United States
Environmental Protection
Agency

2008 Progress Report

Vehicle and Engine Compliance Activities

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United States Environmental Protection Agency
Office of Transportation and Air Quality
1200 Pennsylvania Avenue, NW
Washington, DC 20460

EPA-420-R-10-022
August 2010
www.epa.gov/otaq

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I. Introduction

Welcome to the second compliance progress report of the U.S. Environmental Protection Agency's (EPA's) Office of Transportation and Air Quality (OTAQ). In 2008, OTAQ issued its first compliance report, the "2007 Progress Report on Vehicle and Engine Compliance Activities" (2007 Compliance Report). The purpose of these reports is to present a convenient reference for the environmental data we collect from manufacturers and generate from our test programs with respect to mobile sources, or moving sources of air pollution. These sources include vehicles, engines, and other motorized (including handheld) equipment that produce exhaust and evaporative emissions. It is our job to regulate these sources of air pollution and make sure that they comply with emissions and fuel economy requirements.

This report updates and builds upon the data and information presented in the first report. Specifically, this report includes model year (MY) 2008 certification data as well as information and test results produced during calendar year 2008, and in some cases it features comparisons of the 2007 and 2008 data.

In this report, we have chosen to focus on data and avoid the repetition of basic descriptive information that has not changed since the previous report was issued. We recommend that readers who are unfamiliar with EPA's mobile source emission control programs refer to the first report for background information, including descriptions of vehicle and engine categories regulated by EPA; descriptions of fuels regulated by EPA; details on the contribution of major pollution sources—including engines, vehicles, and equipment—to national air quality; an overview of EPA's engine and vehicle compliance programs; and an overview of regulatory flexibilities contained in EPA's vehicle and engine programs.

In future reports, we expect to update these analyses as well as provide new information as programs evolve and new data become available.

II. Scope of EPA's Vehicle, Engine, Equipment, and Fuel Compliance Programs

EPA's authority comes from a variety of statutes enacted by Congress. For details, see Table 1 of the 2007 Compliance Report.

Compliance programs play an essential role in achieving the benefits of EPA regulations. OTAQ's compliance programs are vast in scope and comprehensive in coverage to ensure that vehicle and engine manufacturers and fuel refiners and producers comply with the regulations. The 2007 Compliance Report includes a list of mobile source regulatory implementation dates for emission standards proposed or established in 2004 and later years. For a comprehensive list of EPA mobile source emission standards, refer to EPA's Emission Standards Reference Guide.

In addition to regulating vehicles and engines, EPA regulates all motor vehicle fuels, including gasoline, diesel, and renewable fuels such as ethanol and biodiesel. EPA provides a comprehensive list of ongoing fuel regulations on its website. For more information on gasoline specifically, see EPA's Fuel Trends Report: Gasoline 1995–2005. OTAQ also provides additional data on its website.

III. Certification and Compliance Data

As shown in Table 4 of the 2007 Compliance Report, EPA has a variety of tools to employ for any given sector for compliance oversight purposes. These tools allow EPA to test vehicles and engines before they are produced, while they are in production, and after they are in use. EPA works with government partners to decide on annual compliance and investigation priorities. Control of mobile source emissions remains a critical component of the Agency's efforts to maintain or improve the nation's air quality. The figures in Section III of the 2007 Compliance Report provide an overview of emission catergories, which can help put vehicle emissions in context with other sources of air pollution.

A. Regulatory Implementation

For cars and light-duty trucks, EPA continued implementing Tier 2 standards that began phasing in with MY 2004. While cars and small pickup trucks reached full phase-in with MY 2007, heavy-duty pickup trucks and sport utility vehicles (SUVs) were still phasing in to the more stringent standards. The phase-in period ended at the end of MY 2008, with 100 percent of cars and light-duty trucks required to meet the Tier 2 standards beginning with MY 2009. EPA also began implementing the Mobile Source Air Toxic (MSAT) regulations, which established a new cold-temperature (20 degrees Fahrenheit) emission standard of 0.3 grams per mile for non-methane hydrocarbons (NMHCs). Though this standard does not officially begin phasing in until MY 2010 for cars and light-duty trucks, it was optional for MY 2008.

In addition to the Tier 2 and MSAT programs, EPA began implementing new aging procedures, which are used to predict the emissions of vehicles at their full useful life (emissions expected to be released during a vehicle's lifetime of 120,000 miles). Manufacturers are required to request EPA approval annually to use their own, proprietary durability aging procedures or to notify EPA that they have opted to use EPA's Standard Road Cycle and/or Standard Bench Cycle (SRC/SBC). Manufacturers of diesel vehicles/engines are not allowed to use bench aging procedures and, therefore, can only use either their own road cycle (with EPA approval) or the EPA SRC. For the first year of implementation, only two manufacturers chose to use the EPA SRC/SBC, and one diesel vehicle manufacturer chose to use the EPA SRC. All the other manufacturers chose to use their proprietary durability aging procedures. Manufacturers that choose to use their own durability aging procedures are also required to provide EPA with an equivalency factor. The equivalency factor enables comparison between the proprietary cycle and the published EPA SRC/SBC cycles. This allows a third party who relies on the EPA SRC/SBC to replicate the aging performed by a manufacturer using a proprietary cycle. EPA publishes these equivalency factors annually and posts them online.

MY 2008 was also the first year for EPA's new fuel economy labeling rule, which was finalized in December 2006. As a result of this rule, all fuel economy estimates are now based on five test methods (instead of two) reflecting actual driving conditions that can affect fuel economy, such as high speed, aggressive driving, use of air conditioning, and cold-temperature operation. To aid consumers shopping for new cars, EPA redesigned the fuel economy window sticker posted on all new cars and light trucks to clearly reflect this new information.

EPA continued implementing programs for the heavy-duty highway and nonroad engine sectors as well. Specifically, EPA began certification of the Tier 4 emission standards for nonroad construction and agricultural engines. The Tier 4 standards began phasing in with MY 2008 for nonroad engines with a rated power up to 56 kilowatts (75 horsepower). EPA also began working with engine manufacturers to prepare for the certification of the more stringent emission standards for heavy-duty highway engines that take effect in MY 2010.

B. Certification

For MY 2008, the overall number of certificates of conformity EPA issued remained relatively constant compared to MY 2007, as shown in Table 1. In both years, EPA issued more than 3,600 certificates for engines, equipment, and vehicles, covering more than a dozen different industry sectors. The number of certificates issued for the MY 2008 ranged from 1,063 for lawn and garden equipment (small-spark ignition) engines to five for heavy-duty engines certified for use only in California.

Table 1. Number of Certificates of Conformity by Model Year

Category	2007	2008
Lawn and Garden Equipment	1,084	1,063
Agriculture and Construction Equipment	676	618
Cars and Light-Duty Trucks	518*	512
Motorcycles	418	485
All-Terrain Vehicles	309	304
Diesel Boats and Ships	117	137
Gasoline Boats and Personal Watercraft	112	118
Nonroad Motorcycles	106	71
Locomotives	60	76
Trucks and Buses (Diesel)	58	75
Trucks and Buses (Gasoline)	38	30
Snowmobiles	37	37
Forklifts, Generators, and Compressors	34	59
Oceangoing Vessels per International Maritime Organization Requirements	31	17
Independent Commercial Importers—Cars and Light-Duty Trucks	22	10
Truck and Bus Engine Evaporative	19	25
Truck and Bus Engine (California)	2	5
Total	3,641	3,642

* Originally reported as 427 in the 2007 Compliance Report. This previous calculation was based on the number of test groups alone, not certificates.

In addition to its mobile source certification work, OTAQ assists EPA's Office of Air Quality Planning and Standards (OAQPS) with certification of stationary engines. Stationary engines are used either in a fixed application or in a portable (or transportable) application, where the engine resides at a single site for at least one year. A given engine may be certified as a mobile engine, stationary engine, or both. Of the 618 certificates of conformity for the agricultural and construction sector, 86 were for mobile-stationary engines and five were for stationary-only engines. Of the 59 certificates of conformity issued for engines in the forklift, generator, and compressor category, nine were for mobile-stationary engines and one was for a stationary-only engine family.

Certificates of conformity are issued on a test-group basis (for cars and light-duty trucks) or on an engine-family (for all other sectors) basis. A test group or engine family is a group of engines or vehicles having similar design and emission characteristics and can cover multiple models. However, different versions within a given model may be included in different test groups or engine families. For example, one General Motors test group covers both the Chevrolet HHR and Cobalt models. At the same time, different versions of the HHR are certified in three test groups, and different versions of the Cobalt are certified in three other test groups. Figure 1 shows the number of manufacturers and test groups/engine families by industry sector.

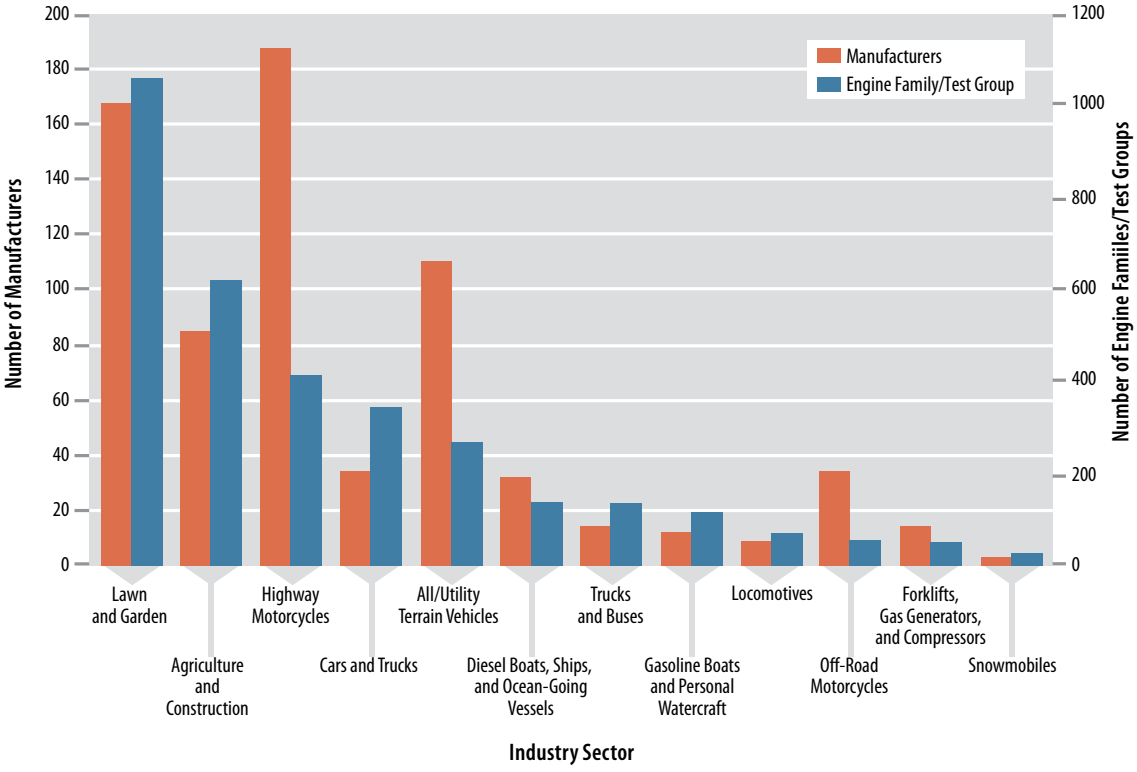


Figure 1. Number of Manufacturers and Engine Families by Industry Sector, MY 2008

1. Cars and Light-Duty Trucks

As shown in Table 1, EPA issued more than 500 certificates to manufacturers of cars and light-duty trucks in MY 2008, reflecting essentially no change relative to 2007. Figure 2 shows the number of certified test groups of MY 2008 cars and light-duty trucks by manufacturer.

Figure 3 presents the number of MY 2008 cars and light-duty trucks produced for sale in the United States by manufacturer. A comparison of Figures 2 and 3 shows that the number of certified test groups does not necessarily reflect the number of vehicles produced. Thus, manufacturers with the most certified test groups do not necessarily produce the most vehicles.

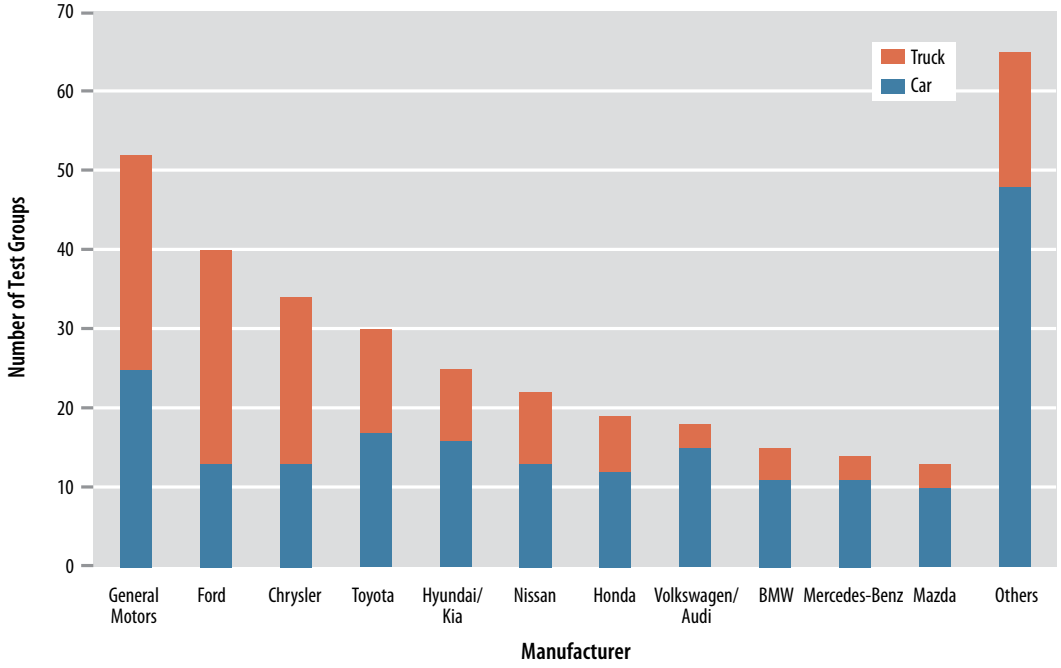


Figure 2. Certified Car and Light-Duty Truck Test Groups by Manufacturer, MY 2008

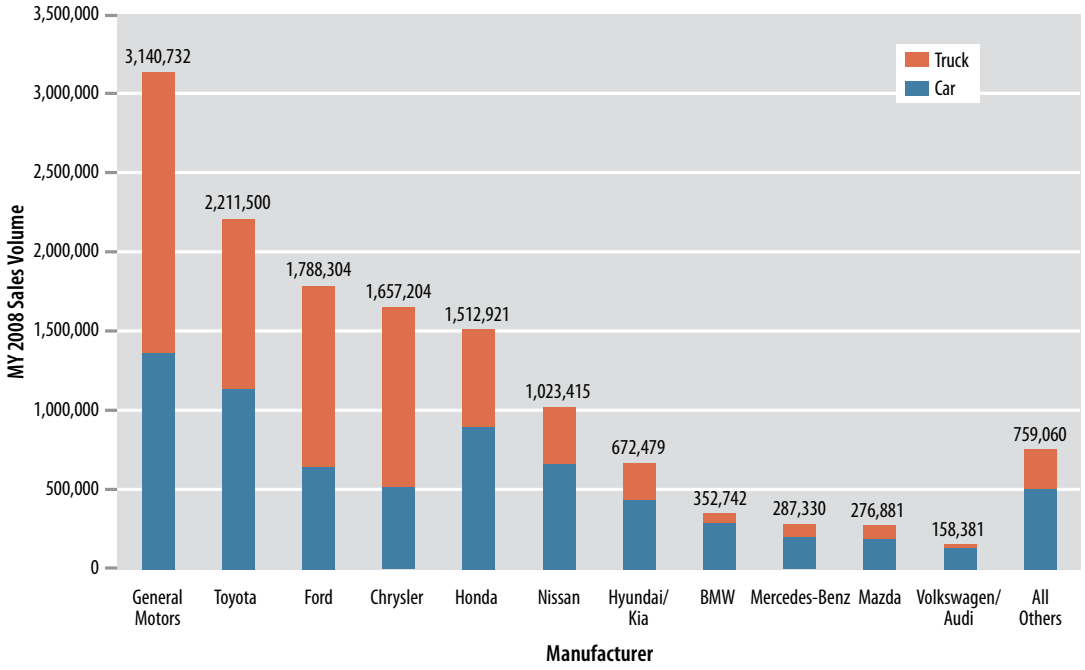


Figure 3. Number of Cars and Light-Duty Trucks Produced for Sale in the United States by Manufacturer, MY 2008

Figure 4 shows the country of origin of all MY 2008 vehicles produced for sale in the United States. The country of origin for a vehicle is the country where a manufacturer's headquarters are located, not necessarily where the vehicles are manufactured. For example, Toyota's corporate headquarters are in Japan, so all of Toyota's MY 2008 vehicles produced for sale in the United States are counted in the Japan column, even though some Toyota vehicles are built in the United States.

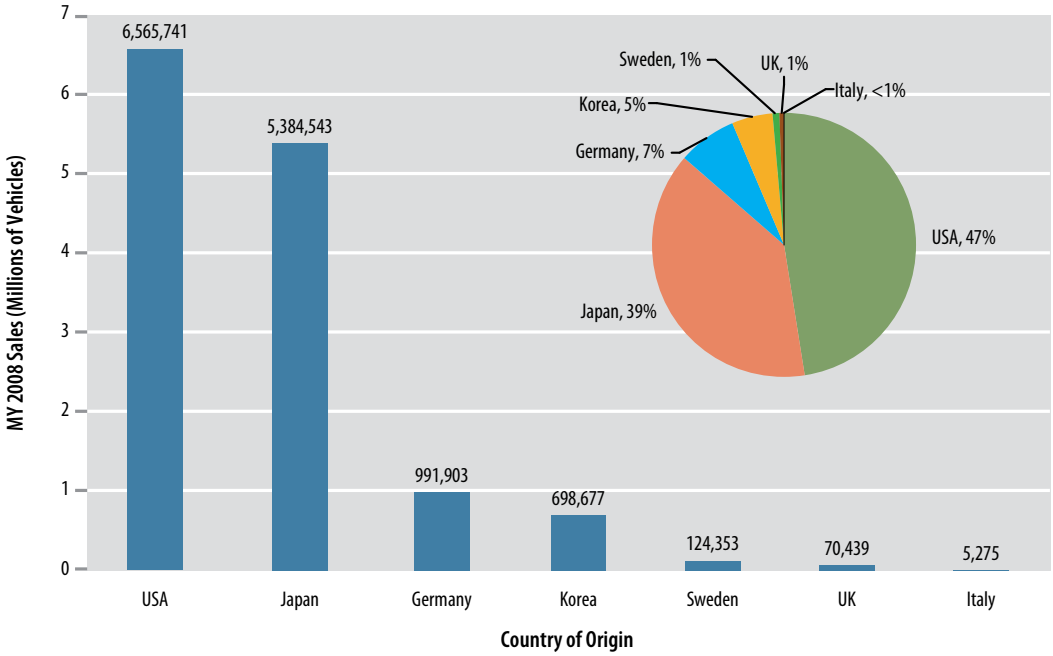


Figure 4. Number of Cars and Light-Duty Trucks Produced for Sale in the United States by Country of Origin, MY 2008

While the vast majority of certified cars and light-duty trucks operate on conventional gasoline, EPA also certifies cars and light-duty trucks that operate on diesel or alternative fuels. Figure 5 presents the number of MY 2008 test groups for diesel and alternative fuel vehicles by manufacturer. All MY 2008 ethanol vehicles are flex-fuel vehicles, which are capable of operating on gasoline, E85 (85 percent ethanol and 15 percent gasoline), or an intermediate blend.

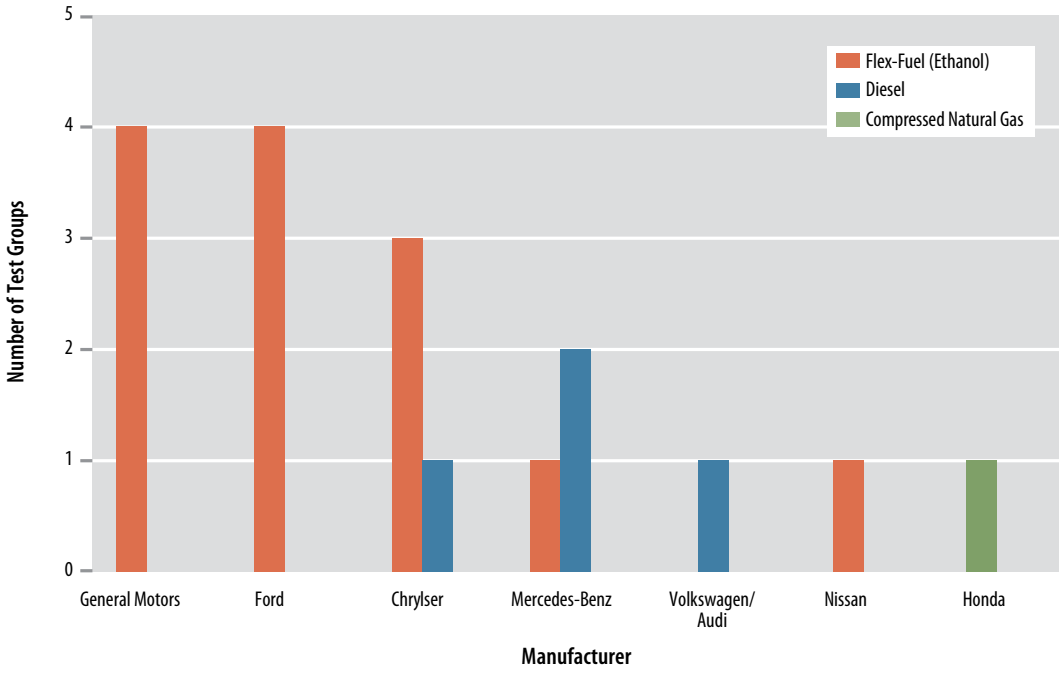


Figure 5. Alternative Fuel Car and Light-Duty Truck Test Groups by Manufacturer, MY 2008

For comparison, Figure 6 shows the production of MY 2008 vehicles by fuel type. About 8 percent of these vehicles were flex-fuel vehicles. Following gasoline and ethanol, diesel is the next most prevalent fuel, but it still represents only about one-tenth of 1 percent of car and light-duty truck production. Compressed natural gas (CNG) vehicles make up an even smaller fraction of MY 2008 vehicle production.

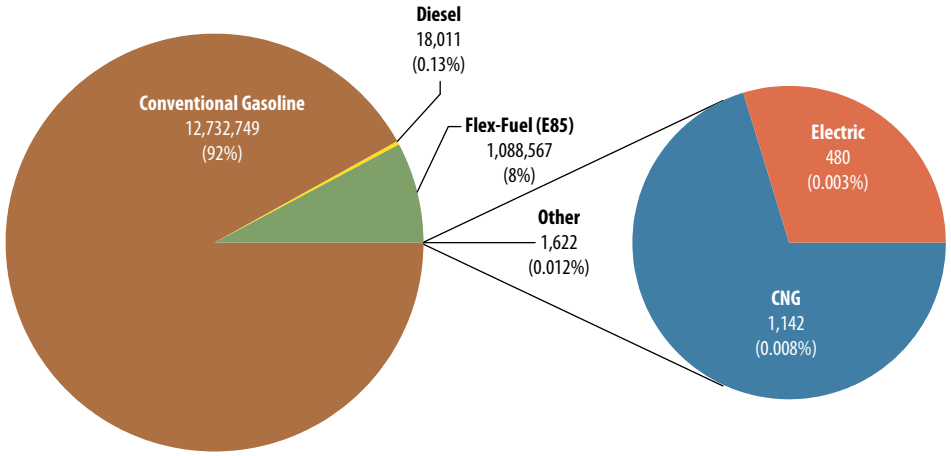


Figure 6. Number of Cars and Light-Duty Trucks Produced for Sale in the United States by Fuel Type, MY 2008

2. Highway Motorcycles

For MY 2008, EPA issued 485 certificates of conformity based on applications submitted by 115 highway motorcycle manufacturers. Figure 7 shows the breakdown of engine families by manufacturer. Figure 8 presents the number of engine families by highway motorcycle class (including scooters with seats), which is based on engine displacement.

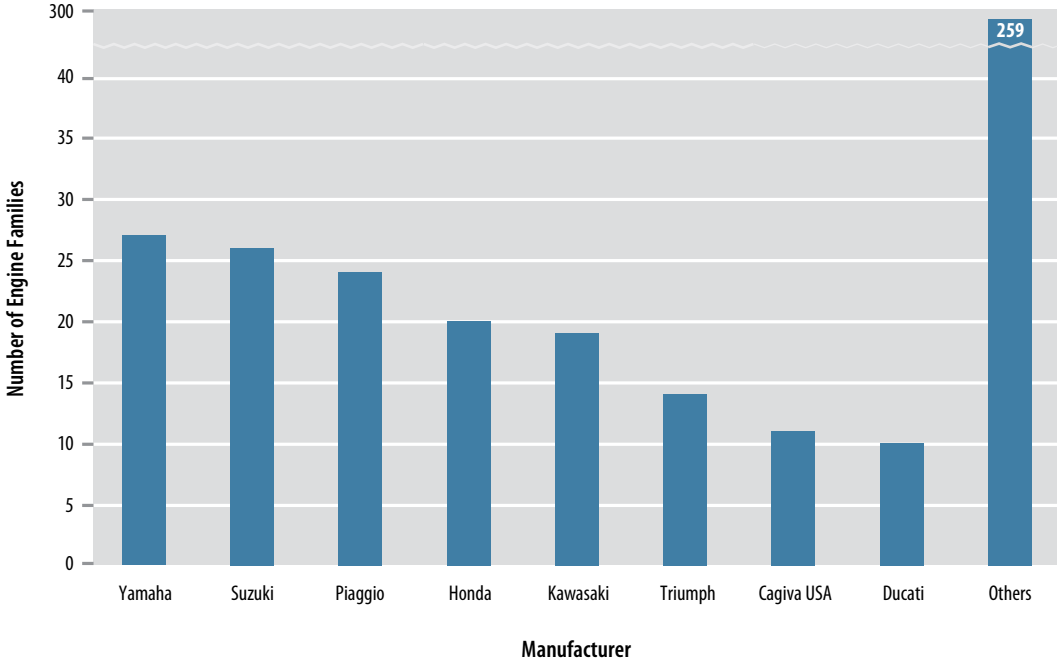


Figure 7. Number of Engine Families by Highway Motorcycle Manufacturer, MY 2008

Figure 8. Number of Engine Families by Highway Motorcycle Class, MY 2008

Highway motorcycles and recreational vehicles sold in the United States are manufactured worldwide. Figure 9 shows the manufacturing location, as indicated by the manufacturer in the application for certification, of highway motorcycles sold under a MY 2008 certificate of conformity. Similarly, Figure 10 shows the manufacturing location of recreational vehicles (excluding snowmobiles) sold under a MY 2008 certificate of conformity.

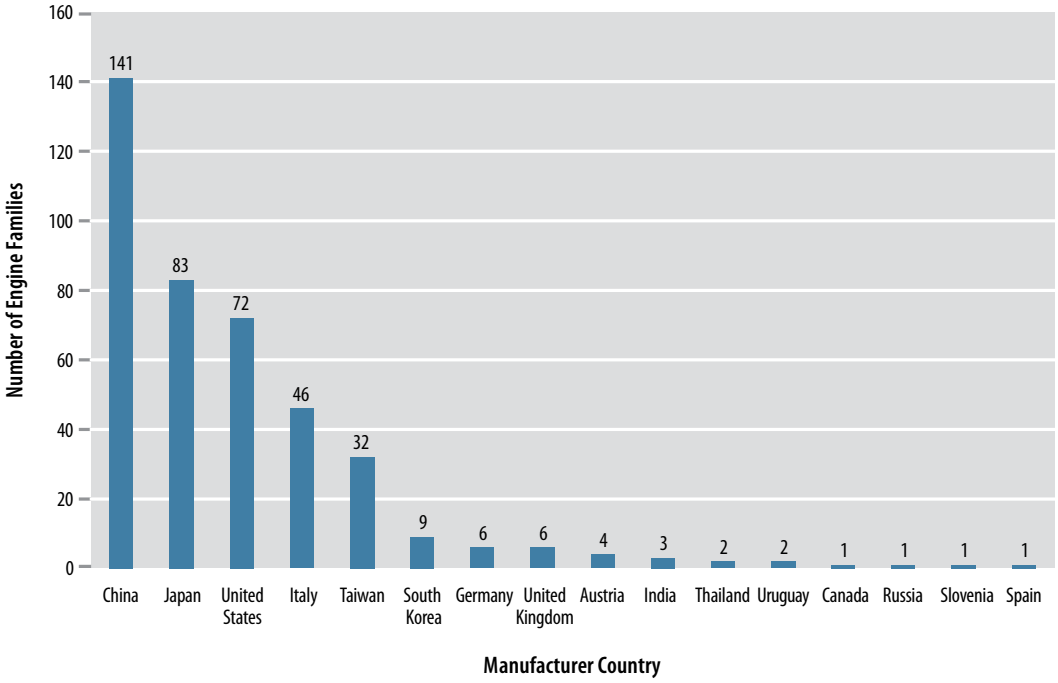


Figure 9. Number of Highway Motorcycle Engine Families by Manufacturer Country of Origin, MY 2008

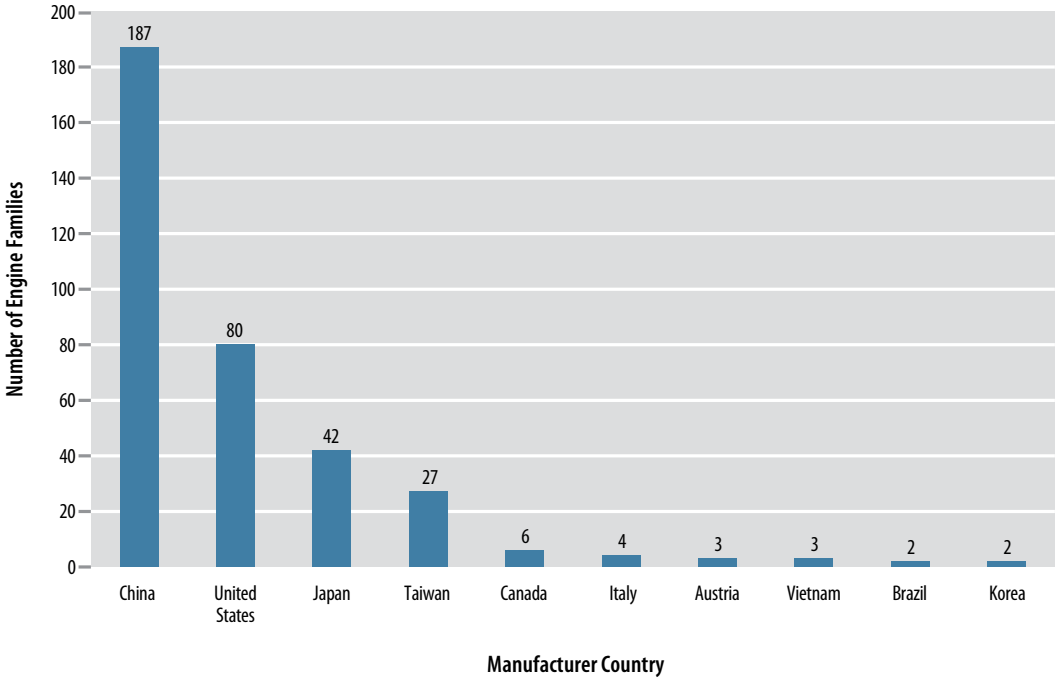


Figure 10. Number of Recreational Vehicle Engine Families by Manufacturer Country of Origin, MY 2008 (Excludes Snowmobiles)

3. Heavy-Duty Highway and Nonroad Engines

While emission regulations for cars, light-duty trucks, and motorcycles call for chassis-certification, the regulations for the heavy-duty highway (truck and bus) and nonroad sectors generally apply to engines.

In MY 2008, EPA issued 2,635 certificates of conformity with emission standards to manufacturers of heavy-duty highway and nonroad engines. This reflects a decrease of approximately 2 percent compared to the 2007 model year. All sectors with the exception of snowmobiles changed—some upward and some downward—from 2007 to 2008.

Figures 11 through 21 show the number of certified MY 2008 engine families per manufacturer in each sector. Note that the number of engine families certified does not necessarily correlate with the number of engines produced. Thus, manufacturers with the most certified engine families do not necessarily produce the most engines.

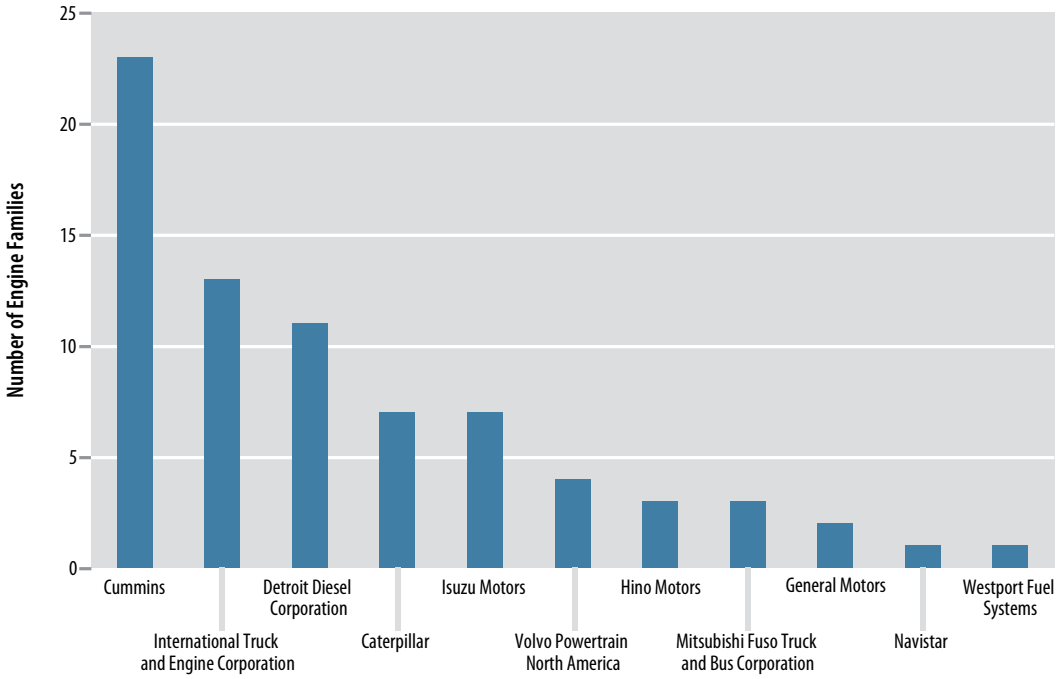


Figure 11. Number of Engine Families by Diesel Truck and Bus Engine Manufacturer, MY 2008

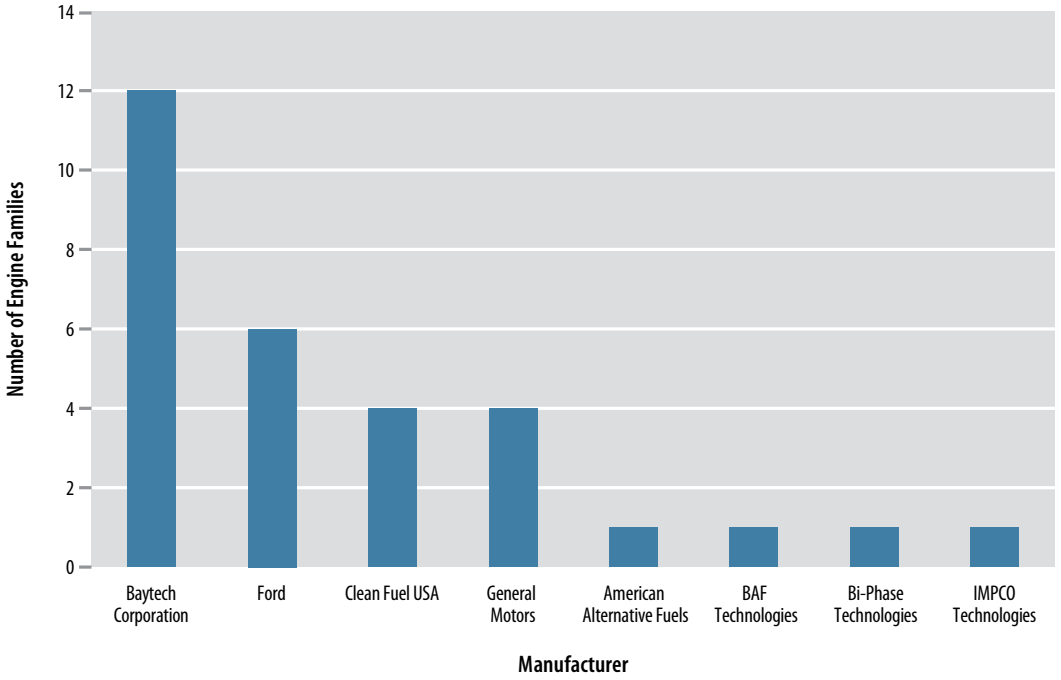
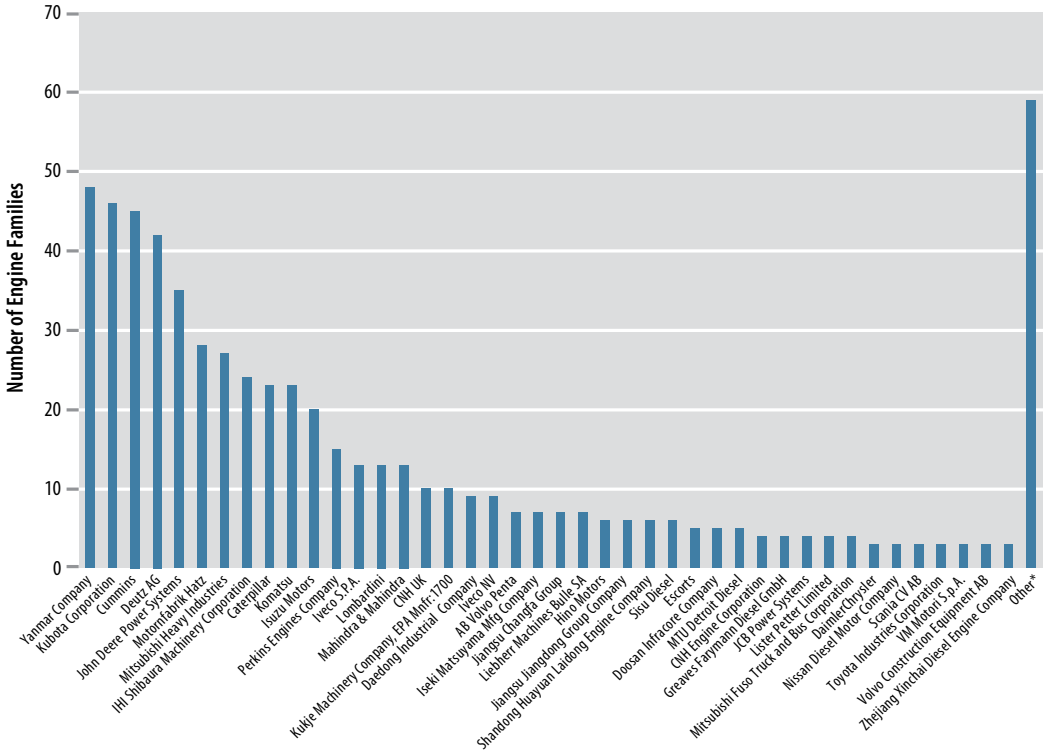
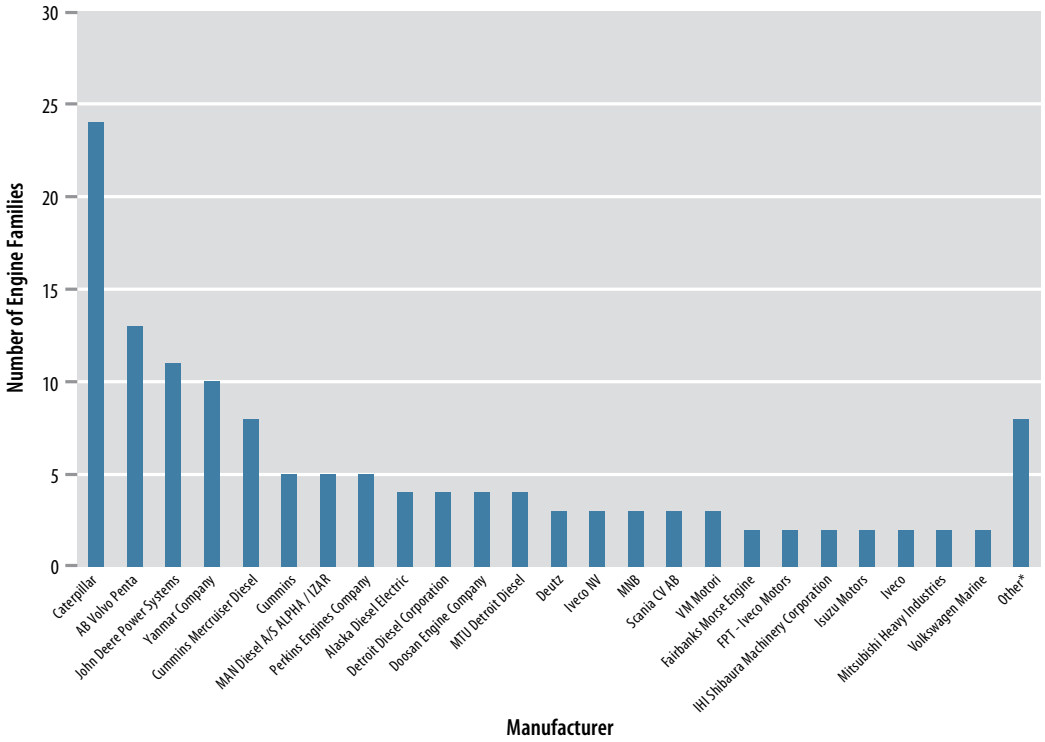


Figure 12. Number of Engine Families by Gasoline Truck and Bus Engine Manufacturer, MY 2008



*"Other" represents 45 manufacturers that produced 59 engine families.

Figure 13. Number of Engine Families by Agricultural and Construction Engine Manufacturer, MY 2008



*"Other" represents eight manufacturers that produced one engine family each.

Figure 14. Number of Engine Families by Diesel Boat and Ship Engine Manufacturer, MY 2008

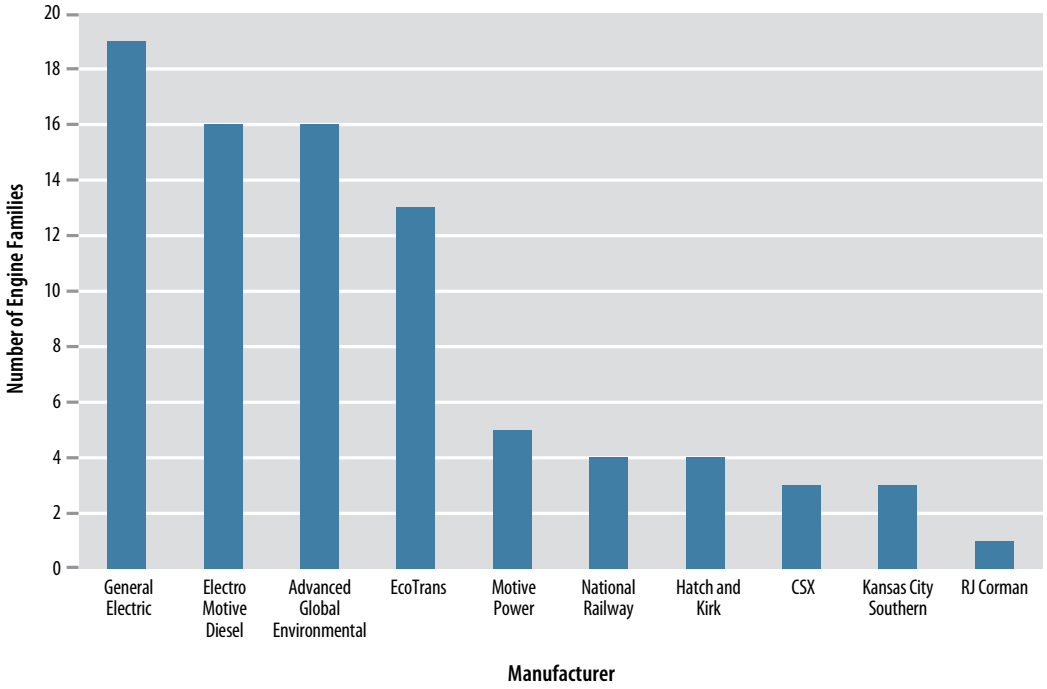
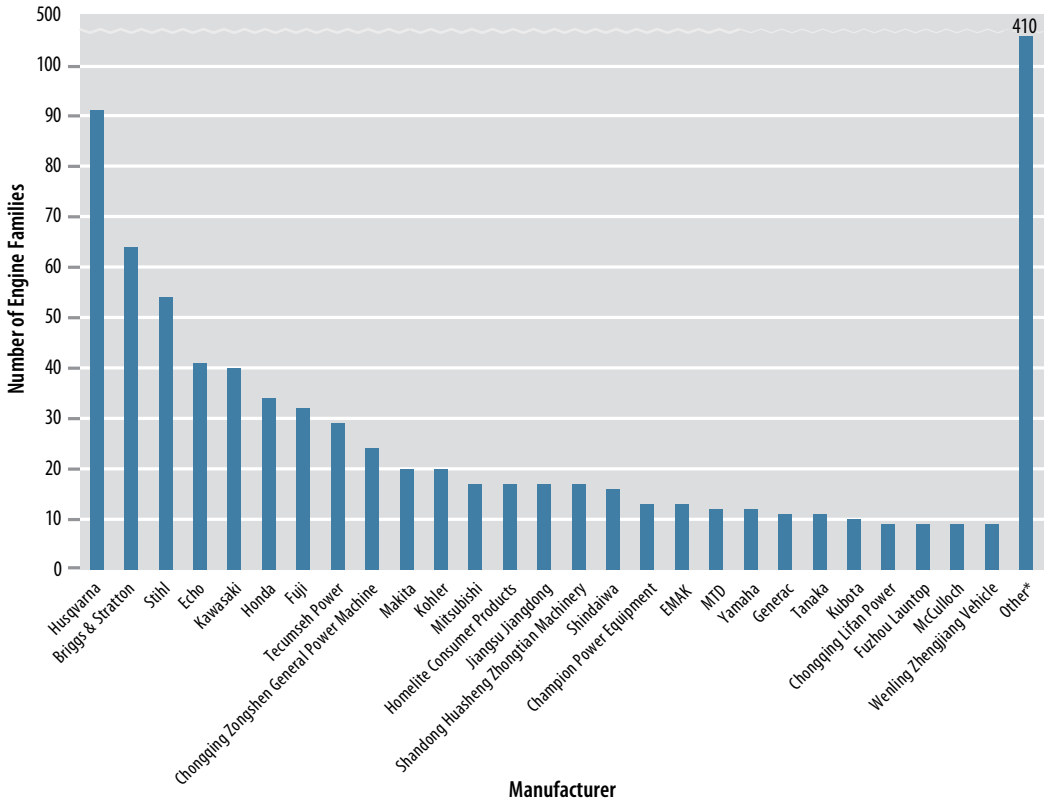


Figure 15. Number of Engine Families by Locomotive and Locomotive Remanufacturing Kit Manufacturer, MY 2008



*"Other" represents 146 manufacturers that collectively produced 410 engine families.

Figure 16. Number of Engine Families by Lawn and Garden Engine Manufacturer, MY 2008

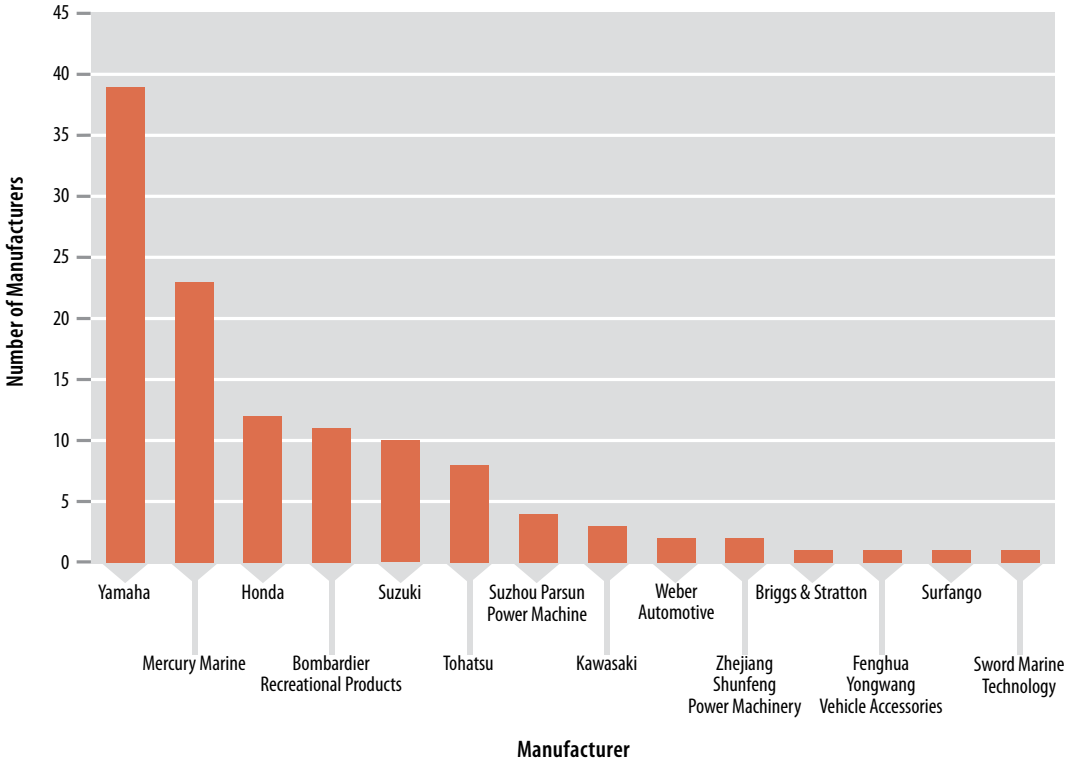


Figure 17. Number of Engine Families by Gasoline Boat and Personal Watercraft Engine Manufacturer, MY 2008

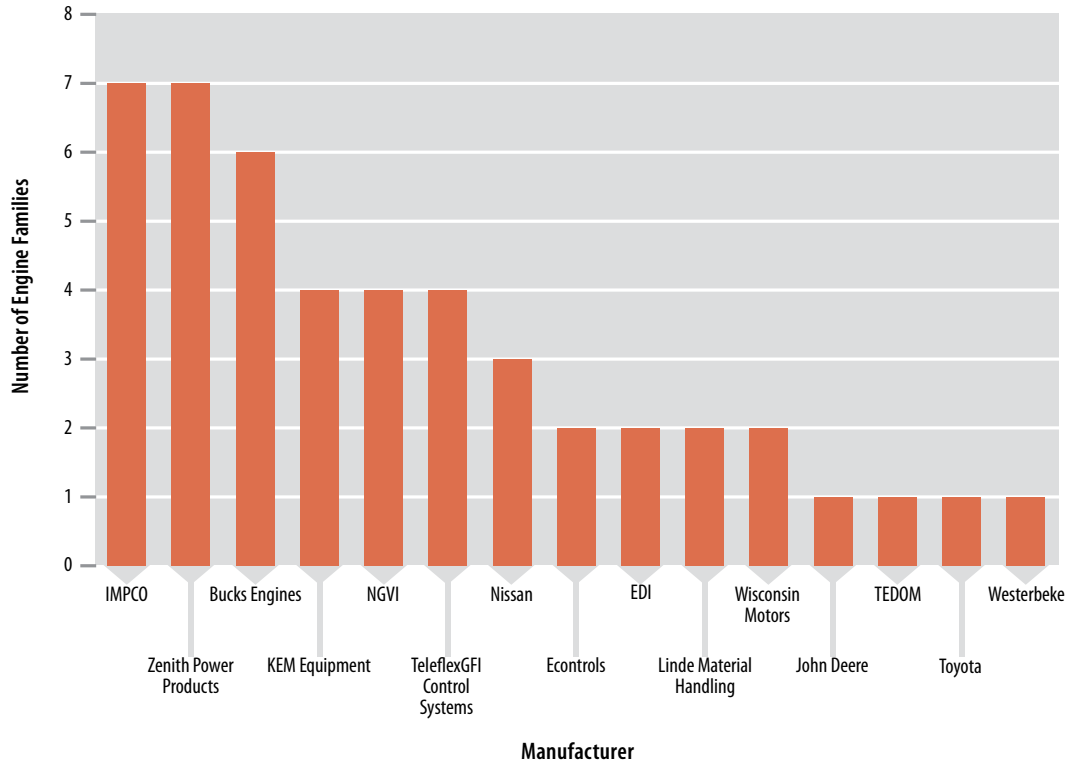


Figure 18. Number of Engine Families by Gasoline Forklift, Generator, and Compressor Engine Manufacturer, MY 2008

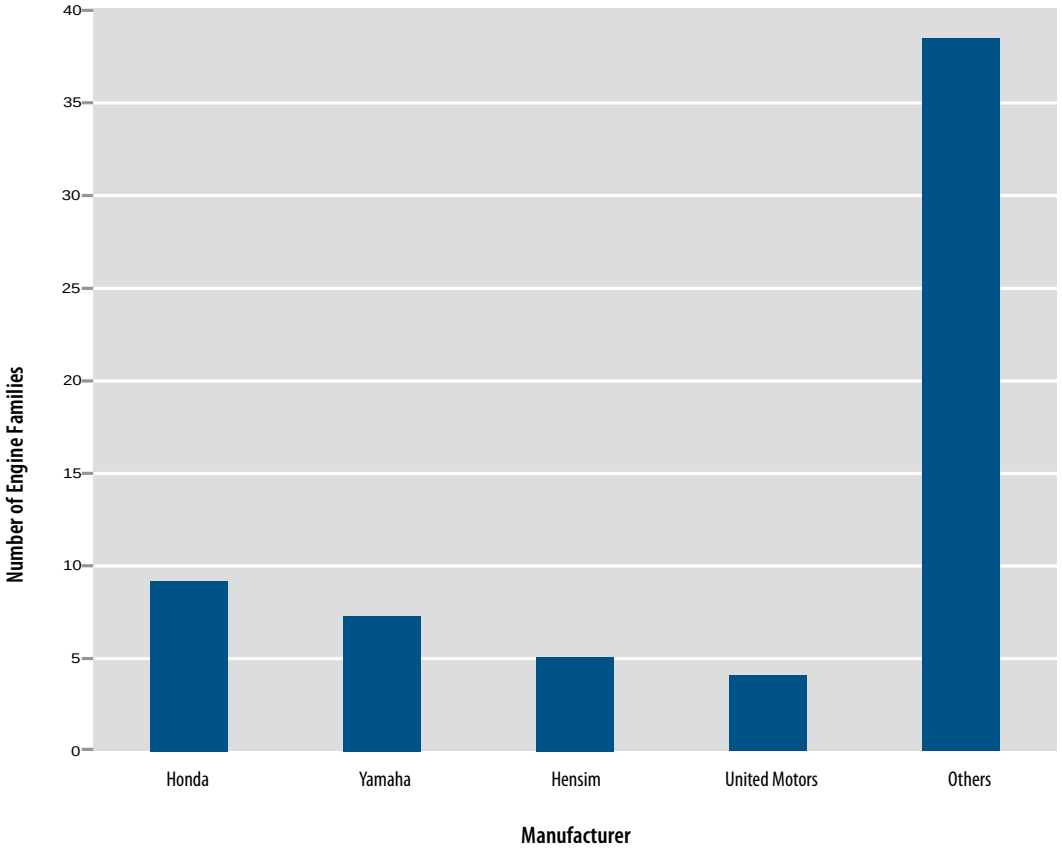


Figure 19. Number of Engine Families by Off-Road Motorcycle Manufacturer, MY 2008

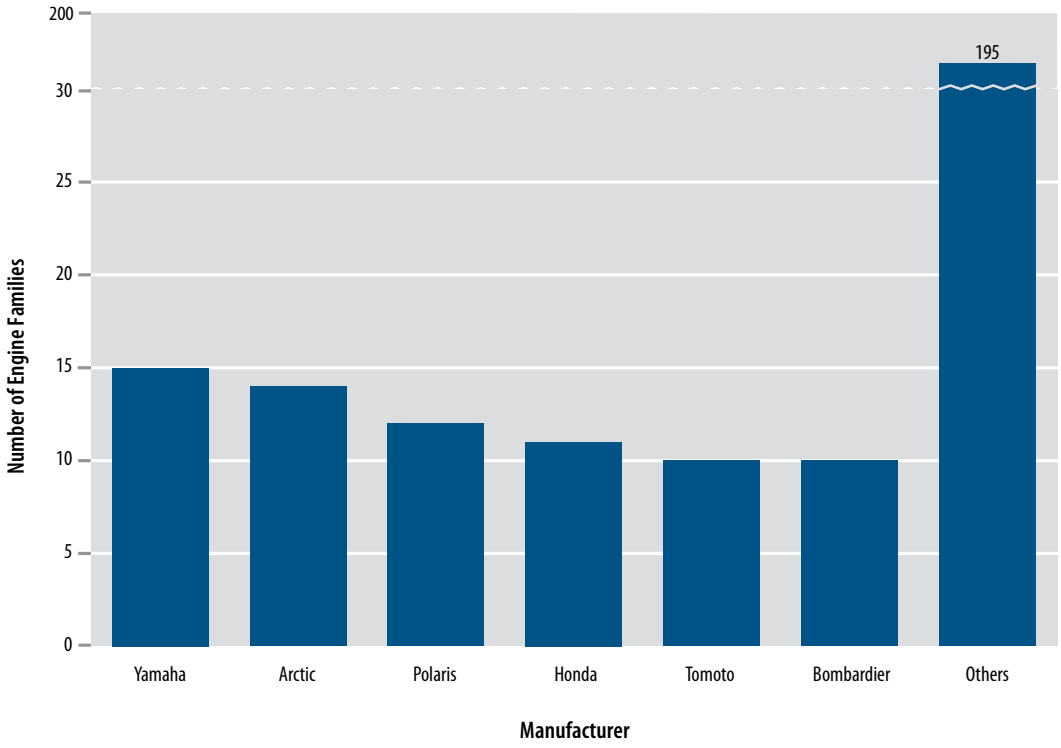


Figure 20. Number of Engine Families by All-Terrain/Utility Vehicle Manufacturer, MY 2008

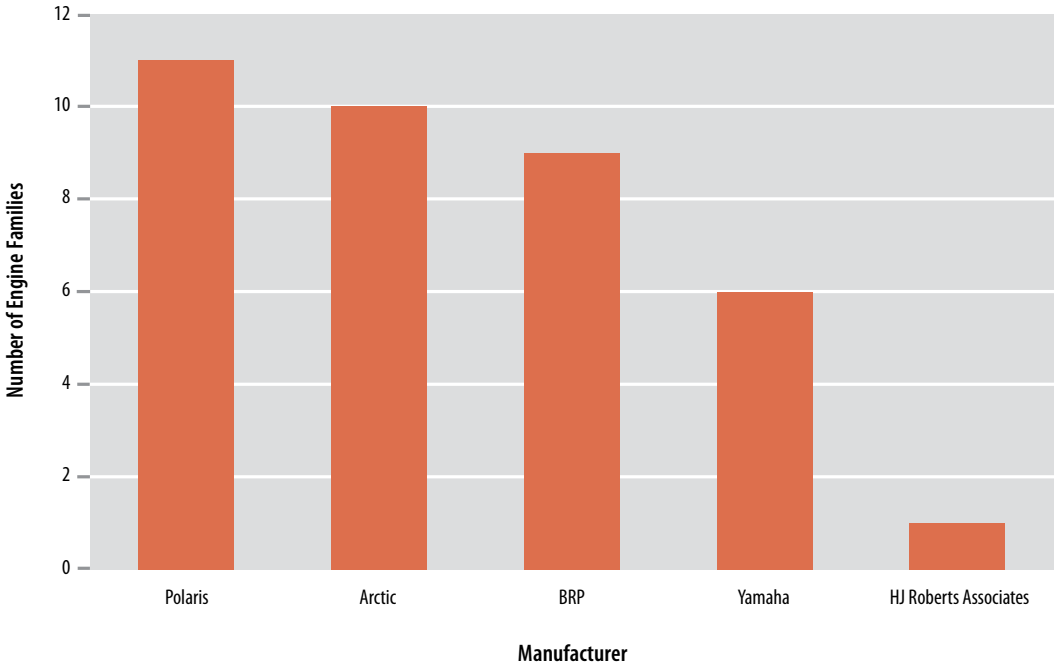


Figure 21. Number of Engine Families by Snowmobile Manufacturer, MY 2008

Heavy-duty and nonroad engines sold in the United States are manufactured worldwide. Table 2 shows the manufacturing location (as indicated by the manufacturer in the application for certification) of heavy-duty highway and nonroad engine categories sold under a MY 2008 certificate of conformity. Engines produced in more than one country were aggregated under "multiple countries." The percentages in Table 2 indicate the portion of U.S.-directed production that occurred in any given country. This reflects the diversity of the supply base of engines for the various heavy-duty highway and nonroad engine sectors. For example, while 50 percent of engines in the agriculture and construction category came from Japan, 83 percent of engines used in trucks and buses were manufactured in the United States.

Table 2. Production of Heavy-Duty and Nonroad Engines by Manufacturing Location

	Industry (% of projected sales volume)						
Country	Agriculture and Construction Engines	Truck and Bus Engines	Diesel Boat and Ship Engines	Lawn and Garden Engines	Gasoline Boat and Personal Watercraft Engines	Gas Forklift, Generator, and Compressor Engines	Snow-mobiles
Austria			1				
Belgium			1				
Brazil		2		<1			
Canada		<1			7	13	42
China	20			43	29		
Czech Republic				<1		<1	
France			3		1		
Germany	5	<1	8	<1	<1	<1	
Italy	3		5	<1			<1
Japan	50	5	4	3	37	2	13
Korea			1			5	
Mexico						<1	
The Netherlands			6				
Sweden			7	<1			
Taiwan				<1			
Thailand				<1	1		
United Kingdom	13		3				
United States	3	83	53	42	25	57	44
Multiple Countries[1]	6	9	8	10		22	

[1] "Multiple Countries" represents engines that are produced in more than one country (for example, some practices of the manufacturing process could be completed in different locations).

4. Alternative Fuel Conversions

Some alternative fuel vehicles were originally designed and certified to operate on gasoline or diesel fuel but were subsequently converted to operate on alternative fuels, such as alcohol, CNG, or liquified natural gas. Alternative fuel converters are responsible for obtaining a certificate of conformity and ensuring that their converted vehicles remain in compliance with all applicable EPA regulations. For MY 2008, the alternative fuel converters estimated total sales of 3,410 converted light-duty vehicles. Table 3 summarizes the number of certificates issued for car and light-duty truck conversions by manufacturer.

Table 3. Alternative Fuel Conversions

Fuel	Total Certificates Issued for MY 2008	Manufacturer
Cars and Light-Duty Trucks		
E85 (Flex-Fuel)	1	Flex Fuel USA
Dual Fuel (LPG/Gasoline)	1	IMPCO Technologies
Dual Fuel (CNG/Gasoline)	5	IMPCO Technologies
Natural Gas	5	BAF Technologies Natural Drive
LPG	9	IMPCO Technologies Roush Industries Yellow Checker Star
Heavy-Duty Highway and Nonroad Engines		
No conversions for MY 2008		

C. Confirmatory Testing

Confirmatory testing typically occurs after a manufacturer has submitted an application for certification. EPA uses both random and targeted methods to select vehicles, after which either EPA or the manufacturer may conduct the testing. Confirmatory tests serve to validate the manufacturer's initial emission test results.

1. Cars and Light-Duty Trucks

Figure 22 shows the results of EPA's car and light-duty truck confirmatory test program for MY 2007 and MY 2008. The graph shows the number and percent of passes and failures over the Federal Test Procedure (FTP), highway cycle, US06 cycle, and evaporative emissions test. For both model years, the FTP test had the highest rate of failure, followed by the US06 test. Both the evaporative and highway tests had relatively low rates of failure. The total number of tests conducted during each test cycle differs because FTP and highway tests are required for both emissions and fuel economy purposes, whereas US06 and evaporative emissions testing are required for emissions only. The number of evaporative tests performed by EPA is low compared to the number of exhaust tests because manufacturers usually have far fewer evaporative control system families than exhaust test groups.

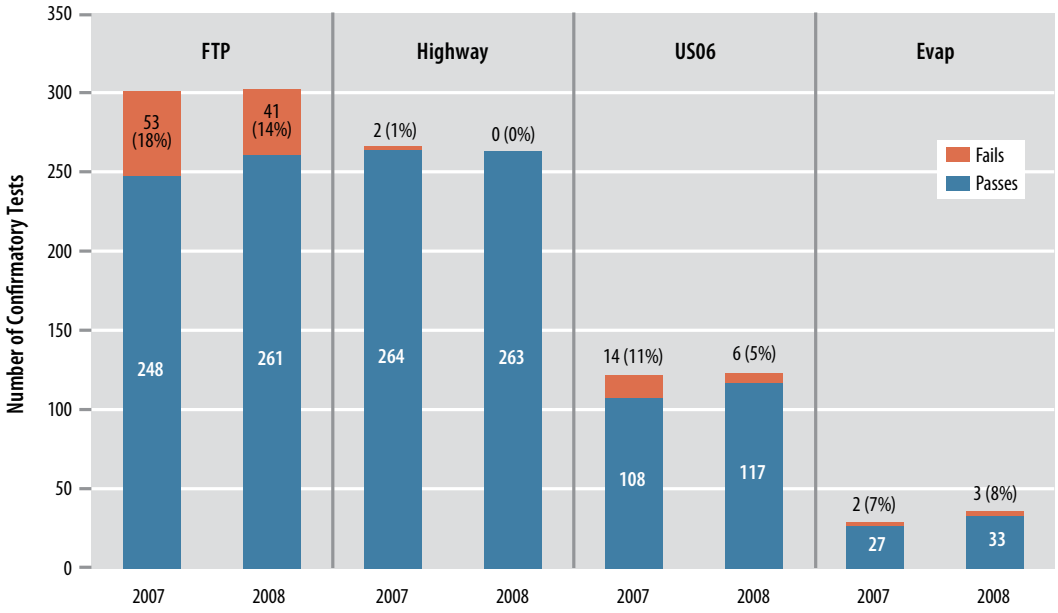


Figure 22. Confirmatory Testing Passes and Failures by Test Cycle , MY 2007 and MY 2008

Figure 23 shows FTP failures by pollutant for MY 2007 and MY 2008. The greatest numbers of failures in both model years were for failing the non-methane organic gas (NMOG) emission standard, followed by the nitrogen oxides (NO_x) and carbon monoxide (CO) emission standards. Failures refer to any failed confirmatory tests, regardless of whether it was an initial test or a retest. The different scenarios following a failure are discussed below.

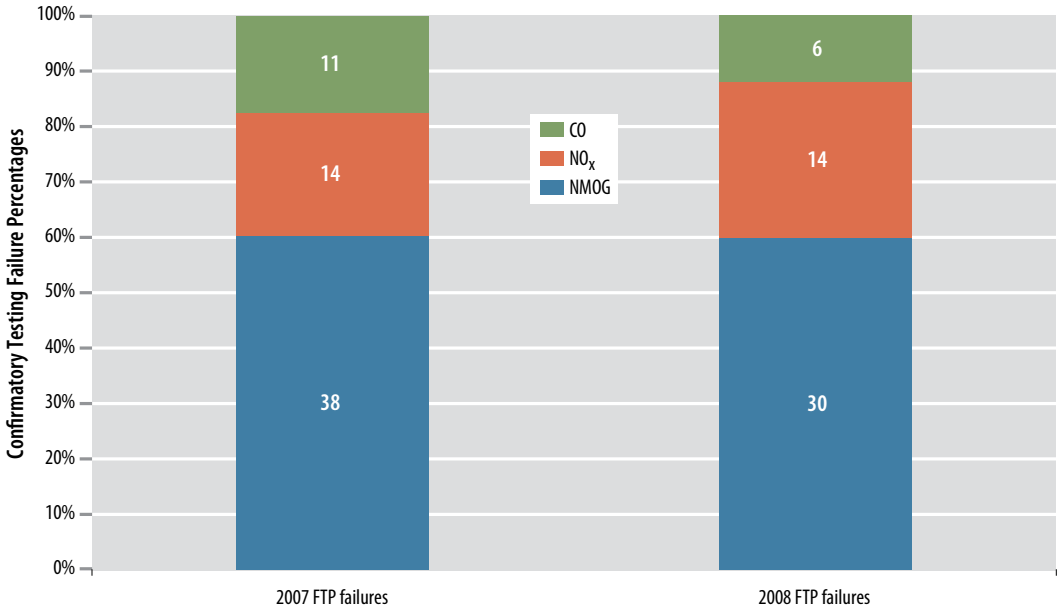


Figure 23. Confirmatory Testing FTP Failures by Pollutant, MY 2007 and MY 2008

When a vehicle fails a confirmatory test, the manufacturer is allowed one retest to confirm or refute the failure. In many cases, the vehicle will pass on retest. In that case, the retest is deemed the official certification test, and the emission results from the retest stand as the official emission levels for that vehicle. In other cases, the confirmatory test failure is traced to problems that render the test vehicle unrepresentative of production vehicles. In those situations, the manufacturer corrects the problem in the test vehicle and retests. In still other cases, failures during the confirmatory test reflect actual engineering problems. These types of failures usually result in manufacturer action to change the calibration of all production vehicles and to update its certification application. Such calibration changes result in a tangible decrease in the emissions of all vehicles subsequently produced under that particular test group. Table 4 lists the confirmatory test failures in 2008 that required some type of calibration change to the vehicle.

Table 4. Confirmatory Test Failures Requiring Vehicle Calibration Change, 2008

Manufacturer	Test Group	Models	Emission Failed
Land Rover	8LRXT03.2001	LR2	NMOG
Chrysler	8CRXK05.7TX1	Dodge Ram 1500, Dodge Ram 2500	CO, NO_x
Koenigsegg*	8KGGV04.71HA	Koenigsegg CCX	NMOG

* This is a small manufacturer covered by the "other" category in Figure 2.

2. Heavy-Duty Highway and Nonroad Engines

As with EPA's car and light-duty truck confirmatory test program, EPA's confirmatory test program for nonroad construction, agricultural, and lawn and garden engines also produced failures that required follow-up action by manufacturers. EPA issued seven test orders for agricultural and construction engine families and 10 test orders for lawn and garden engine families, as shown in Table 5. While all construction and agricultural engines passed confirmatory testing, fewer than half of the lawn and garden engine families passed and more than 20 percent of the families failed. Manufacturers of the remaining lawn and garden engine families ordered for confirmatory testing chose either not to apply for a certificate of conformity or to cancel U.S. production. The engine was not tested in either situation, and certificates of conformity were not issued. As a result, engines from these engine families cannot be legally imported and sold in the United States. Confirmatory testing was not conducted for any MY 2008 heavy-duty highway engines.

Table 5. Confirmatory Testing, MY 2008

Manufacturer	Engine Family	Result
Agriculture and Construction		
Caterpillar	7CPXL07.2ESL*	Pass
Cummins	7CEXL066.1AAJ*	Pass
CNH Engine Corporation	7NHXL06.7DCA*	Pass
Doosan Infracore Company	7DWXL11.0UJA*	Pass
Isuzu Motors	7SZXL07.8HXA*	Pass
Liebherr Machines Bulle	7LHAL10.5LPA*	Pass
Mercedes-Benz	7DDXL7.20RJA*	Pass
Lawn and Garden		
Chongqing Lifan Power	8CLGS.19668F	Pass
Jiangmen Ways Outdoor Power Equipment	8JWYS.3892G3	Did not ship engine—U.S. production cancelled
Jiangmen Qipai Motorcycle	8JMQS.19668F	Did not apply for MY 2008 certificate
Power Train	8PITS.270A02	Failed HC+NO_x
Wuxi World Best	8WWBS.1961KG	Did not ship engine—U.S. production cancelled
Yiwu Tiger Generating Equip. Company	8YWTS.1961TG	Pass
Yongkang Xigguang	8YKXS.125F52	Pass
Zhejiang High Tech	8ZHHS.1711GA	Pass
Zhejiang Taizhou Wangye Power Company	8ZHTS.1961GA	Failed HC+NO_x

* These are carry-over engine families. A carry-over engine family is defined as an engine family that has not changed from the previous model year(s) and that therefore, can use carry-over test data to support its certification.

D. Fuel Economy

EPA performs tests for both emissions and fuel economy validation purposes. Figures 24 and 25 present the average fuel economy as well as the corresponding carbon dioxide (CO_2) emission values of each manufacturer's car and light-duty truck fleet. As the figure shows, fuel economy and CO_2 are inversely related; the more fuel a vehicle burns in any given distance, the higher the CO_2 value and the lower the miles per gallon (MPG) rating. The CO_2 average was determined using the sales-weighted highway and city fuel economy numbers as measured in the laboratory and used for Corporate Average Fuel Economy (CAFE) purposes. Fuel economy label values (the values that are shown on the window stickers of new cars and trucks) are different than the values in Figure 24, as they include an adjustment factor to reflect differences between real-world and laboratory driving conditions. The unadjusted averages presented below therefore reflect lower CO_2 and higher MPG levels than would be expected in real-world driving conditions.

CO_2 is a major greenhouse gas (GHG) and contributor to climate change. On May 7, 2010, EPA and the Department of Transportation's National Highway Traffic Safety Administration (NHTSA) published a final rule to regulate vehicle CO_2 and other GHG emissions for the first time in history. The national program will dramatically reduce GHG emissions and improve fuel economy for new cars and trucks sold in the United States. The combined EPA and NHTSA standards apply to cars, light-duty trucks, and medium-duty vehicles covering MY 2012 through 2016. These vehicles will be required to meet an estimated combined average emissions level of 250 grams of CO_2 per mile in MY 2016, equivalent to 35.5 MPG, if the automobile industry were to meet this CO_2 level solely through fuel economy improvements.

As it moves into regulating GHG emissions, EPA will provide GHG compliance data in future reports.

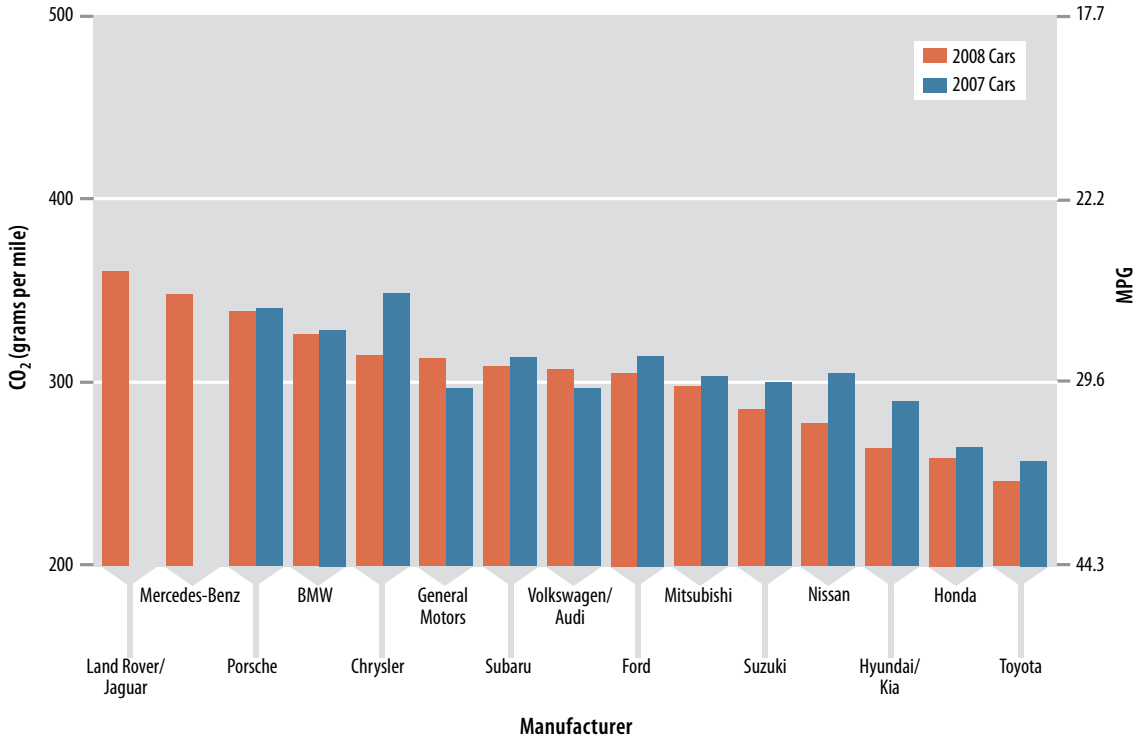


Figure 24. Average CO_2 Emissions and MPG by Manufacturer Car Fleet, MY 2007 and MY 2008

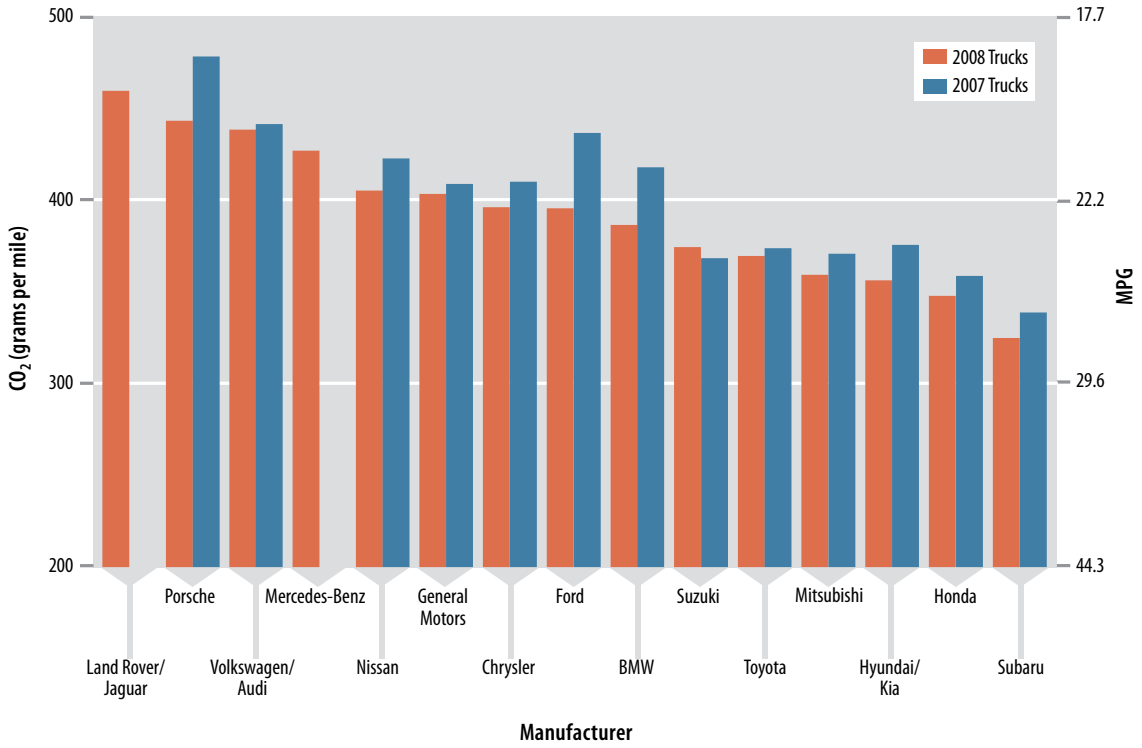


Figure 25. Average CO_2 Emissions and MPG by Manufacturer Light-Duty Truck Fleet, MY 2007 and MY 2008

In general, manufacturers had lower CO_2 results for MY 2008 than for MY 2007, although General Motors and Volkswagen had higher values for their cars, and Suzuki had a higher value for its trucks. Land Rover/Jaguar and Mercedes-Benz were included with Ford and Chrysler, respectively, for MY 2007 but reported separately for MY 2008.

E. Production Line Testing

Production line testing (PLT) requires manufacturers to routinely test engines as they leave the assembly line to demonstrate that production engines control emissions at least as well as the prototype engines tested for certification. PLT is currently used for certain nonroad sectors. To help facilitate the reporting of these data and improve the quality of data received, EPA began providing standardized templates for PLT. In the future, EPA will monitor and present data from these reports, follow up on discrepancies, and take necessary enforcement action for noncompliance.

F. In-Use Compliance Testing

1. Cars and Light-Duty Trucks

a. EPA-Conducted In-Use Surveillance Testing

EPA has an in-use vehicle surveillance program at its laboratory in Ann Arbor, Michigan, to assess the emissions of vehicles a few years after they enter the fleet. EPA typically recruits 2- or 3-year-old vehicles from vehicle owners in southeast Michigan based on random selection, EPA certification data, manufacturer In-Use Verification data (described in the next section), and public complaints and inquiries. Vehicles are categorized by test group. Table 6 shows the vehicle carline, manufacturer, and model year that were subject to EPA surveillance testing in 2008.

In 2008, only the Volkswagen/Audi test group, which covered the Golf and Jetta carlines, exhibited failures that required further investigation by EPA.

Table 6. In-Use Surveillance Testing of Cars and Light-Duty Trucks, 2008

Model Year	Manufacturer	Carlines (Engine Size in Liters)
2005	Chrysler	Dodge Magnum (3.5)
	Ford	Escape (2.3)
	General Motors	Uplander (3.8)
	Honda	Odyssey (3.5)
	Hyundai	XG350 (3.5)
	Mazda	6 Sport Wagon (3.0)
	Mercedes-Benz	CLK 500 (5.0)
	Volkswagen/Audi	Diesel Golf/Jetta/Beetle (1.9), Jetta (2.5)
2006	BMW	Mini Cooper (1.6)
	Chrysler	300 C (5.7), Dodge Dakota (3.7), Dodge Ram 1500 (4.7), Jeep Wrangler 4.0), Pacifica (3.5), PT Cruiser (2.4), Town & Country (3.8)
	Daewoo	Suzuki Reno/Forenza (2.0)
	Ford	Explorer (4.0), F150 (4.2), Focus (2.0), Fusion (2.3), Mustang (4.6), Ranger (3.0)
	General Motors	Chevrolet HHR (2.4), Chevrolet Impala (5.3), Pontiac G6 (3.9), Saturn VUE (2.2), Chevrolet Trailblazer (4.2)
	Honda	Civic (1.8), Civic Hybrid (1.3)
	Hyundai	Azera (3.8)
	Kia	Optima (2.7), Spectra (2.0)
	Mazda	MX-5 (2.0)
	Mercedes-Benz	C230 (2.5)
	Mitsubishi	Eclipse (3.8) , Lancer (2.0)
	Nissan	Infiniti G 35 (3.5), Sentra (1.8)
	Rover Group	LR3 (4.0)
	Subaru	Tribeca (3.0)
	Toyota	Lexus RX400h (3.3), Matrix (1.8), Prius (1.5), Scion TC (2.4)
	Volkswagen/Audi	Audi Passat (2.0), Toureg (3.2)
	Volvo	S60 (2.5)

b. Manufacturer-Conducted In-Use Verification Program

In addition to its own surveillance testing, EPA relies on the manufacturer-run In-Use Verification Program (IUVP) to monitor the performance of vehicles during their useful life. IUVP tests are required at low mileage (between 10,000 and 50,000 miles) and high mileage (more than 50,000 miles). Table 7 shows the calendar year during which a vehicle manufactured during a particular model year will be tested as part of IUVP. The manufacturer must complete low-mileage IUVP testing one year after the end of production and high-mileage IUVP testing five years after the end of production.

Table 7. IUVP Testing Schedule by Vehicle Model Year

	Calendar Year				
	2005	2006	2007	2008	2009
Low Mileage	MY 04	MY 05	MY 06	MY 07	MY 08
High Mileage	MY 00	MY 01	MY 02	MY 03	MY 04

Table 8 shows how the IUVP testing process is followed for a MY 2008 vehicle.

Table 8. Example of IUVP Testing Process for a MY 2008 Vehicle

2007				2008				2009				2010–2011				2012				2013			
Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
		Production Period				Low-Mileage Testing			★									High-Mileage Testing			★		

★ = Testing is due for completion on or before this date.

Table 9 shows the cumulative number of vehicles tested and their corresponding failure rates by vehicle model year for all IUVP testing conducted as of December 31, 2008.

Table 9. In-Use Verification Program Results

Model Year	FTP		US06		2-Day Evaporative		Onboard Re-Fueling Vapor Recovery	
	Vehicles Tested	Percent Fail	Vehicles Tested	Percent Fail	Vehicles Tested	Percent Fail	Vehicles Tested	Percent Fail
High-Mileage Testing								
2000	478	6.4	0	0.0	43	0.0	22	10
2001	1,146	4.2	18	5.6	104	3.9	78	6.6
2002	1,121	5.2	95	3.3	108	3.8	75	9.1
2003	1,183	4.1	253	2.0	121	5.0	101	7.9
2004	657	3.7	426	0.9	90	3.3	84	4.8
Low-Mileage Testing								
2004	668	4.8	620	1.5	167	5.4	150	7.3
2005	650	4.6	587	0.9	154	5.8	145	6.2
2006	645	3.9	562	0.9	150	2.0	152	5.3
2007	673	4.0	555	0.4	135	1.5	141	3.6
2008	100	2.0	97	0.0	20	0.0	19	5.3

Since the 2007 Compliance Report was issued, EPA has made the following changes:

High-Mileage Testing

- **MY 2000–2002:** "Vehicles Tested" and "Percent Fail" have changed due to updates/corrections in the underlying data and removal of void tests (test whose results are deemed invalid because some of the test procedures or processes did not meet the regulatory specifications) from the calculations.
- **MY 2003:** These numbers were updated to reflect completed testing for this model year.
- **MY 2004:** The numbers reported here represent the 61 percent of MY 2004 vehicles tested to date. High-mileage testing for MY 2004 will be completed five years from the end of MY 2004 production or in August 2010.

Low-Mileage Testing

- **MY 2004–2006:** "Vehicles Tested" and "Percent Fail" have changed due to updates/corrections in the underlying data and removal of void tests from the calculations.
- **MY 2007:** These numbers were updated to reflect completed testing for this model year.
- **MY 2008:** The numbers reported here represent approximately 30 percent of MY 2008 vehicles.

Test data for MY 2005 high-mileage and MY 2009 low-mileage vehicles are not included, because manufacturers were beginning to test these vehicles as this report was being compiled.

Overall, the test results from this program show that the in-use fleet continues to perform well. If either the high- or low-mileage testing program were to reveal problems, EPA would work with the manufacturer to fix them, either though voluntary manufacturer action or, if necessary, through an ordered emissions recall.

2. Heavy-Duty Highway and Nonroad Engines

a. EPA-Conducted Testing

In late 2007, OTAQ started a testing program to characterize in-use emissions from heavy-duty diesel trucks and engines to investigate how the emissions change over time. OTAQ obtained well-maintained in-use trucks for testing with Portable Emissions Measurement Systems and laboratory dynamometers. The resulting data are used to: 1) evaluate the way the industry generates deterioration factors for certification purposes and 2) compare emission data generated as the trucks are driven in real-life situations versus data generated in a laboratory. Because all laboratory testing is conducted in accordance with EPA certification requirements, the resulting data may be used later as the basis for compliance actions. EPA focused testing on Class 8 line-haul trucks and engines using the engine dynamometer certification test cycle. EPA is currently evaluating the results of this ongoing testing.

b. Manufacturer-Conducted Testing

EPA regulations require some engine manufacturers to conduct in-use emission testing under EPA's direction. Criteria for selection by EPA include compliance margins (the difference between actual emission levels and the Family Emission Limit [FEL] or standard), previous testing history, technology, and use of emission credits. EPA may also select an engine family if there is reason to believe a problem may exist with the engine family or the manufacturer.

As shown in Table 10, the in-use emission testing requirement currently applies to manufacturers of engines to be used in heavy-duty highway and nonroad engines including trucks, buses, gasoline boats, personal watercraft, gasoline forklifts, generators, compressors, and locomotives (including manufactured locomotives). Manufacturers conduct tests after some amount of in-use activity, so results for 2008 test orders have not yet been reported.

Table 10. Snapshot of Heavy-Duty Highway and Nonroad Engine Manufacturer-Run In-Use Emission Testing Programs

Engine Category	Program in Place Since…	Selection Requirement	EPA Must Approve Testing Plan/ Engine Selection	Sample Size per Engine Family	Age of Engines to Be Tested	Activity in 2008
Heavy-Duty Highway Trucks and Buses	2005	Up to 25% of each manufacturer's engine families	No	Varies	Any age, provided vehicle has not exceeded useful life	7 test orders were issued for 11 MY 2008 engine families
Gasoline Boats and Personal Watercraft	1998		No	Generally, no fewer than 4 engines	50% to 75% of useful life	No test orders were issued in 2008
Gas Forklift, Generator, and Compressor Engines	2007		Yes	Generally 2 or 4, depending on the size of the engine family	At least 50% of useful life	No test orders were issued in 2008
Locomotives	2007	1 engine family and/or 1 remanufactured family per manufacturer	Yes	Generally, 2 locomotives	50% to 75% of useful life	7 test orders were issued for 10 MY 2008 engine families or remanufacturing kits

G. Defect and Recall Reporting

1. Cars and Light-Duty Trucks

Table 11 describes the emission defect and voluntary emission recall report categories for cars and light-duty trucks for 2008. These reports, which can include multiple model years of a given vehicle, covered defects affecting more than 19 million cars, light-duty trucks, and SUVs and recalls affecting more than 3 million cars, light-duty trucks, and SUVs.

Table 11. Number of Car and Light-Duty Truck Defect and Recall Reports by Category, 2008

Defect/Recall Report Category	Defect Reports	Recall Reports
Onboard Diagnostic (OBD) System	32	10
Computer-Related (Other Than OBD)	25	14
Fuel Delivery Component	24	8
Electrical, Mechanical, and Cooling Systems	22	5
Evaporative Emissions System	18	1
Fuel Tank Component	15	7
Ignition Component	15	1
Monitoring/Measuring Sensor/System	14	4
Intake/Exhaust Manifold	12	1
Catalyst Component/System	9	1
Crankcase Ventilation Component/System	7	3
Exhaust System	7	1
Oxygen Sensor	7	0
Driveability Problem	2	0
Other	1	1
EGR System	1	0
Vehicle Emission Control Information Label	0	2
Hybrid Vehicle Component/System	0	1
Total	**211**	**60**

a. Defect Reporting

Manufacturers are required to report emission-related defects to EPA. An emission-related defect is a defect in design, materials, or workmanship in a device, system, or assembly, as described in the approved application for certification, and affects emission-related parameters listed in regulations. EPA regulations establish minimum numbers of confirmed defects that trigger defect information reporting requirements. Currently, manufacturers are required to notify EPA when they identify any emission-related defects in 25 or more vehicles of the same model year.

Figure 26 shows the percentage of vehicles affected for various defect categories for all the cars and light-duty trucks covered by defect reports in 2008. Figure 27 shows the number of defect reports and number of vehicles affected by manufacturer.

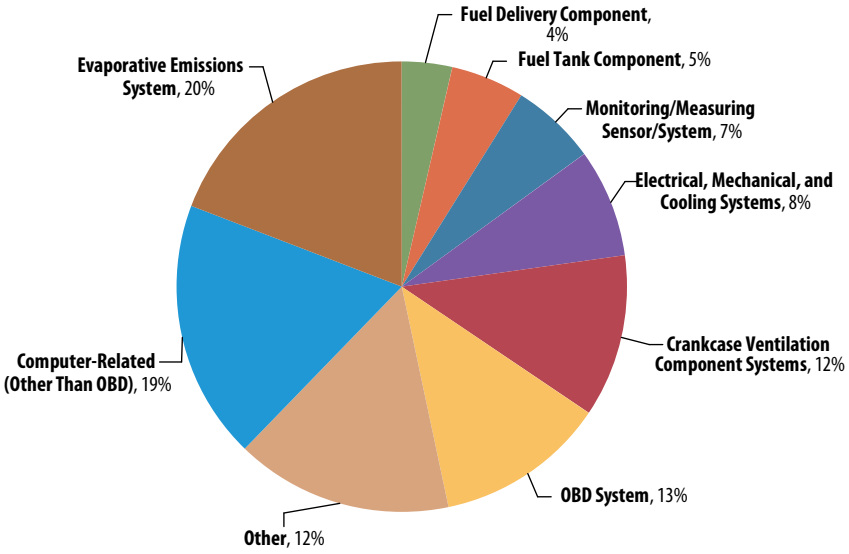


Figure 26. Percentage of Cars and Light-Duty Trucks by Defect Category, 2008

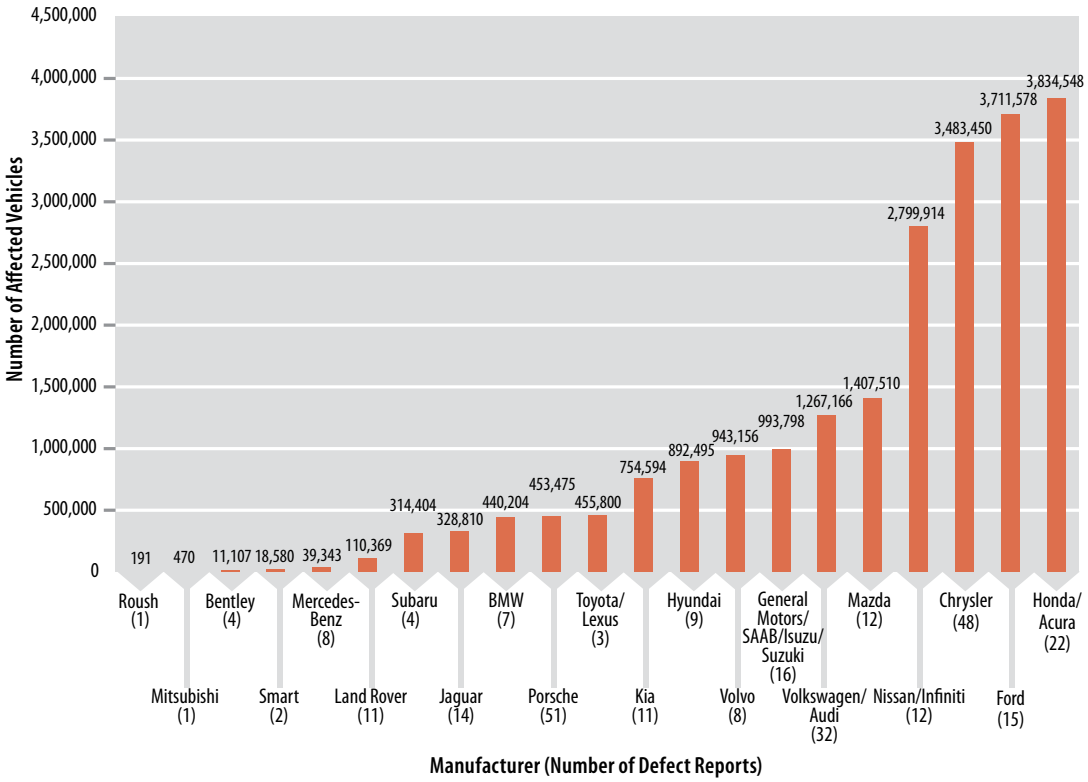
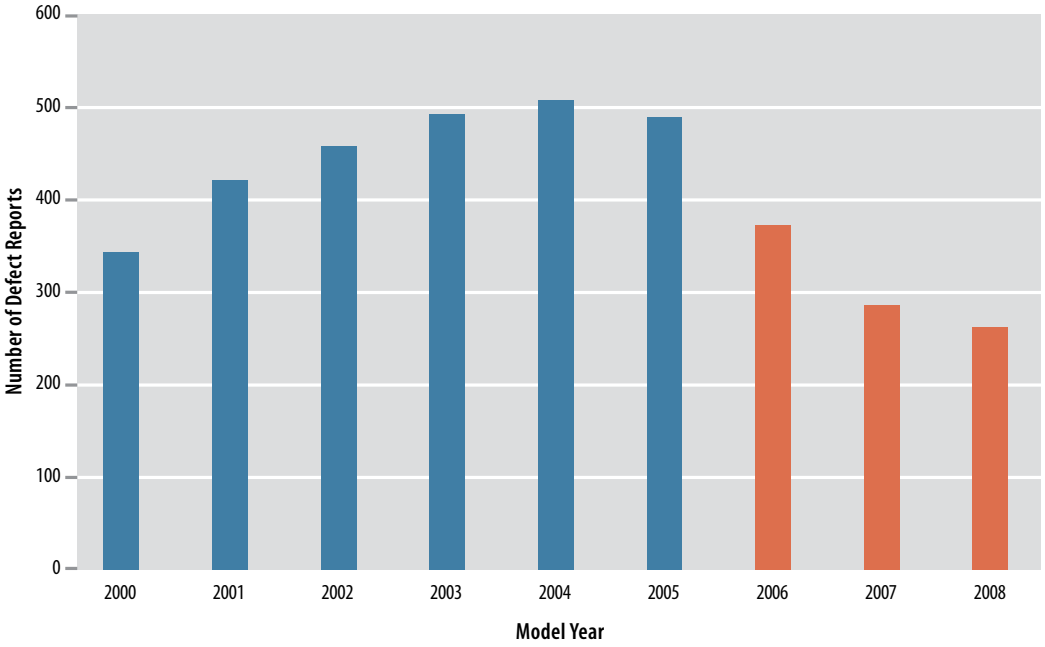


Figure 27. Number of Defect Reports and Affected Car and Light-Duty Trucks by Manufacturer, 2008

Figure 28 shows the number of defect reports submitted by vehicle model year. Manufacturers are required to report defects up to five years after the end of production. As a result, the information for MY 2006 through MY 2008 continues to be updated because manufacturers are still actively discovering, investigating, and reporting issues.



* Orange color indicates that report defects are still being collected for these years.

Figure 28. Number of Defect Reports Submitted by Vehicle Model Year as of 2008

b. Recall Reporting

A recall may be needed when a defect is identified that causes noncompliance with emission standards. Manufacturers usually conduct voluntary recalls, but EPA can also mandate recalls. Even if a recall is wholly or partially motivated because of safety concerns, if it involves an emission-related defect, the manufacturer is required to provide a voluntary emissions recall report to EPA (safety-related, emissions recall). Alternatively, EPA has the authority under the Clean Air Act to order a manufacturer to recall and repair vehicles not in compliance (ordered recall).

Figure 29 depicts some key types of defects that were corrected by voluntary recalls in 2008. The figure shows the percentage of vehicles recalled in 2008 for each of the problem categories. These categories were established internally by EPA primarily for tracking purposes and may be used to identify potential, industry-wide problems with a particular component or technology.

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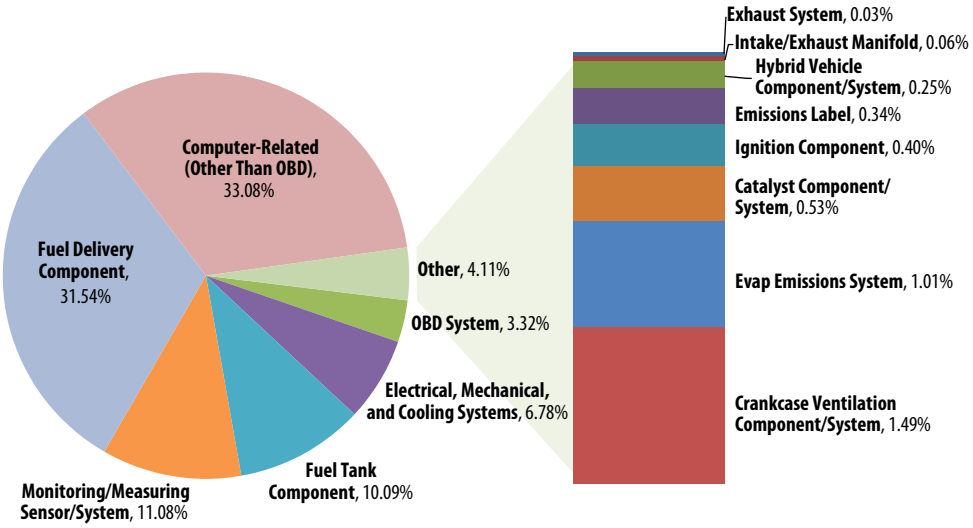


Figure 29. Percentage of Cars and and Light-Duty Trucks by Recall Category, 2008

In 2008, there were 60 recall reports covering more than 3 million cars and light-duty trucks. Of these reports, 48 were for emission-related problems, covering more than 2.5 million cars and light-duty trucks (79 percent). The other 12 reports were for safety-related emission recalls (20 percent), covering almost 700,000 vehicles (21 percent).

Figure 30 shows the number of affected cars and light-duty trucks recalled by manufacturers in 2008. Note that there is no clear correlation between the number of defect reports, the number of recalls, and the number of cars and light-duty trucks recalled. A manufacturer could have many defects that are not significant enough to warrant a recall. Conversely, manufacturers could have a few major defects that result in recalls that affect large portions of their product line.

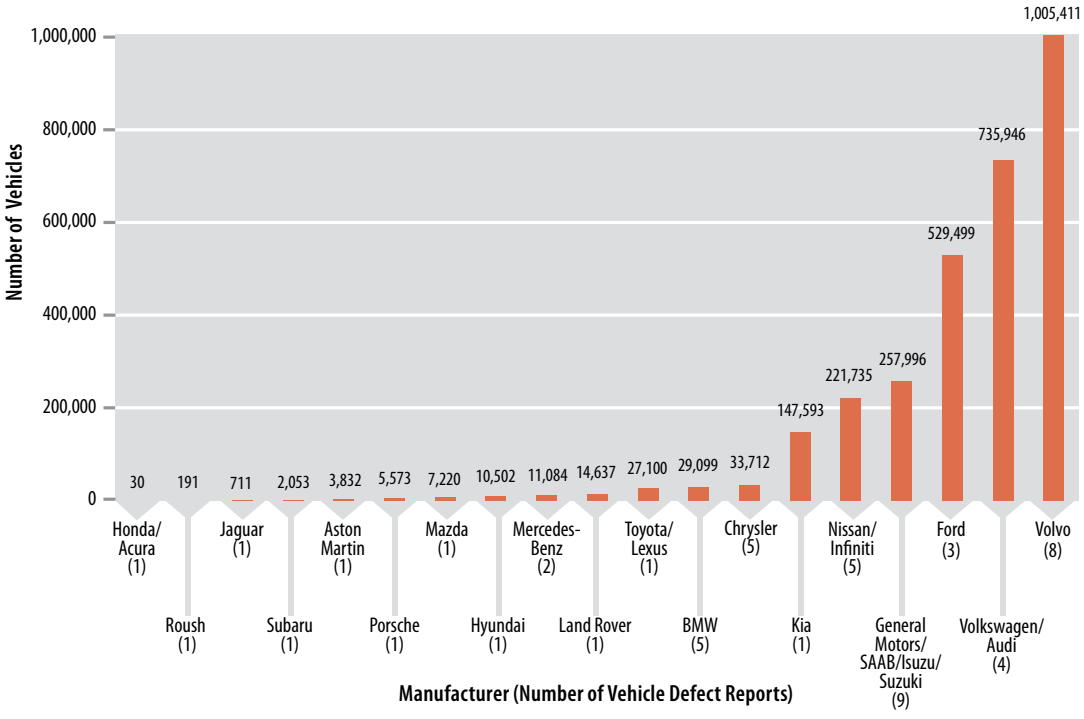


Figure 30. Number of Cars and Light-Duty Trucks Recalled by Manufacturer, 2008

Figure 31 provides a historical perspective on emission-related recall volumes for cars and light-duty trucks from 1971, shortly after the 1970 the Clean Air Act was enacted and when EPA was established, to 2008. In this figure, the volumes for the three types of recalls (e.g., voluntary, influenced, and ordered) are shown. Note that a calendar year total can include multiple model years.

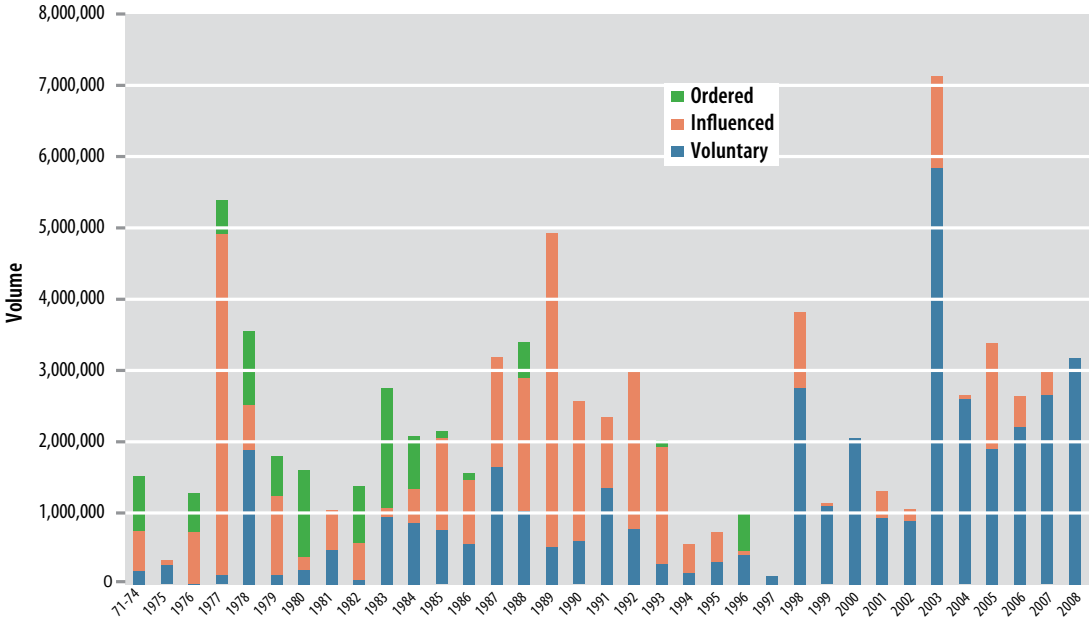


Figure 31. Historical Car and Light-Duty Truck Recall Volumes by Calendar Year

Figure 32 shows the number of recall reports submitted by vehicle model year. Since emission standards are linked to a vehicle's useful life period (e.g., 10 years/120,000 miles), manufacturers may recall vehicles throughout that useful life to remedy defects. In addition, it is possible, but rare, that a large, serious recall could extend beyond the useful life period (e.g., a safety recall that also affects emission control or emission-related components). Therefore, in contrast to Figure 28 for defect reports, each model year data set in Figure 32 should be viewed as dynamic, as manufacturers may continue to discover, investigate, and remedy defects via recall.

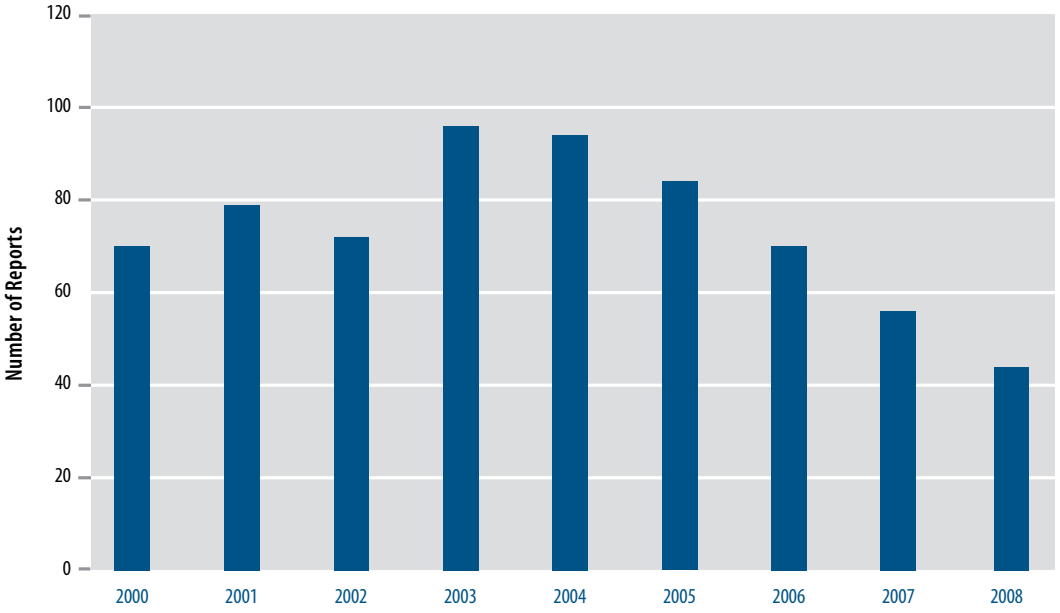


Figure 32. Number of Recall Reports for Cars and Light-Duty Trucks Submitted by Vehicle Model Year as of 2008

2. Heavy-Duty Highway Engines

This section includes defect and recall information for heavy-duty highway engines only. While manufacturers of nonroad engines are required to submit defect and recall reports, EPA was not able to process the reports for this 2008 Compliance Report, given other priority work.

a. Defect Reporting

Table 12 describes the emissions defect and voluntary emissions recall report categories for heavy-duty highway engines for 2008. Manufacturers must submit a defect report when a defect is found in 25 or more engines.

Table 12. Number of Heavy-Duty Highway Engine Defect and Recall Reports by Category, 2008

Defect/Recall Report Category	Defect Reports	Recall Reports
Fuel Delivery Component	8	2
Computer-Related (Other Than OBD)	3	3
Emissions Label	3	2
Electrical, Mechanical, and Cooling Systems	3	1
Exhaust Gas Recirculation System	2	0
Diesel Oxidation Catalyst	1	1
Exhaust System	1	1
Ignition Component	1	1
OBD System	1	1
Active Diesel Particulate Filter	1	0
Catalyst System (Non-Diesel Engine)	1	0
Crankcase Ventilation Component/System	1	0
Turbocharger/Supercharger	1	0
Total	**27**	**12**

In 2008, heavy-duty highway engine manufacturers submitted 27 defect reports, potentially affecting nearly 2 million engines. Figure 33 shows that almost 65 percent of all affected engines fell into the "Electrical, Mechanical, and Cooling Systems" category.

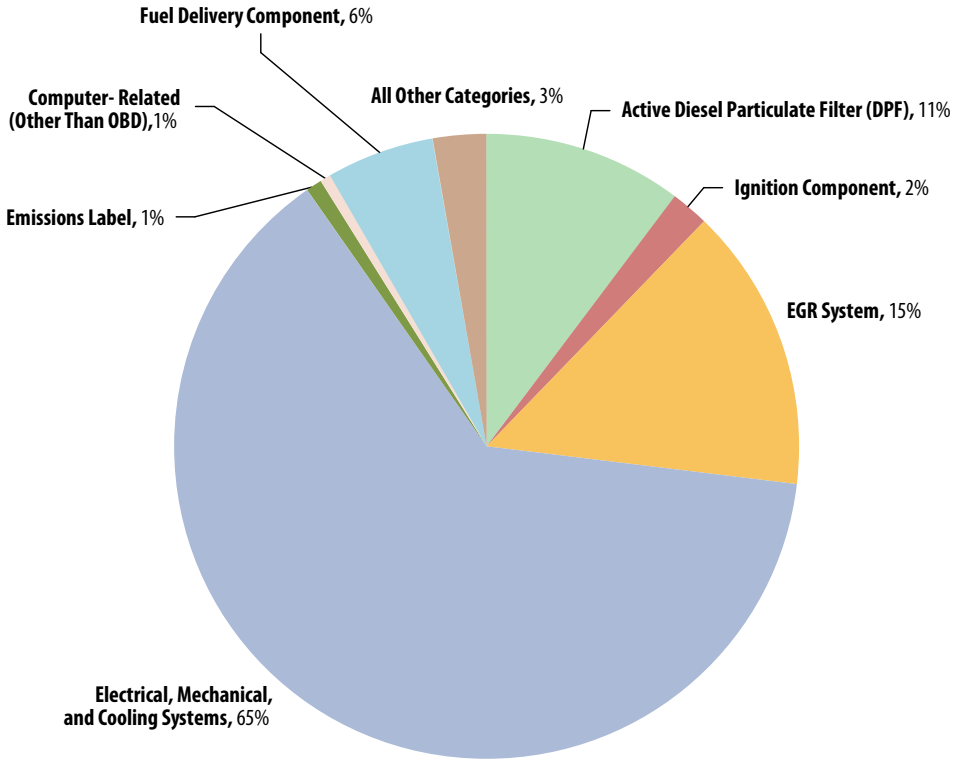


Figure 33. Percentage of Truck and Bus Engines by Defect Problem Category, 2008

b. Recall Reporting

As shown in Table 12, heavy-duty highway engine manufacturers conducted 12 voluntary recalls in 2008. A recall can affect any number of engines; therefore, the frequency of recalls under a particular problem category does not necessarily correlate with the number of engines affected by a particular defect or problem category. For example, in 2008, three of the 12 recalls were related to the category "Computer-Related (Other Than OBD)." However, defects in the "Electrical, Mechanical, and Cooling Systems" category accounted for 95 percent of the recalled vehicles (1.18 million engines out of 1.28 million affected engines). See Figure 34 for further details.

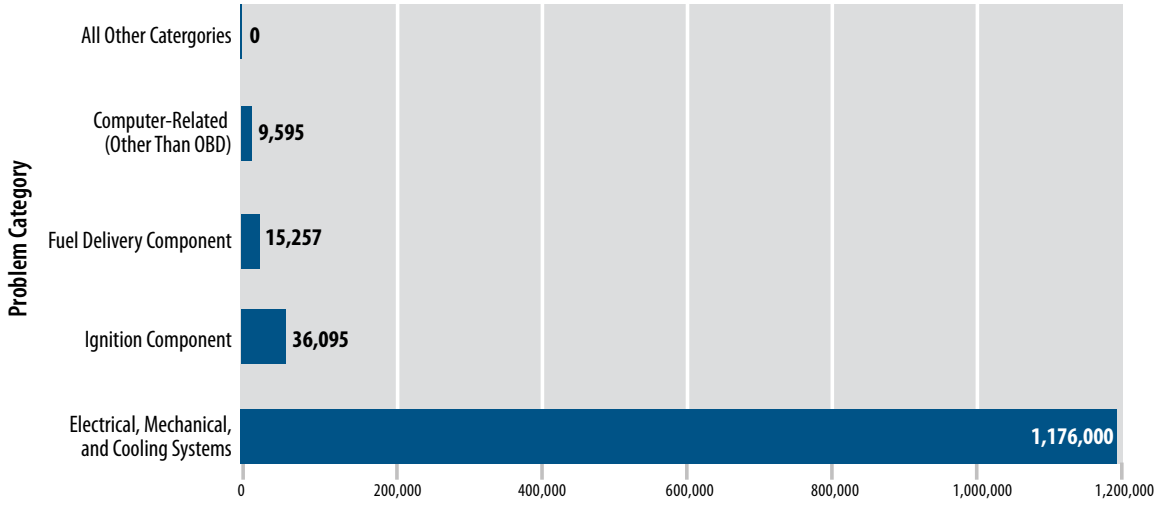


Figure 34. Number of Heavy-Duty Highway Engines Affected by Recall Problem Category, 2008

H. Regulatory Flexibilities

1. Averaging, Banking, and Trading (ABT)

a. Cars and Light-Duty Trucks

The Tier 2 standards are the current set of emission standards that apply to cars and light-duty trucks, regardless of fuel type. Within the program, manufacturers have a choice of emission bins to which they can certify. Lower bin numbers reflect more stringent emission standards. Manufacturers must meet Bin 5 on average each year. Figure 36 shows the percentage of test groups by emission certification bin for MY 2008. For MY 2008, 94 percent of test groups were certified to Bin 5 or better, and 6 percent to the higher emission Bins 6 through 10.

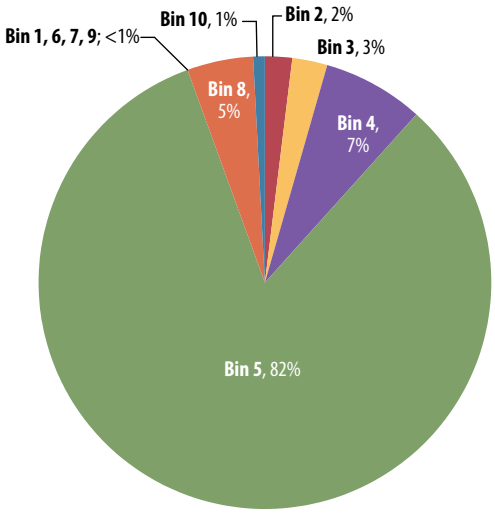


Figure 35. Car and Light-Duty Truck Test Groups by Emission Certification Bin, MY 2008

Figures 36 through 38 present the average certification levels along with the standards for Tier 2 Bin 5 for each major manufacturer.

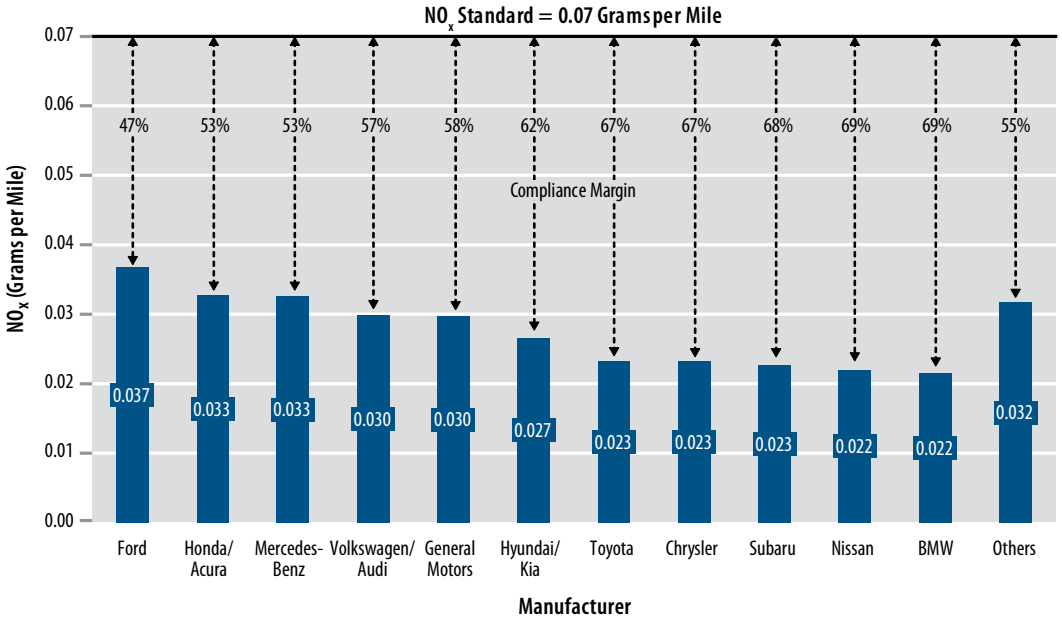


Figure 36. Tier 2 Bin 5 Certification Levels and Compliance Margins for NO_x by Manufacturer, MY 2008

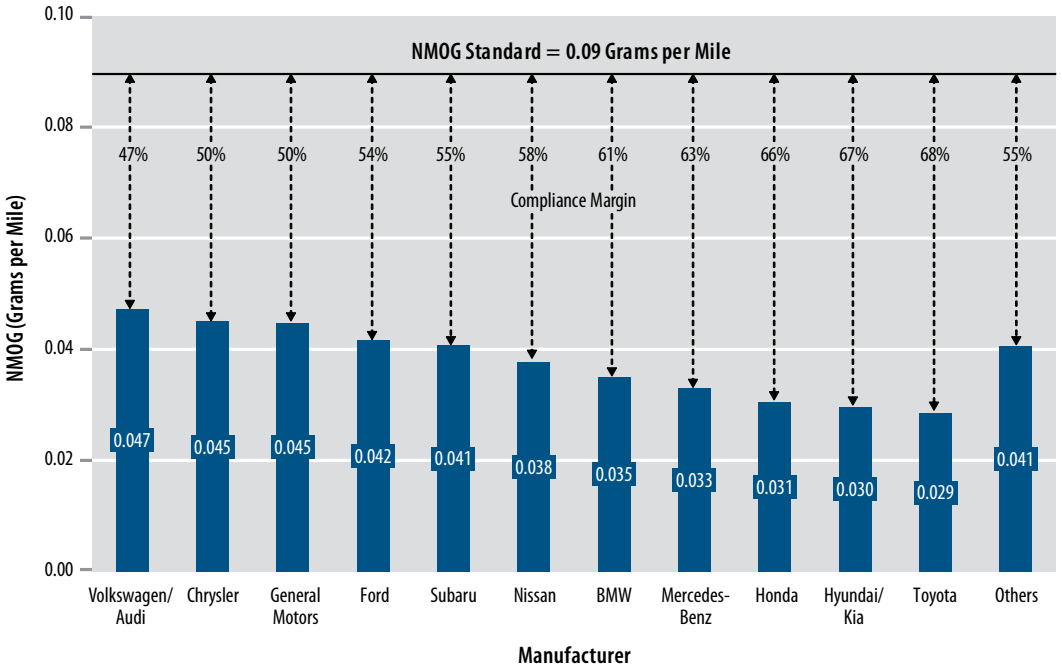


Figure 37. Tier 2 Bin 5 Certification Levels and Compliance Margins for NMOG by Manufacturer, MY 2008

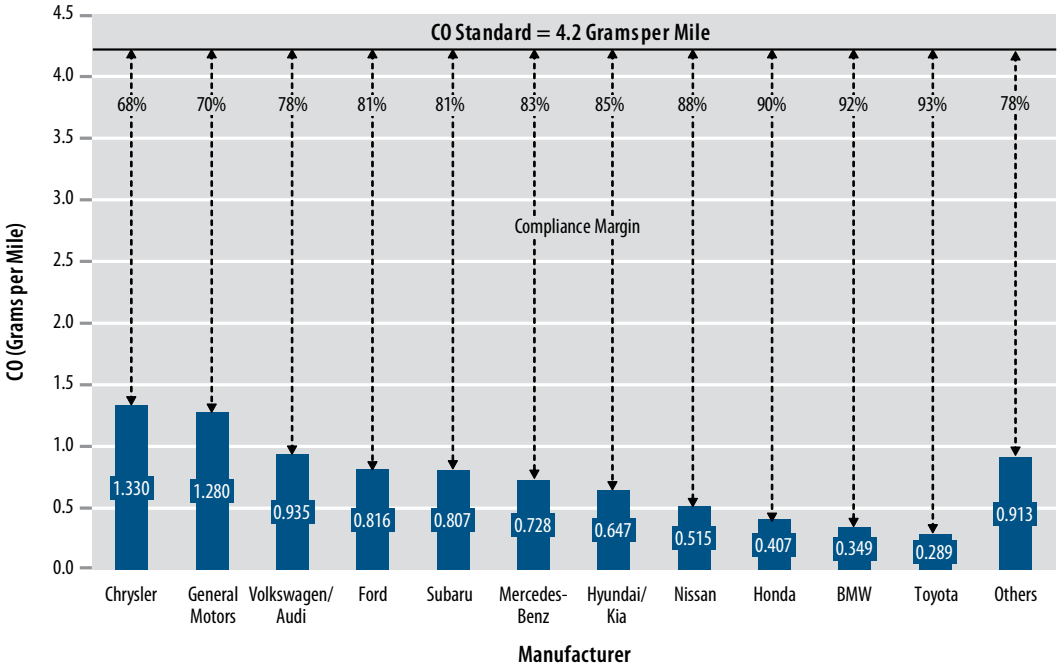


Figure 38. Tier 2 Bin 5 Certification Levels and Compliance Margins for CO by Manufacturer, MY 2008

b. Heavy-Duty Highway and Nonroad Engines

ABT provisions in many EPA regulations allow manufacturers to certify engine families in their product line at levels above the emission standard, provided that these emission "deficits" are offset by positive credits from engine families they certify below the standard. This flexibility to meet overall emission standards by ABT credits facilitates earlier introduction of clean technology into the market than would otherwise be feasible. ABT has proven to be a successful tool in multiple sectors, including nonroad diesel, marine diesel, heavy-duty highway diesel and gasoline, lawn and garden, recreational boats and personal watercraft, snowmobile, and locomotive engines. Participation in the voluntary ABT programs varies in both the number of participants and the pollutants for which credits are generated or used.

Figures 39 and 40 show the compliance margins for lawn and garden engines (broken down by engine class and pollutant) that do and do not participate in ABT programs. Compliance margin is defined as the percent difference between the standard and the reported certification levels. A compliance margin of 10 percent means that the certification levels are 10 percent lower than the applicable emission standard. Compliance margin is one of the criteria used by EPA for selecting engine families for confirmatory and in-use compliance testing.

Lawn and garden engines are divided into classes that have different numerical standards. Class I and II engines are used in non-handheld equipment (such as lawn mowers), and classes III, IV, and V engines are used in handheld equipment (such as leaf blowers). For families not participating in ABT, the percentage represents the margin of compliance to the emission standard. For families participating in ABT, the percentage represents the margin of compliance to the FEL. Manufacturers that participate in ABT select the FEL, which becomes the emission standard they are held to for all certification and compliance activities. By setting the FEL, manufacturers determine for themselves the margin of compliance they are willing to accept. Moreover, they are promising that any engine in that engine family selected for emissions testing will have emissions below the FEL, demonstrating their confidence that the chosen FEL allows for emission differences due to production variability. Because of this, the ABT manufacturers are usually more comfortable naming an FEL closer to the certification level (with a smaller compliance margin). An FEL can be either above or below the standard (subject to limits).

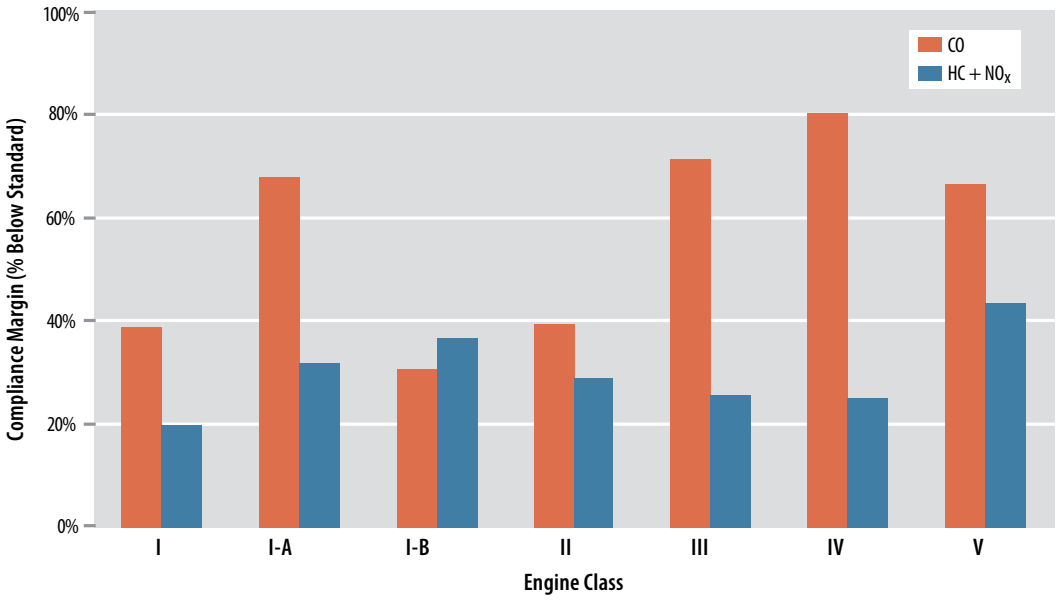


Figure 39. Compliance Margin for Lawn and Garden Engines by Class for Manufacturers Not Participating in ABT

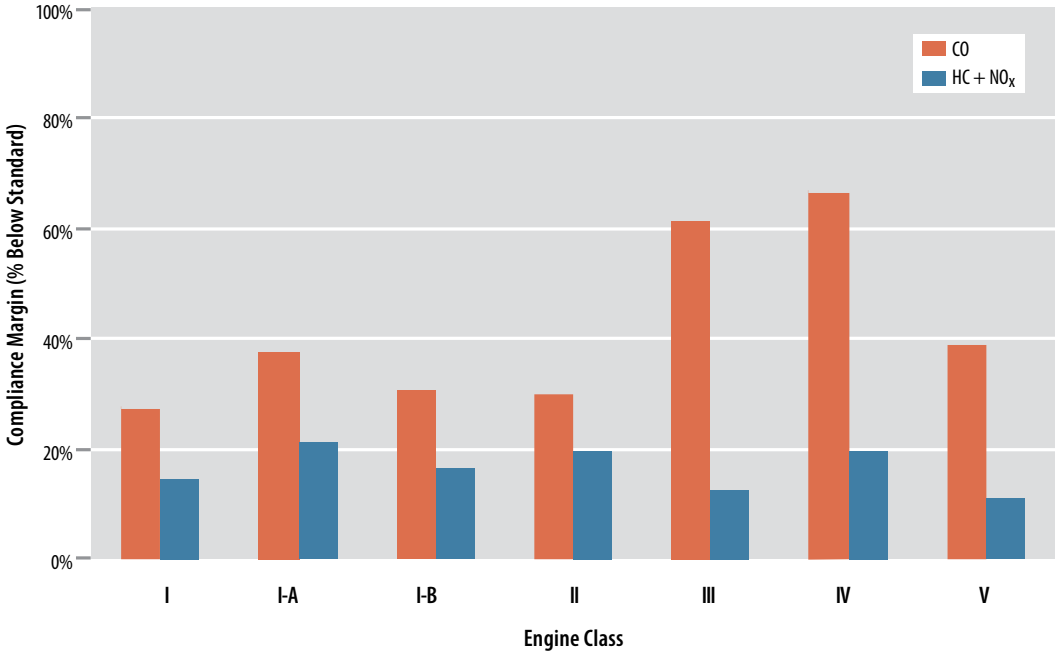


Figure 40. Compliance Margin for Lawn and Garden Engines by Class for Manufacturers Participating in ABT

In the gasoline boat and personal watercraft industry, not all manufacturers participate in the ABT program, but all are required to declare a FEL. Figure 42 illustrates the gasoline boat and personal watercraft industry margin of compliance by manufacturer (average margin for all of a manufacturer's engine families).

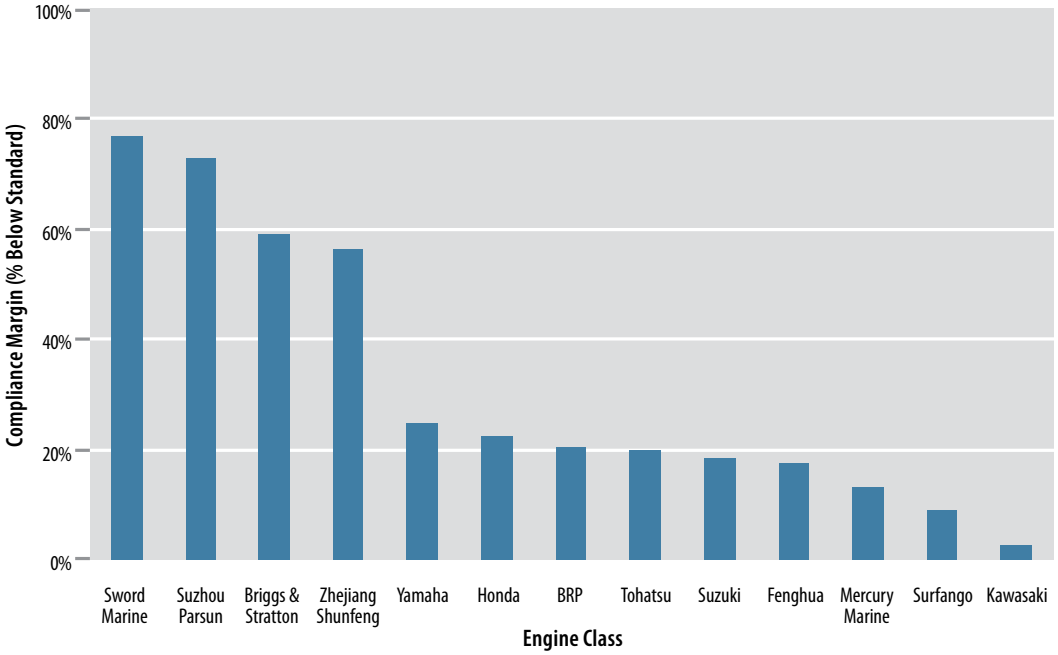


Figure 41. HC + NO_x Compliance Margin by Gasoline Boat and Personal Watercraft Engine Manufacturer, MY 2008

2. Transition Program for Equipment Manufacturers

The voluntary Transition Program for Equipment Manufacturers (TPEM) allows equipment manufacturers to continue using engines that comply with the previous set of emission standards ("noncompliant engines") for up to seven years after the new regulations first apply. The program was designed to allow equipment manufacturers time to redesign their products to accommodate new engines as designs are changed to meet new emission standards. Engine manufacturers may only sell noncompliant engines in the United States if the equipment manufacturer assures the engine manufacturer in writing that the engines will be used under TPEM (equipment manufacturers have prime responsibility for the manufacture and assembly of equipment that incorporates engines produced by engine manufacturers. In some cases, this is the same corporate entity). Both engine manufacturers and equipment manufacturers must report their TPEM activities to EPA.

A new TPEM program began in 2008 as the new emission regulations for nonroad construction and agricultural equipment (also known as the Tier 4 regulations) became effective. The Tier 4 TPEM provides a wider array of options for manufacturers and has stricter reporting requirements than the original TPEM, established in 1999.

As in the first TPEM, the Tier 4 program is only available for up to seven years per power category. However, whereas in the first program the beginning and end dates were set by regulation, Tier 4 TPEM allows manufacturers to choose between two options. Table 13 shows the timeframes for each option. If Option 1 is selected, the availability of the provisions will start in the first year of the interim Tier 4 standards. If Option 2 is selected, the availability of the provisions will start in the first year of the final Tier 4 standards. Note that the determination of when this seven-year period begins is specific to each individual power category, as shown in the Table 13.

Table 13. Availability of TPEM Allowances per Power Category

Power Category	Option 1	Option 2
kW < 19 (25 hp)	2008–2014	—
19 ≤ kW < 56 (75 hp)	2008–2014	2012–2018
56 ≤ kW < 130 (175 hp)	2012–2018	2014–2020
130 ≤ kW ≤ 560 (780 hp)	2011–2017	2014–2020
kW > 560 (780 hp)	2011–2017	2015–2021

For most power categories, there is a gap between the end of the first TPEM and the beginning of the Tier 4 TPEM. Equipment manufacturers may use a limited number of noncompliant engines during that time and discount them from their total Tier 4 allowances. Table 14 shows the year(s) when this "pull-ahead" provision is available.

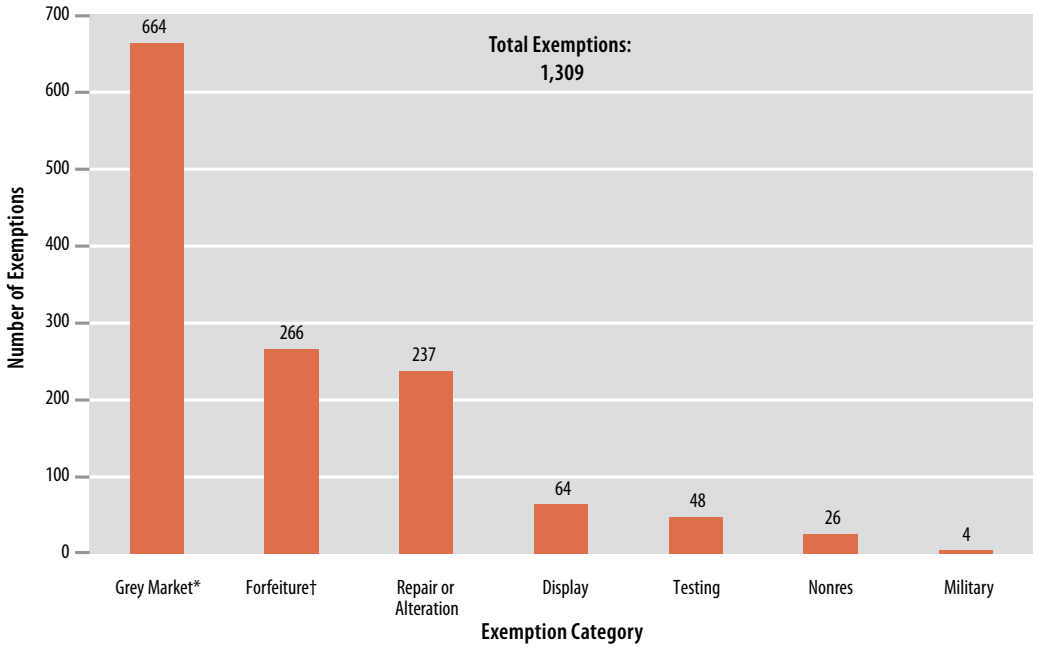
Table 14. TPEM Availability: Years for Early Allowances

Power Category	Calendar Year
kW < 19 (25 hp)	2007
19 ≤ kW < 37 (50 hp)	2006–2011
37 ≤ kW < 56 (75 hp)	2011
56 ≤ kW < 75 (100 hp)	2011
75 ≤ kW < 130 (175 hp)	2010–2011
130 ≤ kW ≤ 225 (300 hp)	2010
225 ≤ kW < 450 (600 hp)	2008–2010
450 ≤ kW ≤ 560 (750 hp)	2009–2010
kW > 560 (750 hp)	—

In 2008, 21 equipment manufacturers notified EPA of their intent to participate in the first TPEM under the categories for which the program is still available, Tier 4 TPEM, or both. EPA received eight reports from engine and equipment manufacturers in 2008 and was reviewing them at the time this report was being developed.

I. Exemptions

Vehicles and engines imported into the United States may be eligible for an exemption from complying with federal emission requirements. For example, vehicles belonging to military personnel or nonresidents may be eligible for exemption. Vehicles that are being imported for testing or display may also be exempt. Depending on the type of exemption, importers must request written EPA approval prior to importation of the vehicle or engine. Of the 1,309 exemptions issued in 2008, the vast majority were for cars and light-duty trucks, with only 40 being issued for heavy-duty highway and nonroad engines or equipment. EPA processes a variety of exemptions each year and works with the Department of Homeland Security U.S. Customs and Border Protection to ensure that proper approvals have been issued before vehicles and engines can enter the United States. Figure 43 summarizes the exemptions that EPA issued in calendar year 2008. EPA also provides more detailed information on imports and exemptions on its website.



*Grey Market: Grey Market vehicles are new or used motor vehicles and motorcycles originally manufactured for foreign countries that do not comply with EPA and Department of Transportation (DOT) federal regulations and are imported by an Independent Commercial Importer (ICI) to be modified, tested, and certified to EPA and DOT federal regulations.

†Forfeiture: These are vehicles from foreign countries that do not comply with EPA and DOT federal regulations, are seized by government enforcement agencies (federal or state) for illegal activities, and then are used by those government agencies for enforcement purposes.

Figure 42. Number of Vehicle and Engine Exemptions by Exemption Category, 2008

J. Conclusion

Compliance data for cars and light-duty trucks show good levels of manufacturer reporting and consistent levels of compliance with respect to passing/failing tests and defects/recalls, as in the past. These trends indicate that EPA oversight is still effective and therefore necessary. For the heavy-duty highway and nonroad engine sectors, EPA began to see broader compliance testing in 2008 and some initial reporting under new regulatory flexibilities. EPA will assess compliance trends for these sectors as manufacturer reporting becomes more complete in the future.

IV. Key to Acronyms

ABT	averaging, banking, and trading
CAFE	Corporate Average Fuel Economy
CNG	compressed natural gas
CO	carbon monoxide
CO_2	carbon dioxide
DPF	diesel particulate filters
E85	85 percent ethanol and 15 percent gasoline
EPA	U.S. Environmental Protection Agency
FEL	family emission limit
FTP	Federal Test Procedure
GHG	greenhouse gas
HC	hydrocarbon
IUVP	In-Use Verification Program
LPG	liquefied petroleum gas
MPG	miles per gallon
MY	model year
NHTSA	National Highway Traffic Safety Administration
NMHC	non-methane hydrocarbon
NMOG	non-methane organic gases
NO_x	nitrogen oxides
OAQPS	Office of Air Quality Planning and Standards
OBD	onboard diagnostics
OTAQ	Office of Transportation and Air Quality
PLT	production line testing
SRC/SBC	EPA Standard Road Cycle and/or Standard Bench Cycle
SUV	sport utility vehicle
TPEM	Transition Program for Equipment Manufacturers