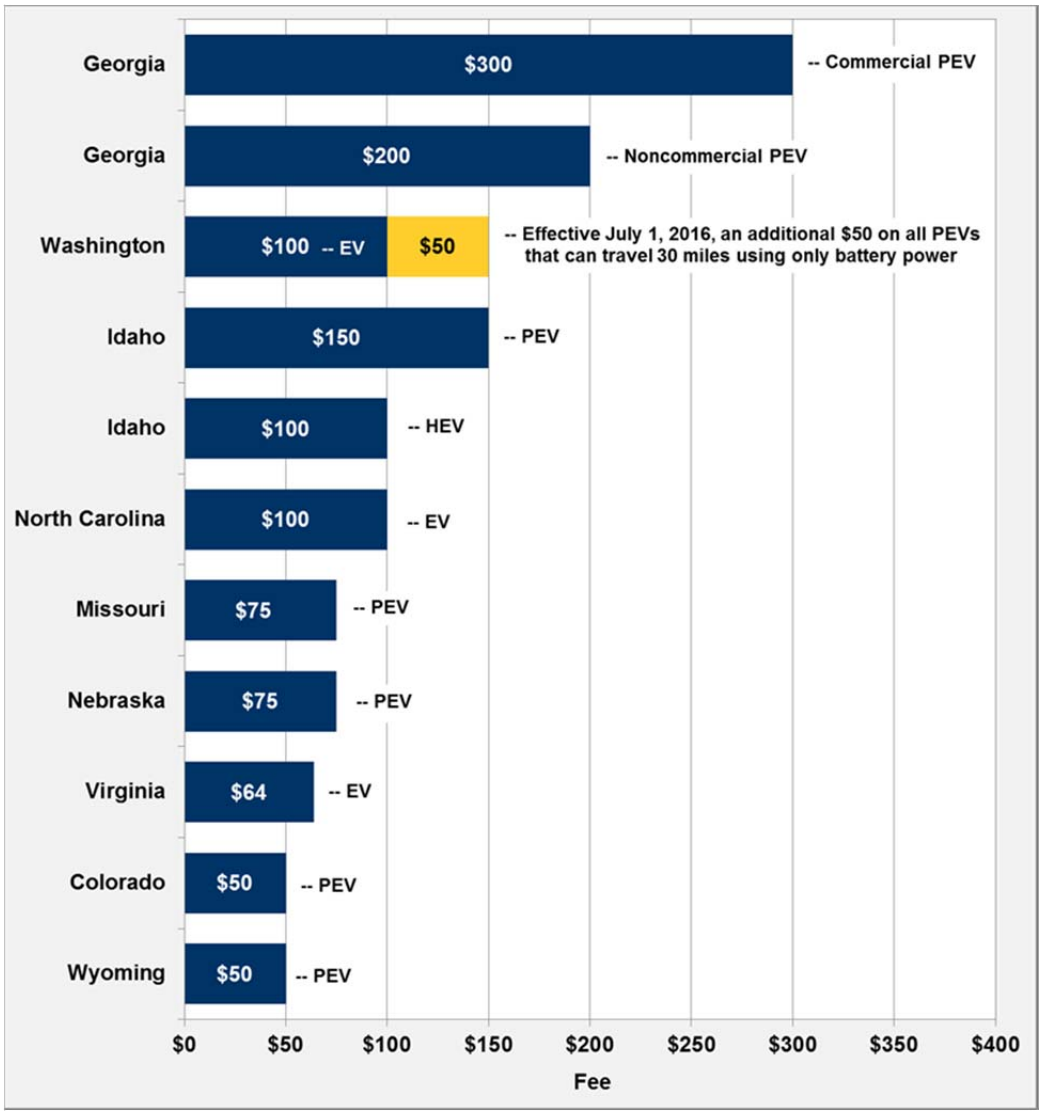


FIGURE 129. Annual State Fees for Electric Vehicle Owners as of September 2015

Source:

Alternative Fuels Data Center, U.S. Department of Energy, Federal and State Laws and Incentives, data accessed September 3, 2015. http://www.afdc.energy.gov/laws

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.

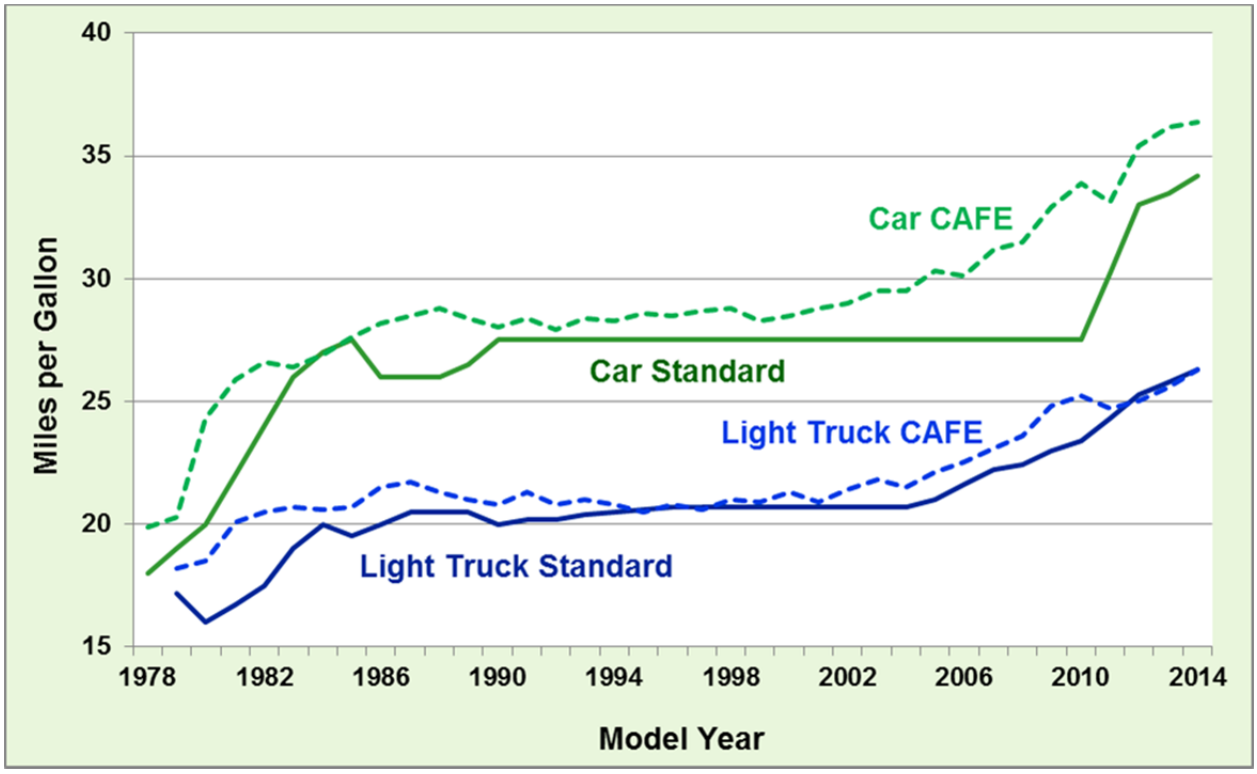


FIGURE 130. CAFE for Cars and Light Trucks, 1978-2014

Note: Light truck standards for MY 2008-2010 are based on "unreformed" standards. MY 2013 and 2014 data are estimates based on product plans.

Source:
National Highway Traffic Safety Administration, "Summary of Fuel Economy Performance," December 2014. http://www.nhtsa.gov/fuel-economy

Corporate Average Fuel Economy (CAFE) Improves for All Manufacturers from 2002 to 2014

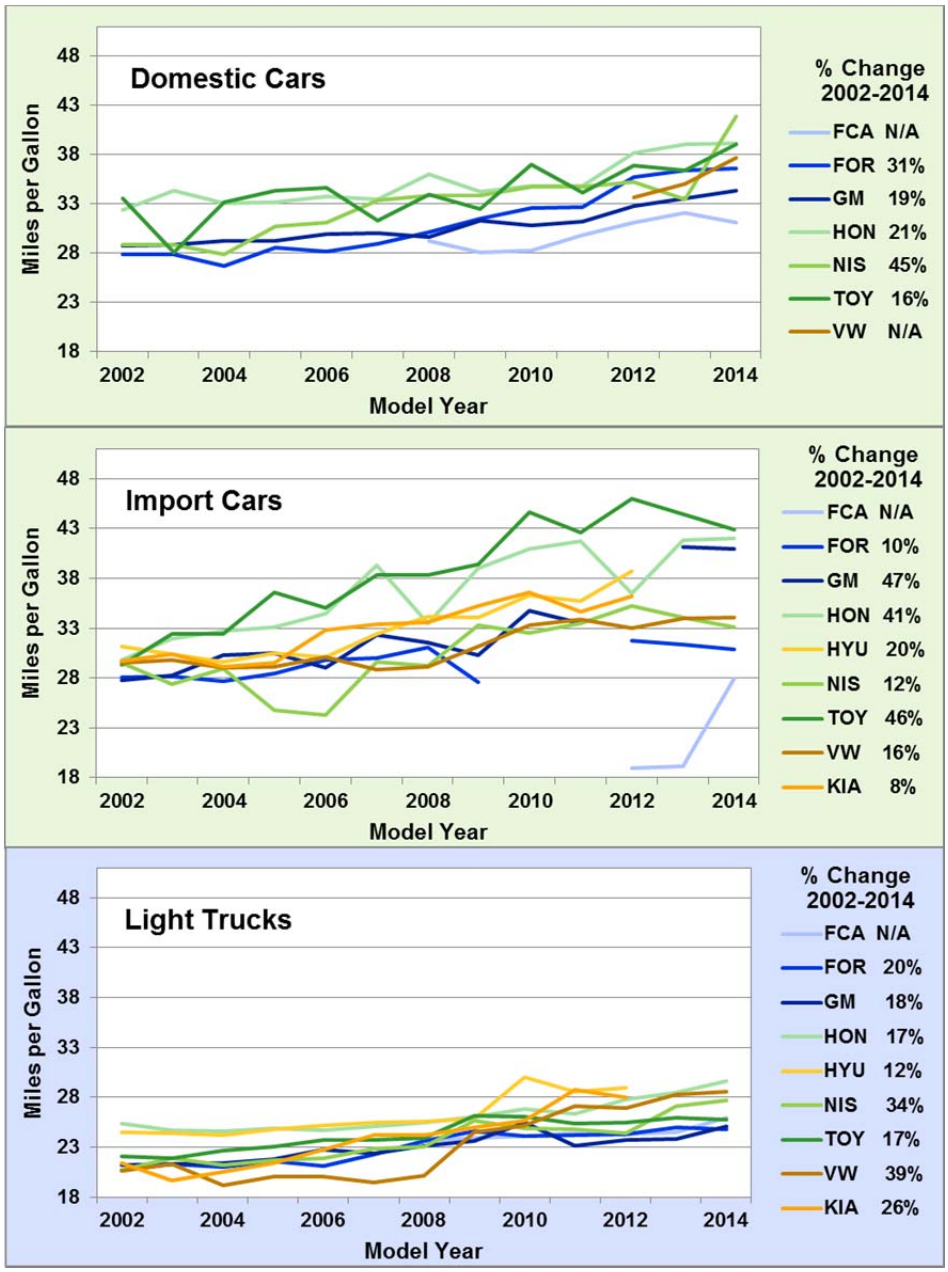


FIGURE 131. CAFE for Domestic and Import Cars and Light Trucks by Manufacturer, 2002-2014

Note: Data for FCA begin in 2008 after the merger with Daimler ended. Ford had no import cars in 2010 and 2011. General Motors had no import cars in 2012. Volkswagen domestic cars begin in 2012. 2013 data was not available for Hyundai and Kia.

Source:

National Highway Traffic Safety Administration, "Summary of Fuel Economy Performance," December 2014. http://www.nhtsa.gov/fuel-economy

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 August 2012, the National Highway Traffic Safety Administration (NHTSA) issued final standards for MY 2017 through 2021 and proposed standards for MY 2022 through 2025. These standards apply to cars and pickup trucks less than 8,500 lb gross vehicle weight rating (GVWR), and sport utility vehicles and passenger vans less than 10,000 lb GVWR.

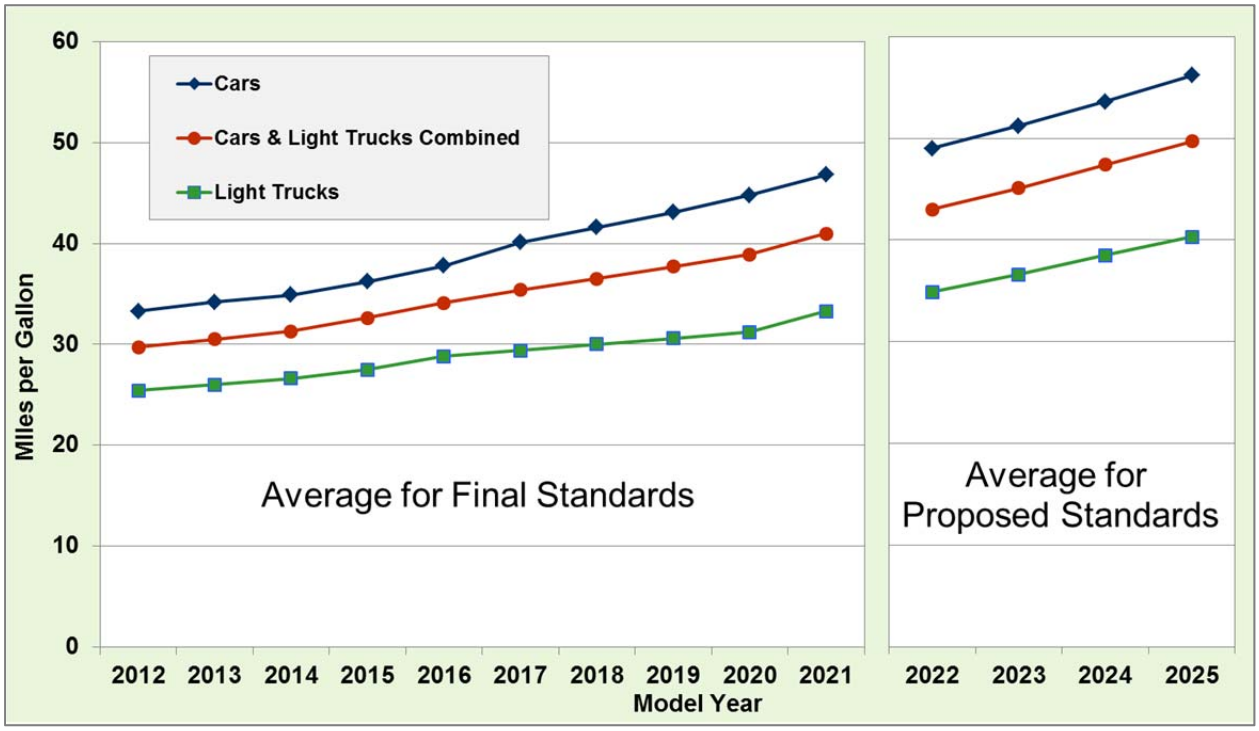


FIGURE 132. Average CAFE Standards for MY 2012-2025

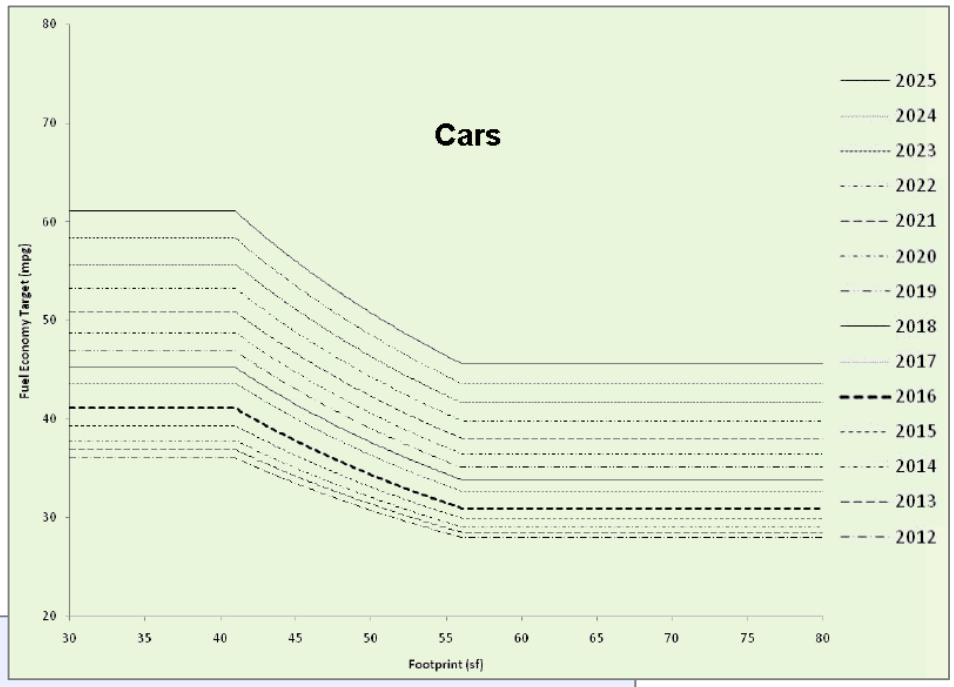
Notes: A MY 2008 baseline was used for MY 2017-2025.
The presented rates of increase in stringency for NHTSA CAFE standards are lower than the Environmental Protection Agency (EPA) rates of increase in stringency for greenhouse gas (GHG) standards. One major difference is that NHTSA's standards, unlike EPA's, do not reflect the inclusion of air conditioning system refrigerant and leakage improvements, but EPA's standards would allow consideration of such improvements which reduce GHGs but generally do not affect fuel economy. The 2025 EPA GHG standard of 163 grams/mile would be equivalent to 54.5 mpg, if the vehicles were to meet this level all through fuel economy improvements. The agencies expect, however, that a portion of these improvements will be made through reductions in air conditioning leakage, which would not contribute to fuel economy.

Sources:
Federal Register, Vol. 75, No. 88, May 7, 2010, pp. 25324-25728.
Final Rule, Docket No. NHTSA-2010-0131, August 28, 2012.

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 2022 to 2025 are proposed standards.



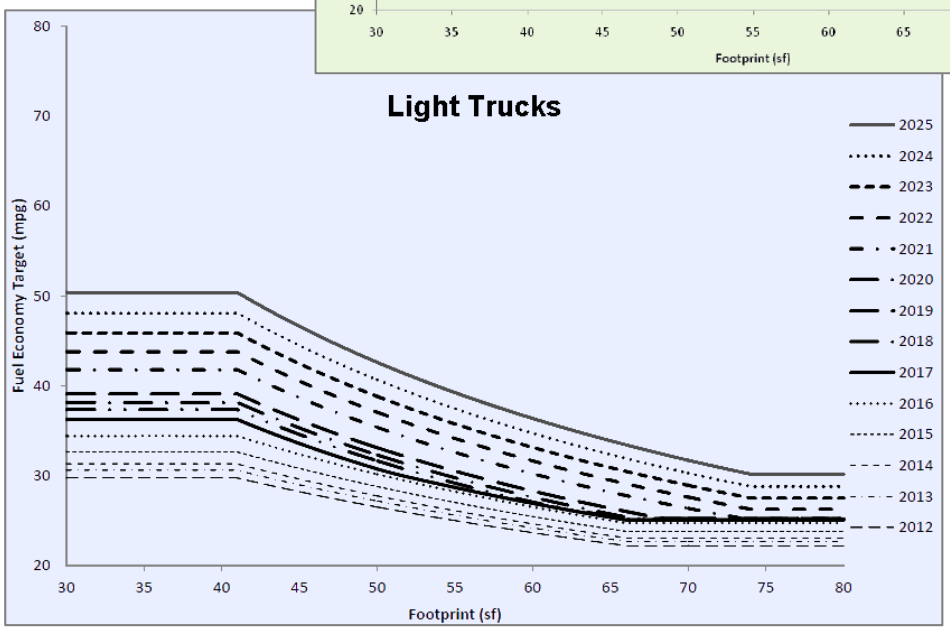


FIGURE 133. CAFE Standards for Cars and Light Trucks, MY 2012-2025

Source:
Final Rule, Docket No. NHTSA-2010-0131, August 28, 2012.

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 vehicle track width. The Corporate Average Fuel Economy Standards have fuel economy targets based on the vehicle footprint. The average footprint for all cars sold in model year (MY) 2014 was 45.9 square feet (sq. ft.), up just 0.5 sq. ft. from MY 2010. The average footprint for light trucks was higher – 54.4 sq. ft. in 2014. The table shows selected vehicles and their MY 2012 footprint with 2025 fuel economy targets.

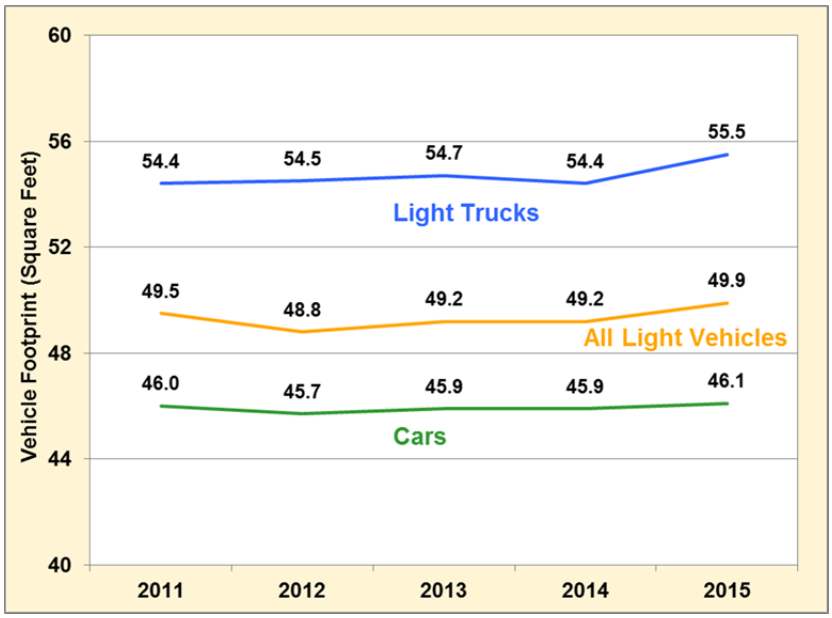


FIGURE 134. Average Vehicle Footprint, MY 2011-2015

TABLE 45. Vehicle Footprint and Fuel Economy Target, MY 2025

Vehicle Type	Example Model (MY 2012 Vehicles)	Footprint (Sq. Ft.)	MY 2025 Fuel Economy Target (mpg)
Cars			
Compact	Honda Fit	40	61.1
Midsize	Ford Fusion	46	54.9
Full-Size	Chrysler 300	53	48.0
Light Trucks			
Small Sport Utility	Ford Escape 4WD	43	47.5
Midsize Crossover	Nissan Murano	49	43.4
Minivan	Toyota Sienna	56	39.2
Large Pickup Truck	Chevrolet Silverado	67	33.0

Sources:

U.S. Environmental Protection Agency, *Light-Duty Automotive Technology, Carbon Dioxide Emissions, and Fuel Economy Trends: 1975 through 2015*, EPA-420-S-15-001, December 2015. http://www.epa.gov/otaq/fetrends.htm

Final Rule, Docket No. NHTSA-2010-0131, August 28, 2012.

GM Has the Highest Car and Light Truck Footprint

The Corporate Average Fuel Economy (CAFE) standards are based on the vehicle's footprint beginning in model year (MY) 2012. In MY 2015, GM had the highest sales-weighted average footprint for both cars and light trucks, thus would have the least stringent standards to meet according to the new CAFE methodology. MY 2015 data are preliminary.

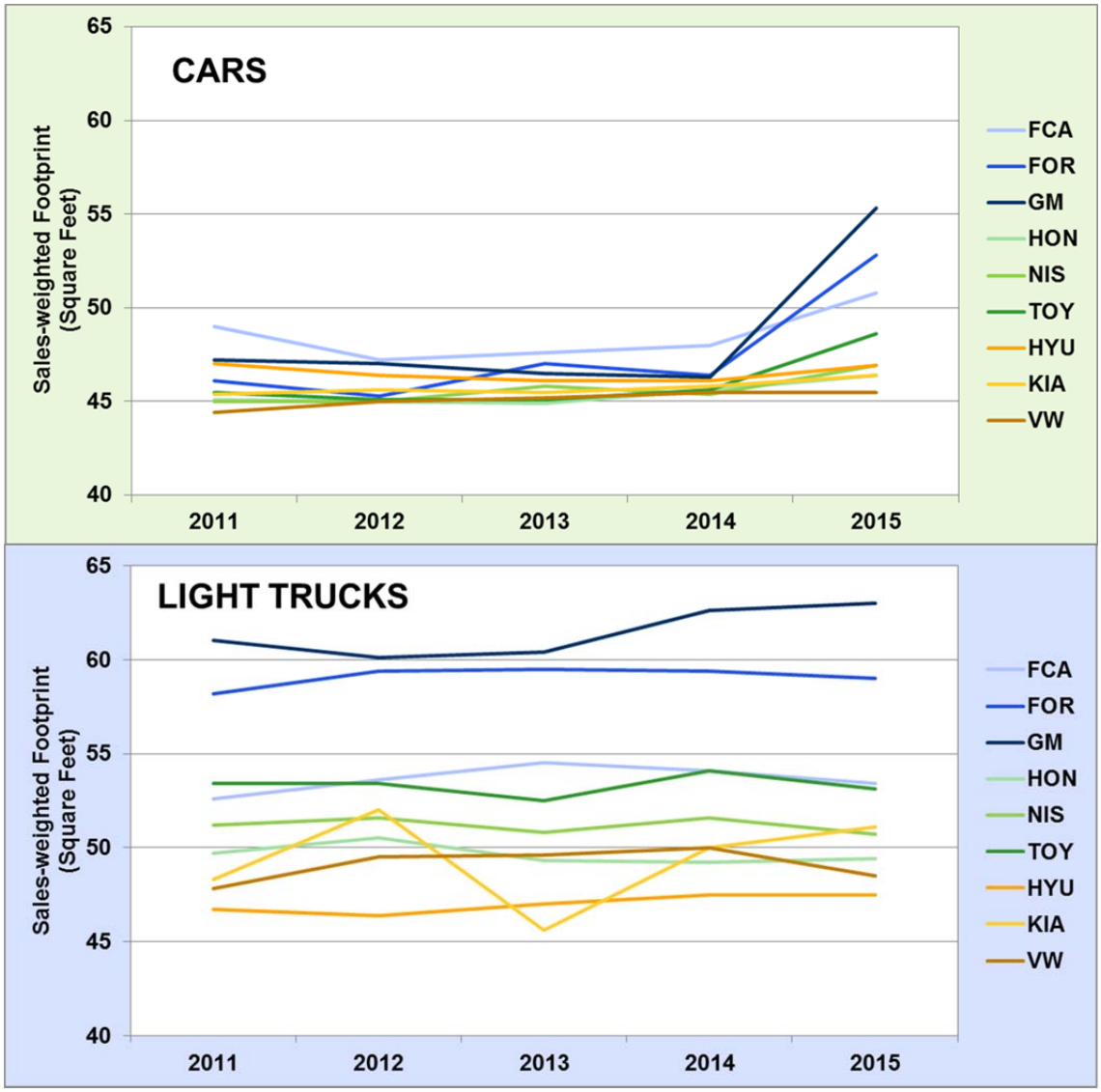


FIGURE 135. Car and Light Truck Footprint by Manufacturer, 2015

Sources:

U.S. Environmental Protection Agency, *Light-Duty Automotive Technology, Carbon Dioxide Emissions, and Fuel Economy Trends: 1975 through 2014*, EPA-420-S-15-001, December 2015. http://www.epa.gov/otaq/fetrends.htm

Honda, Toyota, Nissan, and Tesla Have Sold CAFE Credits

The rulemaking which established the 2012-2016 Corporate Average Fuel Economy (CAFE) standards included plans for the manufacturers to earn early credits in model years (MY) 2009-2011 as well as credits in MY 2012-2016. As of the end of MY 2014, Honda had sold CAFE credits to other manufacturers. Toyota, Tesla, and Nissan also sold credits, while Ferrari, Mercedes-Benz, and FCA purchased credits.

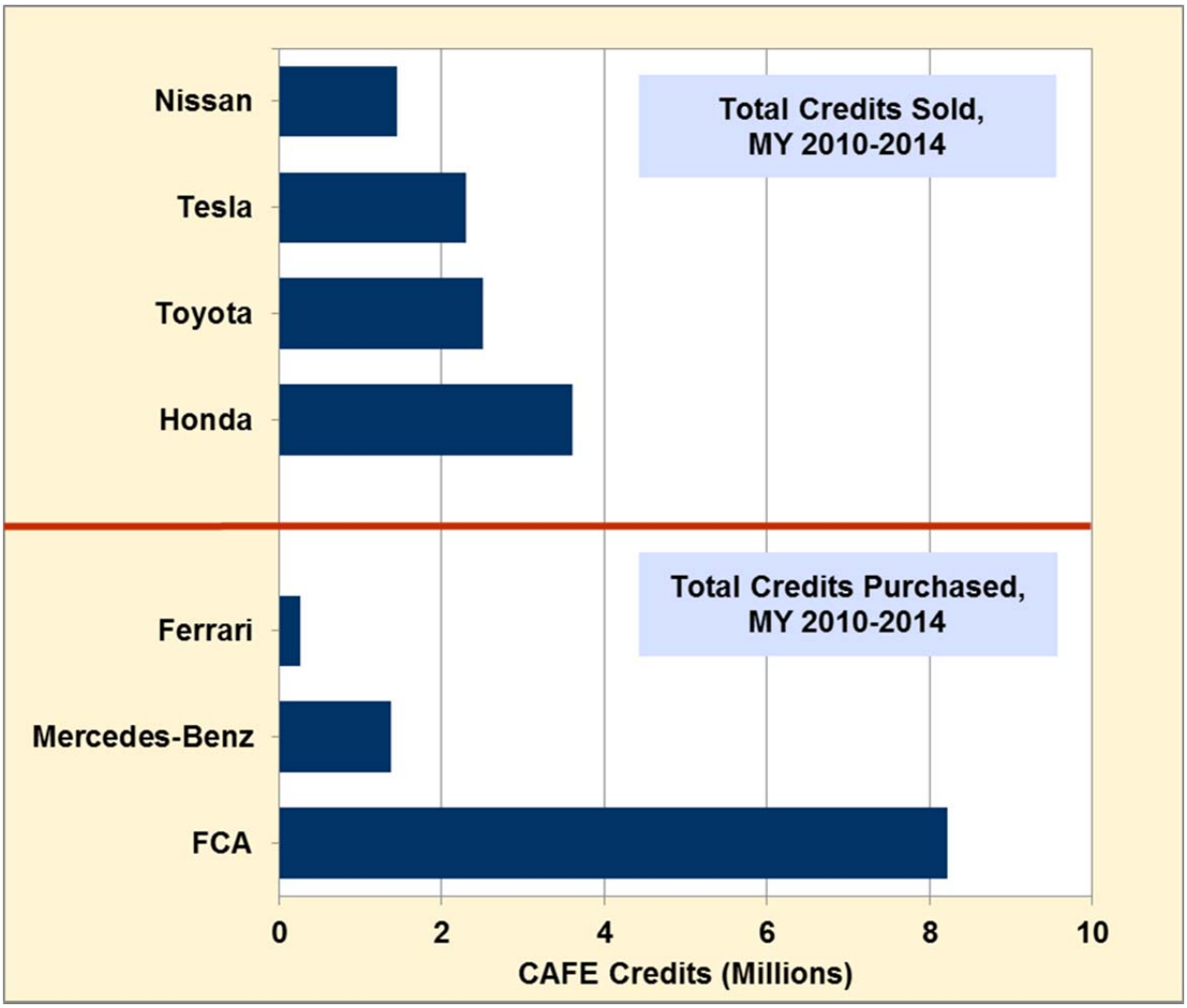


FIGURE 136. Cumulative CAFE Credits Sold and Purchased by Manufacturer at the End of MY 2014

Source:

U.S. Environmental Protection Agency, *Greenhouse Gas Emission Standards for Light-Duty Vehicles: Manufacturer Performance Report for the 2014 Model Year*, EPA-420-R-15-026, December 2015. http://www.epa.gov/otaq/climate/documents/420r15026.pdf

Nearly All Manufacturers Have CAFE Credits at the End of 2014

Some CAFE credits earned by manufacturers were used to offset deficits in future model years (MY) and some credits were traded among manufacturers. After considering all these credit transactions, as of the end of MY 2014, all manufacturers but four (Jaguar Land Rover, Aston Martin, McLaren, and Lotus) carried a positive balance of credits into MY 2015. This does not, however, mean any manufacturer is out of compliance, as the regulation allows for a deficit to be carried over up to three model years.

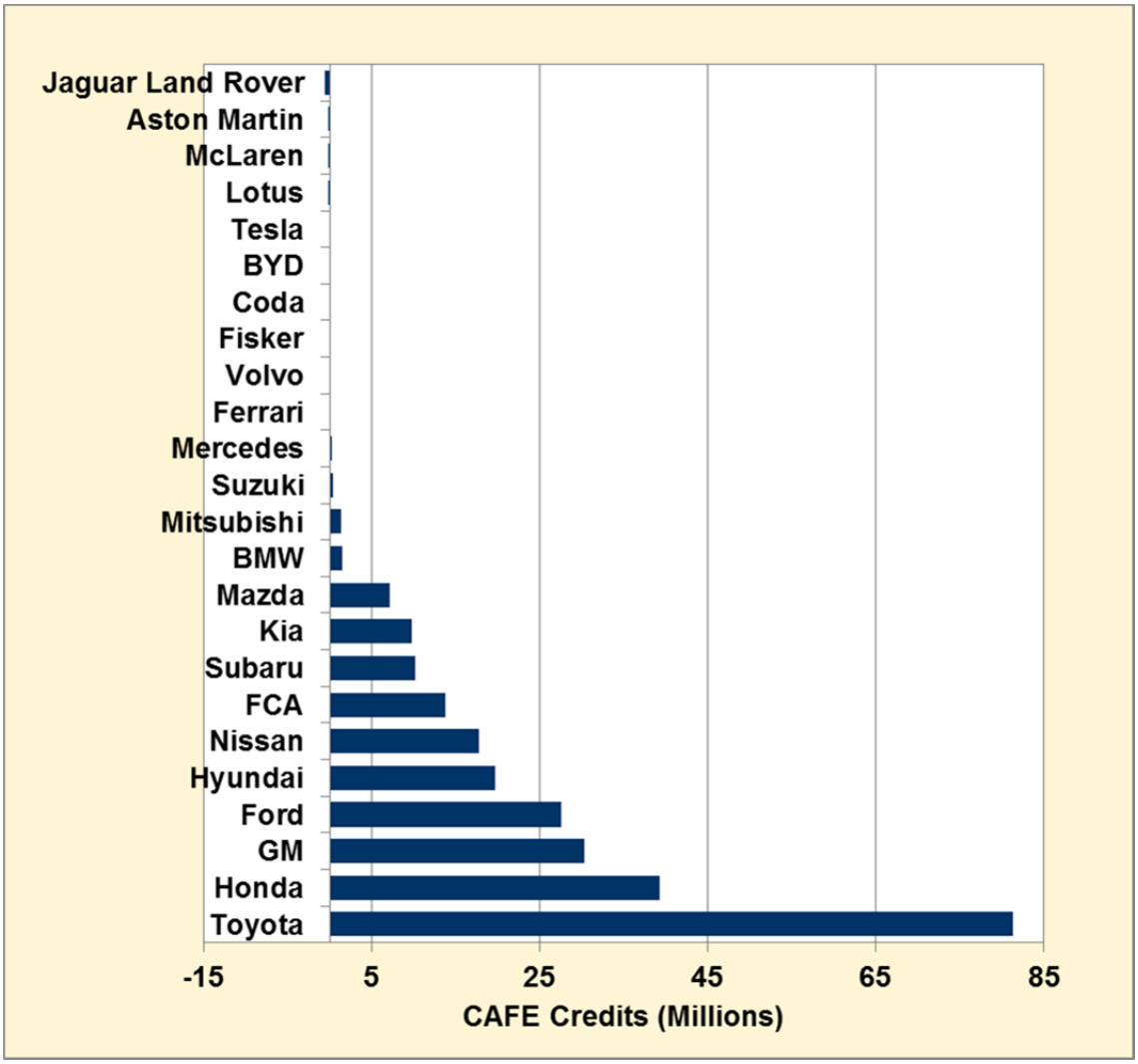


FIGURE 137. Cumulative CAFE Credits by Manufacturer as of the End of MY 2014

Source:

U.S. Environmental Protection Agency, *Greenhouse Gas Emission Standards for Light-Duty Vehicles: Manufacturer Performance Report for the 2014 Model Year*, EPA-420-R-15-026, December 2015. http://www.epa.gov/otaq/climate/documents/420r15026.pdf

Zero-Emission Vehicle Standards in Eight States and Low Carbon Fuel Standards in Development in 13 States

In 2013, the governors of eight states signed the State Zero-Emission Vehicle (ZEV) Programs Memorandum of Understanding to work toward a "collective target of having at least 3.3 million zero-emission vehicles on the road in our states by 2025 and to work together to establish a fueling infrastructure that will adequately support this number of vehicles." Currently, California is the only state to have adopted a low carbon fuel standard (LCFS), but thirteen other states and the District of Columbia are working towards the development of a LCFS.

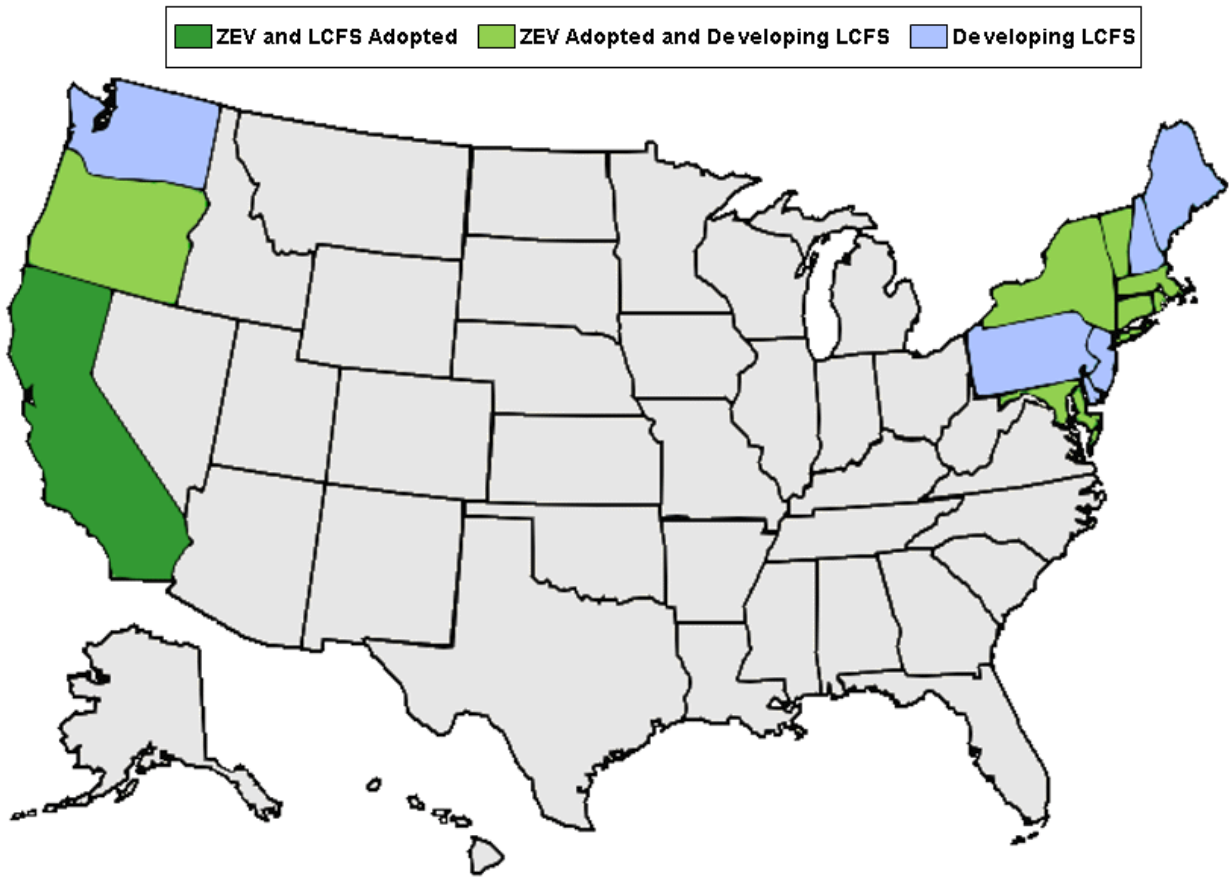


FIGURE 138. States with Zero Emission Vehicle and Low Carbon Fuel Standards

Source:
State Zero-Emission Vehicle Programs Memorandum of Understanding.
http://www.arb.ca.gov/newsrel/2013/8s_zev_mou.pdf
Center for Climate and Energy Solutions, Transportation Sector, Low Carbon Fuel Standard.
http://www.c2es.org/us-states-regions/policy-maps/low-carbon-fuel-standard

Tesla Transferred Over 1,500 Zero Emission Vehicle Credits to Other Manufacturers

Beginning in 1990, the state of California adopted a Zero Emission Vehicle (ZEV) regulation that affects light vehicle manufacturers. Large and intermediate volume manufacturers are subject to requirements based on a percentage of all light vehicles (up to 8,500 lb) delivered for sale in California. The manufacturers can generate credits by exceeding minimum standards of ZEVs, PZEVs, AT PZEVs, and NEVs. Manufacturers are allowed to transfer credits earned; between October 1, 2014 and September 30, 2015, seven manufacturers transferred credits out of their balances, and seven more transferred credits into their balances. The transfer of credits allows each manufacturer to strategically comply with the regulation.

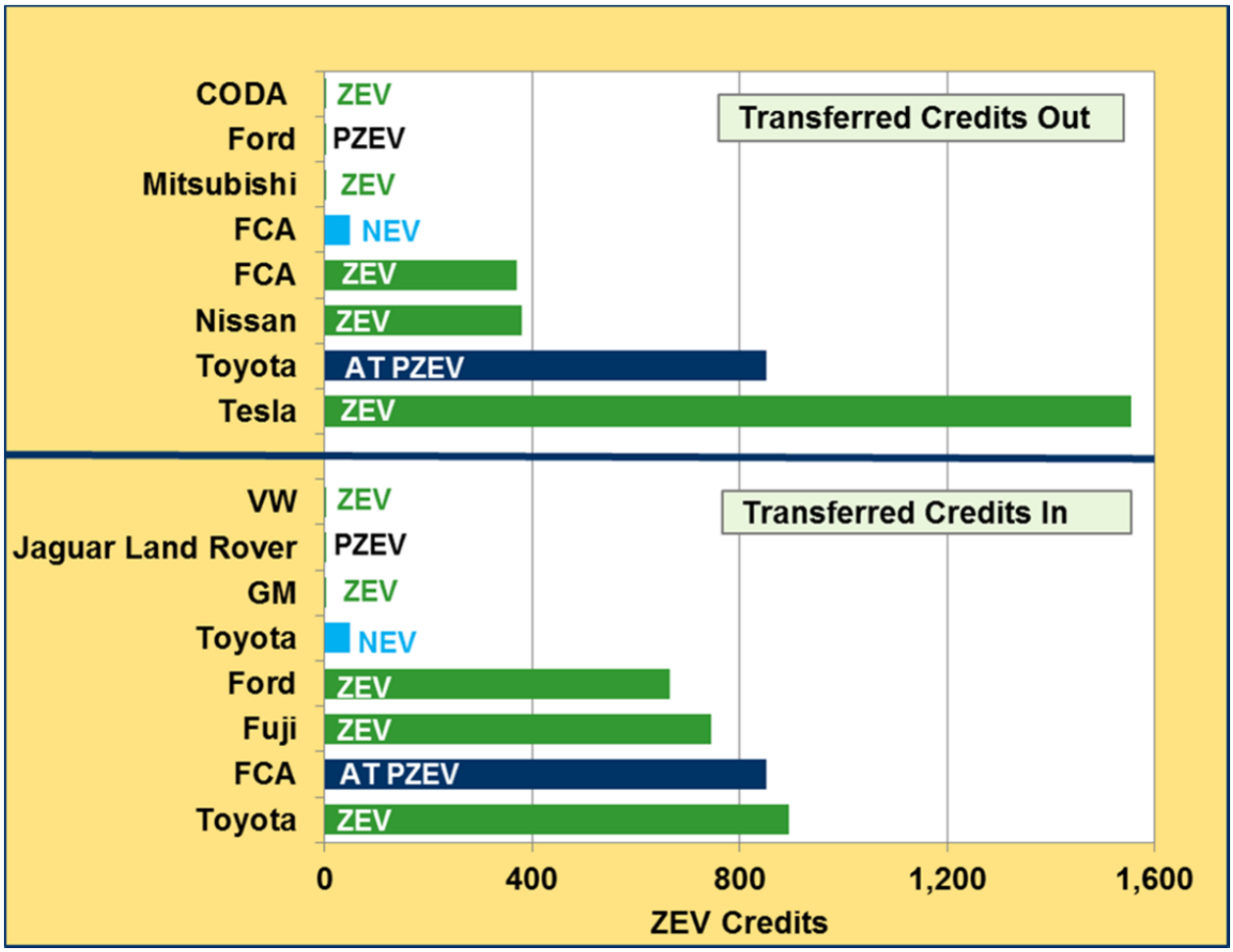


FIGURE 139. California Zero Emission Vehicle Credit Transfers, FY 2015

Note: Transfers between October 1, 2014 and September 30, 2015. PZEV = Partial zero emission vehicle; AT PZEV = Advanced technology partial emission vehicle; NEV = Neighborhood electric vehicle.

Source:
California Air Resources Board, "2014 Zero Emission Vehicle Credits," http://www.arb.ca.gov/msprog/zevprog/zevcredits/2014zevcredits.htm, accessed March 17, 2016.

Toyota Has Largest California Zero Emission Vehicle Credit Balance

Taking into account all credit transfers, in and out, California's zero-emission vehicle (ZEV) balances show that Toyota has the largest amount of credit. These credit balances show ZEV regulation compliance through model year 2014. Tesla, the only manufacturer to produce exclusively ZEVs, has transferred many credits to other manufacturers.

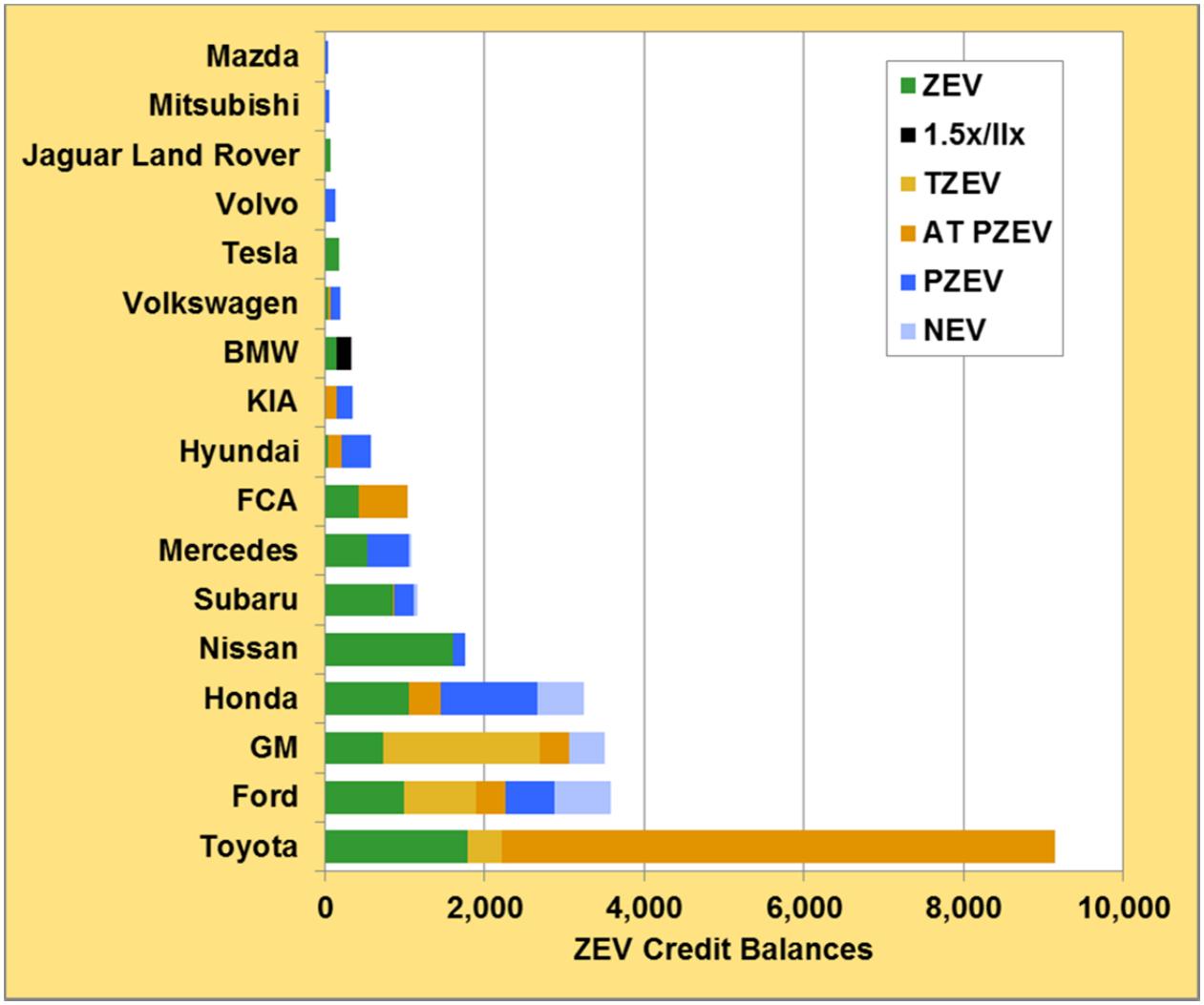


FIGURE 140. California Zero Emission Vehicle Credit Balances by Manufacturer, September 2015

Note: NEV = Neighborhood electric vehicles; TZEV = Transitional ZEV; PZEV = Partial ZEV; AT PZEV = Advanced technology PZEV; 1.5x/IIx is a type of ZEV defined in the regulation.

Source:
California Air Resources Board, "2014 Zero Emission Vehicle Credits," http://www.arb.ca.gov/msprog/zevprog/zevcredits/2014zevcredits.htm, accessed March 17, 2016.

Tier 3 Sets New Light Gasoline Vehicle Emission Standards for NMOG+NOx

The Environmental Protection Agency finalized Tier 3 emission standards in a rule issued in March 2014. One effect of the rule is a decrease in the combined amount of non-methane organic gases (NMOG) and nitrogen oxides (NOx) that new light vehicles with gasoline engines are allowed to produce from 2017 to 2025. These standards apply to a corporate average, meaning that some vehicles produced in those model years will emit more than the standard, while others will emit less.

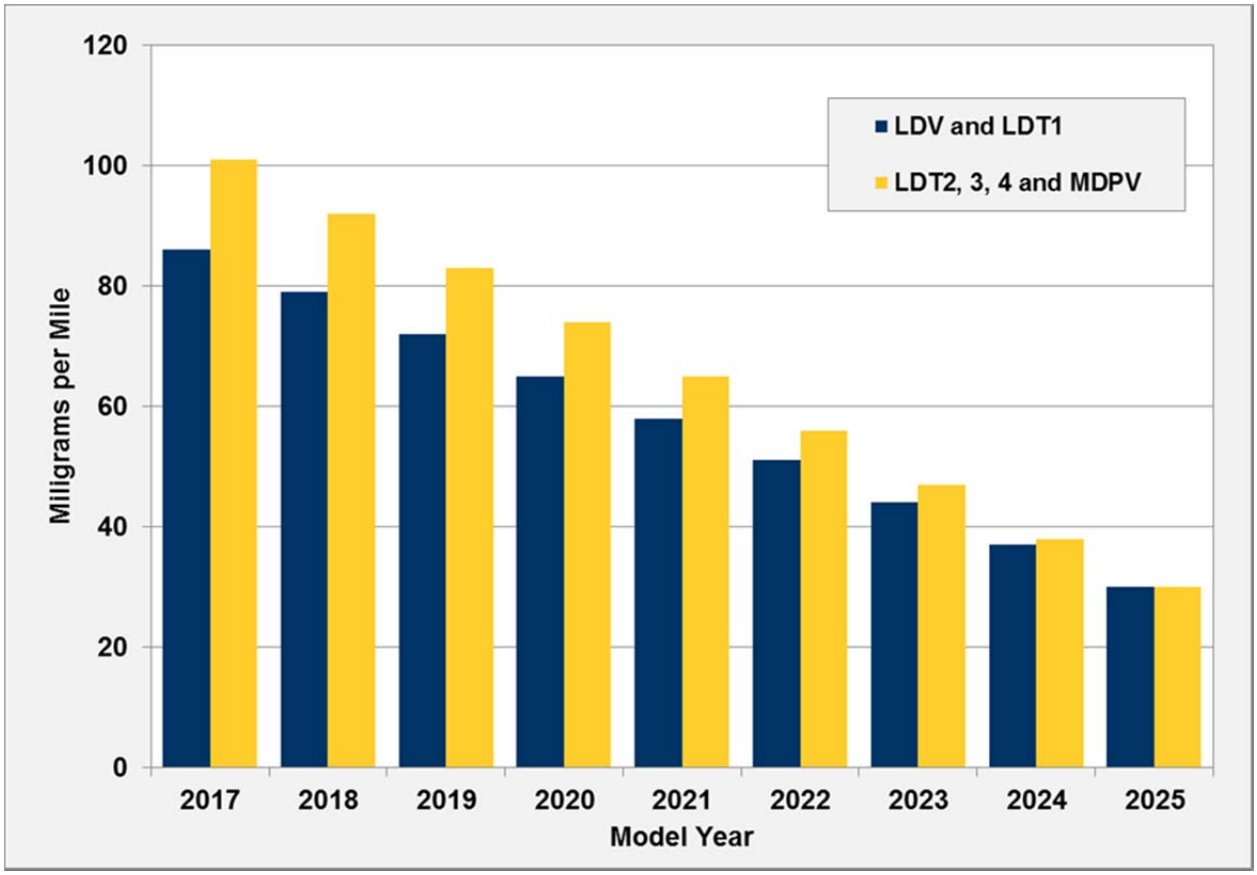


FIGURE 141. Tier 3 NMOG+NOx Emission Standards for Light Gasoline Vehicles, MY 2017-2025

Notes: Standards shown are for the Federal Test Procedure. Different standards apply to the Supplemental Federal Test Procedure. For vehicles over 6,000 lbs. gross vehicle weight rating (GVWR), the standards apply beginning in MY 2018.
LDV = Light-duty vehicles.
LDT1 = Light trucks less than 6,000 lbs. GVWR and less than 3,750 lbs. loaded vehicle weight (LVW).
LDT2, 3, 4 = Light trucks less than 8,500 lbs. GVWR and more than 3, 750 lbs. LVW.
MDPV = Medium-duty passenger vehicles.

Source:
U.S. Environmental Protection Agency, http://www.epa.gov/otaq/tier3.htm.

Tier 3 Particulate Emission Standards for Light Gasoline Vehicles Are Phased in Over Six Years

The Environmental Protection Agency finalized Tier 3 emission standards in a rule issued in March 2014. One effect of the rule is a decrease in the amount of particulate matter (PM) that new light vehicles with gasoline engines are allowed to emit from 2017-on. These standards are to be phased in over a six-year period. The first year, only 20% of U.S. sales are mandated to meet the standard. The PM standards are on a "per vehicle" basis, so by 2021, all vehicles sold (100%) must comply with the standards. Both the certification standards and the in-use standards are shown.

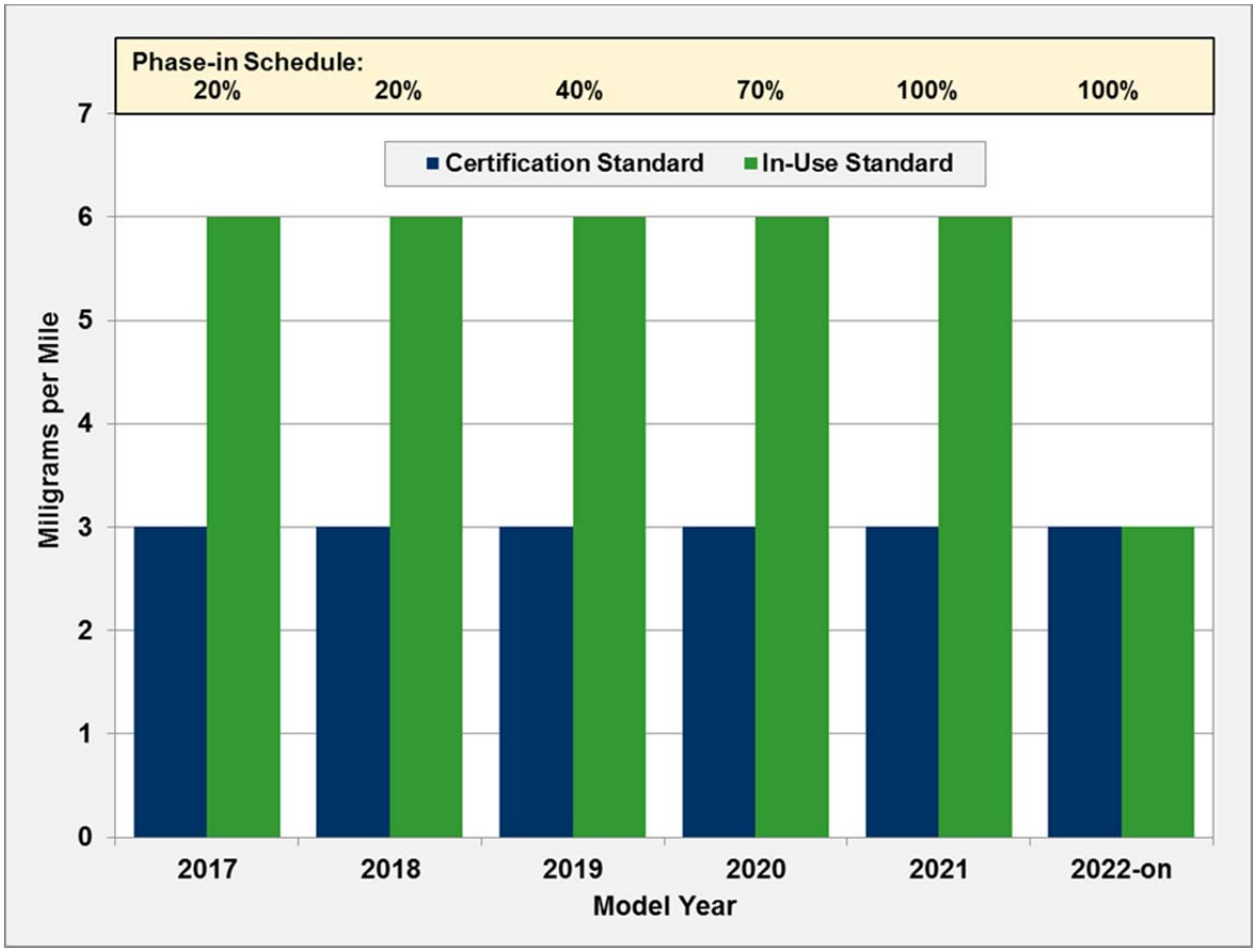


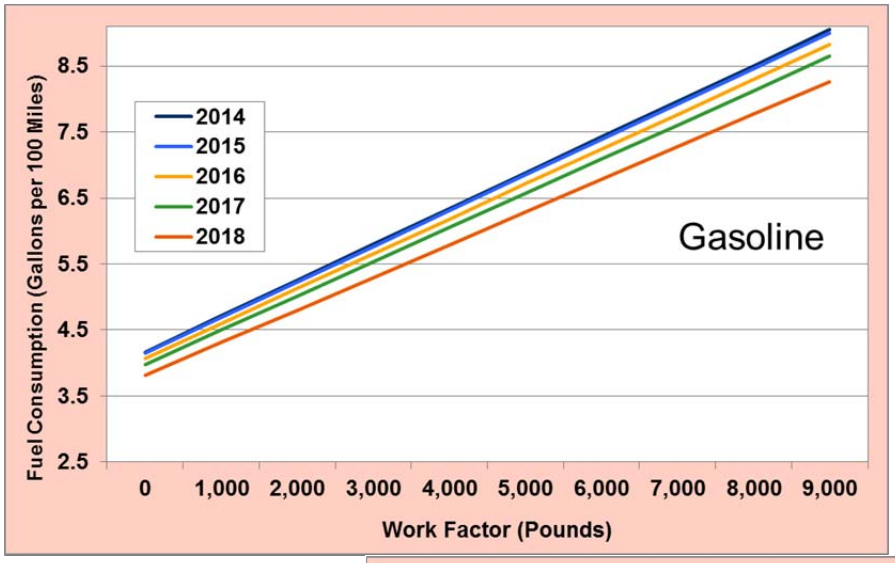
FIGURE 142. Tier 3 Particulate Matter Emission Standards for Light Gasoline Vehicles, MY 2017 and Beyond

Note: Standards shown are for the Federal Test Procedure. The standards apply to all light-duty vehicles, light-duty trucks, and medium-duty passenger vehicles. For vehicles over 6,000 lbs. gross vehicle weight rating, the standards apply beginning in MY 2018.

Source:
U.S. Environmental Protection Agency, http://www.epa.gov/otaq/tier3.htm.

Fuel Consumption Standards Set for Heavy Pickups and Vans through 2018 and Standards Proposed through 2027

In September 2011 the National Highway Traffic Safety Administration (NHTSA) issued the final rule to set standards regulating the fuel use of new vehicles—pickup trucks and cargo trucks over 8,500 lb, and passenger vans over 10,000 lb. Standards were set separately for gasoline and diesel vehicles, on a scale that depends on a "work factor." Standards for model years (MYs) 2014 and 2015 are voluntary, but are mandatory thereafter. In July 2015, NHTSA proposed standards through MY 2027 in Federal Register Vol. 80, No. 133, pp. 40137-40766. Final standards have not been set.



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

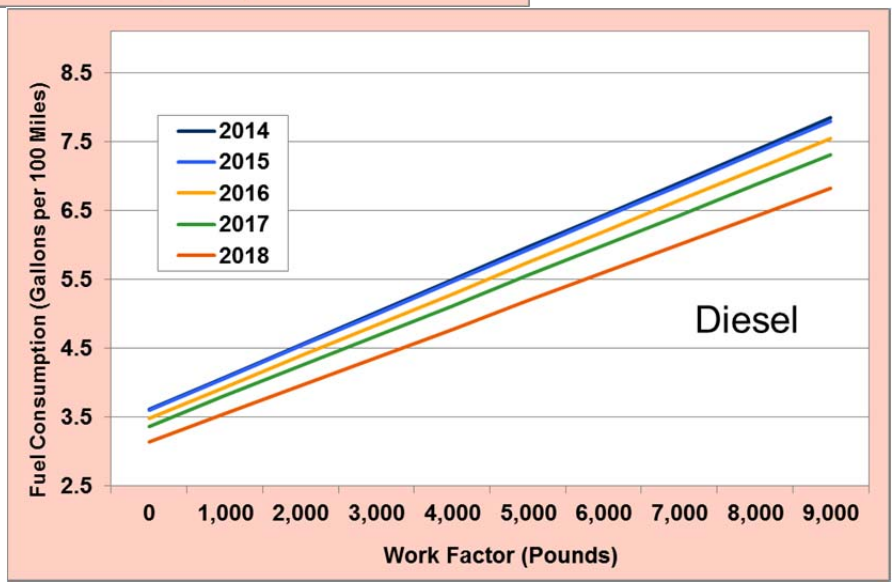


FIGURE 143. Fuel Consumption Target Standards for Gasoline and Diesel Heavy Pickups and Vans, MY 2014-2018

Source:
Federal Register, Vol. 76, No. 179, September 15, 2011, pp. 57105 - 57513.

Fuel Consumption Standards Set for Combination Tractors through 2017 and Standards Proposed through 2027

The National Highway Traffic Safety Administration (NHTSA) 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). Standards for model years (MY) 2018-2027 were proposed by NHTSA in July 2015 but final standards have not been set.

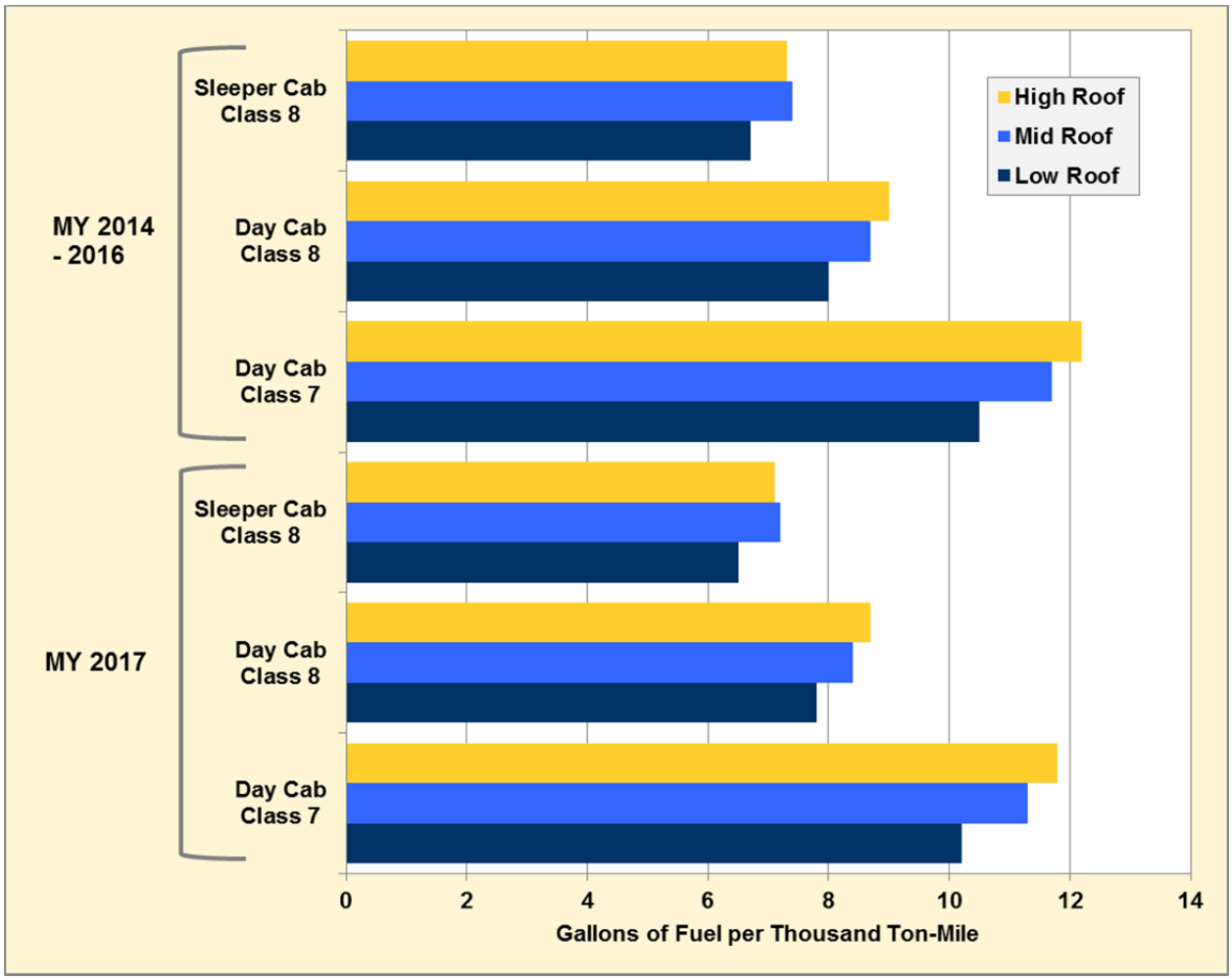


FIGURE 144. Fuel Consumption Standards for Combination Tractors, MY 2014-2017

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. 57105 - 57513.

Fuel Consumption Standards Set for Vocational Vehicles through 2017 and Standards Proposed through 2027

The National Highway Traffic Safety Administration (NHTSA) published final fuel consumption standards for heavy vehicles called "vocational" vehicles in 2011. A vocational vehicle is generally a single-unit work vehicle over 8,500 lb gross vehicle weight rating (GVWR) or a passenger vehicle over 10,000 lb GVWR. These vehicles vary in size, and include 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. NHTSA-proposed standards from MY 2018-2027 were published in the Federal Register on July 13, 2015.

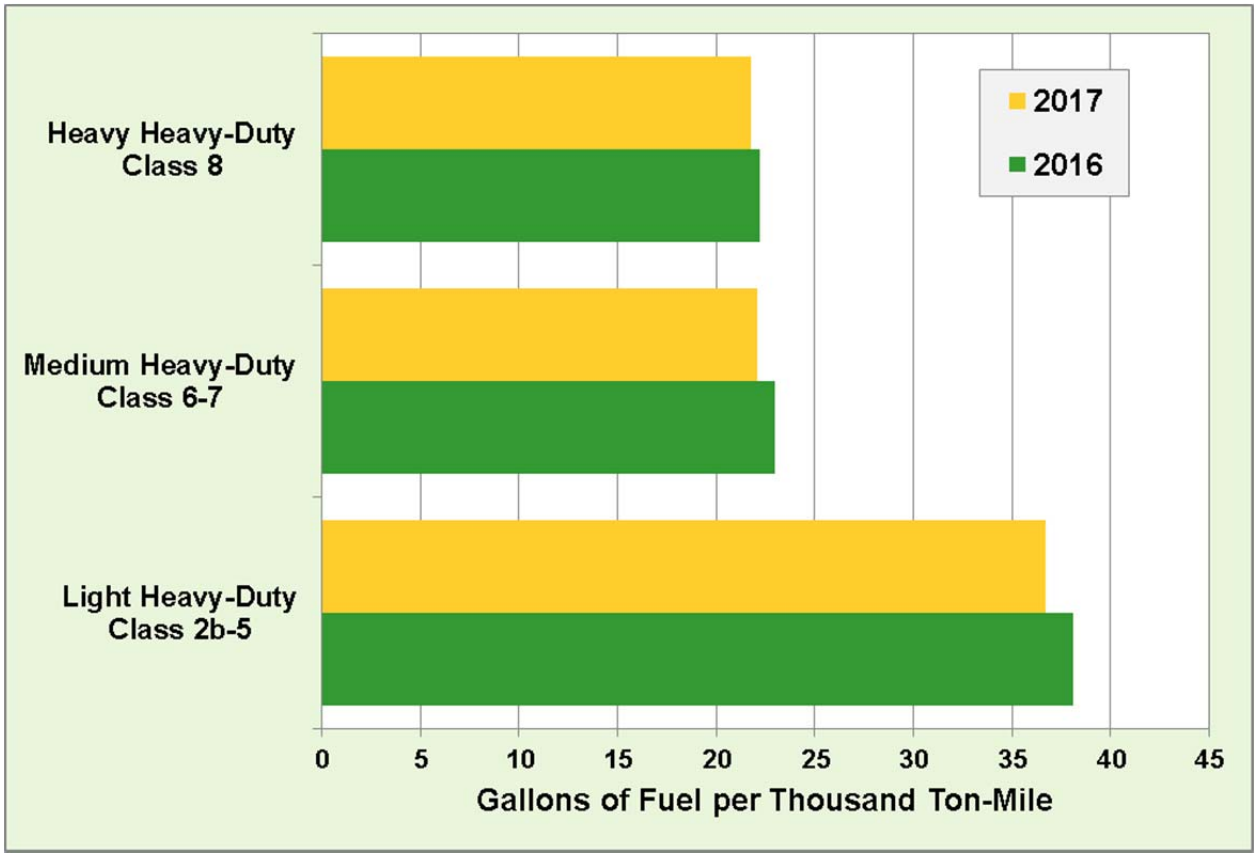


FIGURE 145. Vocational Vehicle Fuel Consumption Standards, MY 2016 and 2017

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. 57105 - 57513.

Diesel Engine Fuel Consumption Standards Are Set through 2020 and Standards Proposed through 2027

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 were 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 were voluntary from model year (MY) 2014 through 2016 and mandatory thereafter. The standards proposed by NHTSA in July 2015 begin with MY 2021 and end in MY 2027.

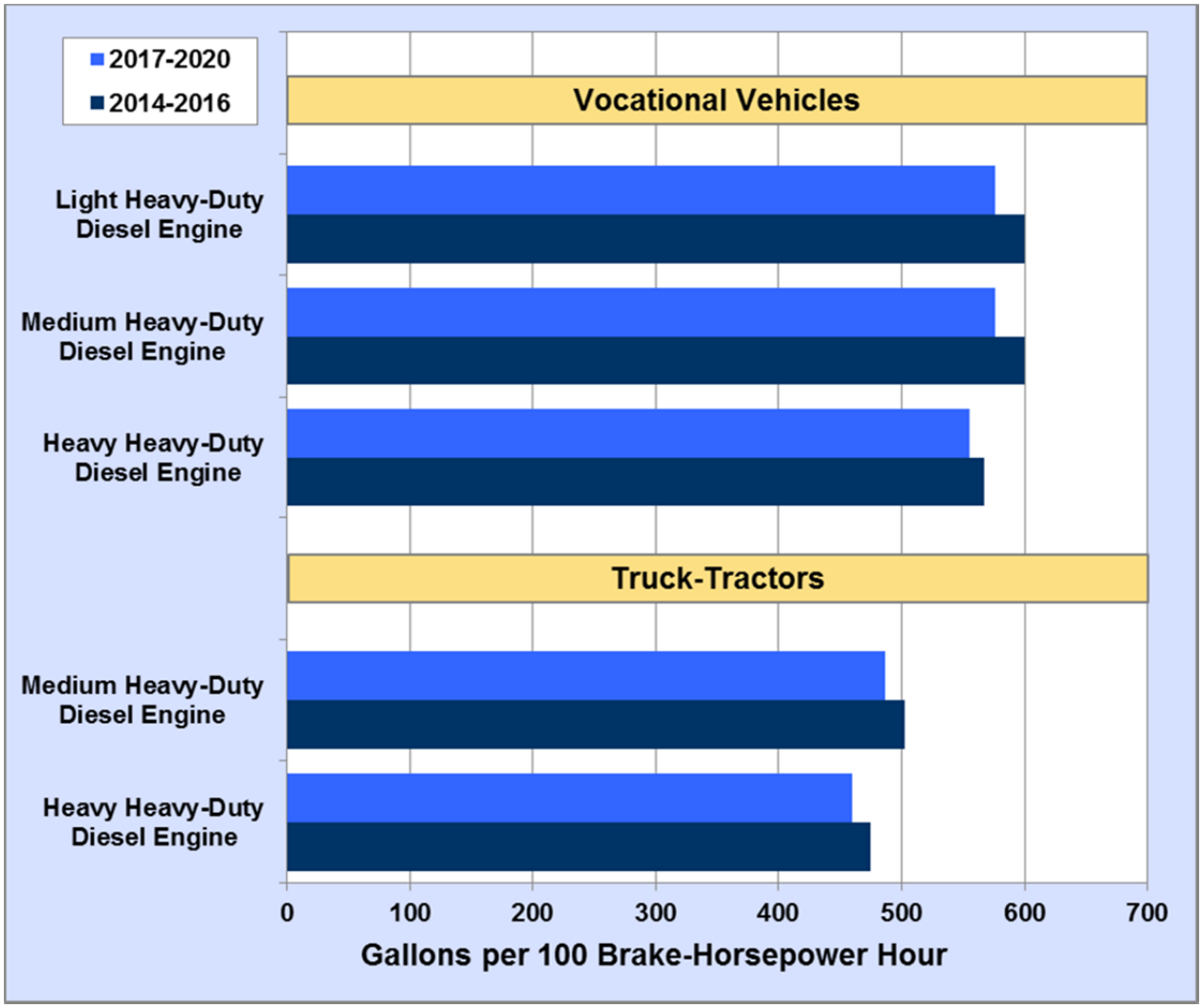


FIGURE 146. Fuel Standards for New Diesel Engines, MY 2014-2020

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. 57105 - 57513.

Energy Policy Act Encourages Idle Reduction Technologies

In order to encourage the use of idle reduction devices in large trucks, the Energy Policy Act of 2005 allowed for a weight exemption for the additional weight of idle 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 either an additional 400 or 550 lb. Other States have a 400 lb weight allowance which is granted by enforcement personnel. Arkansas allows a 550 lb weight exemption by enforcement policy. Five states plus the District of Columbia have not adopted the weight exemption.

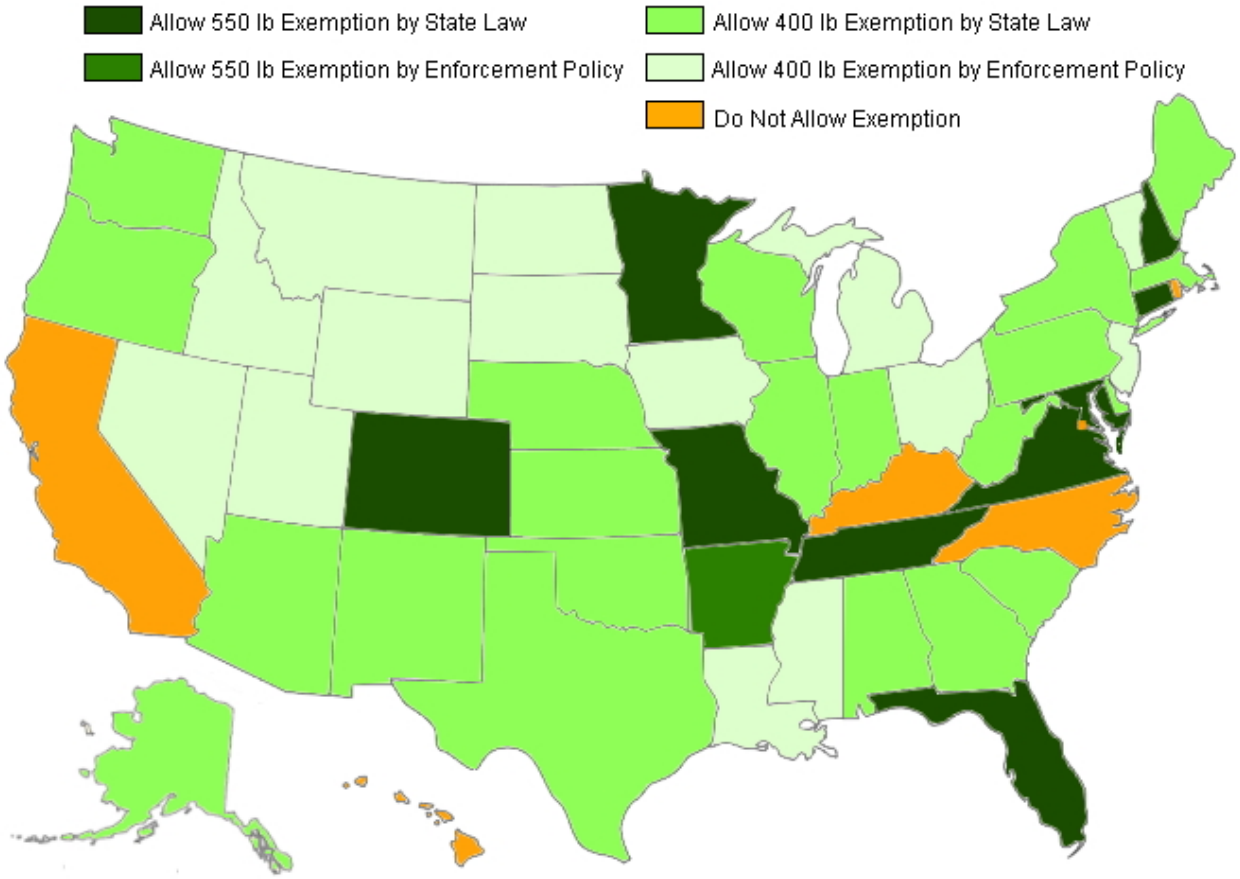


FIGURE 147. States Adopting Weight Exemptions for Idle Reduction Devices, 2016

Source:

U.S. Department of Energy, Energy Efficiency and Renewable Energy, *February 2016 National Idling Reduction News*. http://energy.gov/eere/vehicles/vehicle-technologies-office-national-idling-reduction-network-news

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 for highway vehicles certified with the EPA are shown below.

Auxiliary Power Units/ Generator Sets

- ACEMCO Power Systems, LLC
- Airworks Compressors Corp
- Big Rig Products
- Carrier Transicold
- Centramatic
- Diamond Power Systems
- Dunamis Power Systems
- Hodyon LP
- Kohler
- Life Force
- Mantis Metalworks, LLC
- McMillan Electric Company
- Midwest Power Generators
- Navistar
- Parks Industries, LLC
- Pony Pack, Inc.
- Power Technology Southeast
- RigMaster Power by Mobile Thermo Systems
- Star Class
- Thermo King Corp
- TRIDAKO Energy Systems
- Volvo
- Willis Power Systems

Fuel Operated Heaters

- Automotive Climate Control
- Espar
- Proheat
- Volvo
- Webasto

Battery Air Conditioning/ Heating Systems

- All Around Contracting, LLC
- AuraGen
- Bergstrom, Inc.
- Cool Moves
- Crosspoint Solutions
- DC Power Solutions APU
- Diamond Power Systems
- Dometic Corporation
- Driver Comfort System
- EnergyXtreme
- Freightliner
- Hammond Air Conditioning, LTD
- Idle Free Systems
- Indel B Sleeping Well
- NAS, LLC
- Navistar
- Paddock Solar
- Peterbilt
- Safer Corporation
- Sobo, Inc.
- Sun Power Technologies
- Thermo King
- Volvo

Shore Connection Systems

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

Thermal Storage Systems

- Autotherm Division Enthal Sys, Inc.
- Webasto

FIGURE 148. Idle Reduction Technologies which Are Granted Exemption from Federal Excise Taxes

Source:
U.S. Environmental Protection Agency, SmartWay Technology Program, March 2016.
http://www.epa.gov/smartway/forpartners/technology.htm

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 have not changed since 1991.

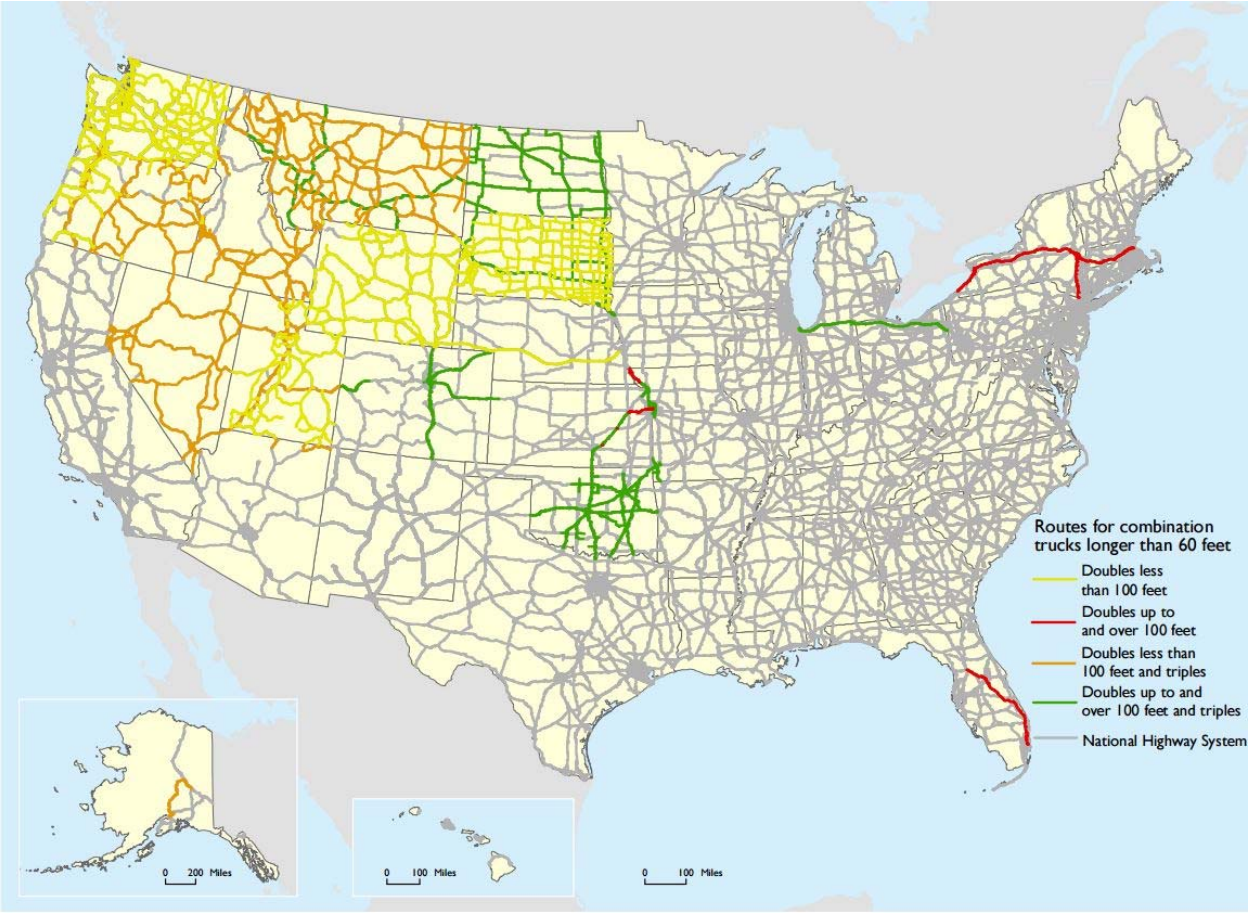


FIGURE 149. Routes Where Longer Combination Vehicles Are Permitted, 2014

Note: Empty triples are allowed on I-80 in Nebraska.

Source:

U.S. Department of Transportation, Federal Highway Administration, *Freight Facts and Figures 2015,* 2015. http://www.rita.dot.gov/bts/sites/rita.dot.gov.bts/files/data_and_statistics/by_subject/freight/freight_facts_2015

Heavy Truck Speed Limits Are Inconsistent

Ranging from a speed limit of 55 miles per hour (mph) to 85 mph, the maximum speed limit for trucks varies from state-to-state and sometimes from year to year. Currently, California has the most conservative maximum speed limit for trucks – 55 mph. At the other end of the spectrum, Texas has some roads where the truck speed limit is 85 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.

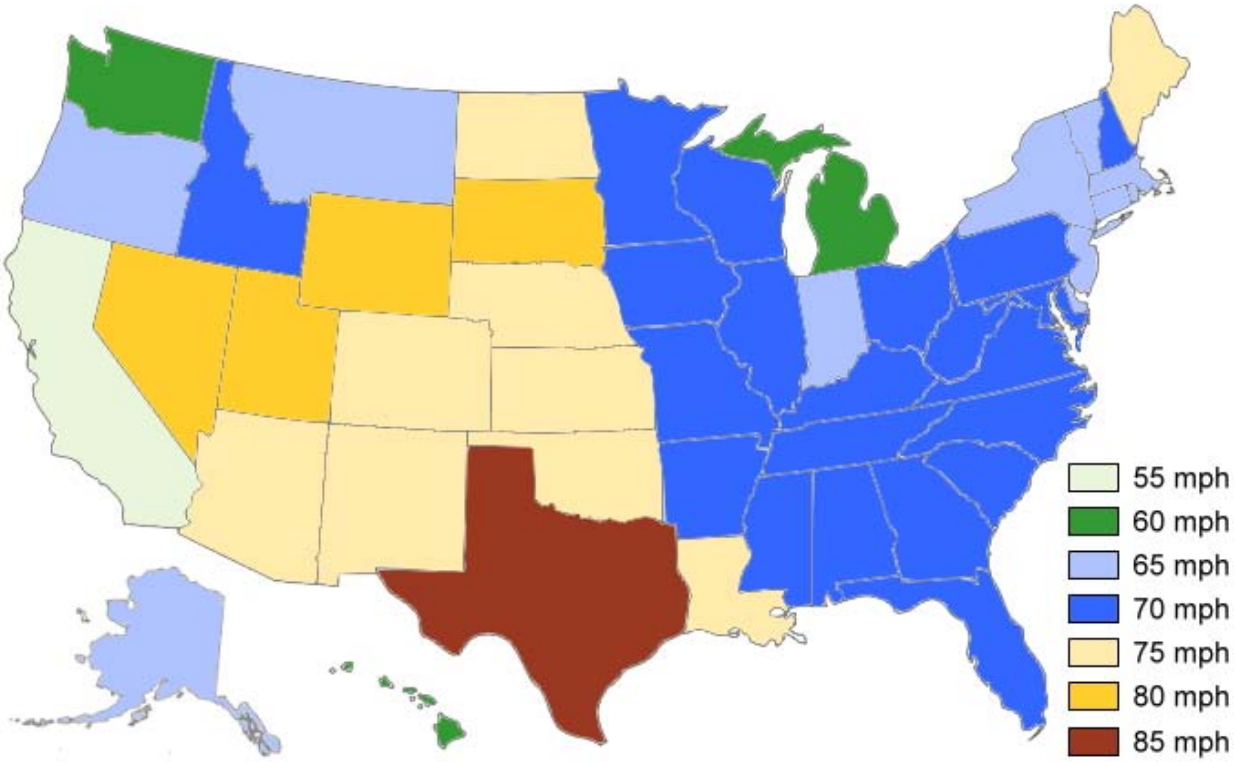


FIGURE 150. Maximum Daytime Truck Speed Limits by State, 2016

Source:
Insurance Institute for Highway Safety, Highway Loss Data Institute, March 2016.
http://www.iihs.org/laws/speedlimits

EPA Finalizes Stricter Standards for Gasoline

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. In March 2014, Tier 3 standards were finalized by the Environmental Protection Agency (EPA). Tier 3 standards take effect in 2017. Large refinery standards are shown below, both the maximum and average per gallon. See the EPA website for additional details on sulfur standards.

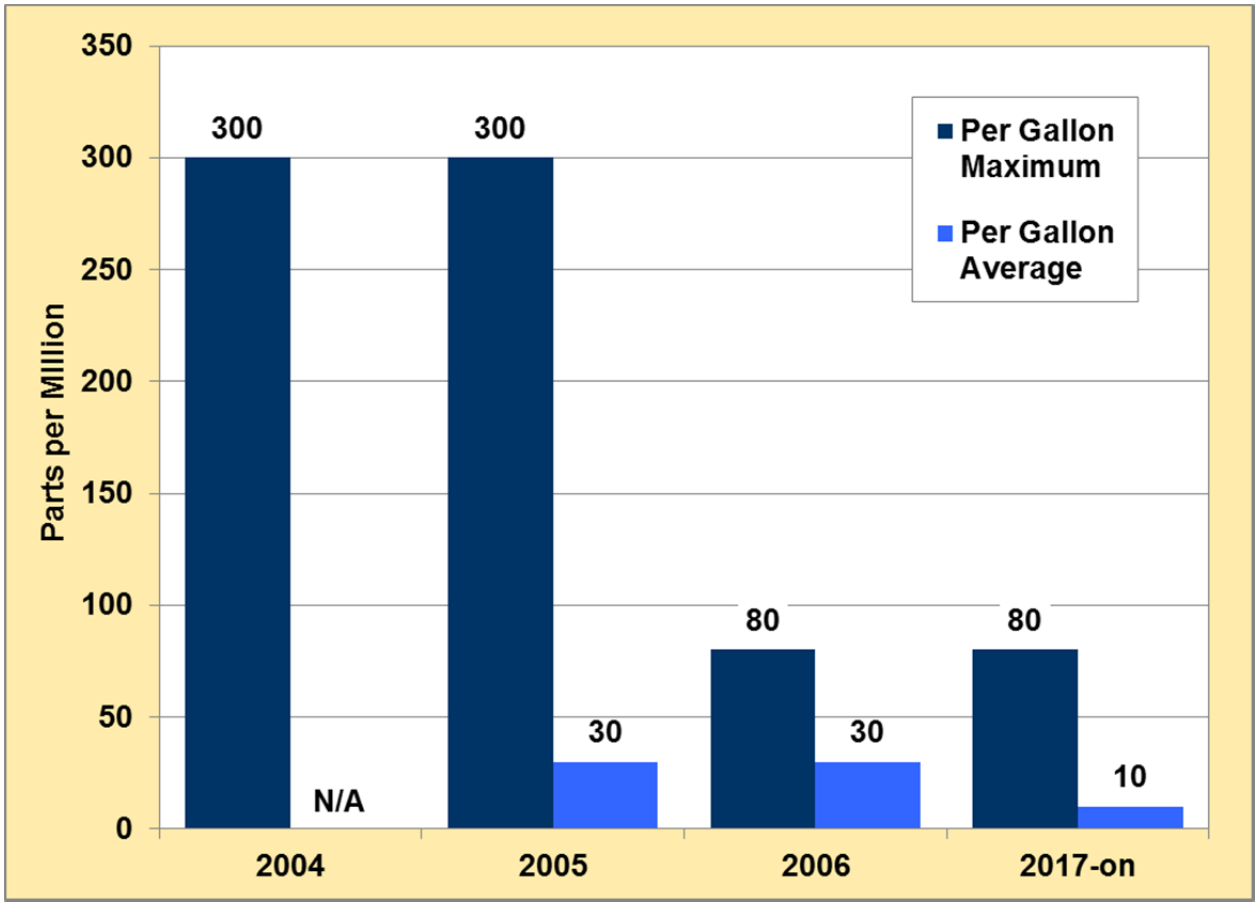


FIGURE 151. Gasoline Sulfur Standards, 2004-on

Note: N/A = not applicable.

Source:
U.S. Environmental Protection Agency, Gasoline Sulfur, http://www.epa.gov/gasoline-standards/gasoline-sulfur.

Diesel Sulfur Standards Set at 15 Parts per Million

Sulfur naturally occurs in diesel fuel, contributing to pollution when the fuel is burned and reducing the effectiveness of vehicle emission controls. 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 (ULSD) which is 15 ppm. By 2010, all diesel fuel produced was ULSD. Separate standards were created for highway and non-highway diesel fuel. The standards for highway diesel from large refineries are shown here; see the Environmental Protection Agency website for additional details on sulfur standards.

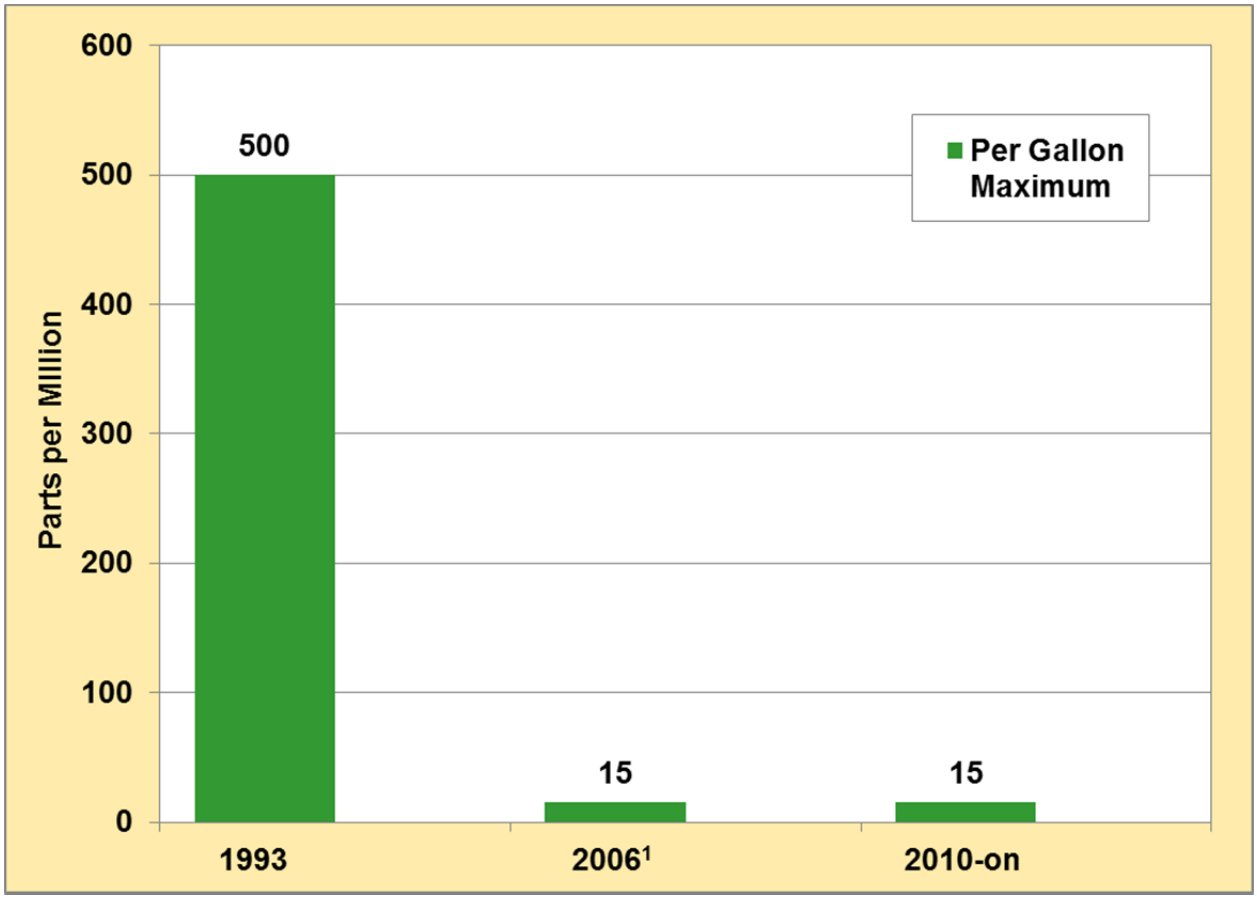


FIGURE 152. Diesel Sulfur Standards, 1993-on

[1] By October 2006 80% of the diesel fuel produced was required to be 15 ppm. In 2010, 100% produced was required to be 15 ppm.

Source:
U.S. Environmental Protection Agency, Heavy-Duty Highway Diesel Program, https://www3.epa.gov/otaq/highway-diesel/regs.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.

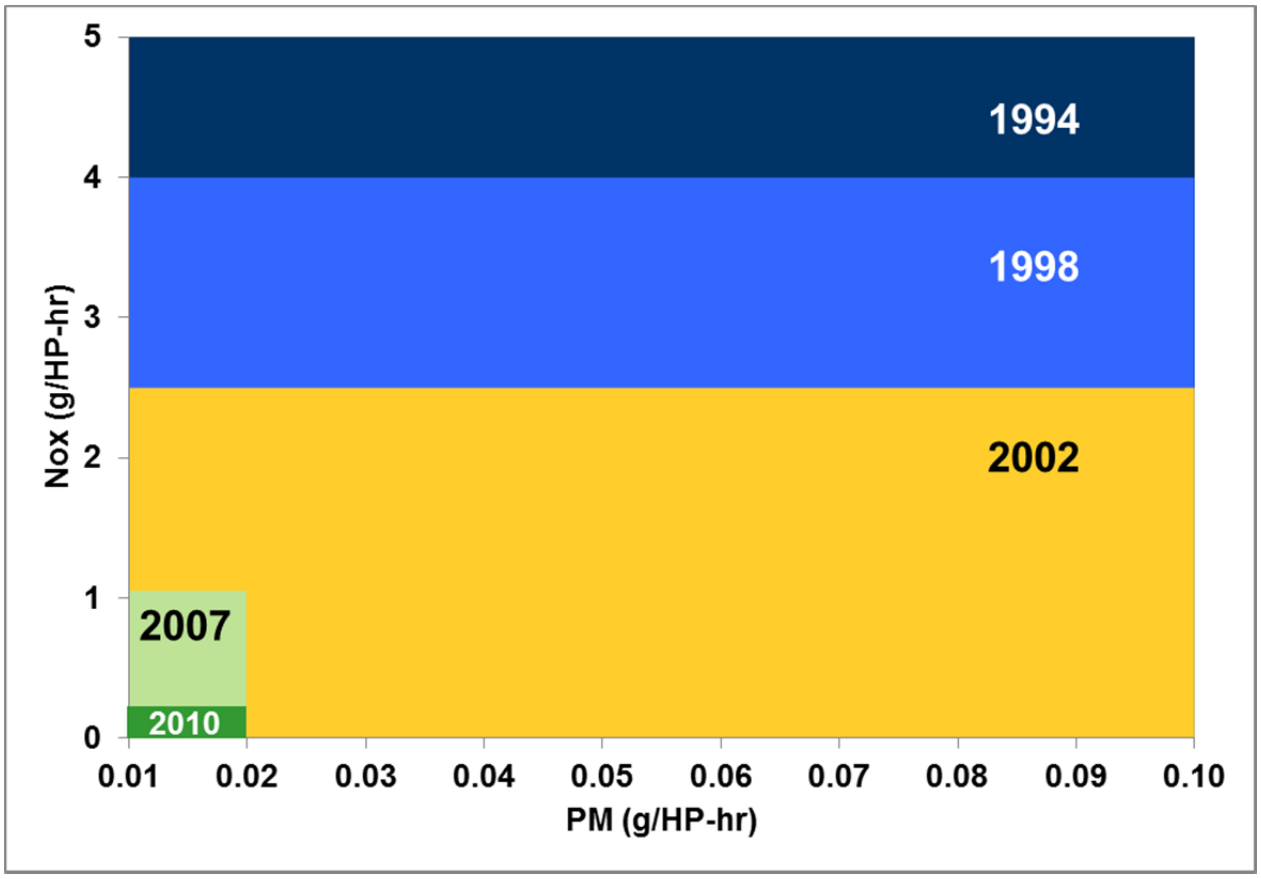


FIGURE 153. Diesel Emission Standards, 1994-2010

Note: All standards apply to vehicle model years, not calendar years. In 2015, manufacturers may choose to certify engines to the California Optional Low NOx Standards of 0.10, 0.05, or 0.02 g/hp-hr.

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.

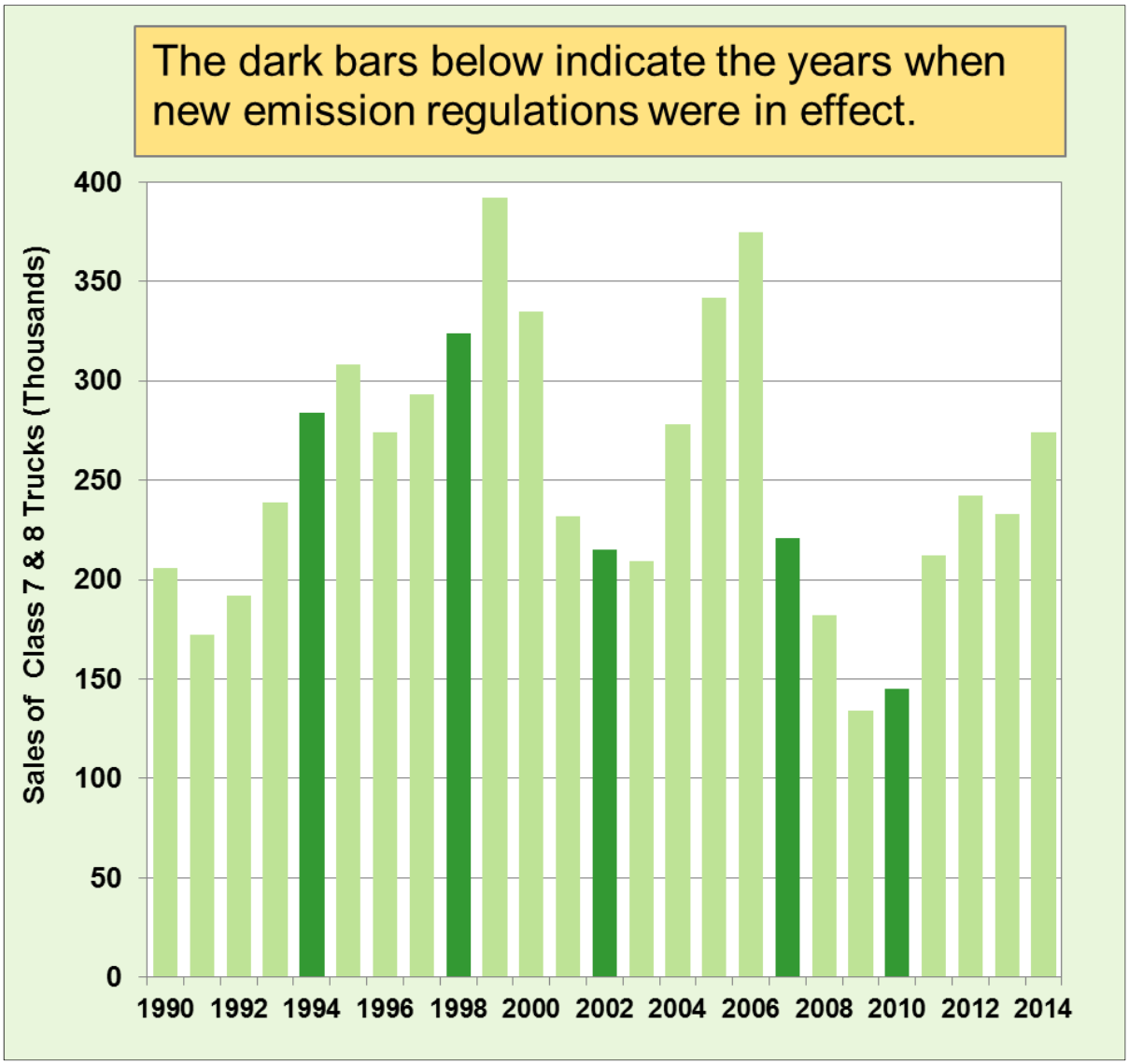


FIGURE 154. Class 7 and 8 Truck Sales, 1990-2014

Source:
Ward's Automotive Group, *Motor Vehicle Facts and Figures 2015*, Southfield, MI, 2015.
http://wardsauto.com