Chapter 2

LIGHT VEHICLES

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Company Profile Section

Company profiles follow for nine different manufacturers.

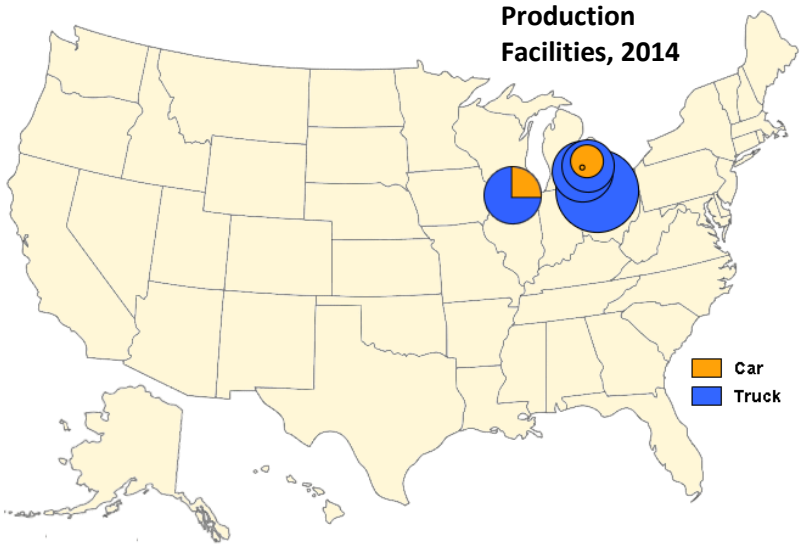
- The first page of each profile is an overview page containing the company's Corporate Average Fuel Economy, average vehicle footprint, number of alternative fuel models, production plant locations, production, and a brief summary of fuel saving technologies.
- The second page of each profile contains a figure showing an overview of the company's vehicle offerings in various market segments. A tabular listing of the vehicle models in each size class follows.
- The third page of each profile shows the market share by vehicle model within each company. This gives an idea of which vehicles are best sellers for that company.
- The fourth page of each profile includes a figure of hybrid vehicle sales by model and year. Also included is a pie chart depicting the manufacturer's share of the 2014 hybrid vehicle market. Since the number of hybrid sales by manufacturer varies, use caution when comparing one manufacturer's chart to another as the scales may be different.
- The last page of each profile shows the interworking relationships that each manufacturer has with other manufacturers around the world.

The nine manufacturers for which we have profiles are:

- three from Detroit
  - Fiat Chrysler Automobiles (FCA),
  - Ford (FOR), and
  - General Motors (GM)
- three from Japan
  - Honda (HON),
  - Nissan (NIS), and
  - Toyota (TOY),
- two from Korea
  - Hyundai (HYU), and
  - Kia (KIA), and
- one from Germany
  - Volkswagen (VW)
    In future reports some data for VW may be revised. At the current time, data in this report do not reflect any revisions due to the ongoing investigation of VW diesel models.

Fiat Chrysler Automobiles (FCA) Company Profile

Corporate Average Fuel Economy, MY 2014	
Domestic Cars	31.3 mpg
Import Cars	29.0 mpg
Light Trucks	26.1 mpg
Average Vehicle Footprint, MY 2015	
Cars	46.9 sq ft
Light trucks	53.4 sq ft
All	50.8 sq ft
Number of Alternative Fuel Models, MY 2015	
Flex Fuel	14
Natural Gas	0
Propane	0
Hybrid-Electric	0
Plug-In Hybrid-Electric	0
Electric	1
Hydrogen	0



FCA Plants	Type	2014 Production
Toledo, OH - North & South	Truck	510,737
Detroit, MI - Jefferson North	Truck	363,841
Warren, MI	Truck	314,796
Belvidere, IL	Truck	265,774
Sterling Heights, MI	Car	179,528
Belvidere, IL	Car	83,099
Detroit, MI - Conner	Car	549

FIGURE 1. FCA Company Profile

Fuel Saving Technologies

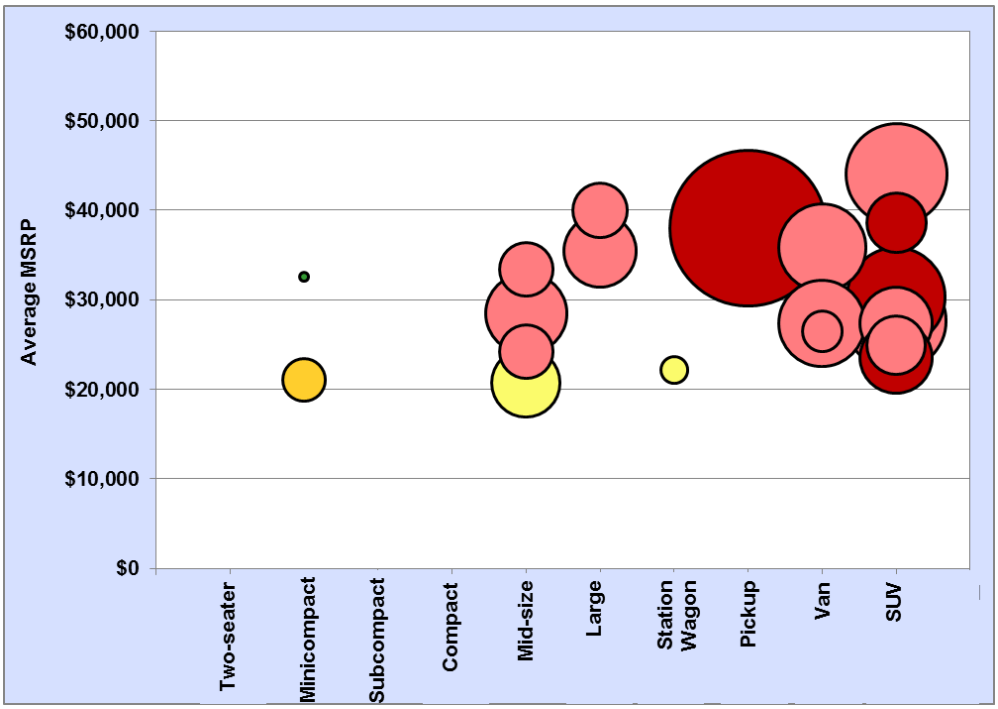
FCA has continued their push toward 8- and 9-speed automatic transmissions in 2015. The all-new 2015 Jeep Renegade became the first small SUV on the market to be offered with a 9-speed transmission; that transmission is also offered on the new Fiat 500x. The "TorqueFlite" 8-speed transmission is now widely used throughout the FCA lineup including sedans, SUVs and pickups and will be used extensively with rear-wheel drive vehicles. FCA estimates a 6-10% improvement in fuel economy over vehicles equipped with the 4-, 5-, and 6-speed predecessors.

Other transmission technologies include the 6-speed automated manual transmission found in the Dodge Dart. Additionally, an all-wheel drive system that automatically disconnects the front or rear axle when not needed reduces mechanical drivetrain losses and improves fuel economy. This axle disconnect technology is installed on a number of vehicles including the new Jeep Renegade and Cherokee, Fiat 500x, Ram 1500, Chrysler 200 and 300, and Dodge Charger. Several new or redesigned engines were also introduced in 2015. The small displacement 1.4L Turbo MultiAir II engine with direct injection was installed on the new 2015 Jeep Renegade and Fiat 500x. The 3.6L Pentastar engine was upgraded for use in model year 2016 vehicles and is expected to deliver fuel economy improvements of about 6%.

Active grille shutters, stop/start, cylinder deactivation and lightweight materials are also employed by FCA. Models like the Ram 1500 EcoDiesel or Dodge Dart Aero make aggressive use of fuel saving technologies. However, even vehicles like the next generation Jeep Wrangler are targeted for weight reduction through greater use of aluminum. For vehicle electrification, there were no hybrid models offered during 2015 and the Fiat 500e, remains the only all-electric vehicle produced by FCA. However, an all-new plug-in hybrid minivan called the Pacifica is planned for late 2016 and is expected to have an all-electric range of about 30 miles.

FCA's Fleet Mix

FCA's vehicle offerings and sales lean heavily toward trucks which tend to have lower fuel economy than cars. The Ram pickup is their largest seller with an EPA-combined fuel economy below 20 mpg. There are three models that average between 25 and 35 mpg (shown in yellow) but they account for a small portion of the overall sales.



Note: The size of the bubble indicates sales. The color of the bubble indicates fuel economy.

Miles per Gallon	Color
< 20	
20-24	
25-29	
30-34	
35-39	
>= 40	

FIGURE 2. FCA Sales by Model, MSRP, EPA Size Class, and Fuel Economy, 2014

TABLE 1. FCA Models by EPA Size Class, 2014

Two-Seater	Mini-compact	Sub-compact	Compact	Mid-Size	Large	Station Wagon	Pickup	Van	SUV
Viper	500e 500		*Ferrari*	*Maserati* Challenger 200 Avenger Dart	300 Charger	500L	Ram	Town & Country Grand Caravan Ram	Grand Cherokee Durango Wrangler Cherokee Journey Compass Patriot

Note: Includes Chrysler, Dodge, Fiat, Ferrari, and Maserati. Models listed in *red italics* do not appear on the figure due to high MSRP.

Cars Comprised about One-Quarter of FCA's Sales in 2014

The combined car market share of Fiat, Chrysler, and Dodge was about 25% of the FCA market share in 2014. The Ram pickup accounted for 21% and the Jeep Grand Cherokee, Cherokee, and Wrangler together accounted for 25%. About 14% of the FCA market was vans.

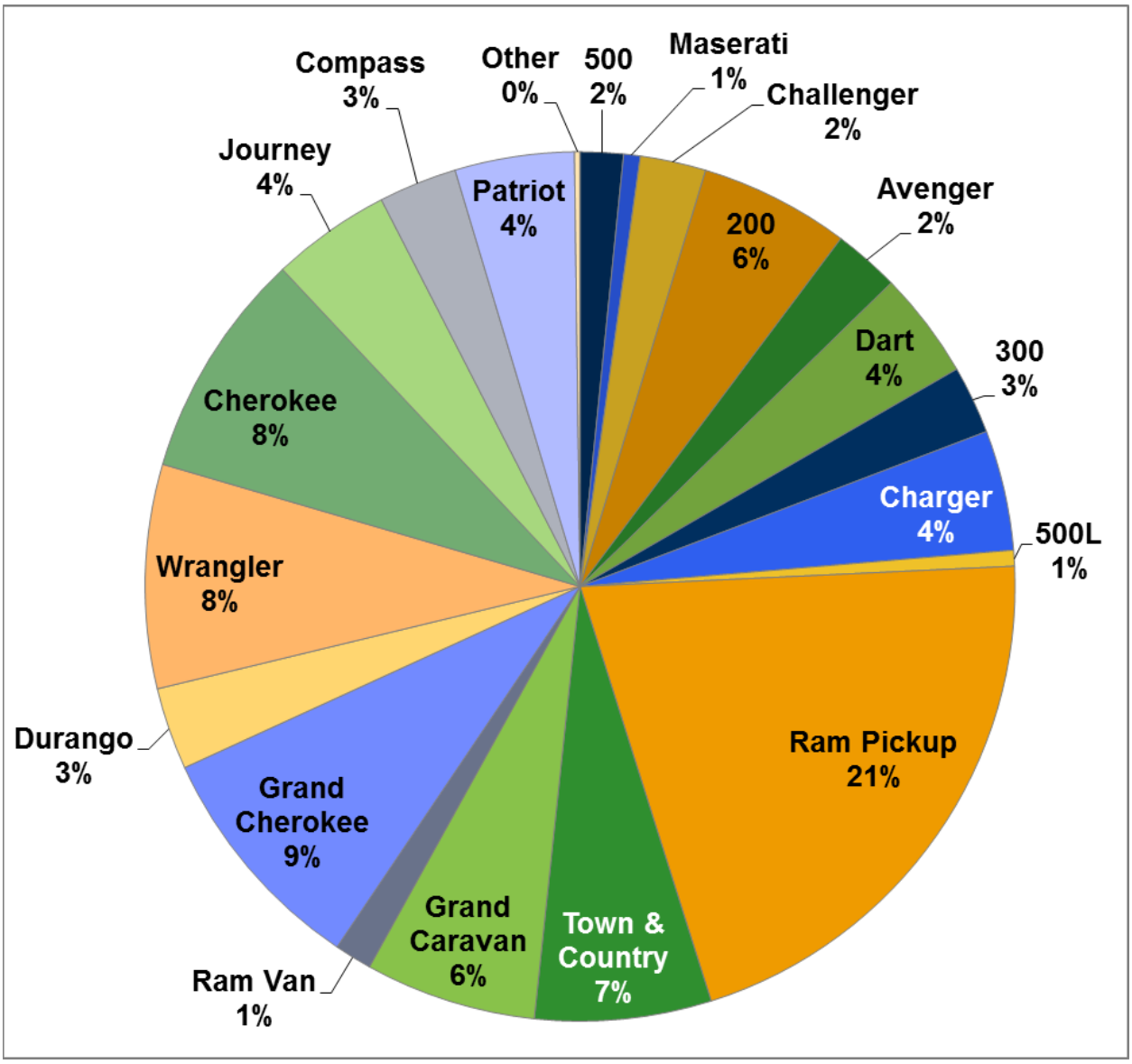


FIGURE 3. FCA Market Share by Model, 2014

Note: "Other" includes the Viper, 500e, and Ferrari. Each vehicle model accounted for less than 1% of the total.

Source:
Ward's Automotive Group, March 2016. http://wardsauto.com

Fiat 500e Sales More than Doubled in 2015

Chrysler began with two hybrid-electric models in 2008-09, the Chrysler Aspen and the Dodge Durango. In 2013, parent company Fiat Chrysler introduced the Fiat 500e all-electric vehicle selling about 1,500 units in 2014, the first full calendar year of sales. In 2015, sales increased to nearly 3,500 units. The Fiat 500e was only sold in California and Oregon.

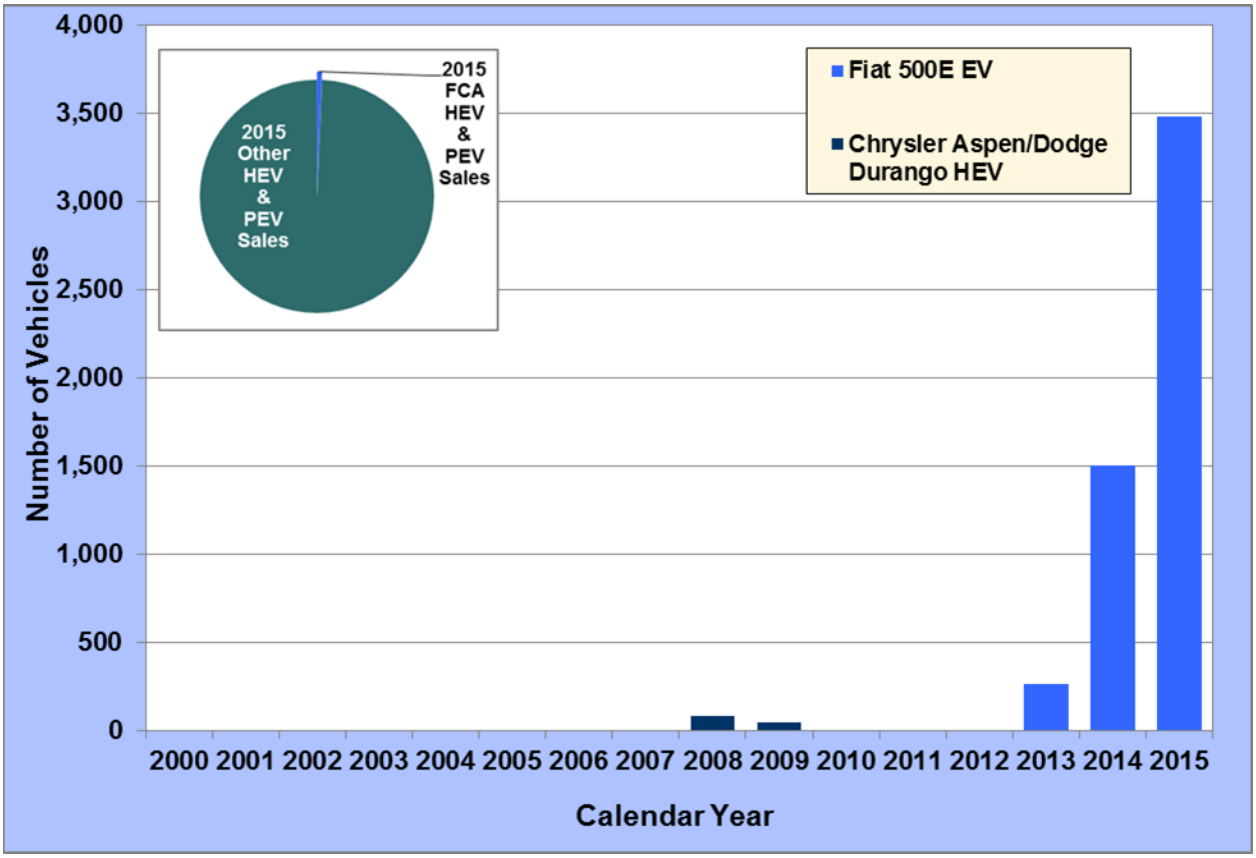


FIGURE 4. FCA Hybrid and Plug-In Electric Vehicle Sales, 2000-2015

Note: Due to the wide variation of hybrid sales among manufacturers, other manufacturers' hybrid sales charts (pp. 44, 49, 54, 59, 64, 69, 74, 79) will have different vertical axis scales. EV = electric vehicle; PEV = plug-in electric vehicle; HEV=hybrid electric vehicle.

Source:
Data provided by Yan (Joann) Zhou, Argonne National Laboratory. http://www.anl.gov/energy-systems/project/light-duty-electric-drive-vehicles-monthly-sales-updates

FCA Has Assembly Agreements with Six Other Manufacturers

TABLE 2. FCA Interrelationships with Other Automotive Manufacturers

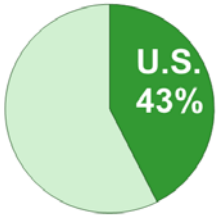
Company	Equity Arrangement	Joint Venture	Supplies/ Buys Major Components	Marketing/Distribution Arrangement	Technology/ Design Arrangement	Manufacturing/ Assembly Agreement	Description
China Motors						✓	Manufactures Chrysler minivans for Taiwanese market
Ford					✓	✓	Ford Ka built in Poland plant by Fiat; Ka and Fiat 500 share same platform
GM, Ford					✓		Co-research projects under the USCAR
GM				✓			Fiat supplies light commercial vehicles based on Doblo platform to Opel to sell as Combo
Guangzhou		✓		✓	✓	✓	Joint venture engaged in R&D, manufacturing, sales, and after-sales service for vehicle products, engines, and parts
Mazda					✓	✓	Will develop and manufacture a new roadster to be built in Hiroshima, Japan
Mitsubishi				✓			Supply its Thai-built Attrage sedan to Chrysler for sale in Mexico; Mitsubishi will supply rebadged L200 midsize pickups to Fiat to sell in Europe and Latin America
Peugeot		✓			✓	✓	Light commercial-truck manufacturing alliance called SevelSud in Italy that co-developed a new full-size delivery van built in Italy
Suzuki			✓				Uses Fiat diesel engines for vehicles in India
Tata		✓				✓	Jointly own Ranjangaon, India plant that builds Tata-developed vehicles and FCA-designed engines

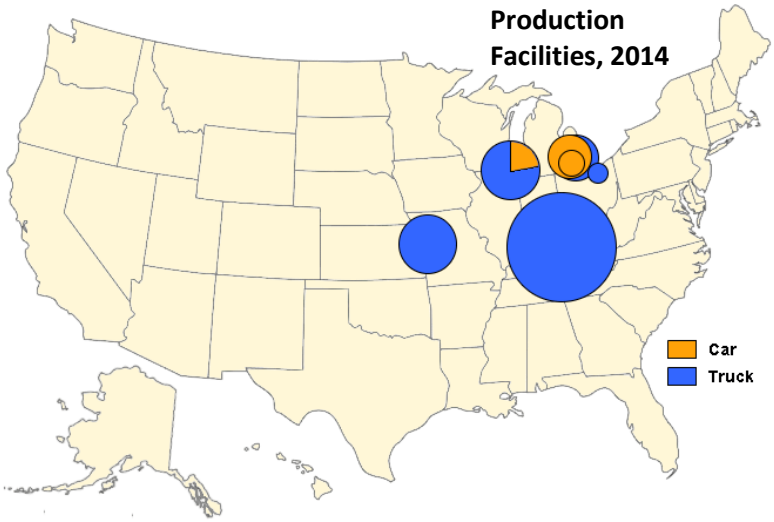
Source:
Ward's Automotive Group, *Interrelationships among the World's Major Auto Makers*, October 2015.
http://wardsauto.com

Ford Company Profile

Corporate Average Fuel Economy, MY 2014	
Domestic Cars	36.8 mpg
Import Cars	30.9 mpg
Light Trucks	25.2 mpg
Average Vehicle Footprint, MY 2015	
Cars	46.6 sq ft
Light Trucks	59.0 sq ft
All	52.8 sq ft
Number of Alternative Fuel Models, MY 2015	
Flex Fuel	5
Natural Gas	0
Propane	0
Hybrid-Electric	3
Plug-In Hybrid-Electric	2
Electric	1
Hydrogen	0

World Sales = 5.8 million





Ford Plants	Type	2014 Production
Louisville, KY	Truck	714,469
Kansas City, MO	Truck	367,708
Chicago, IL	Truck	284,951
Dearborn, MI	Truck	275,951
Wayne, MI	Car	262,760
Flat Rock MI	Car	140,910
Avon Lake, OH	Truck	105,487
Chicago, IL	Car	81,679

FIGURE 5. Ford Company Profile

Fuel Saving Technologies

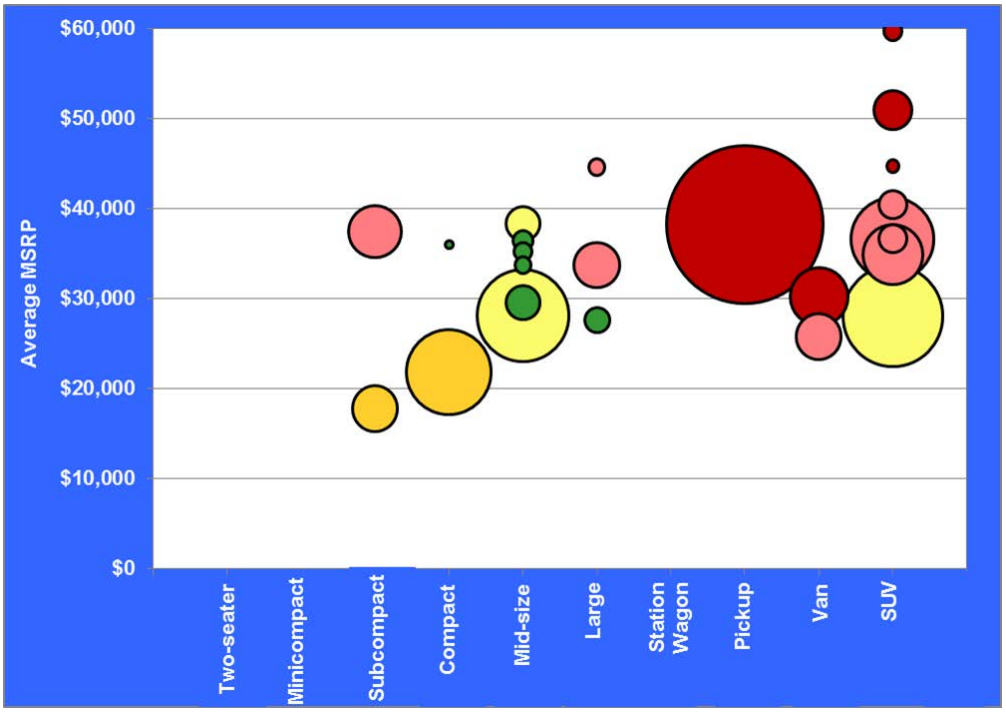
In late 2015, amid low gas prices, Ford announced plans to invest $4.5 billion dollars in vehicle electrification over the next five years. Ford plans to introduce 13 new hybrid or plug-in electric vehicles by 2020 and said that electrification would be an option in 40% of their lineup by that time. Ford is following a strategy of offering a full range of electric configurations including hybrids, plug-in hybrids, and all electric vehicles. Ford is currently installing their hybrid systems in sedans and wagons like the Ford Fusion hybrid, C-Max, and Lincoln MKZ hybrid. Ford's plug-in hybrids – the C-Max Energi and Fusion Energi – offer about 20 miles of electric operation while the Ford Focus electric is Ford's only all-electric vehicle with 76 miles of range.

Following the redesigned aluminum-bodied F-150 pickup which weighed about 700 pounds less than its 2014 predecessor, Ford is expanding its use of aluminum and other lightweight materials. Ford announced that it would be producing aluminum-bodied Super Duty trucks for 2017. The Super Duty trucks will use a thicker gauge of aluminum than the F-150 and more high strength steel will be used in the frame so the weight savings will be about half as much or about 350 lbs. lighter than the models they will be replacing. In 2015 Ford also announced a collaboration with DowAksa to speed production of high-volume, low-cost carbon fiber. A blended carbon fiber and aluminum wheel will be used on the Shelby GT350R. In an industry first, Ford and Corning have developed a lightweight hybrid windshield made from Gorilla glass and regular glass which is 12 pounds lighter and will be used in the GT super car.

Ford continued to refine and expand the use of their EcoBoost technology that uses gasoline direct injection and variable valve timing combined with turbocharging. Efforts to innovate in a wide range of areas from electrification and mass reduction to ride sharing and autonomy, has led Ford to a record number of patent filings in 2015.

Ford's Fleet Mix

Ford Motor Company has a fairly even distribution of models from the subcompact segment to sport utility vehicles. The Ford F-150 is by far their largest selling model. Of the car models that Ford sells, the majority have an average fuel economy of 25 mpg or higher with six models exceeding 40 mpg.



Note: The size of the bubble indicates sales. The color of the bubble indicates fuel economy.

Miles per Gallon	Color
< 20	
20-24	
25-29	
30-34	
35-39	
>= 40	

FIGURE 6. Ford Sales by Model, MSRP, EPA Size Class, and Fuel Economy, 2014

TABLE 3. Ford Models by EPA Size Class, 2014

Two-Seater	Mini-compact	Sub-compact	Compact	Mid-Size	Large	Station Wagon	Pickup	Van	SUV
		Mustang Fiesta	Focus EV Focus	MKZ Fusion Energi MKZ-Hybrid C-Max Energi Fusion-Hybrid Fusion	MKS Taurus C-Max		F-Series	E-Series Transit Connect	Navigator Expedition MKT MKX Flex Explorer Edge Escape

Note: Includes Ford and Lincoln.

The F-Series Accounted for Nearly One-Third of Ford's Sales in 2014

Thirty-one percent of Ford's 2014 market were sales of the F-Series pickup trucks. Ford also had two cars (Focus and Fusion) and two SUVs (Explorer and Escape) that each held 9-12% of Ford's sales.

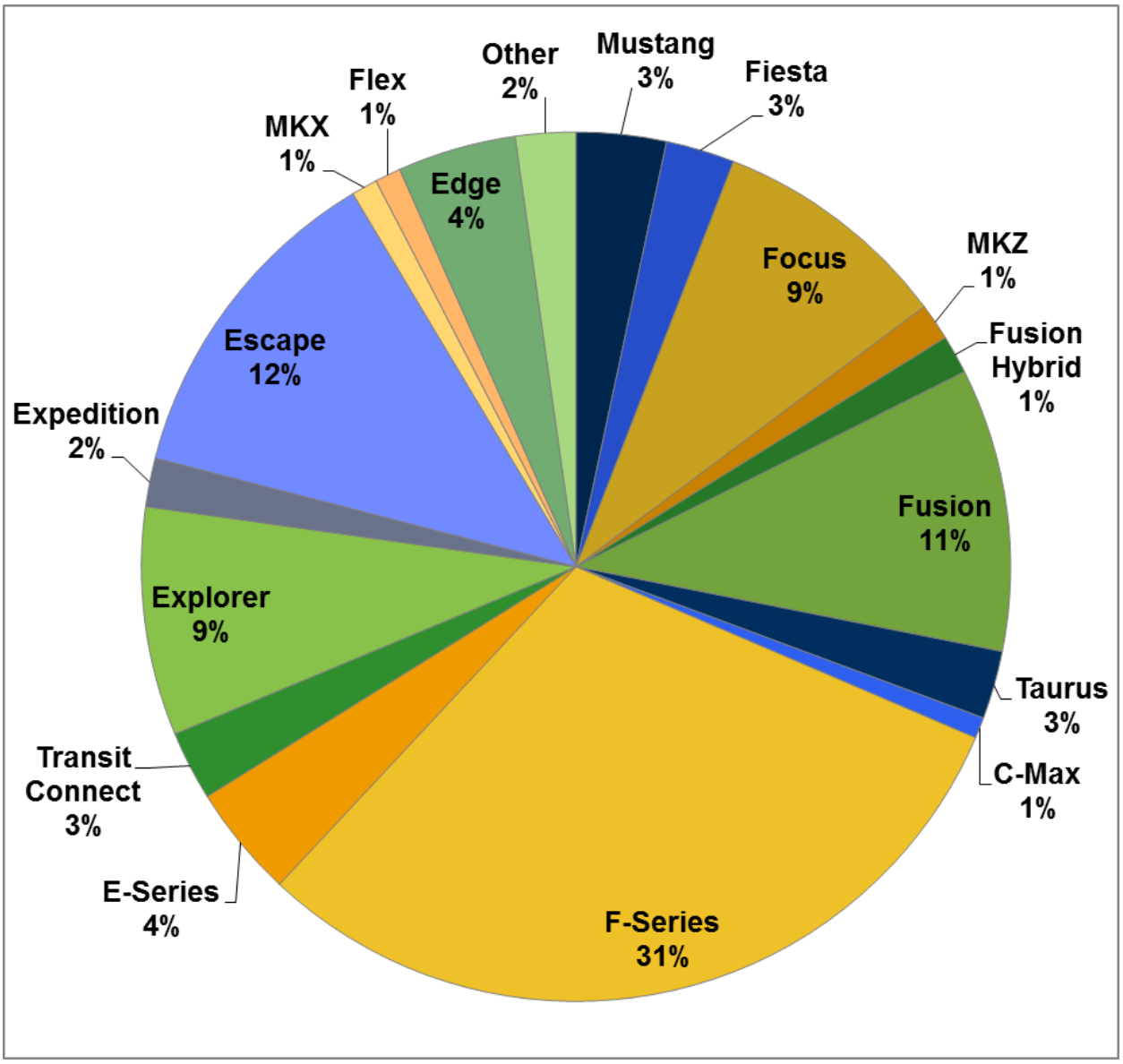


FIGURE 7. Ford Market Share by Model, 2014

Note: "Other" includes the Focus EV, Fusion Energi, C-Max Energi, MKZ Hybrid, MKS, Navigator, and MKT. Each vehicle model accounted for less than 1% of the total.

Source:
Ward's Automotive Group, March 2016. http://wardsauto.com

Ford Hybrid and Plug-In Vehicle Sales Declined in 2015

After more than doubling in 2013, Ford hybrid and plug-in vehicle sales declined in 2015. The Ford Fusion hybrid and Ford Energi plug-in series (Fusion and C-Max) together accounted for the majority of Ford's hybrid and plug-in sales. Ford has the second highest share (13%) of the hybrid-electric (HEV) and plug-in (PEV) market.

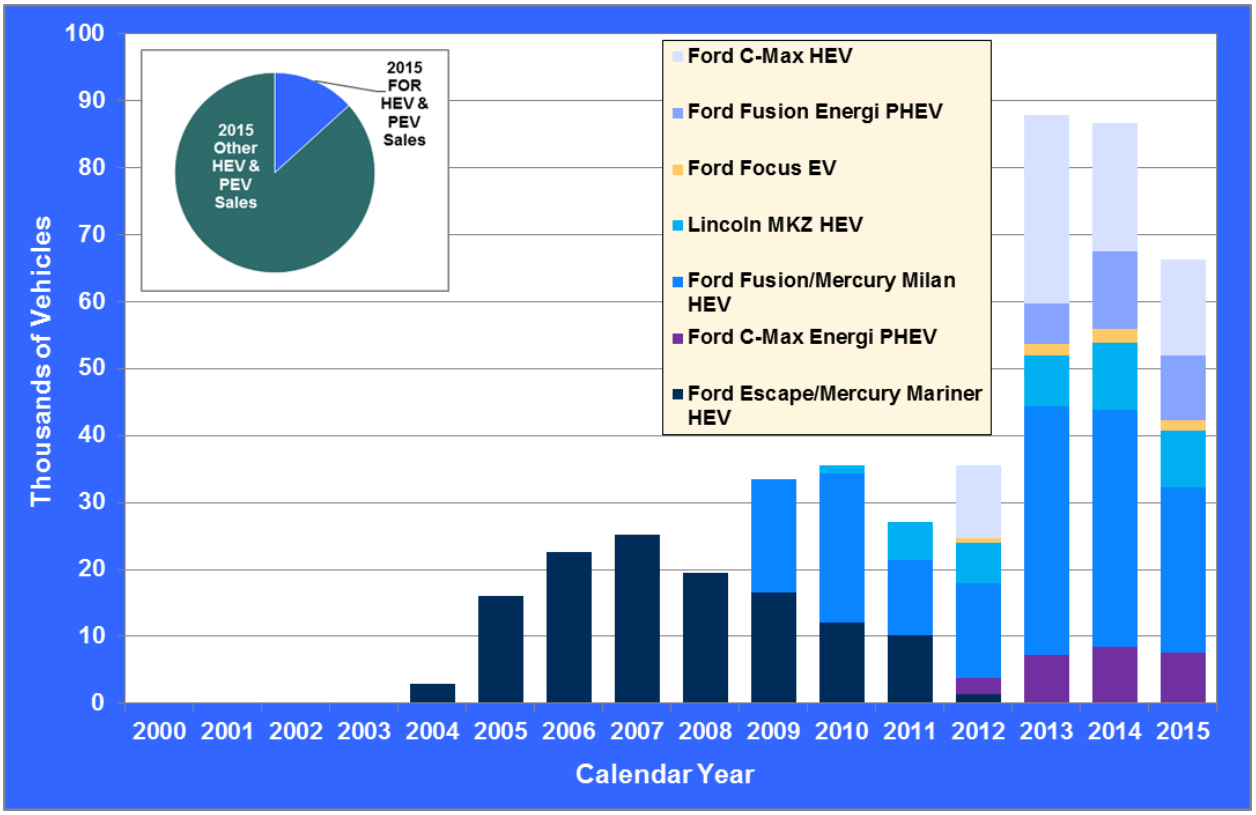


FIGURE 8. Ford Hybrid and Plug-In Electric Vehicle Sales, 2000-2015

Note: Due to the wide variation of hybrid sales among manufacturers, other manufacturers' hybrid sales charts (pp. 39, 49, 54, 59, 64, 69, 74, 79) will have different vertical axis scales.

Source:
Data provided by Yan (Joann) Zhou, Argonne National Laboratory.
http://www.anl.gov/energy-systems/project/light-duty-electric-drive-vehicles-monthly-sales-updates

Ford Continues to Work Closely with Mazda

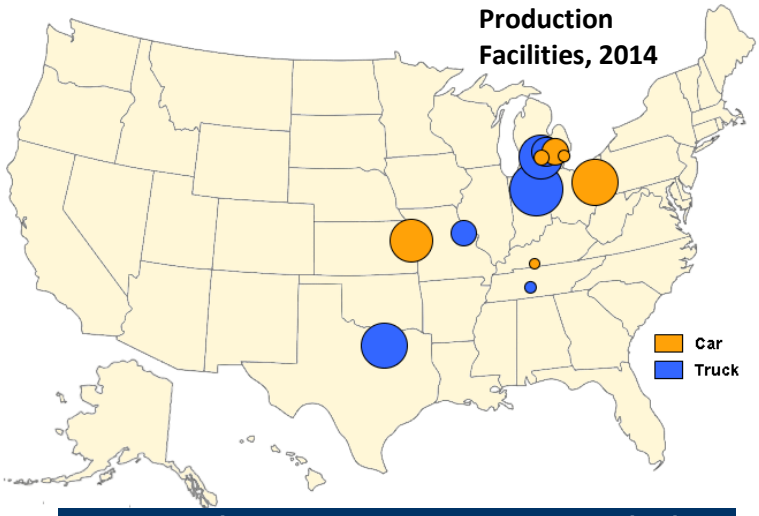
TABLE 4. Ford Interrelationships with Other Automotive Manufacturers

Company	Equity Arrangement	Joint Venture	Supplies/ Buys Major Components	Marketing/Distribution Arrangement	Technology/ Design Arrangement	Mnufacturing/ Assembly Agreement	Description
Chongqing Changan		✓				✓	Joint venture that assembles Ford vehicles in Chongqing, China
BMW, Ford, Daimler, GM, Honda, Toyota, VW					✓		Partners in Clean Energy Partnership
Daimler, Nissan					✓		Partnering in R&D called Automotive Fuel Cell Cooperation
FCA						✓	Builds Ford Ka, which shares Fiat 500 platform at its Tychy, Poland plant
GM					✓		Developing 9- and 10-speed automatic transmissions
GM, Chrysler					✓		Co-research projects under the USCAR
Mazda		✓				✓	Joint ventures in Flat Rock, MI, Thailand, and Malaysia
Mazda			✓		✓		Share platforms and parts
Mazda	✓						Ford has equity stake
Sollers		✓		✓		✓	Assembles Ford vehicles at Ford's Vsevolozhsk plant & Soller's facilities in Chelny & Elabuga. All Ford's Russian prior activities handled by Sollers through this venture

Source:
Ward's Automotive Group, *Interrelationships among the World's Major Auto Makers*, October 2015.
http://wardsauto.com

General Motors (GM) Company Profile

Corporate Average Fuel Economy, MY 2014	
Domestic Cars	33.8 mpg
Import Cars	39.8 mpg
Light Trucks	25.2 mpg
Average Vehicle Footprint, MY 2015	
Cars	46.8 sq ft
Light Trucks	63.0 sq ft
All	55.3 sq ft
Number of Alternative Fuel Models, MY 2015	
Flex Fuel	19
Natural Gas	1
Propane	0
Hybrid-Electric	2
Plug-In Hybrid-Electric	2
Electric	1
Hydrogen	0



GM Plants	Type	2014 Production
Fort Wayne, IN	Truck	332,744
Lordstown, OH	Car	290,028
Arlington, TX	Truck	284,424
Lansing, MI - Delta	Truck	269,997
Fairfax, KS	Car	262,080
Flint, MI	Truck	165,189
Orion, MI	Car	152,680
Wentzville, MO	Truck	141,066
Lansing, MI - Grand River	Car	69,409
Hamtramck, MI	Car	47,368
Spring Hill, TN	Truck	44,319
Bowling Green, KY	Car	39,918

FIGURE 9. GM Company Profile

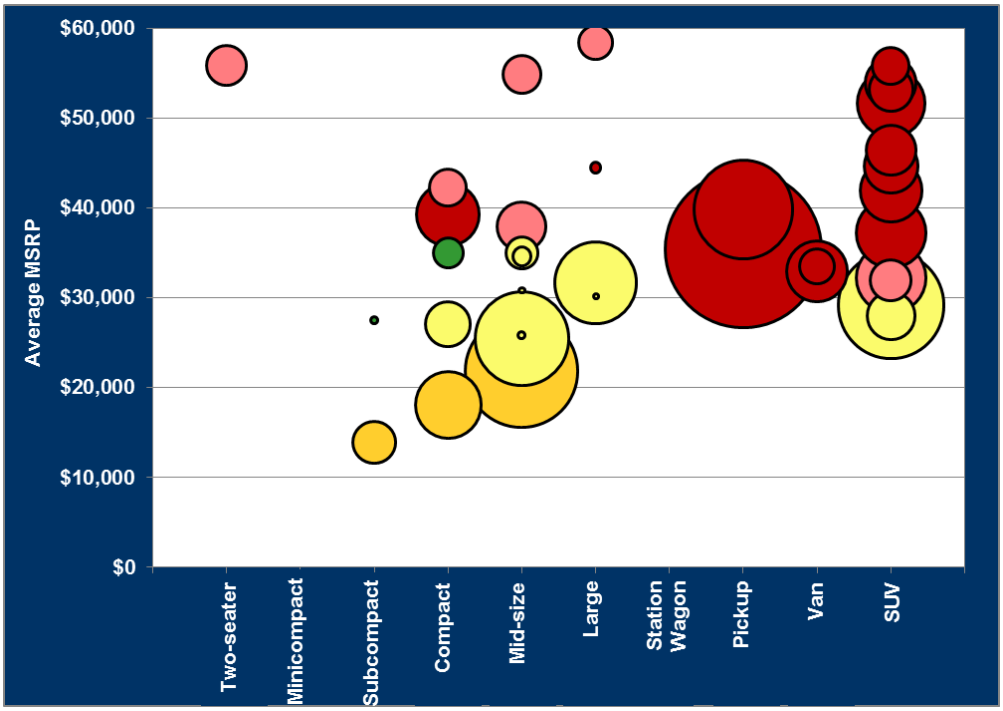
Fuel Saving Technologies

At the 2015 Detroit Auto Show, GM made headlines when they revealed the 200-mile range all-electric Chevrolet Bolt concept with plans for production by 2017 and a projected price of about $30,000 with incentives. Until the Chevrolet Bolt arrives, the Chevrolet Spark remains GM's only all-electric vehicle. GM further demonstrated their commitment to vehicle electrification with several passenger car introductions. Most notable is the redesigned 2016 Chevrolet Volt plug-in hybrid. The 2016 Volt has an all-electric range of 53 miles versus 38 for the 2015 model. GM also revealed the 2016 Chevrolet Malibu Hybrid, which uses an adaptation of the drivetrain from the Chevrolet Volt but with a 1.5 kWh battery pack and no plug. It is expected to deliver a fuel economy rating in excess of 45 mpg. For improved aerodynamics the new Malibu Hybrid will have active grille shutters and a reduced ride height. A first for GM, the 2016 Malibu Hybrid will also use exhaust gas heat recirculation to warm the cabin for more consistent fuel economy in cold temperatures. GM is continuing to offer the eAssist mild hybrid systems on several Buick models and Start/Stop became standard on the 2015 Chevrolet Impala. An advanced form of Start/Stop that uses ultra-capacitors to augment battery power will begin appearing on several Cadillac models in 2016 including the ATS and CTS models.

In pursuit of mass reduction, 2016 Camaro and Cadillac CT6 are both about 200 pounds lighter than the outgoing models due to extensive use of aluminum in the body structures and body panels. GM has not adopted aluminum body panels on their trucks but has increased the use of high strength steels. The all-new midsized 2015 Chevrolet Colorado and GMC Canyon pickup trucks have sold well and will be offered with a 4-cylinder, 2.8 liter diesel option for the 2016 model year. GM's full-sized pickups with 8-cylinder engines rely on cylinder deactivation or "Active Fuel Management" for improved fuel economy.

GM's Fleet Mix

GM encompasses a wide range of brands and models. GM sells a high volume of pickup trucks and SUVs, many of which are large with a combined fuel economy below 20 mpg. The Chevrolet Cruze is the highest selling car with a combined fuel economy of more than 30 mpg.



Note: The size of the bubble indicates sales. The color of the bubble indicates fuel economy.

Miles per Gallon	Color
< 20	
20-24	
25-29	
30-34	
35-39	
>= 40	

FIGURE 10. GM Sales by Model, MSRP, EPA Size Class, and Fuel Economy, 2014

TABLE 5. GM Models by EPA Size Class, 2014

Two-Seater	Mini-com-pact	Sub-com-pact	Compact	Mid-Size	Large	Station Wagon	Pickup	Van	SUV
Corvette		ELR Spark EV Spark	ATS Camaro Volt Verano Sonic	CTS LaCrosse Regal LaCrosse eAssist Regal eAssist Malibu eAssist Malibu Cruze	XTS SS Impala Impala eAssist		Sierra Silverado Canyon Colorado	Savana Express	*Escalade ESV* *Escalade* Yukon XL Suburban Yukon Tahoe SRX Enclave Acadia Traverse Terrain Captiva Equinox Encore

Note: Includes Buick, Cadillac, Chevrolet, and GMC. Models listed in *red italics* do not appear on the figure due to high MSRP.

GM's SUVs Accounted for More than One-Third of GM's Total Sales in 2014

With 16 different SUV models, GM's SUVs accounted for more than 38% of GM sales in 2014. The Chevrolet Equinox was the only SUV with more than a 4% share. The Chevrolet Silverado and GMC Sierra pickup trucks were 25% of GM's sales.

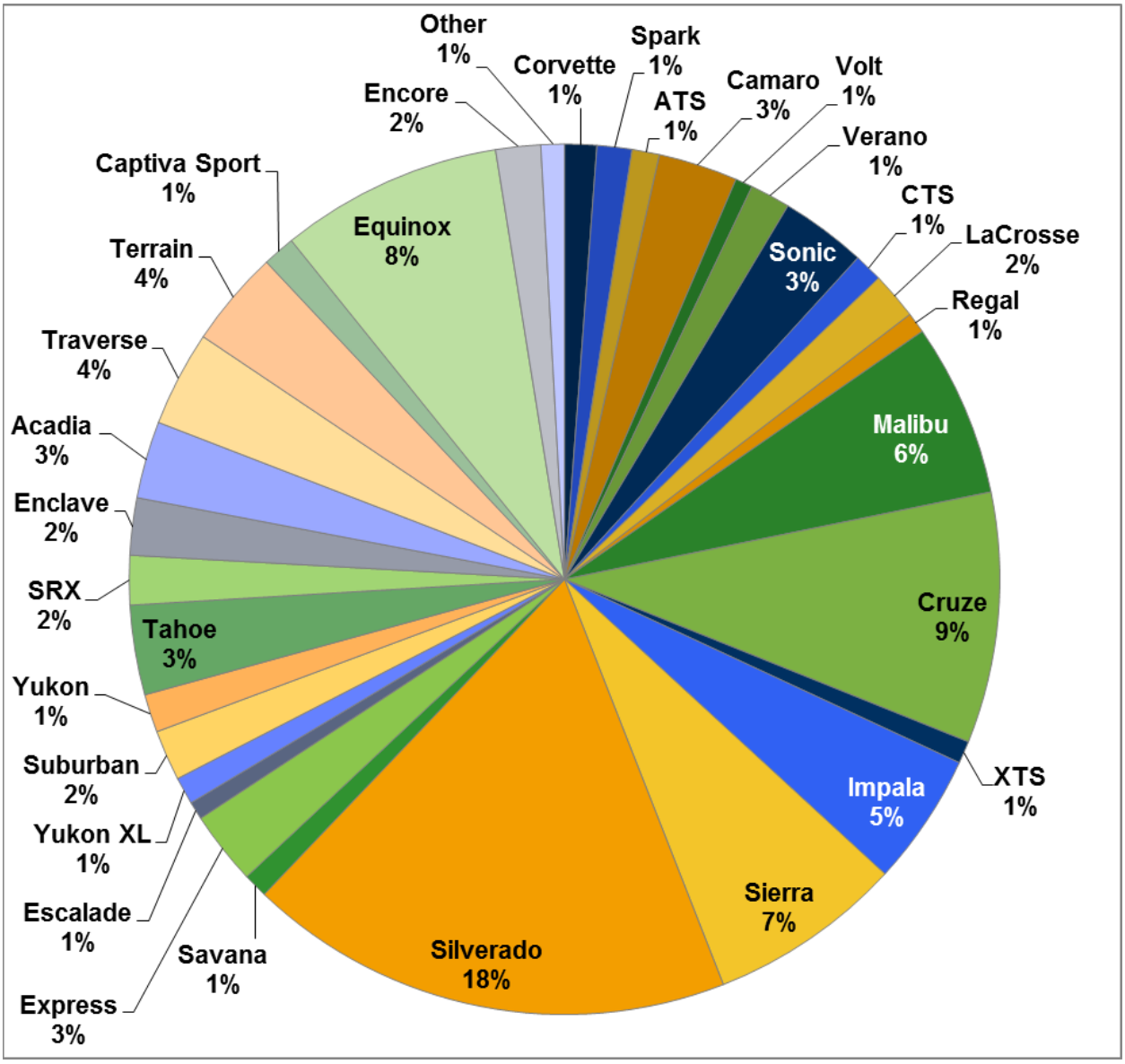


FIGURE 11. GM Market Share by Model, 2014

Note: "Other" includes the ELR, Spark EV, LaCrosse, Regal eAssist, Malibu eAssist, SS, Impala eAssist, and Escalade ESV. Each vehicle model accounted for less than 1% of the total.

Source:
Ward's Automotive Group, March 2016. http://wardsauto.com

Chevrolet Volt Accounted for More than Half of GM's 2015 Hybrid and Plug-In Sales

Cancellation of several eAssist models contributed to a decline in GM's 2014 and 2015 hybrid (HEV) sales. Sales of the aging first-generation Chevrolet Volt continued to decline in 2015. With declining availability of hybrid models and lower sales on hybrids and plug-ins (PEV), GM accounted for just under 5% of all hybrid and plug-in vehicle sales.

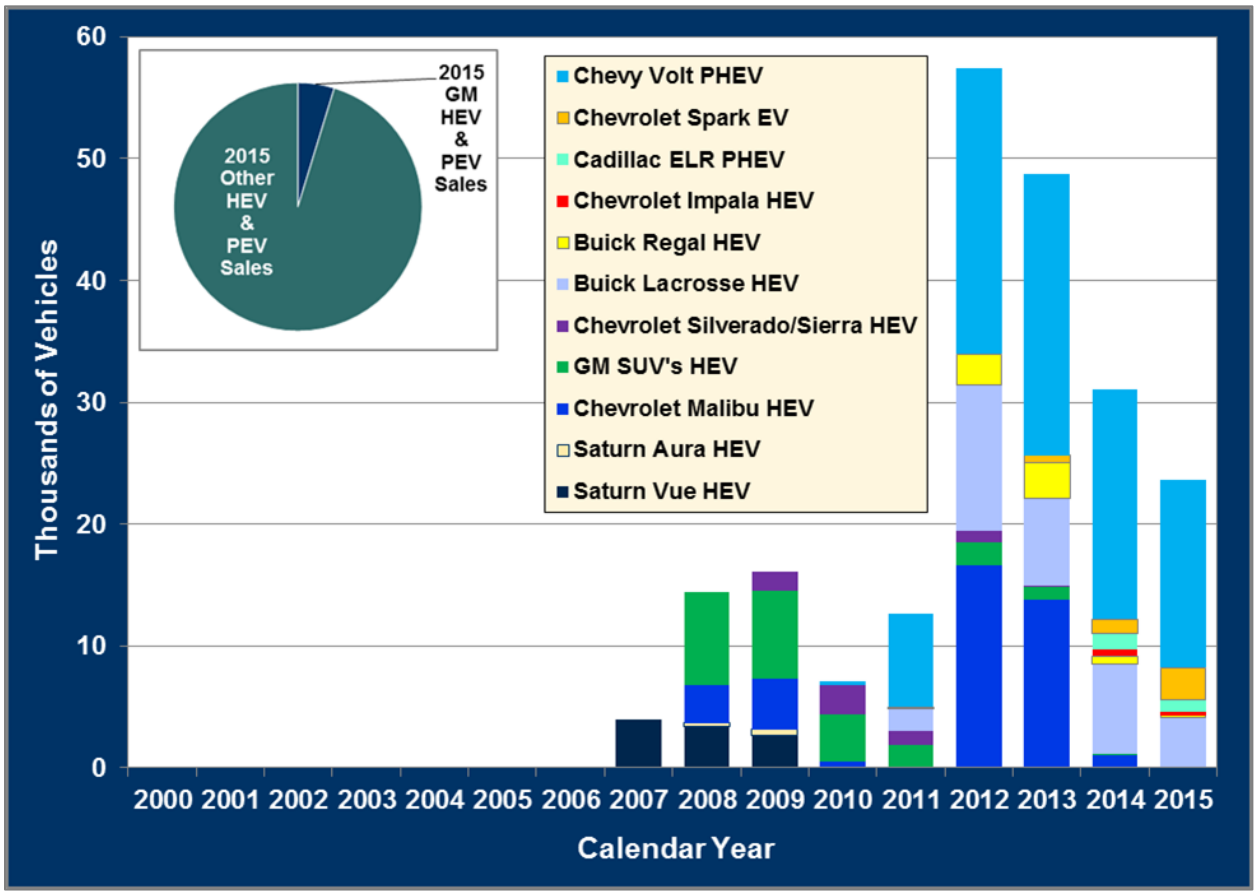


FIGURE 12. GM Hybrid and Plug-In Electric Vehicle Sales, 2000-2015

Note: Due to the wide variation of hybrid sales among manufacturers, other manufacturers' hybrid sales charts (pp. 39, 44, 54, 59, 64, 69, 74, 79) will have different vertical axis scales.

Source:
Data provided by Yan (Joann) Zhou, Argonne National Laboratory.
http://www.anl.gov/energy-systems/project/light-duty-electric-drive-vehicles-monthly-sales-updates

GM Has Many Technology/Design Relationships with Other Manufacturers

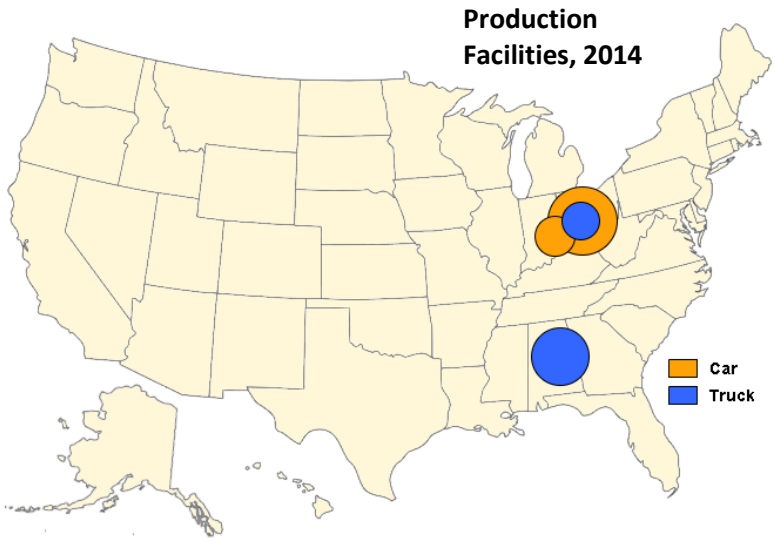
TABLE 6. GM Interrelationships with Other Automotive Manufacturers

Company	Equity Arrangement	Joint Venture	Supplies/ Buys Major Components	Marketing/Distribution Arrangement	Technology/ Design Arrangement	Manufacturing/ Assembly Agreement	Description
Avtovaz		✓				✓	Assembly joint venture in Togliatti, Russia for Chevrolet Niva
BMW					✓		Developing hydrogen refueling standards
BMW, Ford, Daimler, GM, Honda, Toyota, VW					✓		Partners in Clean Energy Partnership
FAW		✓				✓	Production & sales of light trucks & vans in China
FCA				✓			Supplies light vehicles to Opel to sell as the Combo
Ford					✓		Developing 9- and 10-speed automatic transmissions
Ford & FCA					✓		Co-research projects under the USCAR
GAZ						✓	Assembles Chevrolet Aveo in Nizhny, Norgorod
Honda					✓		Co-developing next generation fuel cell system and hydrogen storage technologies
Isuzu					✓		Memorandum of Understanding to jointly develop a pickup truck
Isuzu			✓	✓		✓	Build and distribute trucks in South Africa, Kenya, Egypt & Tunisia
Nissan				✓			Supply NV200 vans to sell as Chevrolet City Express in Canada & U.S
Peugeot	✓			✓	✓		Jointly develop small engines & vehicles for European market
Shanghai Auto					✓		Co-develop architecture and components for electric cars sold in China
Shanghai Auto		✓		✓			Co-handles production, sales and after-sales services for GM vehicles
Shanghai Auto						✓	Partner in vehicle assembly operation in Liuzhou, China
Shanghai Auto	✓						Holds stakes in GM Korea and GM India
ZAZ						✓	Assembles Chevrolet models

Source:
Ward's Automotive Group, *Interrelationships among the World's Major Auto Makers*, October 2015.
http://wardsauto.com

Honda Company Profile

Corporate Average Fuel Economy, MY 2014	
Domestic Cars	39.6 mpg
Import Cars	42.0 mpg
Light Trucks	28.8 mpg
Average Vehicle Footprint, MY 2015	
Cars	45.3 sq ft
Light Trucks	49.4 sq ft
All	46.4 sq ft
Number of Alternative Fuel Models, MY 2015	
Flex Fuel	0
Natural Gas	1
Propane	0
Hybrid-Electric	3
Plug-In Hybrid-Electric	0
Electric	0
Hydrogen	0



Honda Plants	Type	2014 Production
Marysville, OH	Car	442,135
Lincoln, AL	Truck	363,419
Greensburg, IN	Car	242,061
East Liberty, OH	Truck	221,289

FIGURE 13. Honda Company Profile

Fuel Saving Technologies

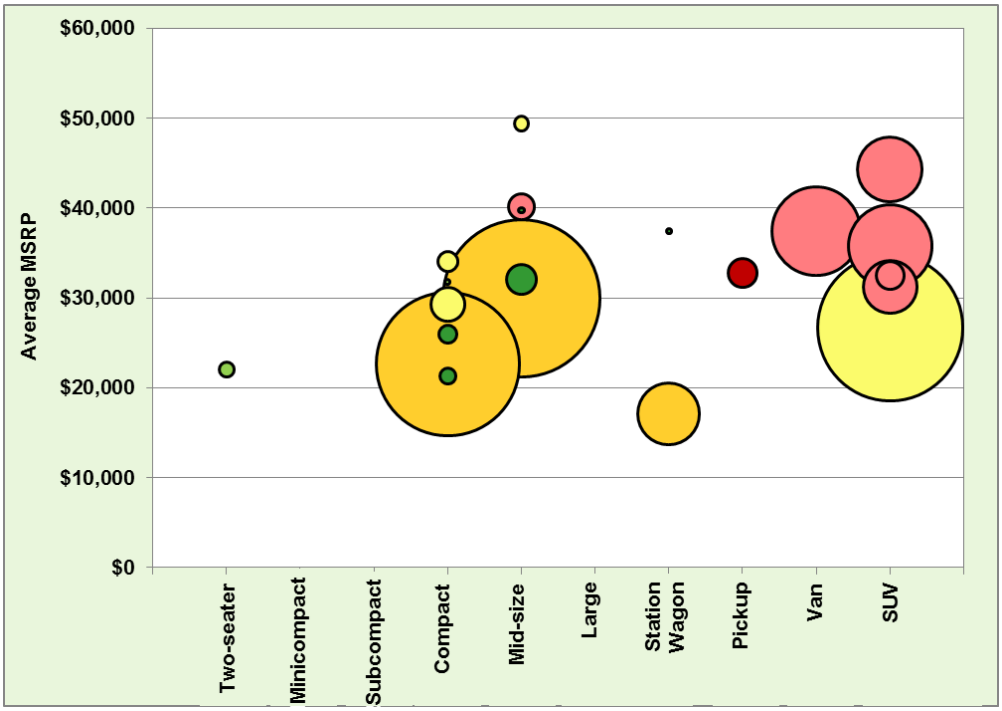
For the 2015 model year, Honda discontinued both the Fit EV and the Honda Accord Plug-in Hybrid. The Fit EV was a compliance car, sold only in California and the Accord Plug-in Hybrid was rated at just 13 miles of electric range. However, Honda remains committed to hybrid and electric technologies, offering hybrid drive trains in the CR-Z sport hybrid and on versions of the Civic, Accord and Acura RLX. Honda also announced that a plug-in hybrid offering about 40 miles of electric range was planned as is an all-electric model.

Honda unveiled the production version of the all-new Clarity Fuel Cell sedan which replaces the FCX Clarity. Initially, it will only be available in selected areas of California beginning in late 2016. The new Clarity has a fuel cell stack that is 33% smaller than the previous fuel cell stack while producing 60% more output. The fuel cell components size reduction allows the entire powertrain to be housed under the hood of the sedan making it possible for Honda to install this technology across a broad range of vehicle types as the cabin space is not compromised. The Honda Civic Natural Gas sedan, which is the only natural gas sedan on the market from a major automaker, will be phased out as Honda concentrates on fuel cell, hybrid, and electric vehicles.

For conventional gasoline vehicles, Honda has been implementing a suite of drivetrain technologies marketed under the name “Earth Dreams” that includes a new generation of direct injection engines, turbocharging, and greater use of CVT transmissions. Improvements to previously used technologies like cylinder deactivation are also part of the strategy. A 9-speed transmission was used on the 2016 Pilot, and in late 2015, Honda announced that it is developing a new 10-speed automatic transmission and claims that fuel economy will be improved by about 6% over the models fitted with the current 6-speed transmissions.

Honda's Fleet Mix

Honda Motor Company has just one model with a combined average fuel economy of less than 20 mpg and it represents a small portion of total sales. Those models that sell in the greatest number have combined fuel economies of 25 mpg or higher. The Honda Accord is the highest selling model followed closely by the Civic with a combined average fuel economy of more than 30 mpg. Nearly all of Honda's models have an average MSRP of less than $50,000.



Note: The size of the bubble indicates sales. The color of the bubble indicates fuel economy.

Miles per Gallon	Color
< 20	
20-24	
25-29	
30-34	
35-39	
>= 40	

FIGURE 14. Honda Sales by Model, MSRP, EPA Size Class, and Fuel Economy, 2014

TABLE 7. Honda Models by EPA Class, 2014

Two-Seater	Mini-compact	Sub-compact	Compact	Mid-Size	Large	Station Wagon	Pickup	Van	SUV
CR-Z			TSX ILX Hybrid ILX Civic-Hybrid Civic Insight	*RLX Hybrid* RLX TL Accord PHEV Accord Hybrid Accord		Fit EV Fit	Ridgeline	Odyssey	MDX Pilot Crosstour RDX CR-V

Note: Includes Honda and Acura. Models listed in *red italics* do not appear on the figure due to high MSRP.

The Accord, CR-V, and Civic Combined Were Two-Thirds of Honda's Sales in 2014

The three biggest sellers for Honda are the Accord, CR-V, and Civic, each with more than 20% of Honda's market share. All together, the Accura-brand vehicles comprise less than 20% of the total.

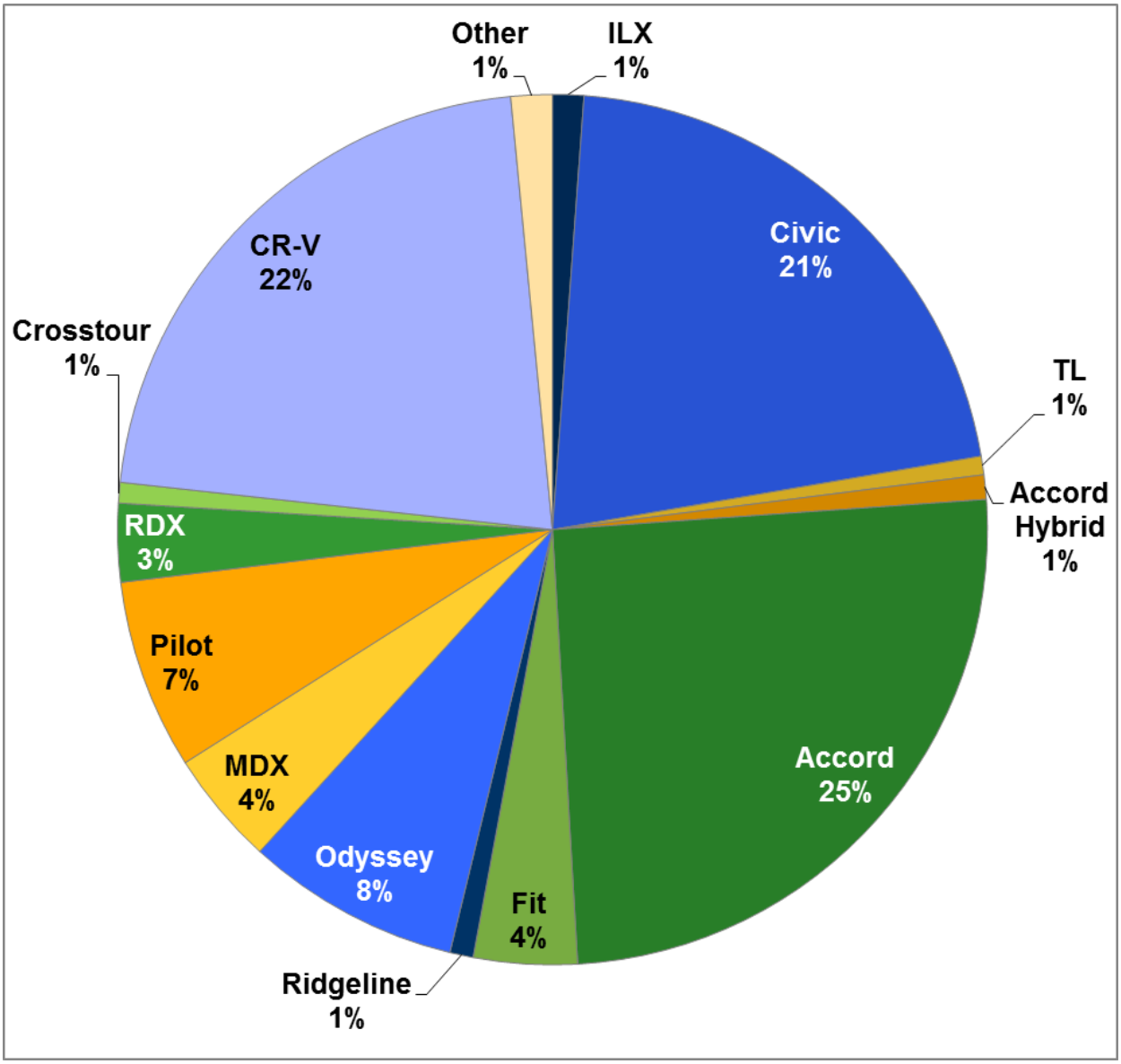


FIGURE 15. Honda Market Share by Model, 2014

Note: "Other" includes the CR-Z, TSX, ILX Hybrid, Civic Hybrid, Insight, RLX, Accord PHEV, and Fit EV. Each vehicle model accounted for less than 1% of the total.

Source:
Ward's Automotive Group, March 2016. http://wardsauto.com

Honda Discontinues Five Hybrid and Plug-In Models

Honda announced in 2014 that the Honda Fit EV, Honda Insight and Acura ILX Hybrid would be discontinued for model year 2015. The discontinuation of the Honda Civic Hybrid and Honda Accord Plug-in Hybrid was announced in 2015. Because sales are shown on a calendar-year basis, some of the models may have sales in the calendar year after discontinuation. In 2015, Honda sold just over 4% of all hybrid-electric (HEV) and plug-in vehicle (PEV) sales.

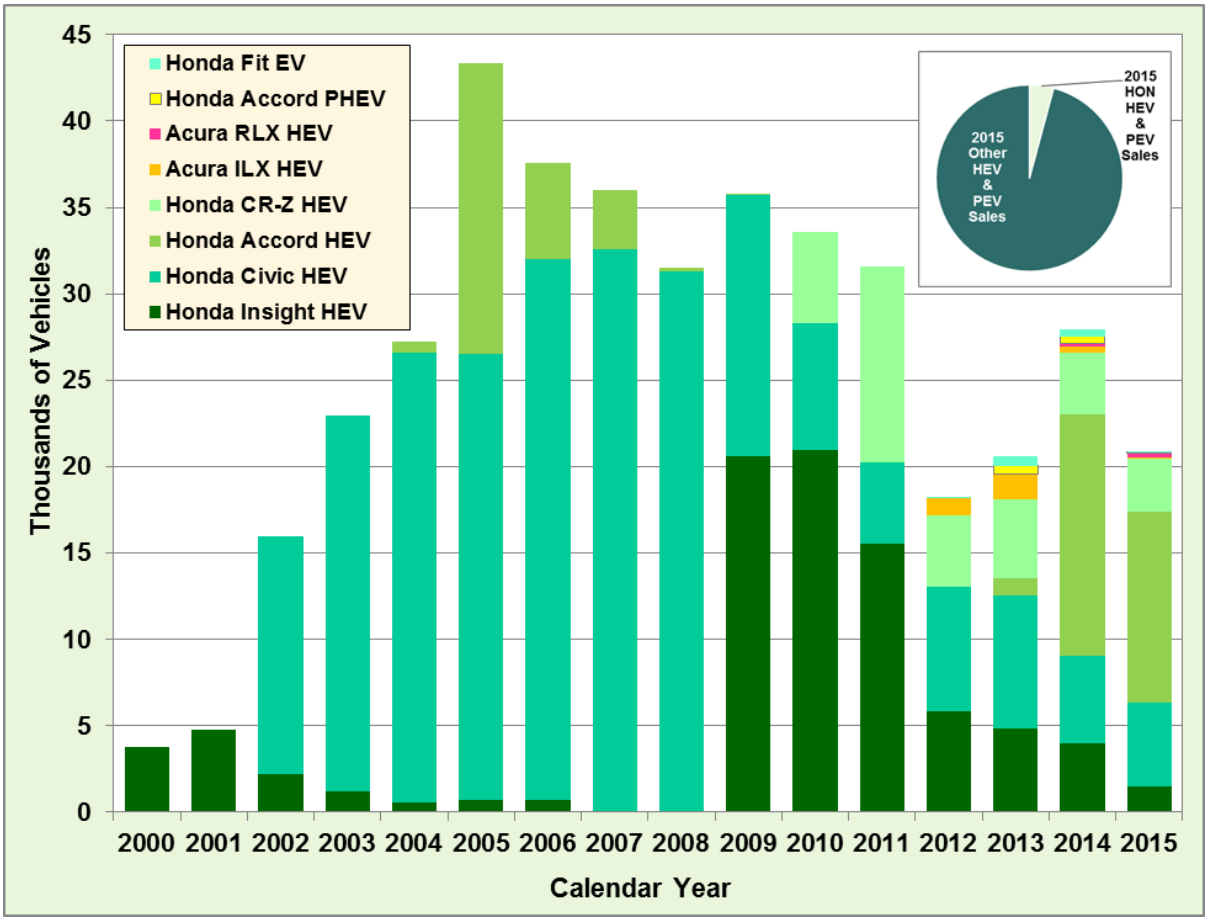


FIGURE 16. Honda Hybrid and Plug-In Electric Vehicle Sales, 2000-2015

Note: Due to the wide variation of hybrid sales among manufacturers, other manufacturers' hybrid sales charts (pp. 39, 44, 49, 59, 64, 69, 74, 79) will have different vertical axis scales.

Source:
Data provided by Yan (Joann) Zhou, Argonne National Laboratory.
http://www.anl.gov/energy-systems/project/light-duty-electric-drive-vehicles-monthly-sales-updates

Honda Works with Other Manufacturers on Fuel Cells and Hydrogen

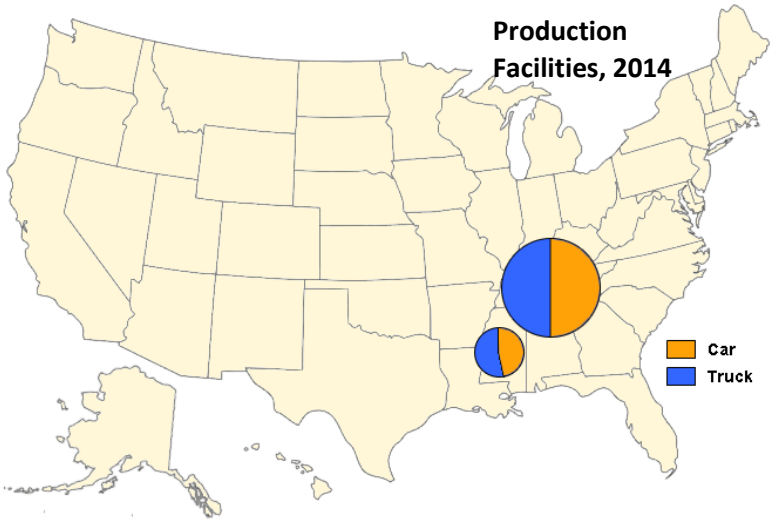
TABLE 8. Honda Interrelationships with Other Automotive Manufacturers

Company	Equity Arrangement	Joint Venture	Supplies/ Buys Major Components	Marketing/Distribution Arrangement	Technology/ Design Arrangement	Manufacturing/ Assembly Agreement	Description
BMW, Ford, Daimler, GM, Honda, Toyota, VW					✓		Partners in Clean Energy Partnership
Dongfeng		✓				✓	Joint venture to build and sell cars in Wuhan, China
Guangzhou		✓				✓	Joint venture to build cars and vans in Guangzhou, China
GM					✓		Co-developing next generation fuel cell system and hydrogen storage technologies
Nissan, Toyota		✓					Joint venture project for the development of hydrogen station infrastructure in Japan
Proton				✓	✓		Planning partnership to include platform sharing and distribution arrangements

Source:
Ward's Automotive Group, *Interrelationships among the World's Major Auto Makers*, October 2015.
http://wardsauto.com

Nissan Company Profile

Corporate Average Fuel Economy, MY 2014	
Domestic Cars	40.6 mpg
Import Cars	38.8 mpg
Light Trucks	26.7 mpg
Average Vehicle Footprint, MY 2015	
Domestic Cars	45.1 sq ft
Import Cars	50.7 sq ft
Light Trucks	46.9 sq ft
Number of Alternative Fuel Models, MY 2015	
Flex Fuel	2
Natural Gas	0
Propane	0
Hybrid-Electric	3
Plug-In Hybrid-Electric	0
Electric	1
Hydrogen	0



Nissan Plants	Type	2014 Production
Smyrna, TN	Truck	327,011
Smyrna, TN	Car	321,038
Canton, MS	Truck	158,770
Canton, MS	Car	140,739

FIGURE 17. Nissan Company Profile

Fuel Savings Technologies

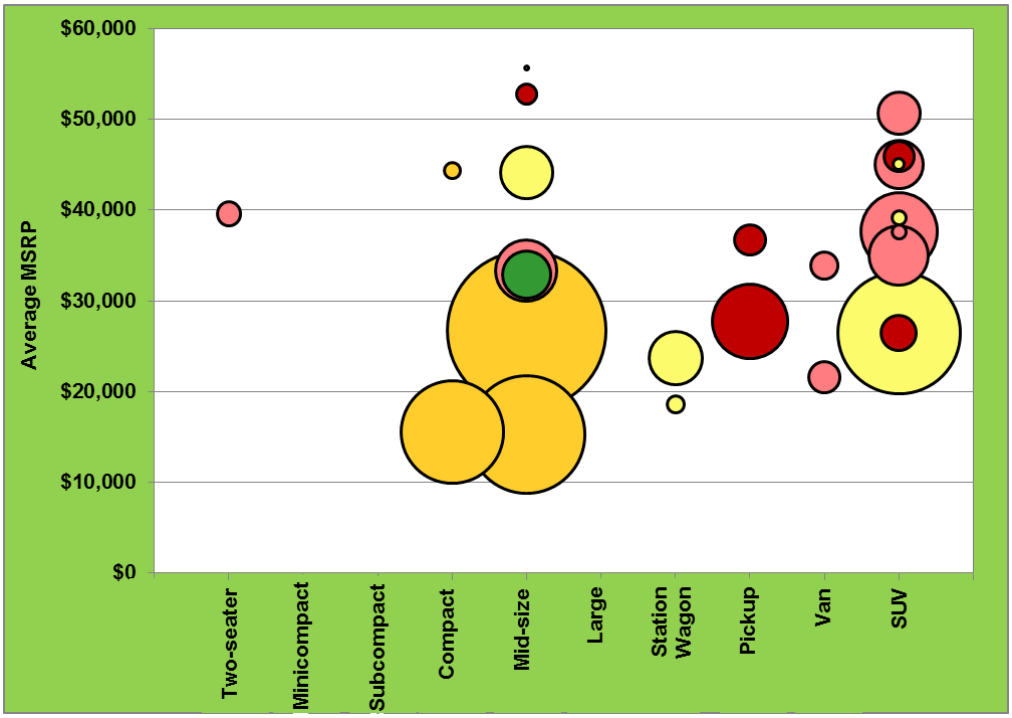
Nissan has made several statements in the media this year reaffirming their commitment to bringing affordable all-electric vehicles to market. In 2015, Nissan introduced two battery options for the 2016 Nissan Leaf. A 30 kWh battery pack that delivers 107 miles of range is now available in addition to the 24 kWh battery pack rated at 84 miles. The next generation Nissan Leaf is expected in 2018 with a 60 kWh battery and a range of about 200 miles. Some degree of autonomous driving capability is also expected with the redesigned Leaf. The Nissan Pathfinder Hybrid and Infiniti QX60 Hybrid have been cancelled for the 2016 model year, but Nissan continues to produce hybrid sedans under the Infiniti brand.

Nissan has long been a leader in the development and implementation of continuously variable transmissions (CVTs) and now offers them across a broad selection of vehicles. Nissan's Xtronic CVT is used with engine displacements up to 3.5 liters. For 2015, Nissan introduced an update to their CVT transmission called D-Step Shift Logic that mimics the sensation and sound of an automatic transmission while retaining the fuel economy benefits of a CVT. Nissan also employs conventional automatic transmissions, manual transmissions and an automated manual dual clutch transmission in sporty models like the Nissan GT-R.

Reducing vehicle mass and downsizing engines through direct injection, turbocharging and supercharging are key areas of focus. Nissan has committed to greater use of advanced high tensile strength steel which reduced the weight of the Infiniti Q50 by about 90 pounds. Nissan is planning much greater use of high strength steel beginning in 2017. Engine downsizing and weight reduction are epitomized in the 1.5L turbocharged 3-cylinder engine that weighs just 88 pounds but delivers 400 horsepower and 280 pound-feet of torque. While developed for racing, it demonstrates what is possible and may well influence future production engine design.

Nissan's Fleet Mix

Nissan sells a large number of models that have a combined fuel economy of less than 20 mpg but they sell in relatively low numbers. The compact and mid-size car segments account for a large portion of Nissan's overall sales. The Nissan Versa, Altima, Sentra, and Leaf are the four car models shown in the figure with a combined rating of more than 30 mpg.



Note: The size of the bubble indicates sales. The color of the bubble indicates fuel economy.

Miles per Gallon	Color
< 20	
20-24	
25-29	
30-34	
35-39	
>= 40	

FIGURE 18. Nissan Sales by Model, MSRP, EPA Size Class, and Fuel Economy, 2014

TABLE 9. Nissan Models by EPA Size Class, 2014

Two-Seater	Mini-compact	Sub-compact	Compact	Mid-Size	Large	Station Wagon	Pickup	Van	SUV
370Z		*GT-R*	Q50 Hybrid Versa	Q70-Hybrid Q50 Q60 Leaf Maxima Altima Sentra		Juke Cube	Titan Frontier	Quest NV200	*QX80* QX60 Armada QX60-Hybrid QX70 Pathfinder-Hybrid Pathfinder QX50 Murano Rogue Xterra

Note: Includes Nissan and Infiniti. Models listed in *red italics* do not appear on the figure due to high MSRP.

Nissan Altima Was Nearly One-Quarter of Nissan's Sales in 2014

The Altima was Nissan's best seller in 2014, followed by the Rogue SUV (14%). The Versa and Sentra are the only other models to account for 10% or more. The pickup trucks (Frontier and Titan) held about 6% of Nissan's total sales.

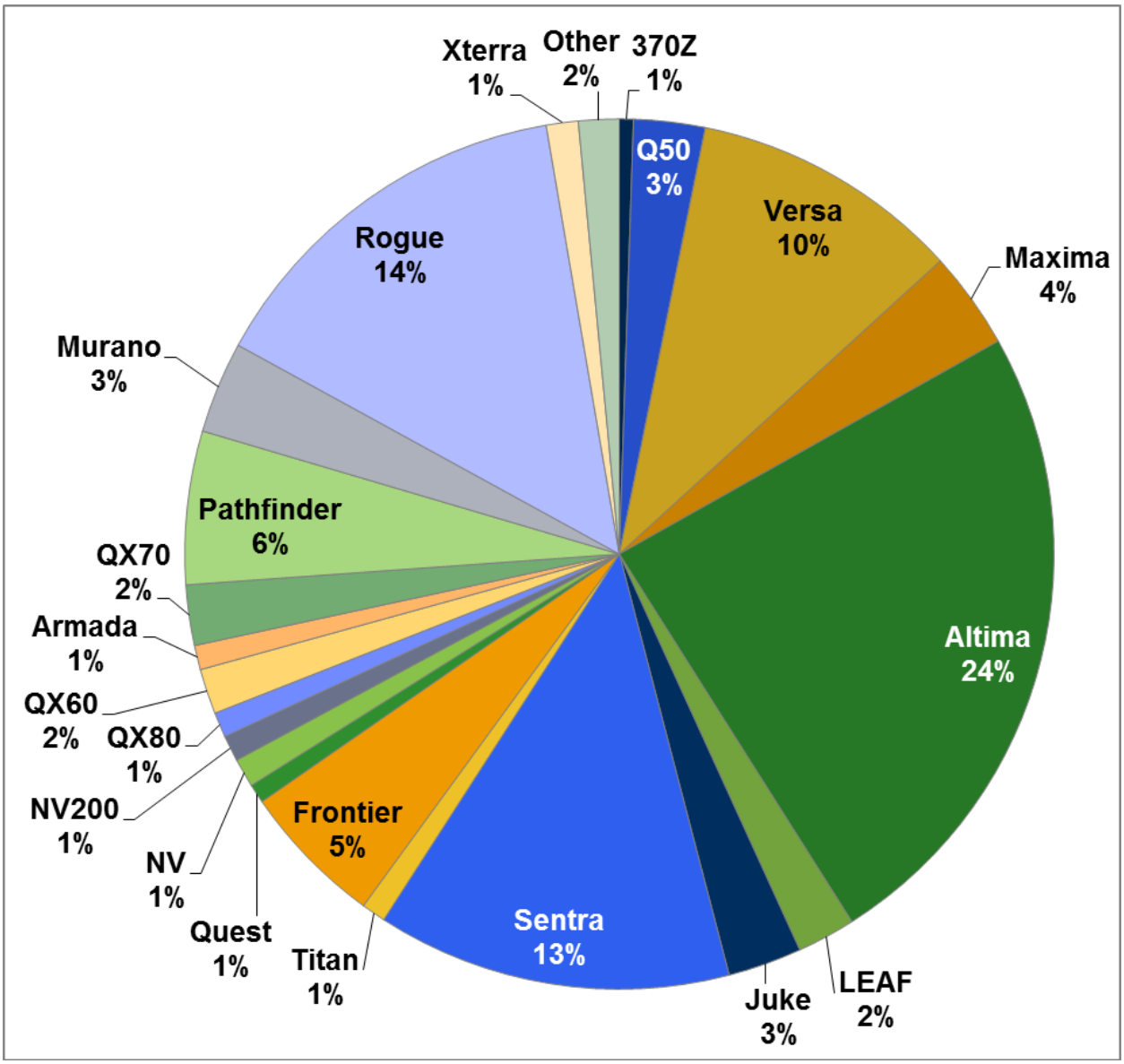


FIGURE 19. Nissan Market Share by Model, 2014

Note: "Other" includes the GT-R, Q50 Hybrid, Q70 Hybrid, Q60, Cube, QX60 Hybrid, Pathfinder Hybrid, and QX50. Each vehicle model accounted for less than 1% of the total.

Source:
Ward's Automotive Group, March 2016. http://wardsauto.com

Nissan Leaf Was Two-Thirds of Nissan's Hybrid and Plug-In Vehicle Sales in 2015

Nissan Leaf electric vehicle (EV) sales represent two-thirds of Nissan's hybrid-electric (HEV) and plug-in vehicle (PEV) sales. The sales of the Infiniti Q50 and QX60 hybrids grew slightly in 2015, but other hybrid models declined. Nissan is responsible for just over 5% of all HEV and PEV sales.

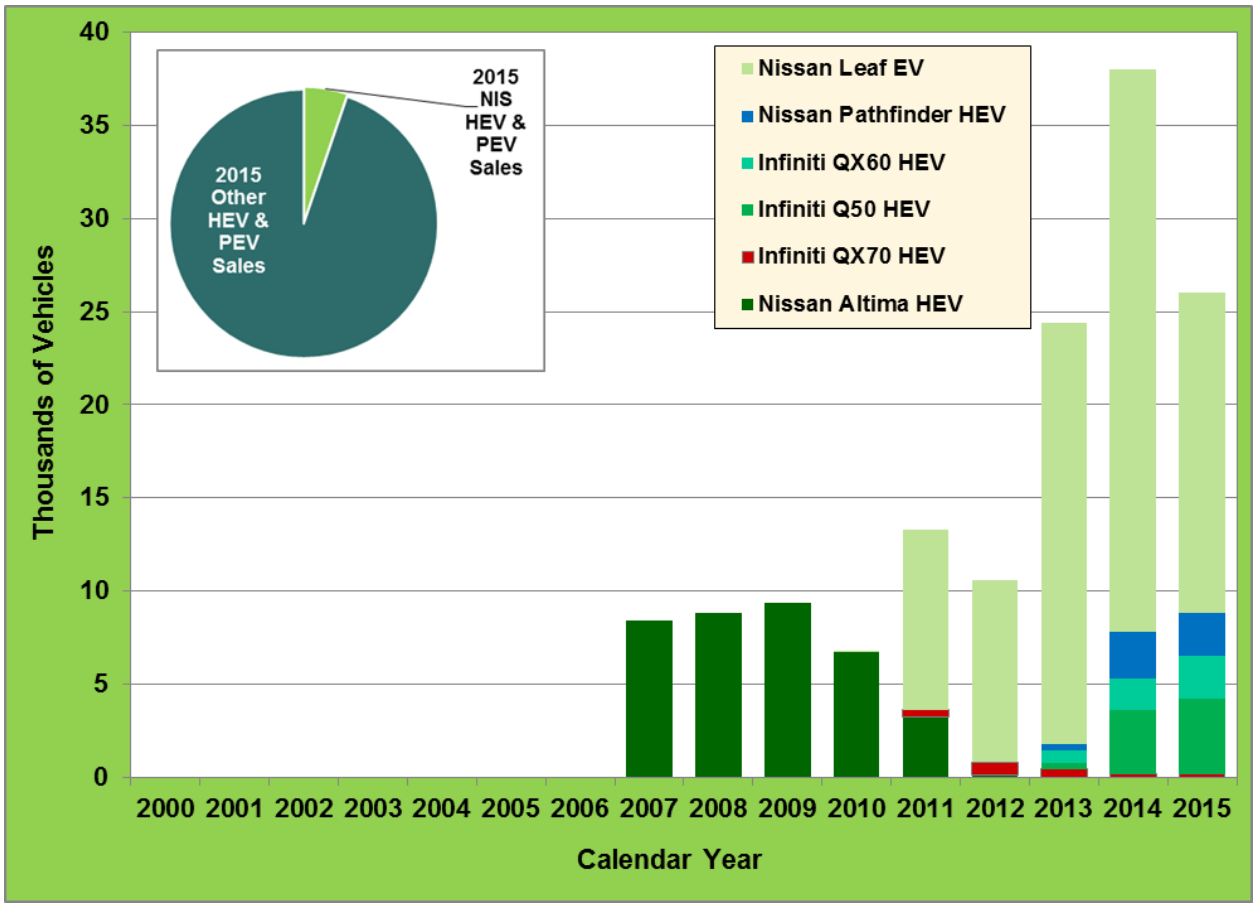


FIGURE 20. Nissan Hybrid and Plug-In Electric Vehicle Sales, 2000-2015

Notes: Due to the wide variation of hybrid sales among manufacturers, other manufacturers' hybrid sales charts (pp. 39, 44, 49, 54, 64, 69, 74, 79) will have different vertical axis scales. Altima sales in 2012 are for the Model Year 2011.

Source:
Data provided by Yan (Joann) Zhou, Argonne National Laboratory.
http://www.anl.gov/energy-systems/project/light-duty-electric-drive-vehicles-monthly-sales-updates

Nissan Has the Most Interrelationships

TABLE 10. Nissan Interrelationships with Other Automotive Manufacturers

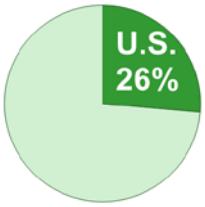
Company	Equity Arrangement	Joint Venture	Supplies/ Buys Major Components	Marketing/Distribution Arrangement	Technology/ Design Arrangement	Manufacturing/ Assembly Agreement	Description
Avtovaz	✓						Joint venture with Renault-Nissan
BMW					✓		Memorandum of understanding to jointly plan and build a national grid of vehicle charging stations in South Africa
Dacia					✓		Co-engineered Nissan Logan platform built by Dacia
Daimler, Ford					✓		Partnering in R&D Automotive Fuel Cell Cooperation
Daimler		✓			✓		Partner with Renault-Nissan to develop small cars, vans, & powertrains
Daimler			✓	✓			Supplies diesel engines for European Infiniti models
Daimler			✓				Allows Nissan to manufacture automatic transmissions for Nissan & Infiniti vehicles
Daimler						✓	Engines for Infiniti & Mercedes Benz built by Nissan in 2014
Daimler					✓	✓	Jointly develop a Mercedes-Benz midsize pickup truck to be built by Renault-Nissan in Spain and Argentina
Dongfeng		✓		✓		✓	Joint venture in Guangzhou, China to make & sell Venucia cars
Dongfeng				✓	✓		Co-developed medium truck in Avila, Spain
GM						✓	Nissan supplies NV200 vans to GM in the United States. & Canada
Mazda			✓	✓	✓		Supplies vehicles & develops components
Mitsubishi		✓			✓	✓	Joint venture in minicars called NMKV
Mitsubishi				✓		✓	Supplies light duty trucks in Japanese market
Renault			✓	✓	✓		Share platforms, components & marketing
Renault	✓					✓	Owns a stake and builds vehicles for Nissan
Renault, Avtovaz		✓					Joint venture in Tangier, Morocco
Suzuki, Mitsubishi	✓						Co-ownership with Nissan in Jatco Ltd transmission making
Suzuki				✓	✓	✓	Produces mini commercial vehicles & minicars in Japan

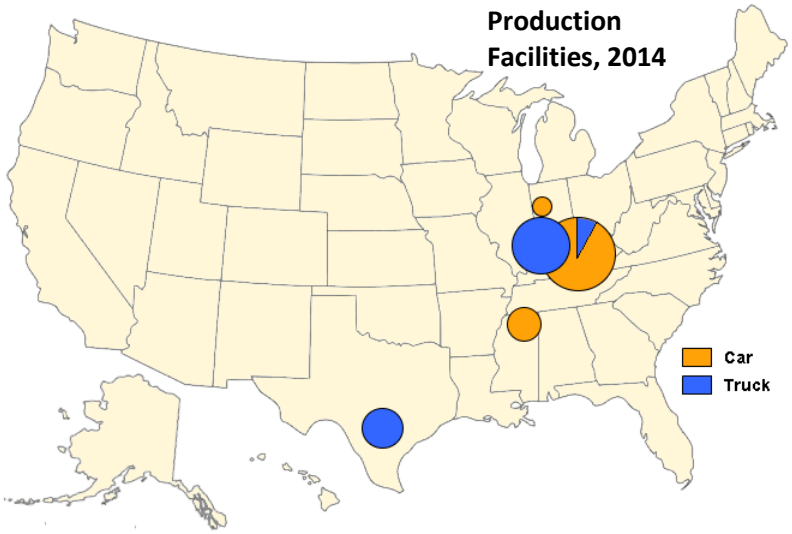
Source: Ward's Automotive Group, *Interrelationships among the World's Major Auto Makers*, October 2015. http://wardsauto.com

Toyota Company Profile

Corporate Average Fuel Economy, MY 2014	
Domestic Cars	39.1 mpg
Import Cars	44.2 mpg
Light Trucks	25.8 mpg
Average Vehicle Footprint, MY 2015	
Cars	45.5 sq ft
Light Trucks	53.1 sq ft
All	48.6 sq ft
Number of Alternative Fuel Models, MY 2015	
Flex Fuel	2
Natural Gas	0
Propane	0
Hybrid-Electric	12
Plug-In Hybrid-Electric	1
Electric	2
Hydrogen	0

World Sales = 9.0 million





Toyota Plants	Type	2014 Production
Georgetown, KY	Car	425,705
Princeton, IN	Truck	349,522
San Antonio, TX	Truck	236,668
Blue Springs, MS	Car	189,314
Lafayette, IN	Car	93,476
Georgetown, KY	Truck	40,006

FIGURE 21. Toyota Company Profile

Fuel Saving Technologies

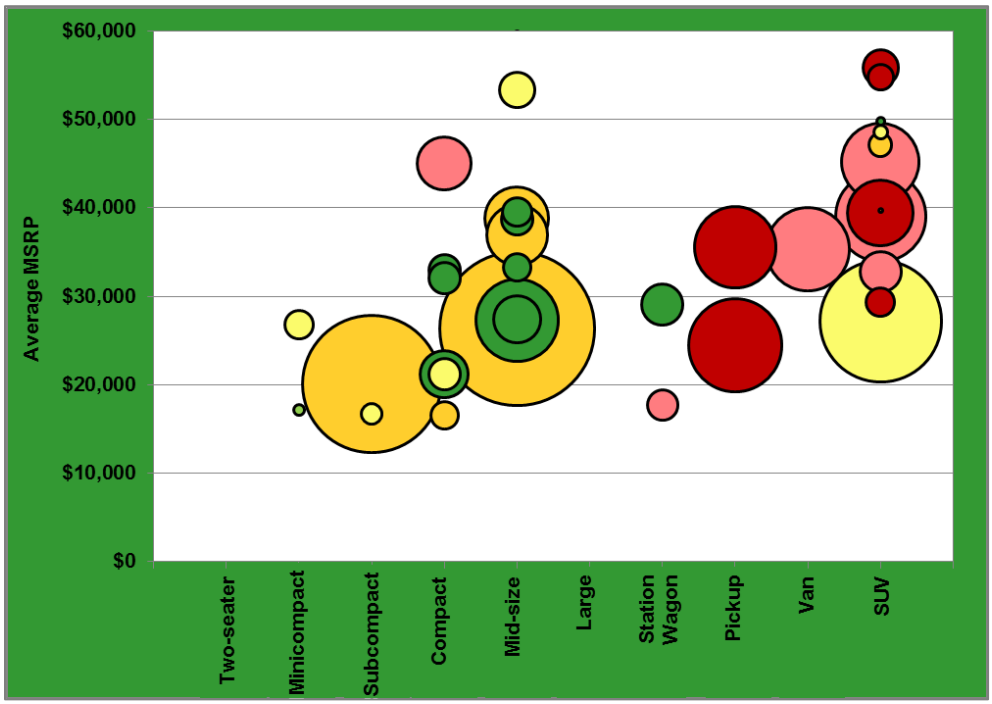
In the Fall of 2015, US sales of the 2016 Toyota Mirai fuel cell sedan began in California with a price of $57,500 before incentives. The Mirai is Toyota's first production fuel cell vehicle and it represents an important step in their strategy for advanced drivetrains. Unlike many manufacturers, Toyota has eschewed all-electric vehicles in favor of hydrogen fuel cell technology. This shift in strategy became clear in 2014 when Toyota revealed production plans for the Mirai while cancelling their all-electric RAV4 EV and Scion IQ EV programs.

Despite these all-electric vehicle cancelations, they remain committed to vehicle electrification by expanding and refining their Hybrid Synergy Drive technology. In fact, the Mirai fuel cell vehicle also incorporates Hybrid Synergy Drive technology. In 2015, Toyota revealed the redesigned fourth-generation Prius. The new 2016 Prius Eco has a combined EPA rating of 56 mpg making it the most fuel-efficient gasoline powered vehicle on the market. Production of the Toyota Prius plug-in hybrid that delivers about 11 miles of electric operation will be temporarily paused after the 2015 model year and a redesigned Prius plug-in hybrid is expected in late 2016, probably as a 2017 model year offering.

Conventional models have also received engine and transmission refinements. Toyota has introduced new engines with increased thermal efficiency and greater use of turbocharging. Toyota has also increased their use of CVT transmissions on models with smaller displacement engines like the Corolla. In the interest of reducing vehicle weight, Toyota is expanding the use of aluminum across their vehicle line-up for hoods, closures, and other parts. Expanded use of high-strength steels, mixed metals and resin-based materials is also planned. The redesigned 2016 Prius is built on the lightweight Toyota New Global Architecture platform and is offered with lithium-ion batteries to improve power density and offset weight on upper trim levels.

Toyota's Fleet Mix

Toyota produces many models and they are fairly evenly split between cars and trucks. Among the truck models, about half achieve a combined fuel economy of more than 20 mpg. Nearly all of the car models had a combined fuel economy of 25 mpg or higher and those models also represented a large portion of Toyota's overall sales. Ten models (shown in dark green) had a combined average fuel economy of 40 mpg or higher.



Note: The size of the bubble indicates sales. The color of the bubble indicates fuel economy.

Miles per Gallon	Color
< 20	
20-24	
25-29	
30-34	
35-39	
>= 40	

FIGURE 22. Toyota Sales by Model, MSRP, EPA Size Class, and Fuel Economy, 2014

TABLE 11. Toyota Models by EPA Size Class, 2014

Two-Seater	Mini-compact	Sub-compact	Compact	Mid-Size	Large	Station Wagon	Pickup	Van	SUV
LFA	FR-S iQ	Corolla xD	IS CT 200h Prius C tC Yaris	*LS 600h* *LS* *GS 450h* GS ES 300h ES Avalon-Hybrid Avalon Prius-PHEV Camry-Hybrid Prius Camry		Prius v xB	Tacoma Tundra	Sienna	*LX* *Land Cruiser* GX Sequoia RAV4 EV Highlander-Hybrid RX 450h RX NX-Hybrid 4Runner Highlander Venza FJ Cruiser RAV4

Note: Includes Toyota, Lexus, and Scion. Models listed in *red italics* do not appear on the figure due to high MSRP.

Together the Toyota Camry and Corolla Were Nearly One-Third of Toyota's Sales in 2014

In 2014, the Camry and Corolla were Toyota's biggest sellers, followed by the RAV4 SUV (11%). Together, the Tacoma and Tundra pickup trucks were 11% of Toyota's market. SUVs make up about one-quarter of Toyota's sales.

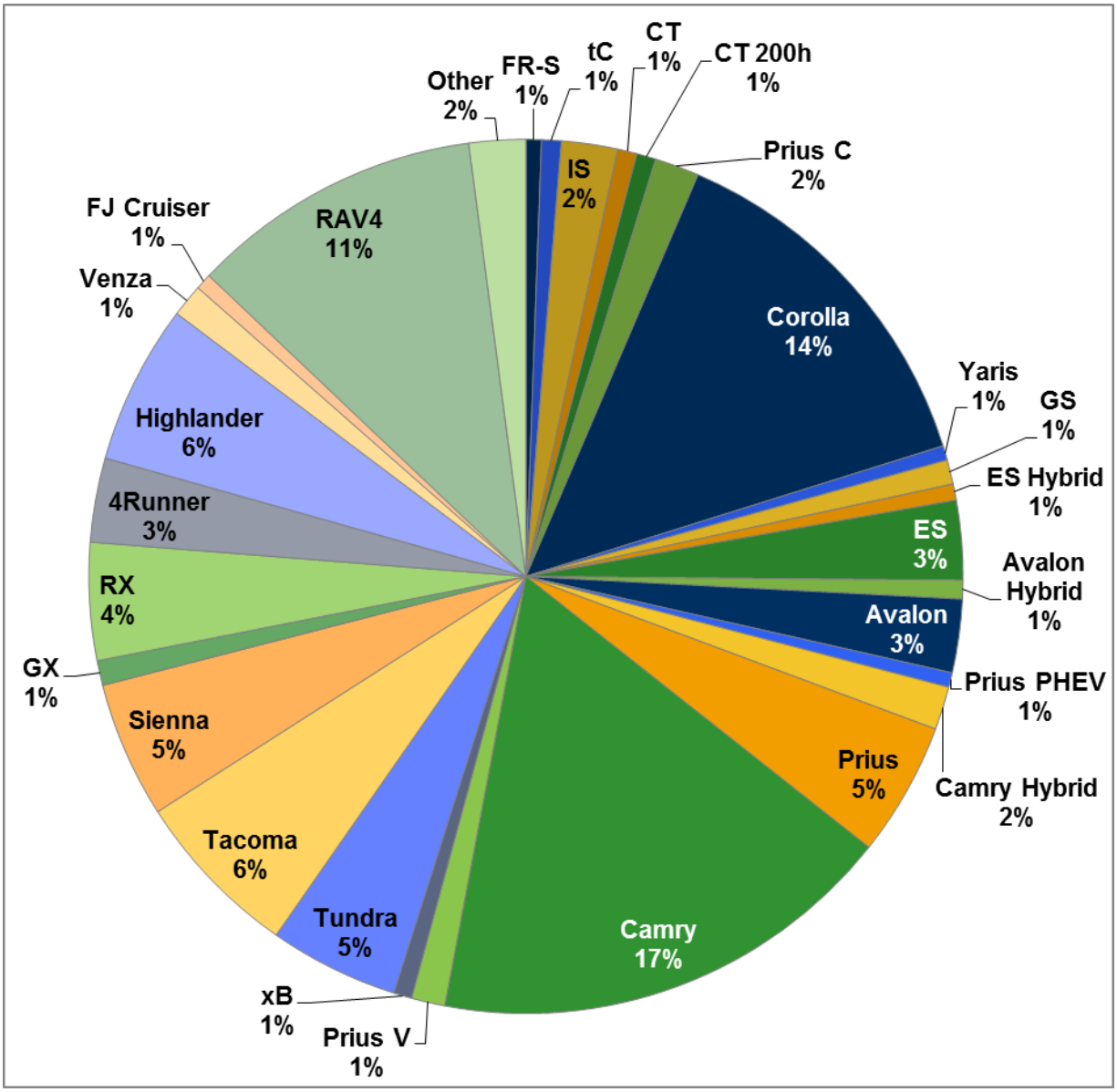


FIGURE 23. Toyota Market Share by Model, 2014

Note: "Other" includes the LFA, iQ, xD, LS 600h, LS, GS 450h, LX, Land Cruiser, Sequoia, RAV4 EV, Highlander Hybrid, Rx450h, and NX Hybrid. Each vehicle model accounted for less than 1% of the total.

Source:
Ward's Automotive Group, March 2016. http://wardsauto.com

Toyota Accounted for over Half of All Hybrid and Plug-In Vehicle Sales in 2015

Although Prius sales declined by about 7% from 2014 to 2015, Toyota remained the dominant manufacturer of hybrid vehicles (HEV). In addition to the Prius, the other hybrid and plug-in vehicles (PEV) from Toyota had declining sales in 2015, with the exception of the Lexus NX Hybrid which debuted in late 2014.

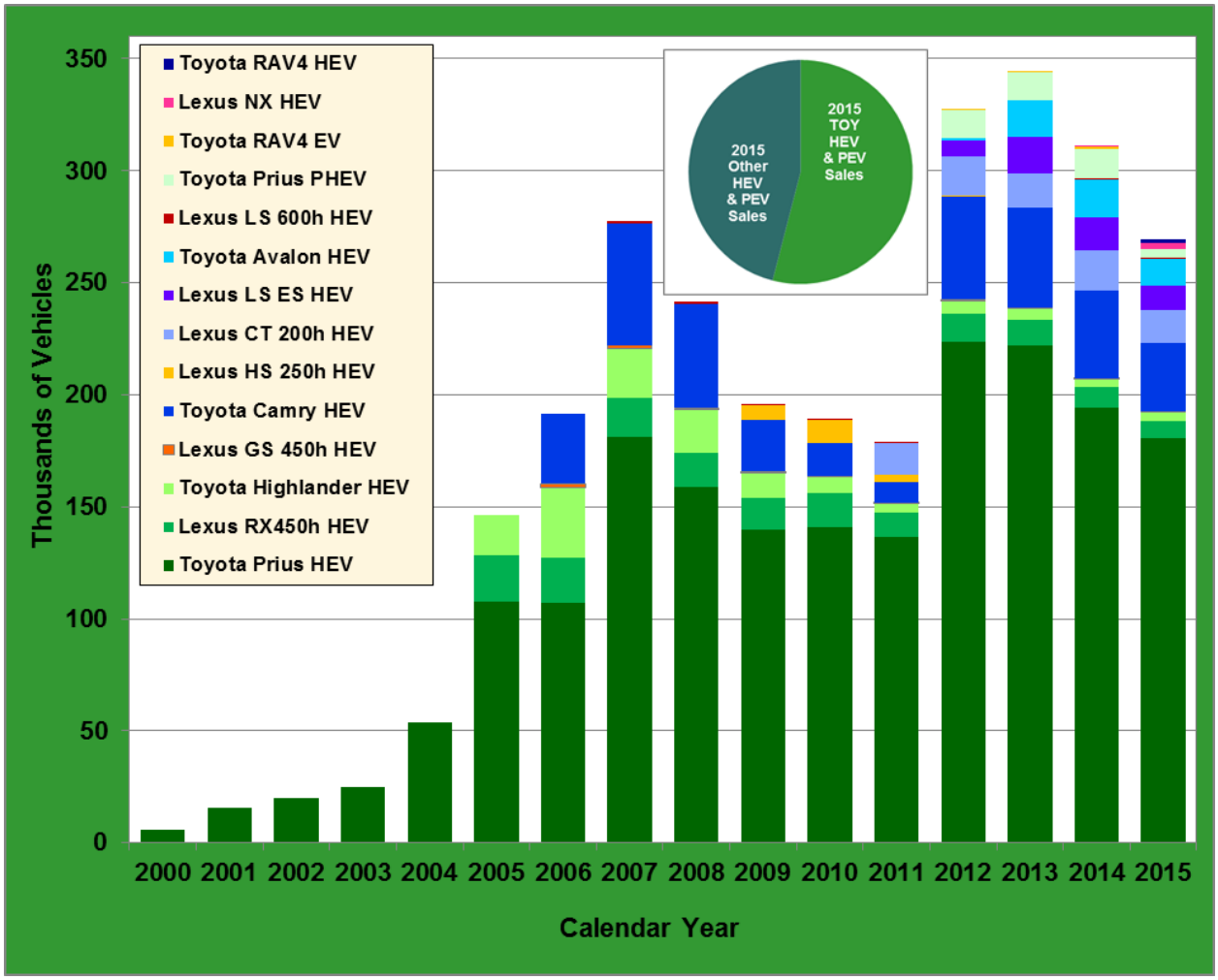


FIGURE 24. Toyota Hybrid and Plug-In Electric Vehicle Sales, 2000-2015

Note: Due to the wide variation of hybrid sales among manufacturers, other manufacturers' hybrid sales charts (pp. 39, 44, 49, 54, 59, 69, 74, 79) will have different vertical axis scales.

Source:
Data provided by Yan (Joann) Zhou, Argonne National Laboratory.
http://www.anl.gov/energy-systems/project/light-duty-electric-drive-vehicles-monthly-sales-updates

Toyota Has Six Joint Ventures

TABLE 12. Toyota Interrelationships with Other Automotive Manufacturers

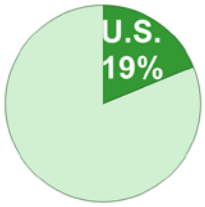
Company	Equity Arrangement	Joint Venture	Supplies/ Buys Major Components	Marketing/Distribution Arrangement	Technology/ Design Arrangement	Manufacturing/ Assembly Agreement	Description
BMW, Ford, Daimler, GM, Honda, Toyota, VW					✓		Partners in Clean Energy Partnership
BMW					✓		Jointly developing a sports-car platform
BMW			✓				Will supply diesel engines to Toyota Motor Europe
Brilliance China						✓	Manufactures Toyota minibuses
Daihatsu	✓	✓	✓				Owned mostly by Toyota
Daihatsu				✓	✓	✓	Develop components & vehicles, build vehicles
Daihatsu						✓	Toyota builds vehicles in Pakistan & Venezuela for Daihatsu
FAW	✓	✓					Three joint ventures in Asia
FAW				✓		✓	Engine manufacturing in China
Fuji	✓						Toyota owns stake in Fuji Heavy Industries
Fuji					✓		Subaru BRZ & Scion FR-S were co-developed by Toyota and Fuji
Fuji						✓	Subaru of Indiana Automotive builds Toyota Camry
Guangzhou		✓				✓	Joint venture that builds Toyota-based vehicles in Guangzhou, China
Isuzu	✓				✓		Toyota has a stake in Isuzu. The two companies collaborate on powertrain technology
Mazda			✓		✓		Licensing agreement gives Mazda access to Toyota's Hybrid Synergy Drive system
Peugeot		✓		✓		✓	Joint venture car production in Czech Republic. Peugeot will supply rebadged vans to Toyota to sell in Europe
Renault		✓				✓	Colombian SOFASA is owned by Renault, Toyota & Mitsui Engineering
Tesla					✓		Tesla developed the battery pack & powertrain for the Toyota RAV4 EV electric CUV
Tianjin		✓					Tianjin FAW Toyota Motor Co. is a joint venture with three manufacturing facilities in Tianjin Province
Tianjin						✓	Builds Toyota-based vehicles

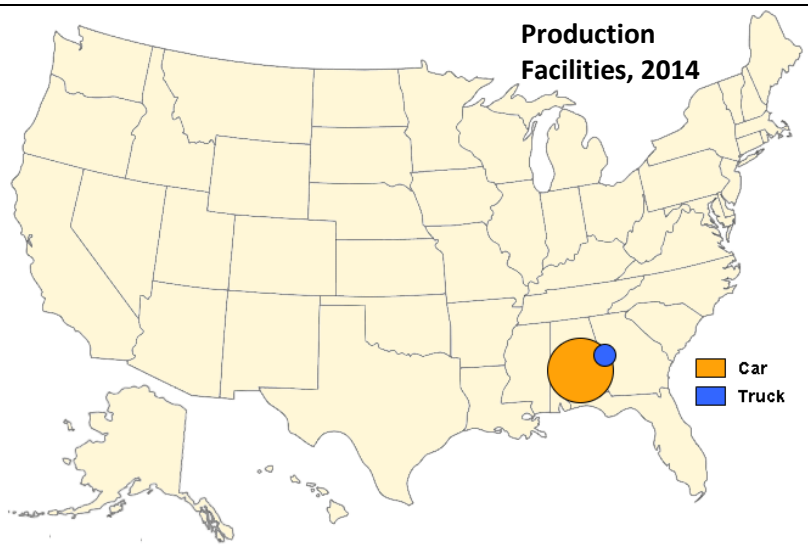
Source:
Ward's Automotive Group, *Interrelationships among the World's Major Auto Makers*, October 2015.
http://wardsauto.com

Hyundai Company Profile

Corporate Average Fuel Economy, MY 2014	
Domestic Cars	None
Import Cars	35.6 mpg
Light Trucks	27.5 mpg
Average Vehicle Footprint, MY 2015	
Cars	46.8 sq ft
Light Trucks	47.5 sq ft
All	46.9 sq ft
Number of Alternative Fuel Models, MY 2015	
Flex Fuel	0
Natural Gas	0
Propane	0
Hybrid-Electric	1
Plug-In Hybrid-Electric	0
Electric	0
Hydrogen	1

World Sales = 6.9 million





Hyundai Plants	Type	2014 Production
Montgomery, AL	Car	398,851
West Point, GA	Truck	107,830

Note: World sales figure includes Kia. All other data on the page are Hyundai only. Hyundai vehicles assembled in Alabama in 2014 do not meet CAFE criteria for domestic vehicles due to the low percentage of domestic content.

FIGURE 25. Hyundai Company Profile

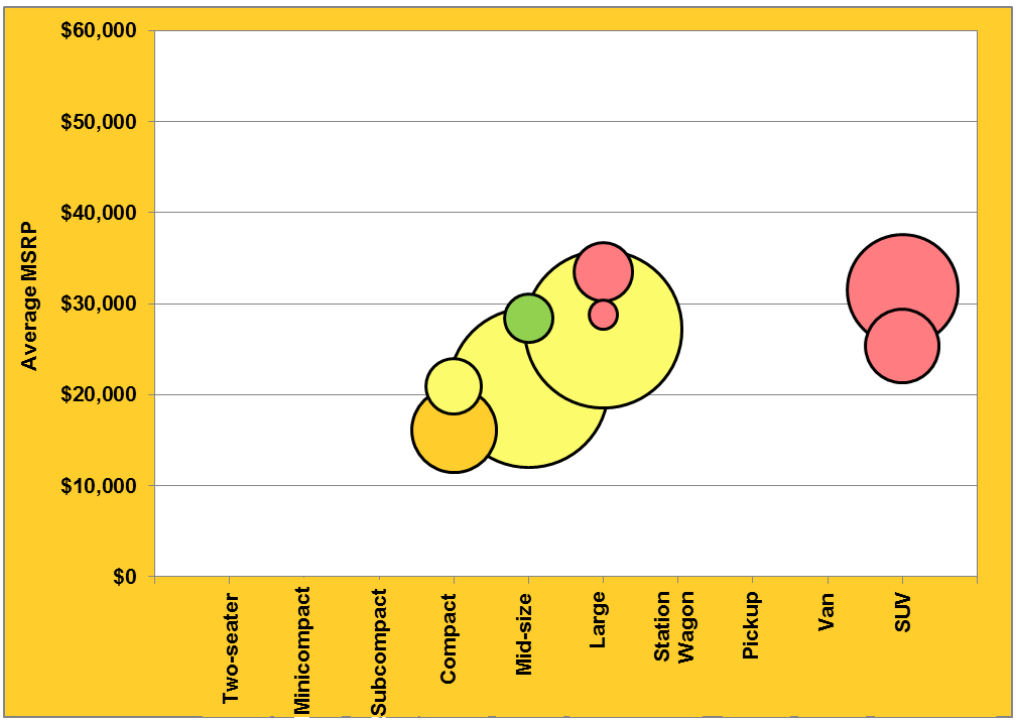
Fuel Saving Technologies

In 2015, Hyundai built on their commitment to vehicle electrification with the introduction of their first plug-in hybrid model. Joining the redesigned 2016 Sonata Hybrid, the 2016 Sonata plug-in hybrid arrived in late 2015 with an all-electric range of 27 miles and a combined electric rating of 99 MPGe and a combined gasoline rating of 40 mpg. The redesigned Sonata Hybrid has an EPA combined fuel economy of 41 mpg versus 38 mpg for the previous model. Hyundai's advanced powertrain offerings have been expanding in recent years. The 2015 Hyundai Tucson fuel cell SUV became available for lease in late 2014 for select residents in Southern California. Hyundai has announced plans to produce an all-new model called the Ioniq which will first appear as a hybrid but will later be offered as a plug-in hybrid and as an all-electric model. The Ioniq will be a hatchback sedan and is expected to arrive in 2017.

Efforts to further downsize engines and reduce vehicle weight are evident in their plans for the new Ioniq hybrid which will be powered by a 1.6 liter GDI engine with a claimed 40% thermal efficiency and it will be paired with an automated manual dual clutch transmission. To reduce weight, 54% of the body structure will be high strength steel while the hood, tailgate, and some suspension components will be made from aluminum. Unlike many manufacturers, Hyundai has not embraced CVT transmissions and is instead favoring fixed gear hydraulic automatic transmissions and automated dual clutch transmissions. At the 2014 Paris Motor Show, Hyundai unveiled their first 7-speed dual clutch automatic transmission which is now available on some 2016 models including the Tucson and Veloster Turbo. Hyundai is also developing a gasoline engine that operates like a diesel, referred to as GDCI or gasoline direct compression ignition. This engine holds the promise of offering diesel efficiency at a lower cost to build and operate than a diesel engine.

Hyundai's Fleet Mix

Hyundai's model offerings, as well as sales, are dominated by cars that have a combined fuel economy of 25 mpg or higher. The mid-size Elantra is the largest seller with an MSRP less than $20,000. All Hyundai vehicles have an MSRP less than $35,000 except the Equus which, due to its high price, is not shown on the figure.



Note: The size of the bubble indicates sales. The color of the bubble indicates fuel economy.

Miles per Gallon	Color
< 20	
20-24	
25-29	
30-34	
35-39	
>= 40	

FIGURE 26. Hyundai Sales by Model, MSRP, EPA Size Class, and Fuel Economy, 2014

TABLE 13. Hyundai Models by EPA Size Class, 2014

Two-Seater	Mini-compact	Sub-compact	Compact	Mid-Size	Large	Station Wagon	Pickup	Van	SUV
			Accent Veloster	Sonata-Hybrid Elantra	*Equus* Genesis Azera Sonata				Santa Fe Tucson

Note: Models listed in *red italics* do not appear on the figure due to high MSRP.

Together the Hyundai Elantra and Sonata Accounted for About 60% of Hyundai's Sales in 2014

The Hyundai Elantra just edged out the Sonata as the top-selling Hyundai model. The company concentrates on car sales—less than 25% of Hyundai's sales were for SUVs and there were no pickup trucks in the current lineup.

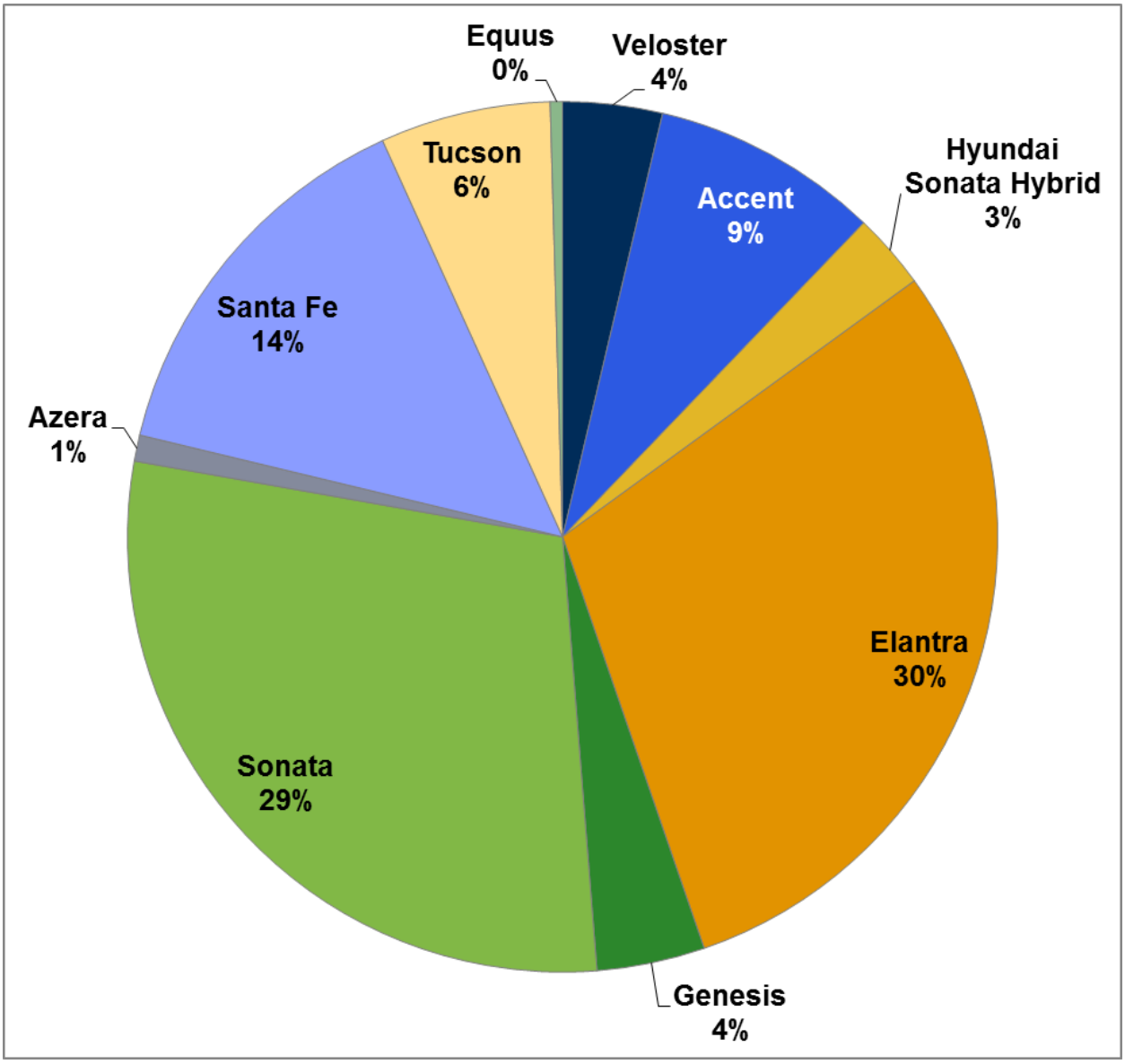


FIGURE 27. Hyundai Market Share by Model, 2014

Source:
Ward's Automotive Group, March 2016. http://wardsauto.com

Hyundai's Sonata Plug-In Vehicle Debuted in December 2015

The Sonata hybrid-electric vehicle (HEV) has been selling for five years, but the Sonata plug-in hybrid-electric vehicle (PHEV) was available for sale in December of 2015. Sales for the Sonata HEV declined by 5% from 2014 to 2015 but still accounted for about 4% of all HEV and plug-in vehicle (PEV) sales.

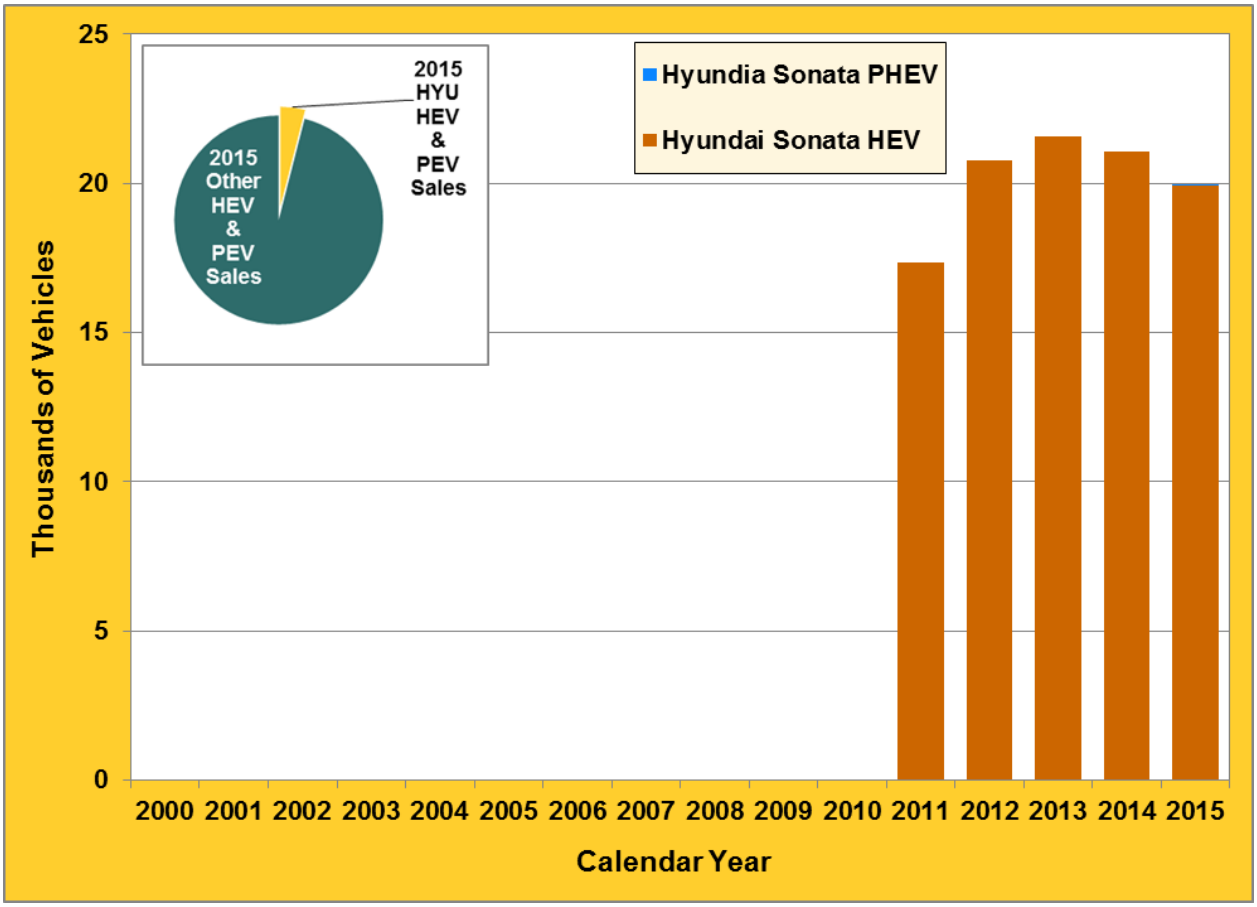


FIGURE 28. Hyundai Hybrid and Plug-In Electric Vehicle Sales, 2000-2015

Note: Due to the wide variation of hybrid sales among manufacturers, other manufacturers' hybrid sales charts (pp. 39, 44, 49, 54, 59, 64, 74, 79) will have different vertical axis scales.

Source:
Data provided by Yan (Joann) Zhou, Argonne National Laboratory.
http://www.anl.gov/energy-systems/project/light-duty-electric-drive-vehicles-monthly-sales-updates

Hyundai Has a Joint Venture in China

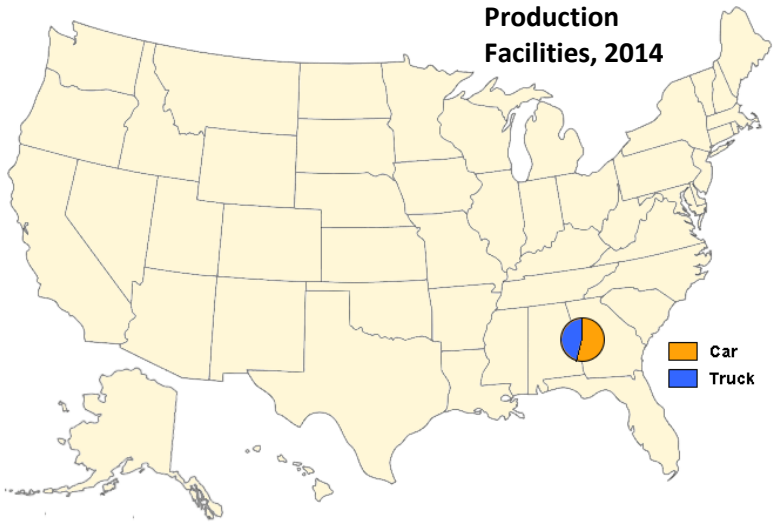
TABLE 14. Hyundai Interrelationships with Other Manufacturers

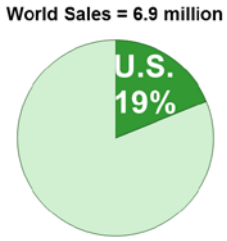
Company	Equity Arrangement	Joint Venture	Supplies/ Buys Major Components	Marketing/Distribution Arrangement	Technology/ Design Arrangement	Manufacturing/ Assembly Agreement	Description
Beijing Automotive		✓				✓	Car building joint venture
Kia			✓		✓		Share vehicle platforms, components and some R&D resources
Kia	✓						Partial ownership by Hyundai Motor & Hyundai Capital
Kia						✓	Builds the Hyundai Santa Fe

Source:
Ward's Automotive Group, *Interrelationships among the World's Major Auto Makers*, October 2015.
http://wardsauto.com

Kia Company Profile

Corporate Average Fuel Economy, MY 2014	
Domestic Cars	None
Import Cars	33.8 mpg
Light Trucks	26.9 mpg
Average Vehicle Footprint MY 2015	
Cars	46.1 sq ft
Light Trucks	51.1 sq ft
All	46.4 sq ft
Number of Alternative Fuel Models, MY 2015	
Flex Fuel	0
Natural Gas	0
Propane	0
Hybrid-Electric	1
Plug-In Hybrid-Electric	0
Electric	1
Hydrogen	0





Kia Plants	Type	2014 Production
West Point, GA	Car	142,561
West Point, GA	Truck	119,119

Note: World sales figure includes Hyundai. All other data on the page are Kia only. Kia vehicles assembled in Georgia do not meet CAFE criteria for domestic vehicles due to the low percentage of domestic content.

FIGURE 29. Kia Company Profile

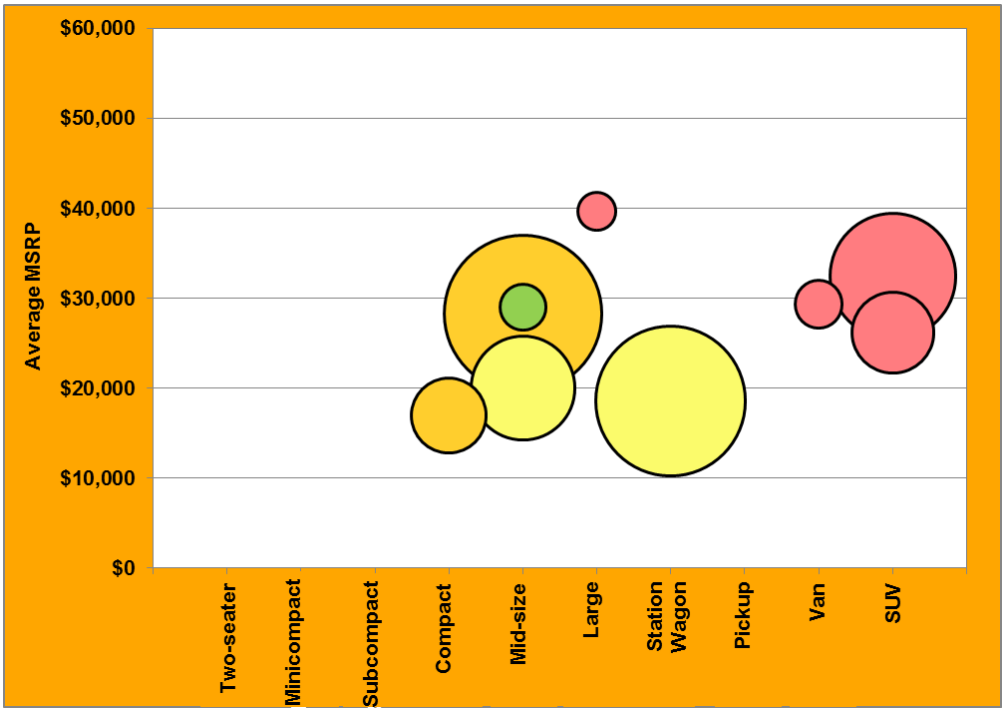
Fuel Saving Technologies

In 2015, Kia announced a $10.2 billion dollar investment in the development of advanced powertrain vehicles over the next five years and is aiming for a 25% increase in Corporate Average Fuel Economy over 2014. Kia's five-year plan is guided by a belief that there is no single technology that will satisfy all segments of the vehicle industry in the short term so they plan to develop a full range of drivetrain technologies and bring 11 new advanced drivetrain models to market by 2020. This will include hybrids, plug-in hybrids, all-electric vehicles and fuel cell vehicles. Kia's first all-electric vehicle, the 2015 Soul EV arrived at dealerships in the second half of 2014. The first two models to arrive under the new five-year plan are both variants of the Optima. The Optima Hybrid has been redesigned for the 2016 model year with a larger battery pack and redesigned electric motors and transmission. It is expected to be about 10% more efficient than the previous Optima Hybrid models. A plug-in hybrid version of the Optima will arrive in the second half of 2016 and will feature a lithium-polymer battery and a six-speed automatic transmission. It will be Kia's first plug-in hybrid vehicle, with more expected by 2020. The all-new Niro hybrid SUV is expected for 2017 and will be built on Kia's new, dedicated eco-car platform, which has been engineered to accommodate the next generation of advanced powertrains. Kia's target date for a mass produced fuel cell vehicle is 2020.

Like other manufactures, Kia has embraced gasoline direct injection (GDI) and turbocharging for maximizing engine performance and fuel economy. Other conventional strategies include weight reduction through greater use of high-strength steel, improved aerodynamics, "Idle Stop & Go" or ISG, and Kia's Active Eco System that proactively controls the engine, transmission, and air conditioning system for maximum efficiency, improving fuel economy by as much as 11%.

Kia's Fleet Mix

Kia has comparatively few models and all have an average manufacturer's suggested retail price (MSRP) of less than $45,000. About two-thirds of Kia's sales are from models with a combined rating of 25 mpg or higher while none of their models are rated below 20 mpg. About one-third of Kia's models and sales come from light trucks which all fall into the fuel economy range of 20-24 mpg.



Note: The size of the bubble indicates sales. The color of the bubble indicates fuel economy.

Miles per Gallon	Color
< 20	
20-24	
25-29	
30-34	
35-39	
>= 40	

FIGURE 30. Kia Sales by Model, MSRP, EPA Size Class, and Fuel Economy, 2014

TABLE 15. Kia Models by EPA Size Class, 2014

Two-Seater	Mini-compact	Sub-compact	Compact	Mid-Size	Large	Station Wagon	Pickup	Van	SUV
			Rio	Optima-Hybrid Optima Forte	Cadenza	Soul		Sedona	Sorento Sportage

Kia Optima and Soul Were over Half of Kia's Sales in 2014

The Kia Optima had the largest market share (27%) of all Kia models in 2014 and the Soul closely followed with a 25% share. The Sorento SUV was 17% of Kia's sales.

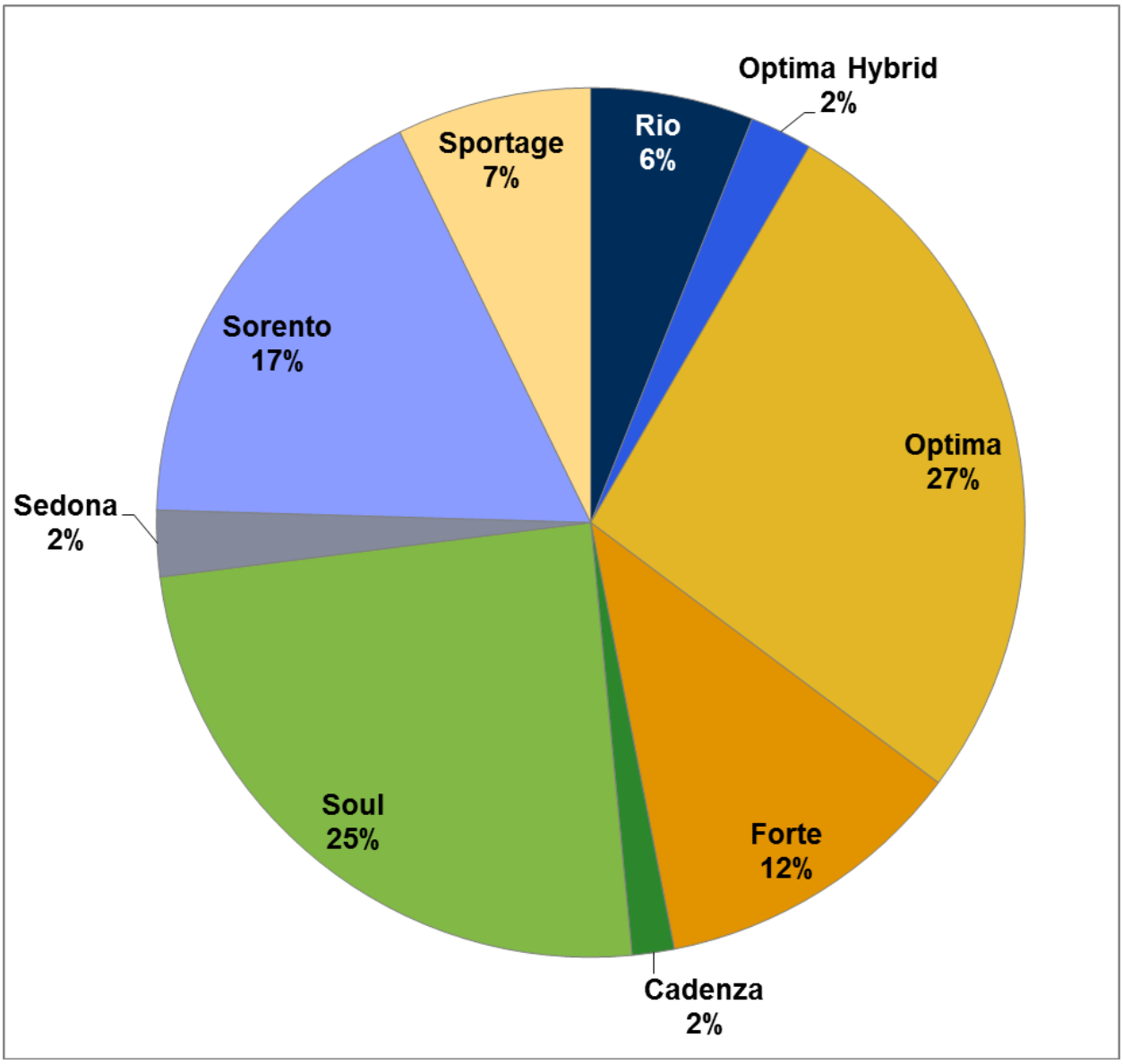


FIGURE 31. Kia Market Share by Model, 2014

Source:
Ward's Automotive Group, March 2016. http://wardsauto.com

Kia Soul Electric Vehicle Sales Grew in 2015

The Kia Soul electric vehicle (EV) was introduced in California in 2014 but by the end of 2016, Kia will have expanded the sales territory to nine other states – Oregon, Washington, Georgia, Texas, Hawaii, New York, New Jersey, Connecticut, and Maryland. Sales for the Soul EV in 2015 were small but increased from 2014. The Kia Optima hybrid electric vehicle (HEV) sales declined by about 17% in 2015. Kia is responsible for 3% of all hybrid-electric (HEV) and plug-in vehicle (PEV) sales in 2015.

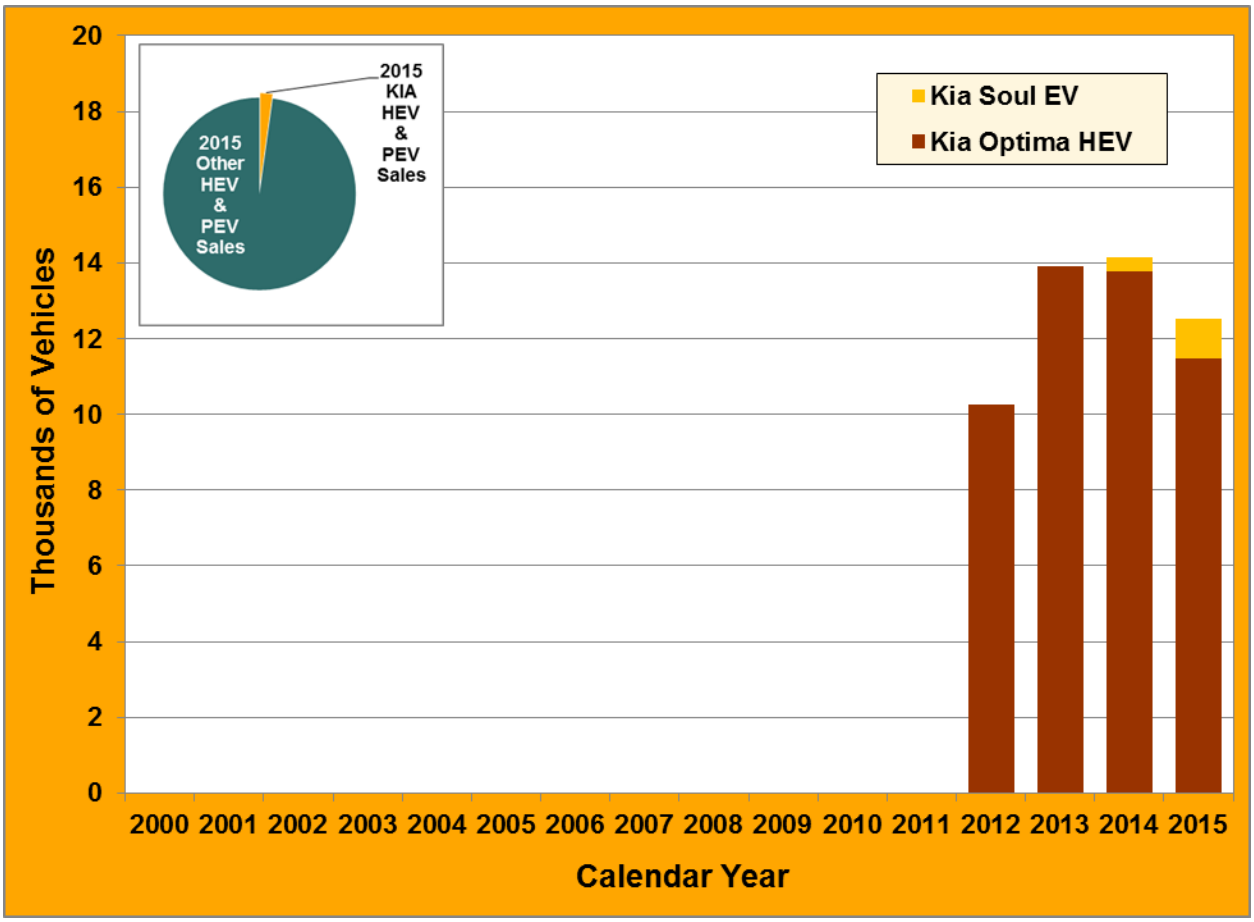


FIGURE 32. Kia Hybrid and Plug-In Electric Vehicle Sales, 2000-2015

Note: Due to the wide variation of hybrid sales among manufacturers, other manufacturers' hybrid sales charts (pp. 39, 44, 49, 54, 59, 64, 69, 79) will have different vertical axis scales.

Source:
Data provided by Yan (Joann) Zhou, Argonne National Laboratory.
http://www.anl.gov/energy-systems/project/light-duty-electric-drive-vehicles-monthly-sales-updates

Kia Is Owned by Hyundai

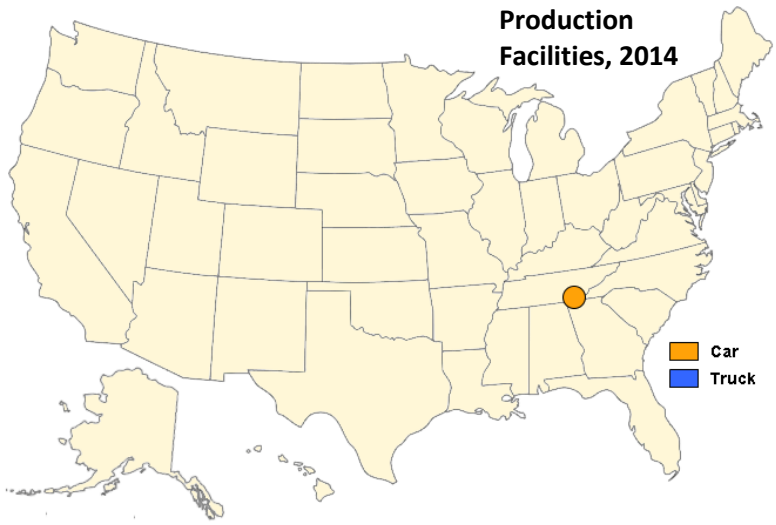
TABLE 16. Kia Interrelationships with Other Automotive Manufacturers

Company	Equity Arrangement	Joint Venture	Supplies/ Buys Major Components	Marketing/Distribution Arrangement	Technology/ Design Arrangement	Manufacturing/ Assembly Agreement	Description
Dongfeng		✓				✓	Car-building joint venture in China
Hyundai			✓		✓		Share vehicle platforms, components and some R&D resources
Hyundai	✓						Partial ownership of Kia by Hyundai Motor & Hyundai Capital
Hyundai						✓	Kia builds the Hyundai Santa Fe

Source:
Ward's Automotive Group, *Interrelationships among the World's Major Auto Makers*, October 2015.
http://wardsauto.com

Volkswagen (VW) Company Profile

Corporate Average Fuel Economy, MY 2014	
Domestic Cars	33.6 mpg
Import Cars	33.8 mpg
Light Trucks	28.9 mpg
Average Vehicle Footprint, MY 2015	
Cars	45.0 sq ft
Light Trucks	48.5 sq ft
All	45.5 sq ft
Number of Alternative Fuel Models, MY 2015	
Flex Fuel	4
Natural Gas	0
Propane	0
Hybrid-Electric	3
Plug-In Hybrid-Electric	0
Electric	1
Hydrogen	0



Volkswagen Plants	Type	2014 Production
Chattanooga, TN	Car	117,628

FIGURE 33. VW Company Profile

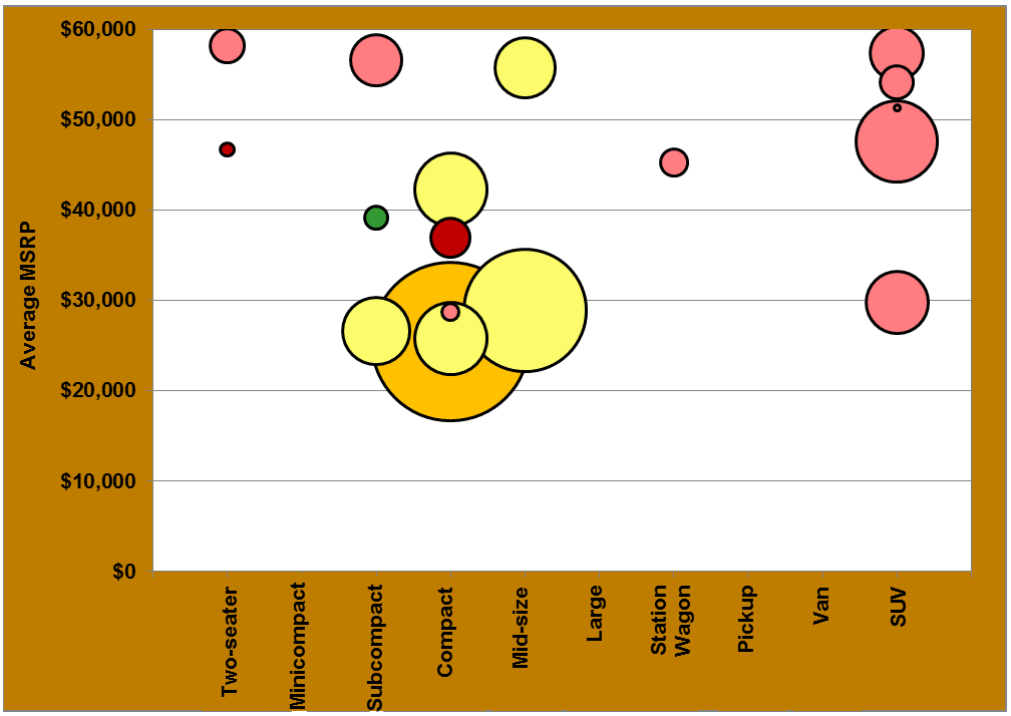
Fuel Saving Technologies

After years of leading the diesel light passenger vehicle sales in the US, headlines in 2015 were dominated by the discovery and subsequent admission from Volkswagen that many of their diesel models sold between 2009 and 2015 were installed with "defeat devices" designed to thwart accurate emissions tests. Nearly 600,000 vehicles in the US and as many as 11 million vehicles worldwide were sold with software that detected testing procedures and altered engine operation to restrict emissions only during testing. During normal on-road operation, the software in those same vehicles switched to normal operation and allowed them to exceed emissions standards in real-world driving. Despite the diesel emissions scandal, there are no plans to abandon diesel technology in future models.

Though not turning away from diesels, Volkswagen has since committed to greater focus on vehicle electrification. There have been several all-electric concept models showcased over the years including the Volkswagen e-Up! and Audi R8 e-Tron supercar, but the 2015 e-Golf became Volkswagen's first all-electric model for the US market. In a 2015 press release Volkswagen announced that the Phaeton luxury sedan would be brought back as a long-range all-electric vehicle. At the 2016 Consumer Electronics Show, Volkswagen revealed the BUDD-e concept which is an all-electric microbus with a 101 kW-hr battery pack and an all-electric range of up to 373 miles. It is built on a newly developed architecture that is specifically designed for electric vehicles. Unveiled at the 2016 Detroit Auto Show was the plug-in hybrid Volkswagen Tiguan SUV which may join current plug-in vehicle offerings under the Porsche and Audi brands. For conventional hybrid technology, Volkswagen currently offers the Jetta and Touareg as hybrids. The fuel economy of Volkswagen's gasoline and diesel models continue to benefit from engine and transmission refinements including the development of a new 10-speed transmission.

VW's Fleet Mix

VW is the parent company of several upscale and luxury brands, so the average MSRP distribution of their models is much wider than shown on this figure which is limited to an MSRP of $60,000. Most of the models sold by VW are cars in the subcompact, compact, and midsize segments. Although there is only one model shown with a combined fuel economy above 30 mpg, it must be noted that high-fuel-economy diesel variants of popular models like the Jetta, Golf, and Passat are not shown.



Note: The size of the bubble indicates sales. The color of the bubble indicates fuel economy.

Miles per Gallon	Color
< 20	
20-24	
25-29	
30-34	
35-39	
>= 40	

FIGURE 34. VW Sales by Model, MSRP, EPA Size Class, and Fuel Economy, 2014

TABLE 17. VW Models by EPA Size Class, 2014

Two-Seater	Mini-compact	Sub-compact	Compact	Mid-Size	Large	Station Wagon	Pickup	Van	SUV
Lamborghini R8 Boxster/ Cayman TT	*911 Series*	A5/S5 Eos Beetle	A4/S4 CC Jetta-Hybrid Golf Jetta	A7 A6/S6 Passat	*Bentley Panamera* *Panamera S-Hybrid* *A8/S8*	allroad quattro		Routan	*Cayenne* *Cayenne S-Hybrid* *Touareg-Hybrid* Q7 Touareg Q5-Hybrid Q5 Tiguan

Note: Includes VW, Audi, Lamborghini, and Bentley. Models listed in *red italics* do not appear on the figure due to high MSRP.

VW Jetta Was about One-Quarter of VW's Sales in 2014

The VW Jetta and the VW Passat were the only models to account for more than 8% of VW's market. Two-thirds of VW's sales are cars. The Audi Q5 and the VW Tiguan are the SUVs with the greatest market share.

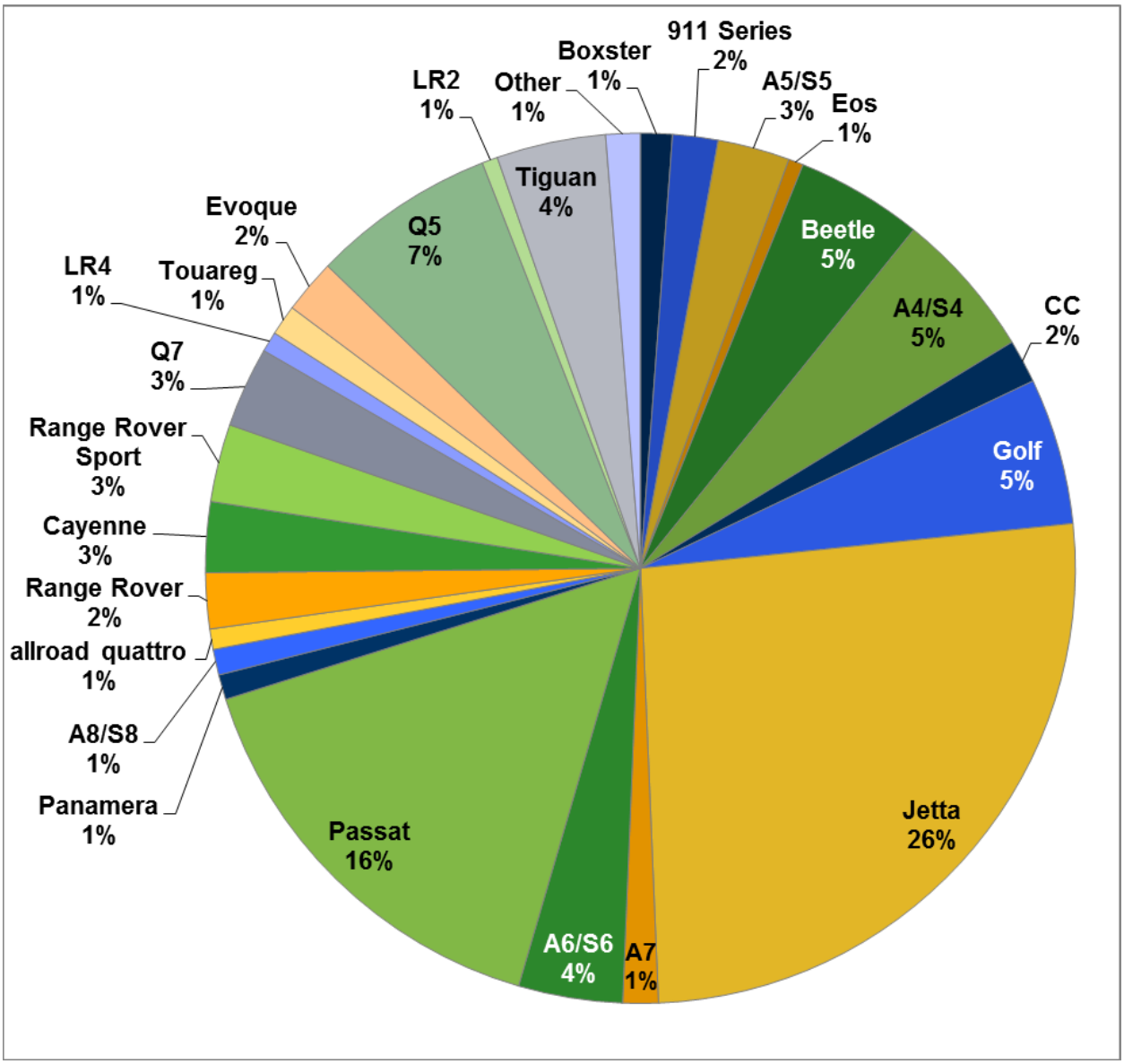


FIGURE 35. VW Market Share by Model, 2014

Note: "Other" includes the R8, TT, Jetta Hybrid, Bentley, Panamera Hybrid, Touareg Hybrid, and Q5 Hybrid. Each vehicle model accounted for less than 1% of the total.

Source:
Ward's Automotive Group, March 2016. http://wardsauto.com

VW Hybrid and Plug-In Vehicle Sales Grew by 57% Due to the e-Golf Sales

Nearly every hybrid-electric vehicle (HEV) and plug-in hybrid-electric vehicle (PHEV) model offered by VW experienced a decline in sales from 2014 to 2015, but the growing sales of the VW e-Golf electric vehicle (EV) more than made up for those declines. Total HEV and plug-in vehicle (PEV) sales for 2015 were up by 57% in 2015. Sales for the Porsche Panamera S E-Hybrid PHEV also increased from 2014 to 2015. VW is responsible for just over 1% of all HEV and PEV sales.

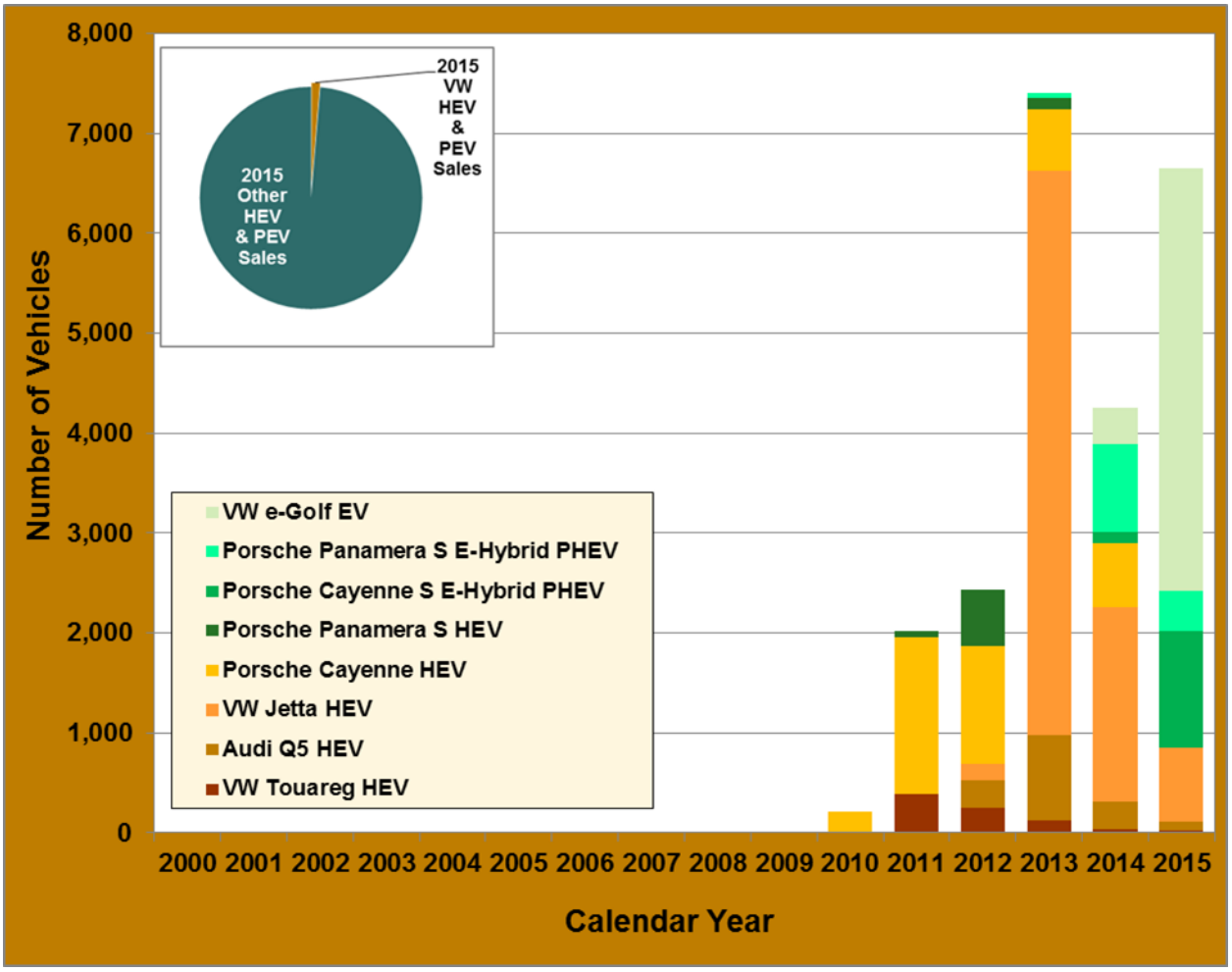


FIGURE 36. VW Hybrid and Plug-In Electric Vehicle Sales, 2000-2015

Note: Due to the wide variation of hybrid sales among manufacturers, other manufacturers' hybrid sales charts (pp. 39, 44, 49, 54, 59, 64, 69, 74) will have different vertical axis scales.

Source:
Data provided by Yan (Joann) Zhou, Argonne National Laboratory.
http://www.anl.gov/energy-systems/project/light-duty-electric-drive-vehicles-monthly-sales-updates

VW is One of the World's Largest Manufacturers but has Few Interrelationships

TABLE 18. VW Interrelationships with Other Automotive Manufacturers

Company	Equity Arrangement	Joint Venture	Supplies/ Buys Major Components	Marketing/Distribution Arrangement	Technology/ Design Arrangement	Manufacturing/ Assembly Agreement	Description
BMW, Ford, Daimler, GM, Honda, Toyota, VW					✓		Partners in Clean Energy Partnership
Daimler					✓		VW & Mercedes co-designed a commercial vehicle sold as Mercedes Sprinter & VW Crafter
First Auto Works		✓				✓	Joint car-producing venture in Changchun, China
GAZ						✓	VW & Skoda models are produced in Nizhny, Novogorod (Russia)
Shanghai Automotive		✓				✓	Joint venture in Shanghai, China producing Skoda and VW vehicles & engines

Source:
Ward's Automotive Group, *Interrelationships among the World's Major Auto Makers*, October 2015.
http://wardsauto.com

Summary Comparison of Manufacturers' Markets

A comparison of each manufacturer's sales chart shows that GM, Toyota and VW have the most models. Toyota has more fuel efficient models; Hyundai's market is mainly in cars; and FCA's market is mainly light trucks.

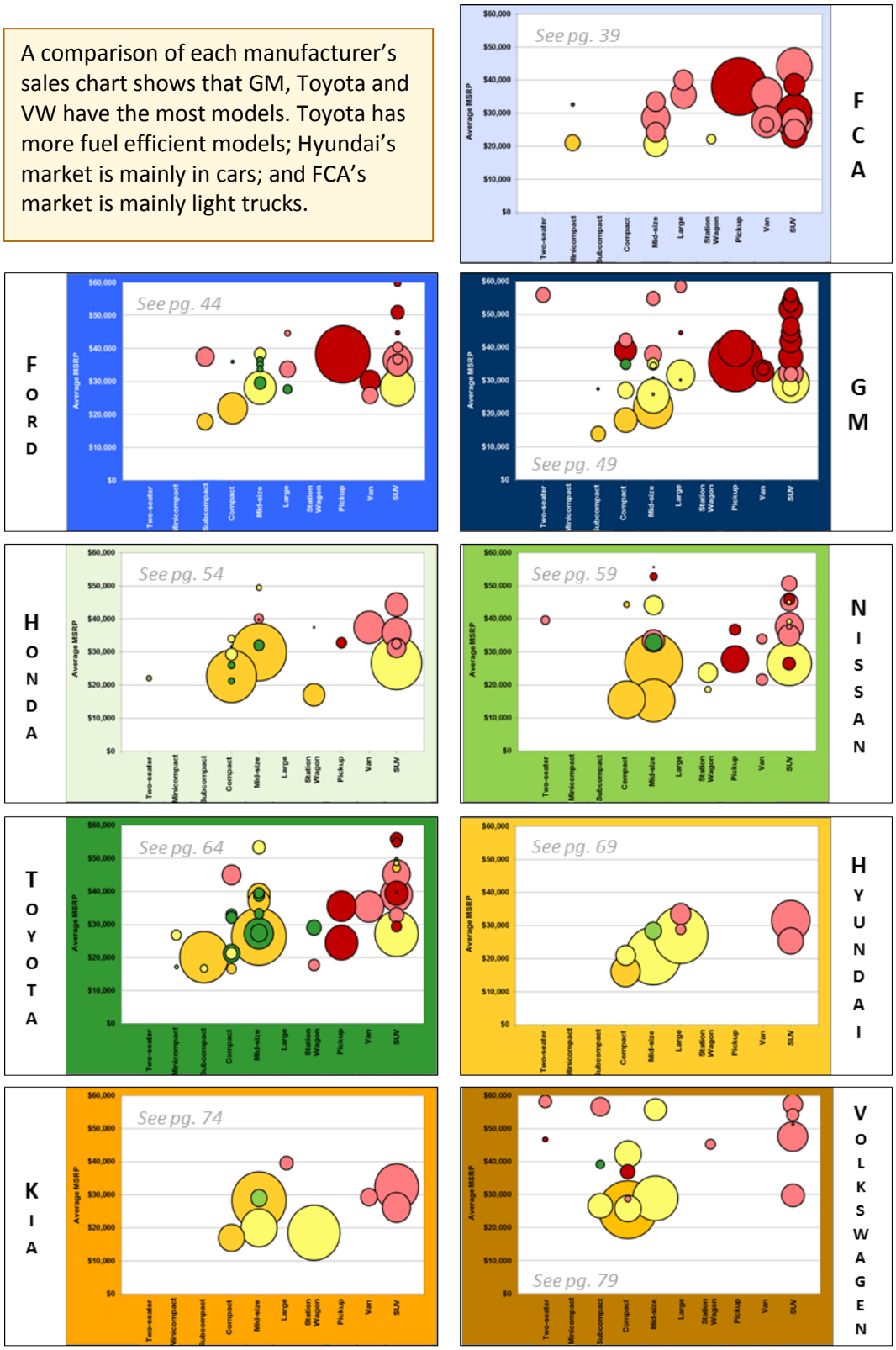


FIGURE 37. Summary Comparison of Manufacturers' Markets, 2014

Top Nine Manufacturers Selling Vehicles in the United States Only Produce a Little More than Half of World's Vehicles

The companies that made 91% of all vehicles produced in the United States in 2014 are together responsible for a little more than half of the vehicles produced worldwide. Volkswagen, which did not produce vehicles in the United States until 2011, held 7% of World production in 2014. Toyota produced 11% in the World as well as 11% in the United States. Many companies, like recent upstarts in China and India, comprise the other 49% of world production. The United States produces about 13% of the world's vehicles.

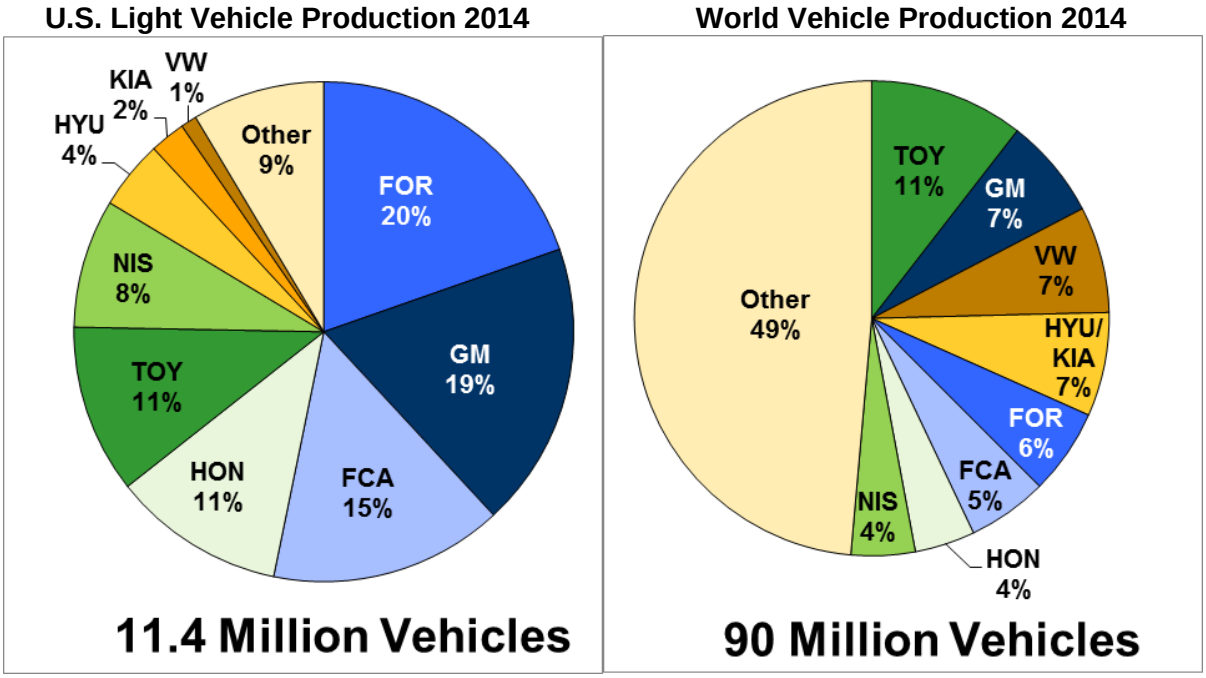


FIGURE 38. Production of United States and World Vehicles in 2014 by Manufacturer

Note: World production includes heavy vehicles, which are a small share of total production. Shanghai AIC, which is included in the "Other" category on the World chart above, is the only other automotive company to hold more than 5% of World production; it had a 6.3% share in 2014.

Source:
Ward's Automotive Group. http://wardsauto.com

U.S. Light Truck Sales Volumes Continued to Rise in 2015

Sales volumes rose from 2011 to 2015, for light trucks and car sales fell only slightly in 2015. By 2015, sales reached between 7 and 8 million for cars and nearly 10 million for light trucks.

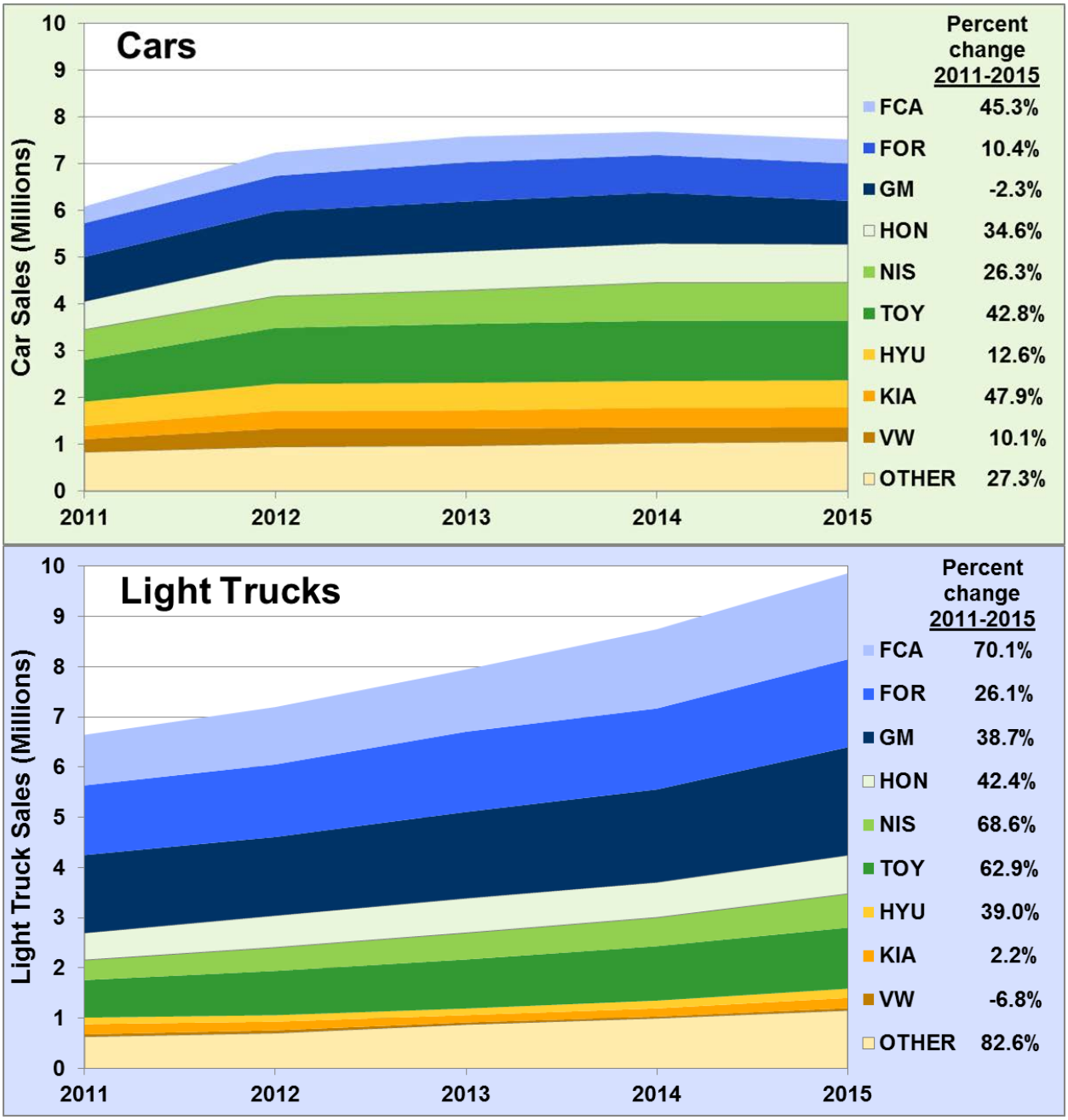


FIGURE 39. New Light Vehicle Sales by Manufacturer, 2011-2015

Source:
Ward's Automotive Group. http://wardsauto.com

Market Share Shifted among Manufacturers

Kia, FCA, and Honda experienced the largest gains in car market share from 2011-2015. Nissan experienced a slight gain in car market share in the five-year period while the market share declined for Toyota, General Motors, VW, and Ford. The three domestic manufacturers accounted for about 57% of the light truck market share in 2015.

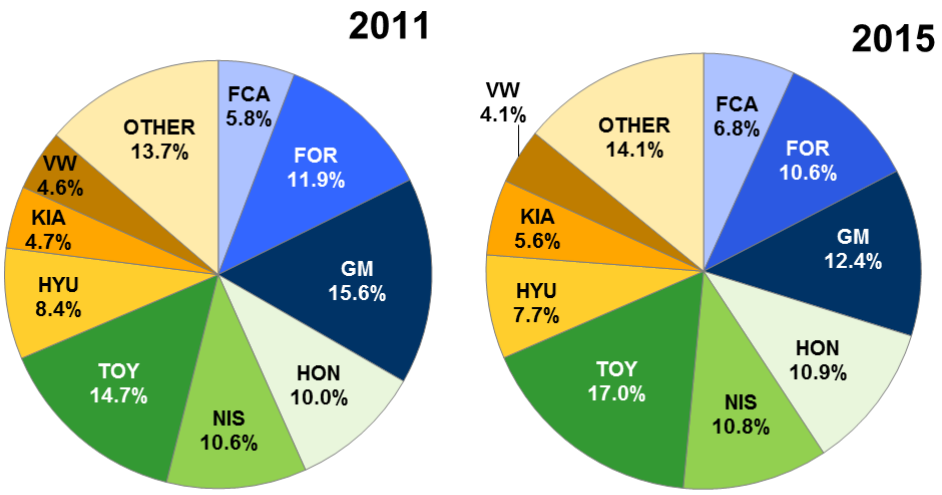


FIGURE 40. New Car Market Share by Manufacturer, 2011 and 2015

Source:
Ward's Automotive Group. http://wardsauto.com

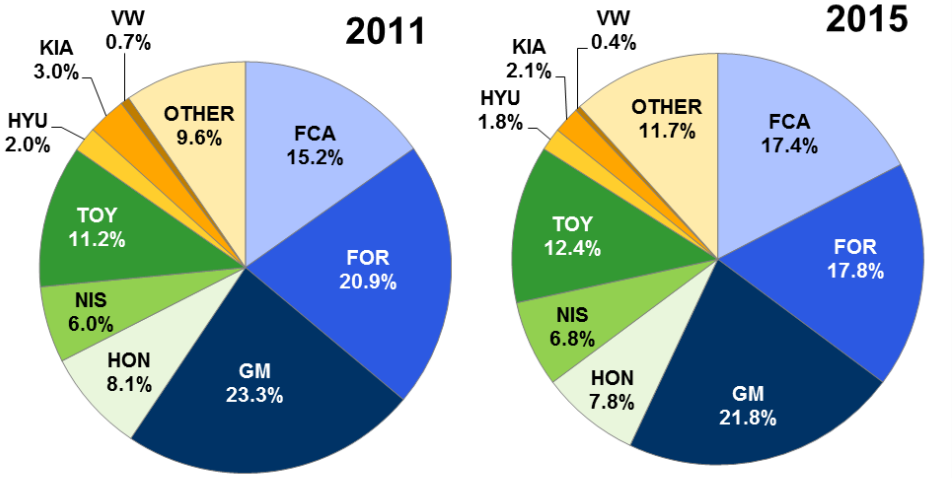


FIGURE 41. New Light Truck Market Share by Manufacturer, 2011 and 2015

Source:
Ward's Automotive Group. http://wardsauto.com

Share of Import Cars Declined to About 25% of Total Car Sales in 2015

In 1970, about 15% of all cars sold were imported (built outside of North America) and about 5% of all light trucks sold were imported. These import shares grew during the 1970's and the early 1980's. Following sharp declines in the late 1980s through the mid-1990s, import shares of both cars and light trucks rebounded, with import cars reaching a peak of just over 34% in 2009. Import light trucks reached their peak share in 1981 at almost 23% but accounted for just 18% in 2015.

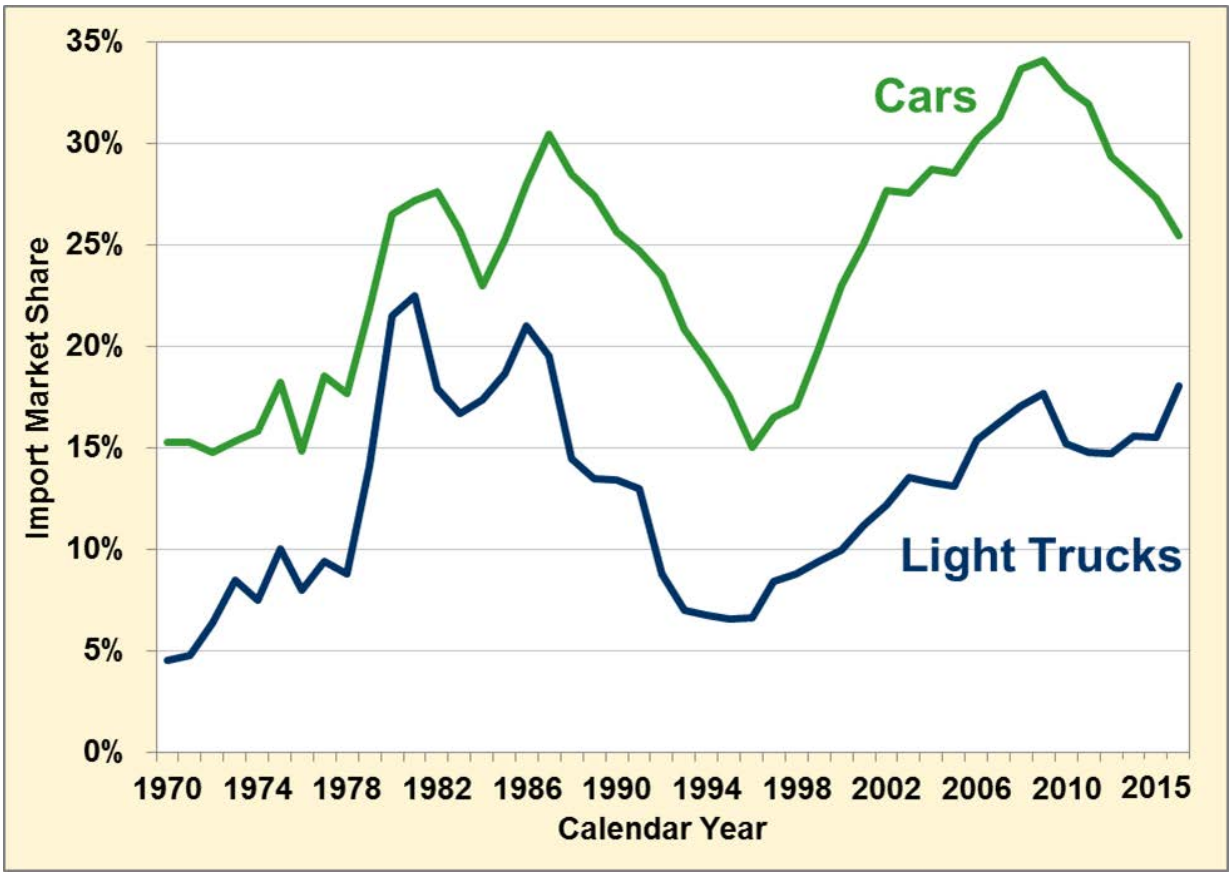


FIGURE 42. Import Market Share of Cars and Light Trucks, 1970-2015

Note: Imports are from outside North America. Light trucks are classes 1-3.

Source:
Ward's Automotive Group. http://wardsauto.com

Toyota Imports More Light Vehicles than Other Manufacturers

Most vehicle manufacturers, even if they are based in the United States, import some of the vehicles sold in this country. Of the nine largest U.S. manufacturers, Toyota sells the most imported light vehicles which accounts for about 29% of their sales. Kia, however, has the highest import share—imports accounted for 58% of Kia light vehicle sales in 2015.

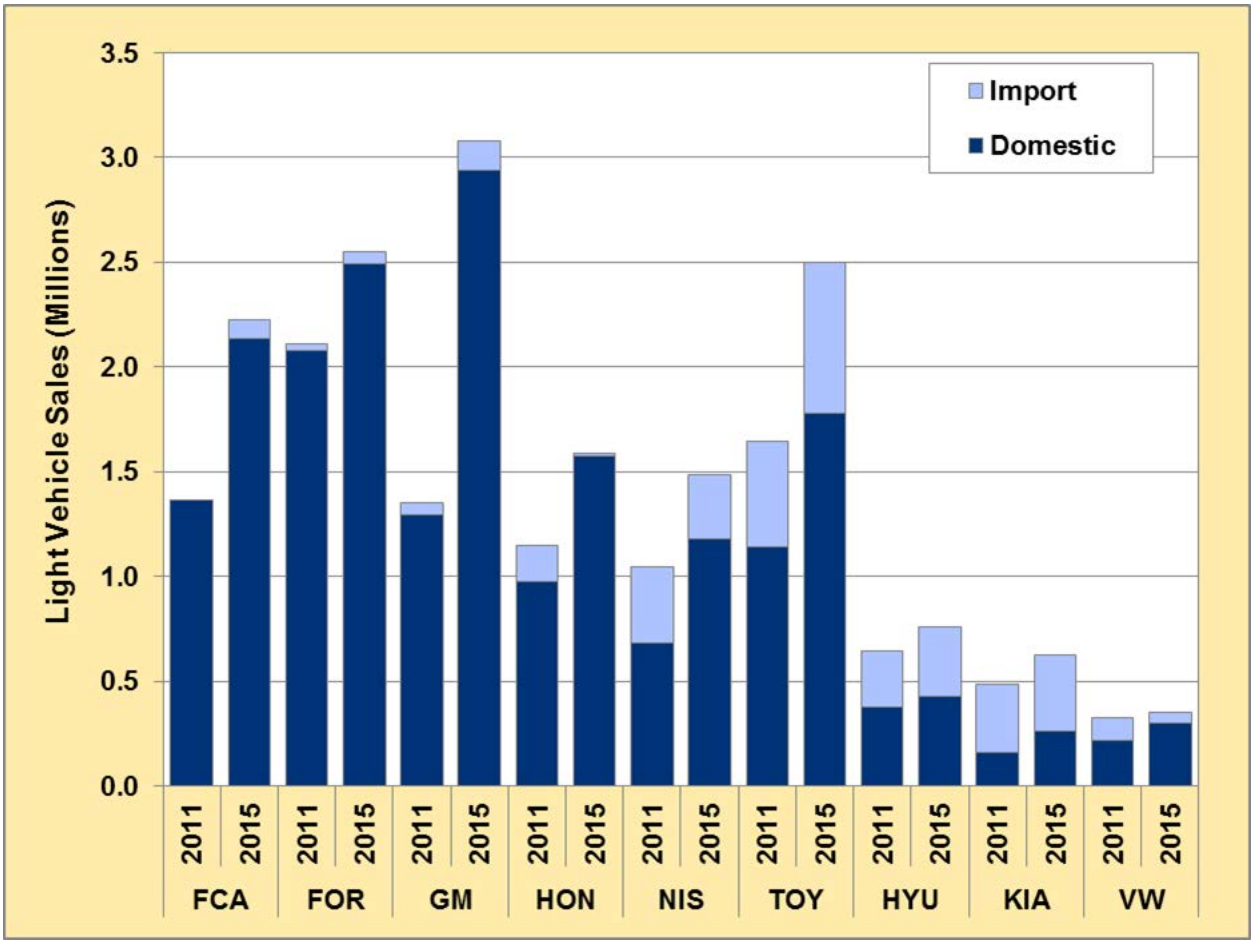


FIGURE 43. Light Vehicle Sales by Source and Manufacturer, 2011 and 2015

Source:
Ward's Automotive Group. http://wardsauto.com

Engine Displacement for Cars has Declined by 9%

Average sales-weighted engine displacement for all new cars declined 9% from 2011 to 2015. In the same time period, average displacement for light trucks declined by 3%. In general, FCA, General Motors, and Toyota have larger engines than the other major manufacturers. Yearly fluctuations are typically a result of the introduction or elimination of a model.

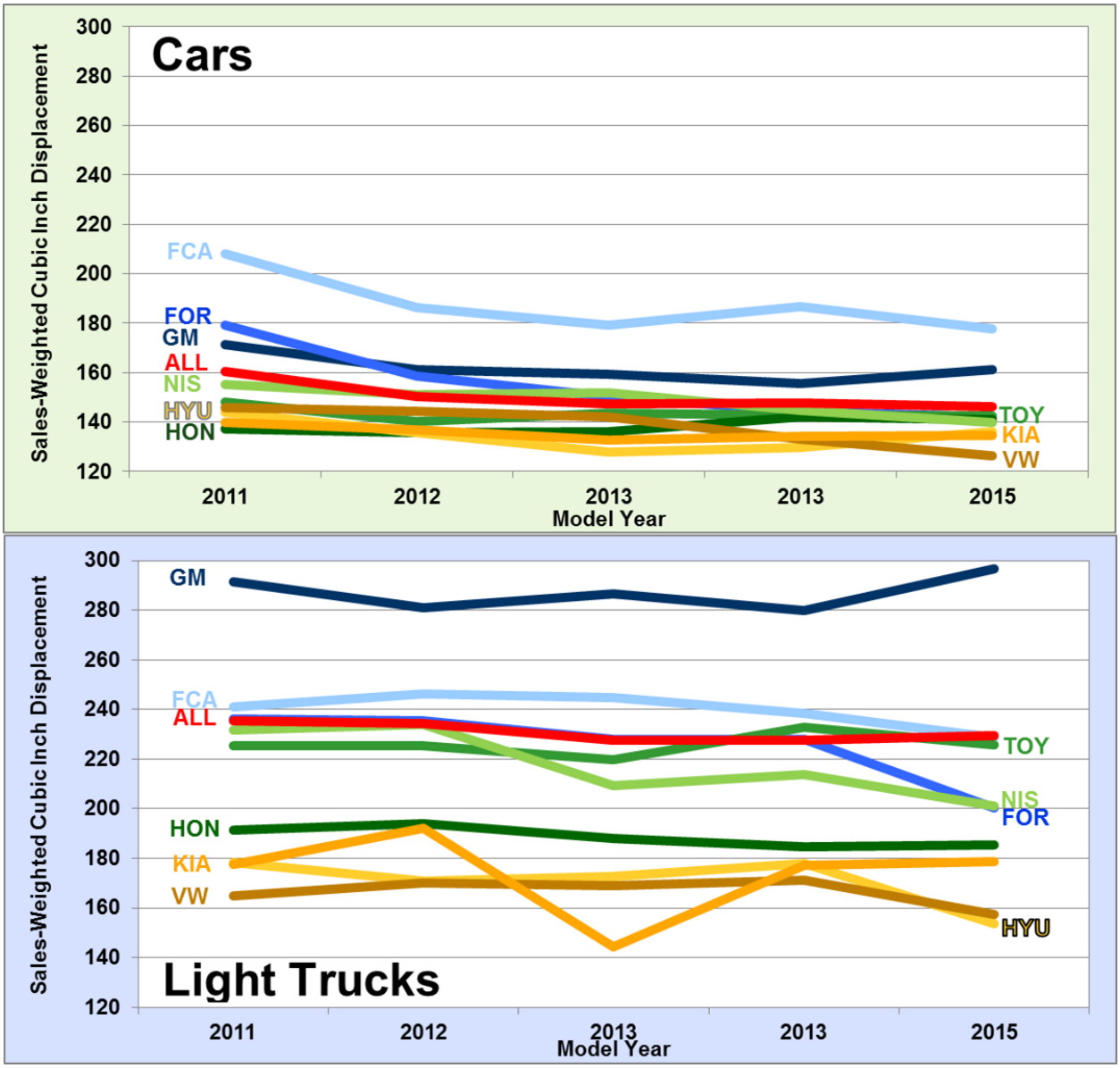


FIGURE 44. Car and Light Truck Engine Size by Manufacturer, 2011-2015

Source:

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

Light Truck Horsepower Increased by 4% from 2011 to 2015

Advancements in engine design and overall engine technology can increase horsepower without increasing the engine size. Chrysler, General Motors, and Ford, which produce the most trucks, have increased average sales-weighted horsepower from 2011. The noticeable drop in Kia's light truck horsepower in 2013 is likely due to the discontinuation of the Sedona minivan. Average horsepower for cars has stayed about the same over the five-year time period.

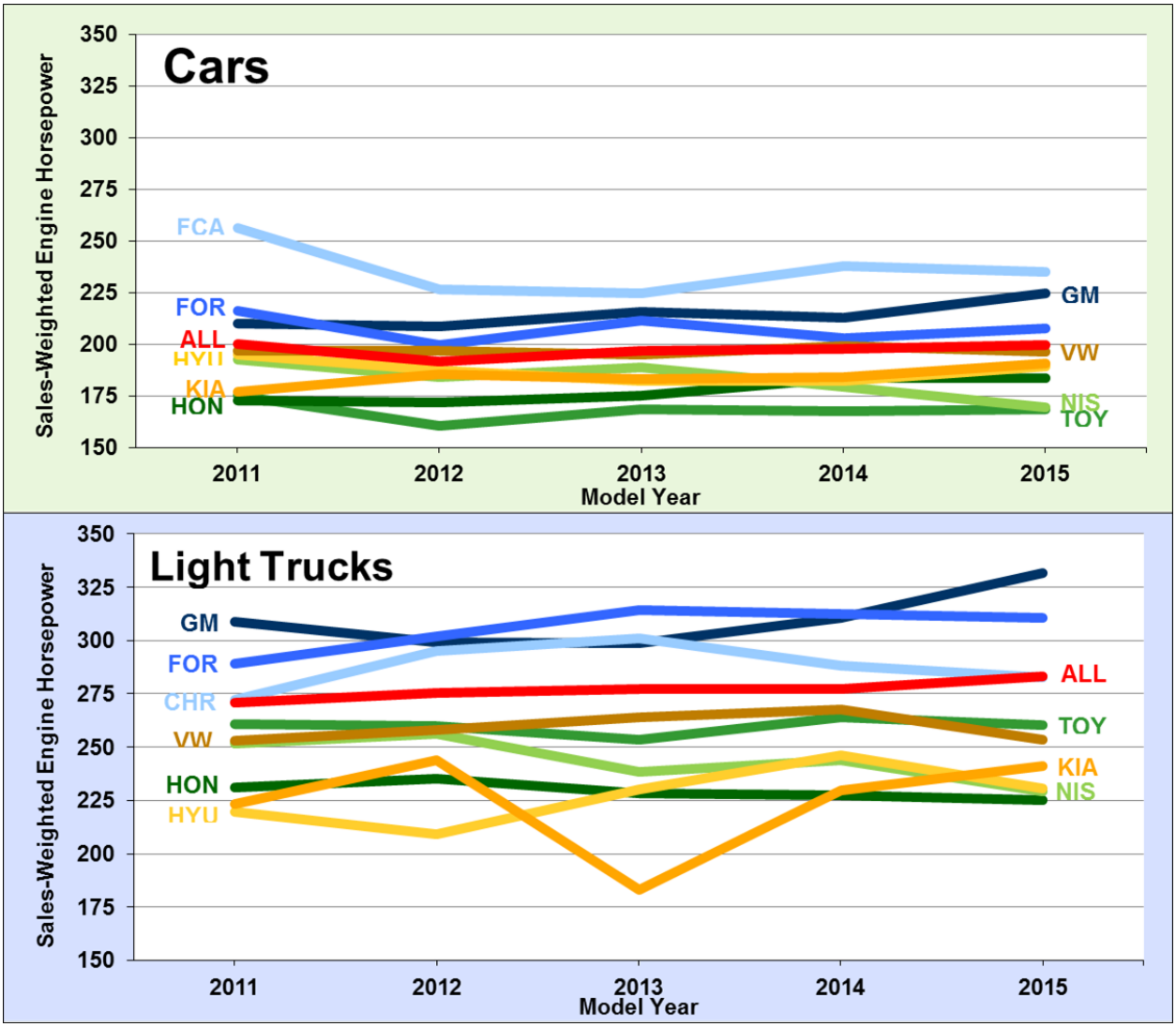


FIGURE 45. Car and Light Truck Horsepower by Manufacturer, 2011-2015

Source:

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

Technology Has Improved Performance More than Fuel Economy

Despite a 125% increase in horsepower and 47% decrease in 0-60 time from 1980 to 2015, the fuel economy of vehicles improved 29%. All of these data series are sales-weighted averages. The weight of the vehicle appears to have an inverse relationship with fuel economy.

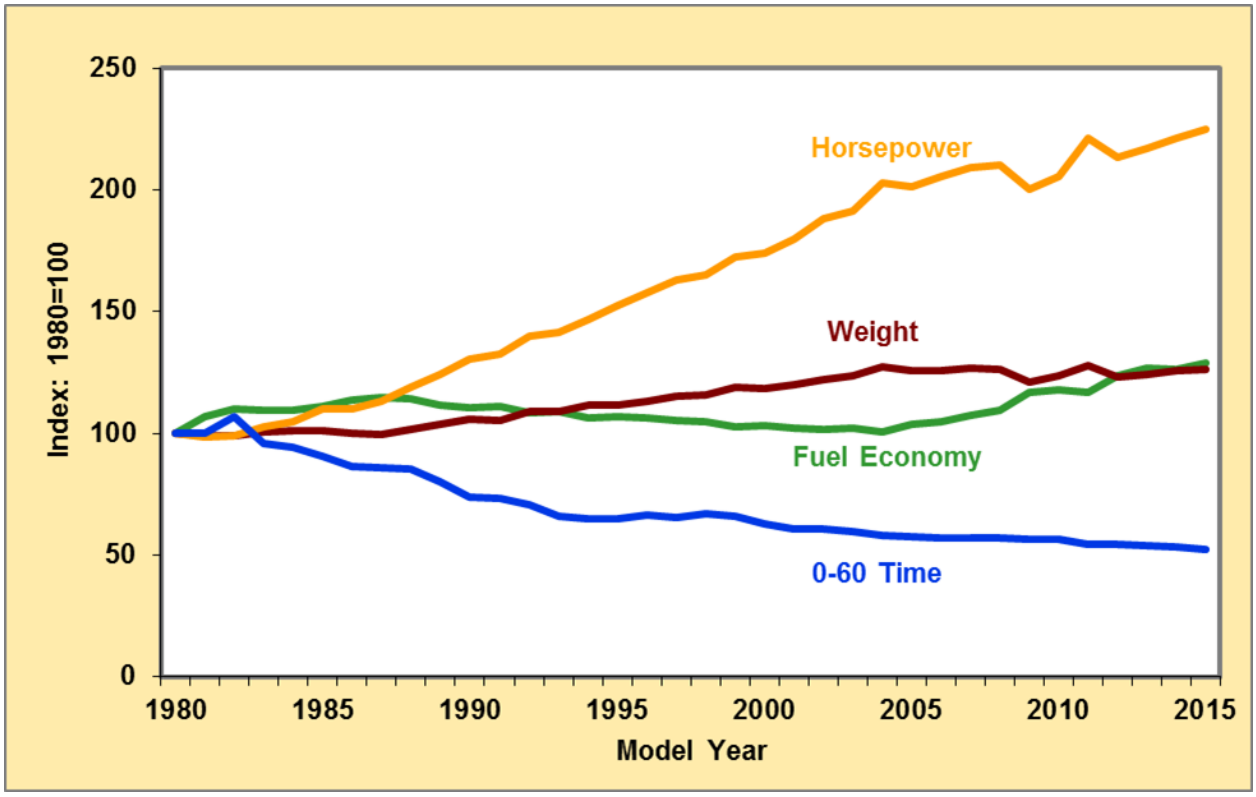


FIGURE 46. Characteristics of Light Vehicles Sold, 1980-2015

Note: Data are sales-weighted.

Source:
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

Horsepower above Fleet Average and Fuel Economy near Fleet Average for Detroit 3 Manufacturers

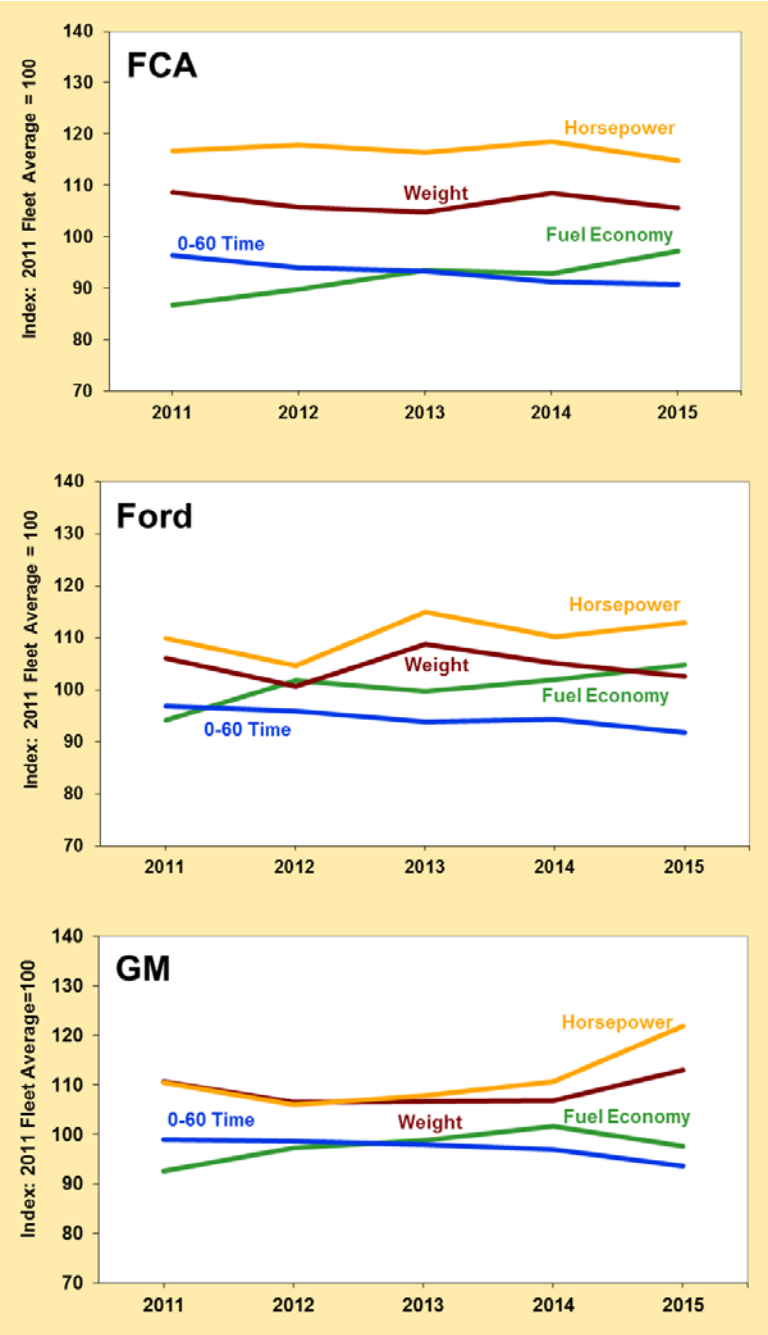


FIGURE 47. Characteristics of Detroit 3 Light Vehicles Sold, 2011-2015

These sales-weighted averages show that all of the Detroit 3 manufacturers have horsepower above the fleet average (above 100 on the graph). Vehicle weight for all three has fluctuated slightly up and down as they try to use more lightweight materials while adding additional features on the vehicles. FCA made the biggest improvement in fuel economy over the five year period – a 12% improvement from 2011 to 2015. In the same time frame, Ford had an 11% and General Motors (GM) a 5% improvement. Fuel economy in 2015 was below the fleet average (below 100 on the graph) for FCA and GM.

Source:

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

Fuel Economy above Fleet Average and Weight below or Equal to Fleet Average for Toyota, Honda, and Nissan

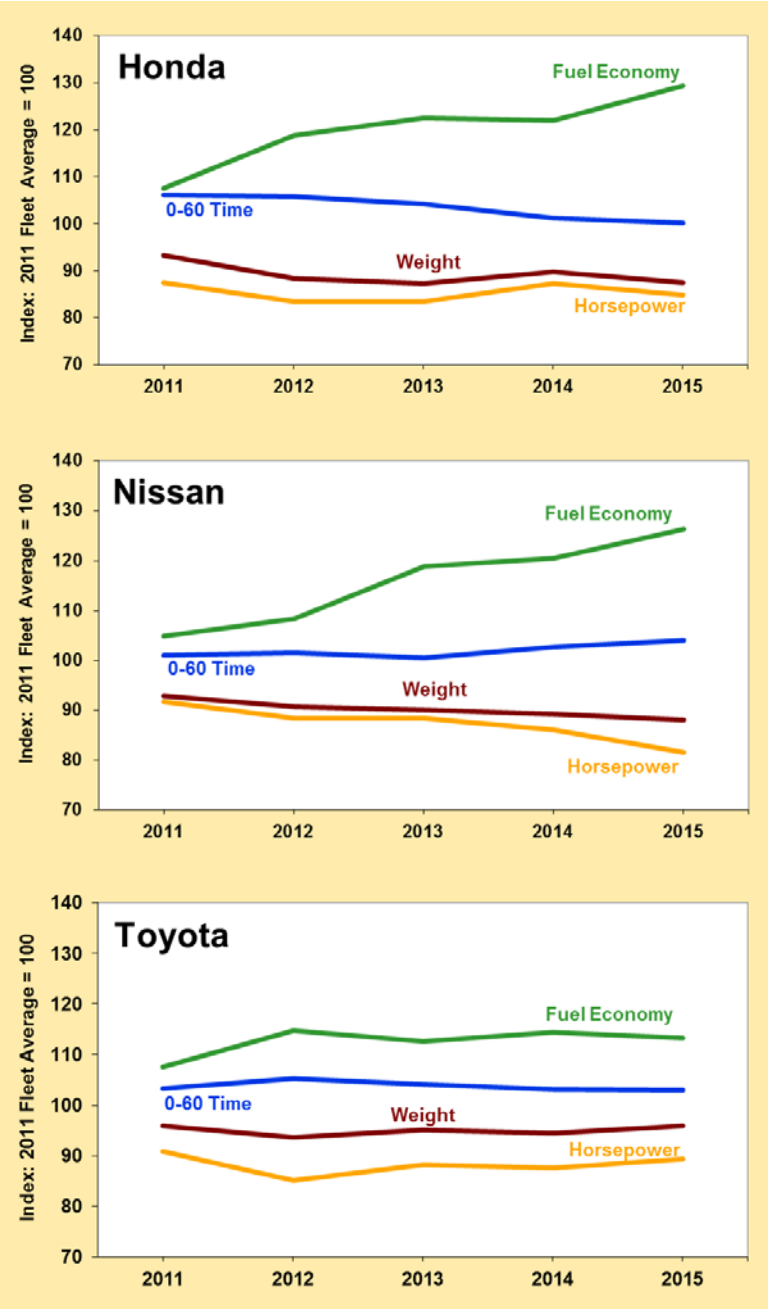


FIGURE 48. Characteristics of Japanese Light Vehicles Sold, 2011-2015

These sales-weighted averages show that the fuel economy of Toyota, Honda and Nissan has been equal to or above the fleet average (above 100 on the graph) over the last five years. Nissan had the greatest fuel economy improvement of the three Japanese manufacturers – 21% over the five year period – followed by Honda with 20% improvement. While Nissan's fuel economy improved, horsepower declined by 11%. Weight for all three manufacturers was below fleet average.

Source:

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

Fuel Economy above Fleet Average and Horsepower below Fleet Average for Hyundai and Kia

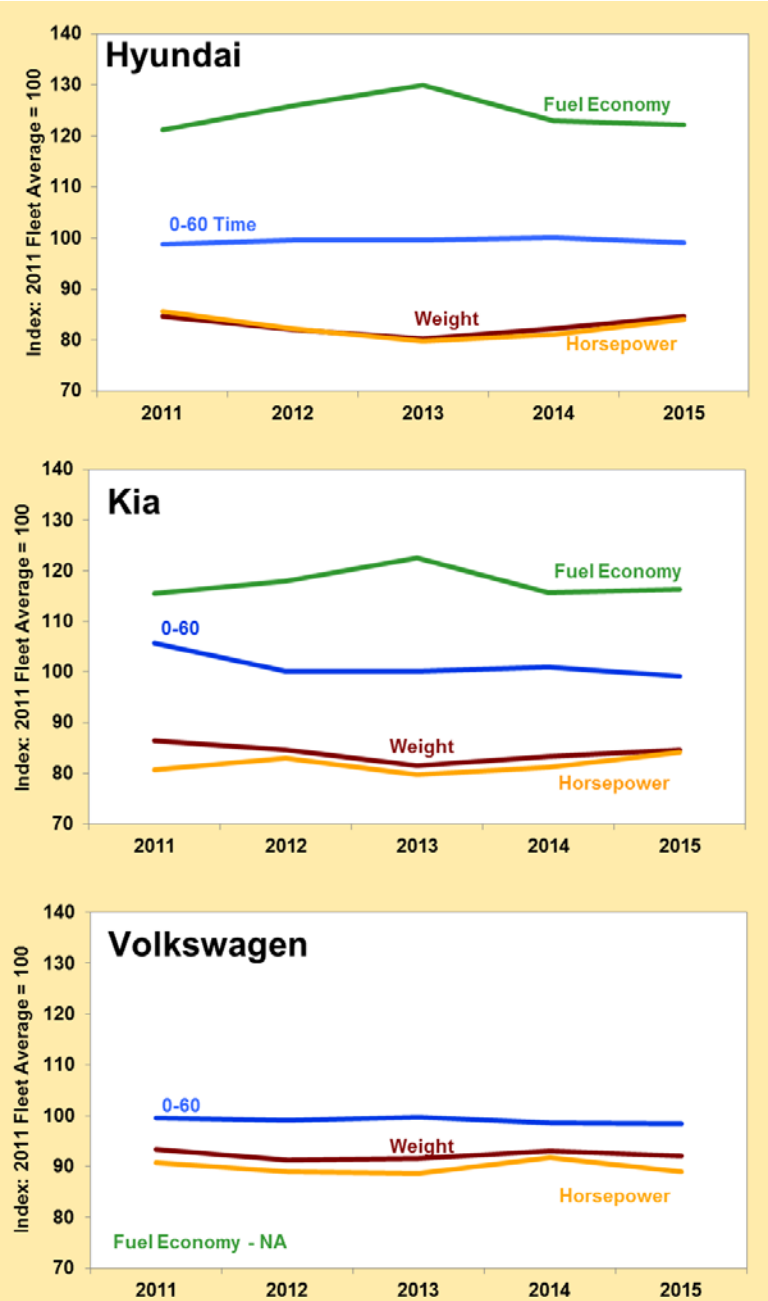


FIGURE 49. Characteristics of Light Vehicles Sold by Other Large Manufacturers, 2011-2015

The fuel economy for Hyundai's and Kia's light vehicles in 2011 was higher than the fleet average (higher than 100 on the graph). Horsepower and weight were below the fleet averages for all three manufacturers. Volkswagen's fuel economy is not available from 2009-on due to the on-going investigation of VW diesel models.

Source:

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

More than 26% of New Cars Sold Have Continuously Variable Transmissions

Continuously variable transmissions (CVT) offer an infinite number of gear ratios that allow the engine to operate at peak efficiency throughout the entire range of vehicle speeds which improves fuel efficiency. Though CVT technology has been around for many years, the sales of vehicles with CVTs began slowly and have climbed to 26.3% of car and 12.5% of light truck market share. Nissan sold 32% of cars and 40% of light trucks in 2015 that were equipped with CVT.

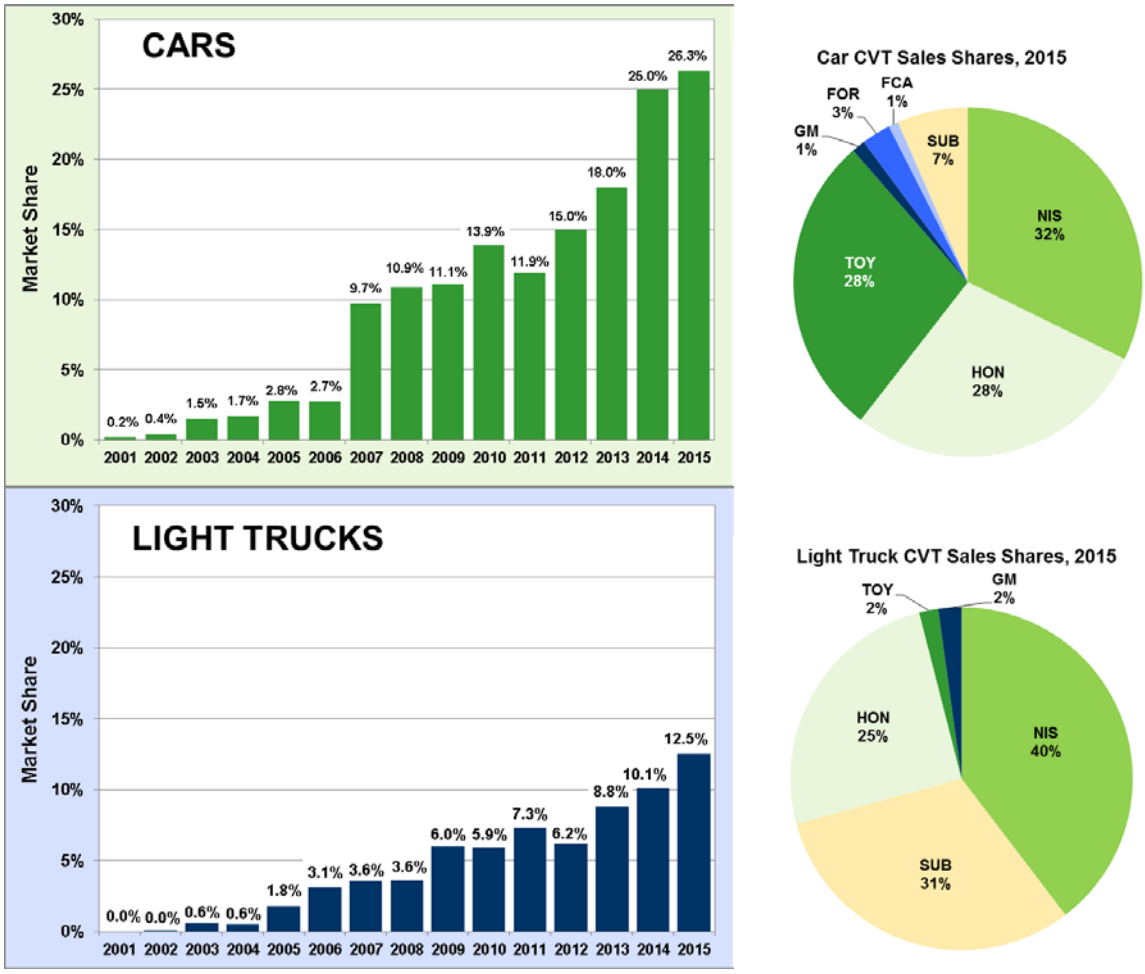


FIGURE 50. CVT Market Share, 2001-2015 and CVT Manufacturers' Share, 2015

Note: SUB = Subaru.

Source:

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

Twenty Percent of New Cars Have Turbochargers

Turbocharging is not a new technology, but has grown in new light vehicle market share over the last five years. In 2015, more than 20% of new cars and nearly 14% of new light trucks had turbocharged engines (turbos). Ford had the greatest share of turbo sales in both cars and light trucks.

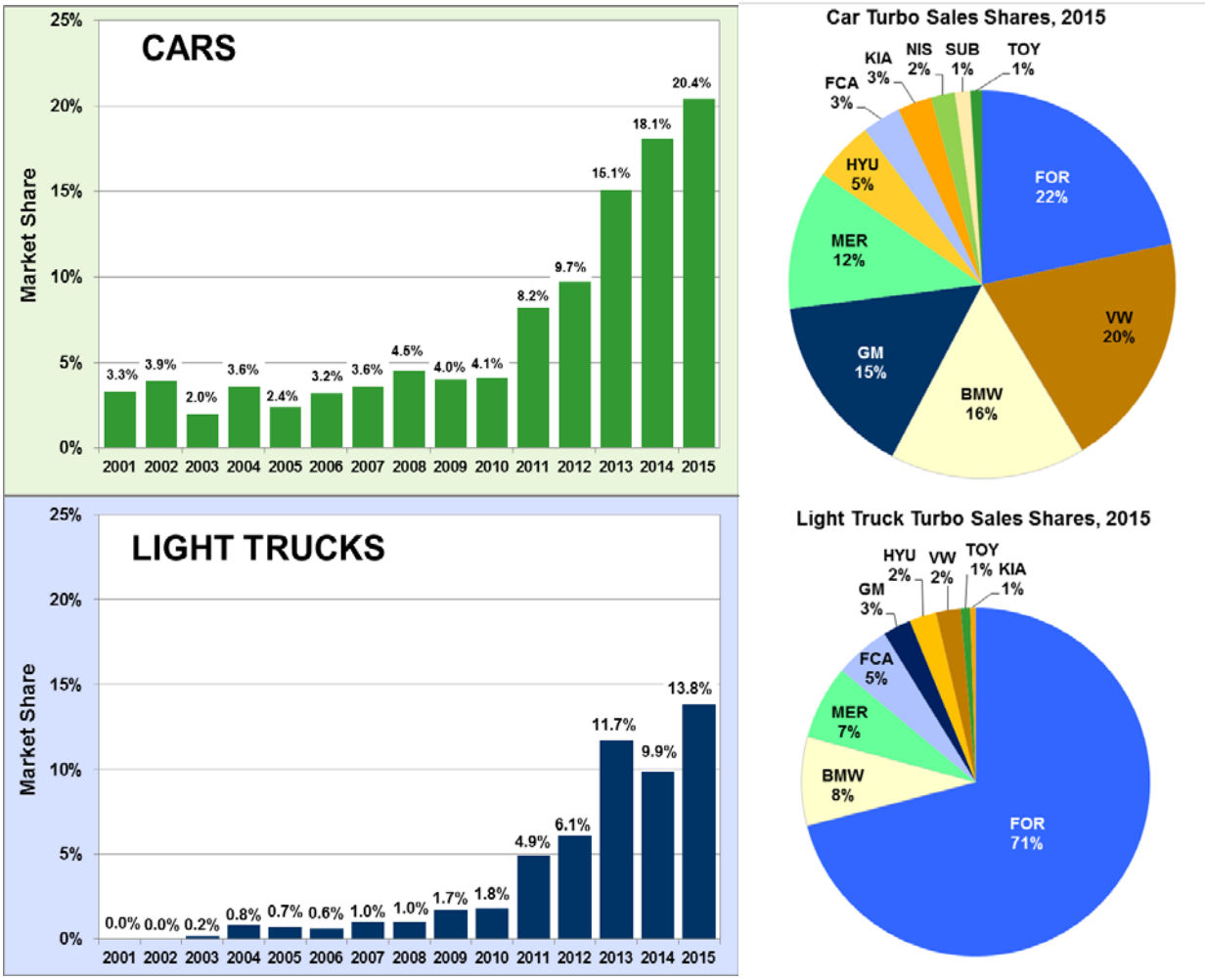


FIGURE 51. Turbo Market Share, 2001-2015 and Turbo Manufacturer's Share, 2015

Note: Light trucks include pickups, sport utility vehicles, and vans. MER = Mercedes; SUB = Subaru.

Source:

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

Over 45% of Light Vehicles Sold Have Gasoline Direct Injection

Gasoline direct injection (GDI) began market penetration in cars in 2007 and in light trucks in 2008. By 2015, the market share for GDI was 46.4% for cars and 43.3% for light trucks. In 2015, half of all light trucks with GDI were sold by GM.

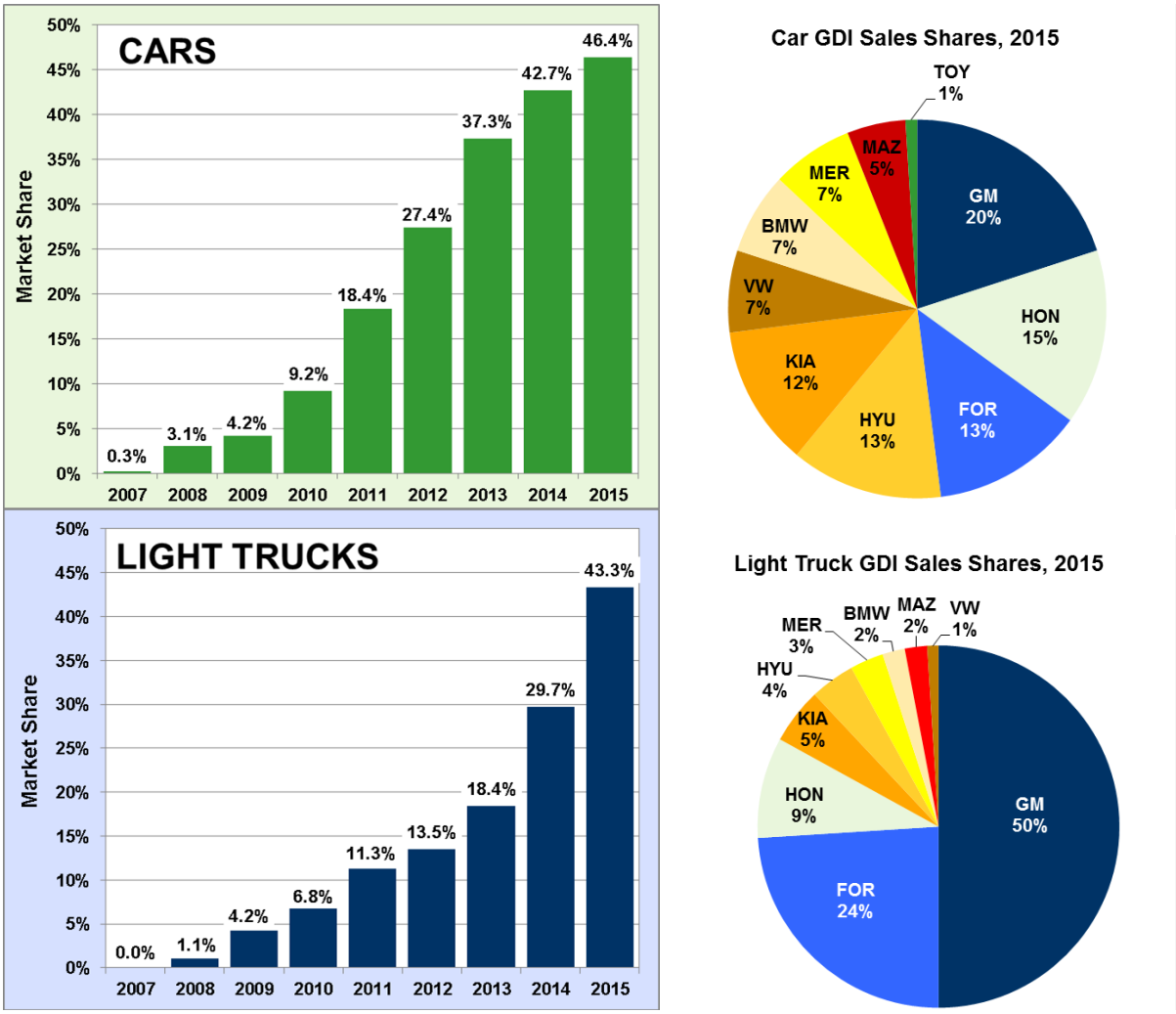


FIGURE 52. GDI Market Share, 2007-2015 and GDI Manufacturer's Share, 2015

Note: Light trucks include pickups, sport utility vehicles, and vans. MAZ = Mazda; MER = Mercedes.

Source:

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

Four Manufacturers Are Using Cylinder Deactivation to Boost Fuel Economy

GM, Honda, and FCA are using cylinder deactivation (CD) as a fuel saving technology in cars and light trucks. Also, VW uses CD in cars. Three-fourths of all cars sold with CD were from Honda. GM sold 70% of all light trucks with CD.

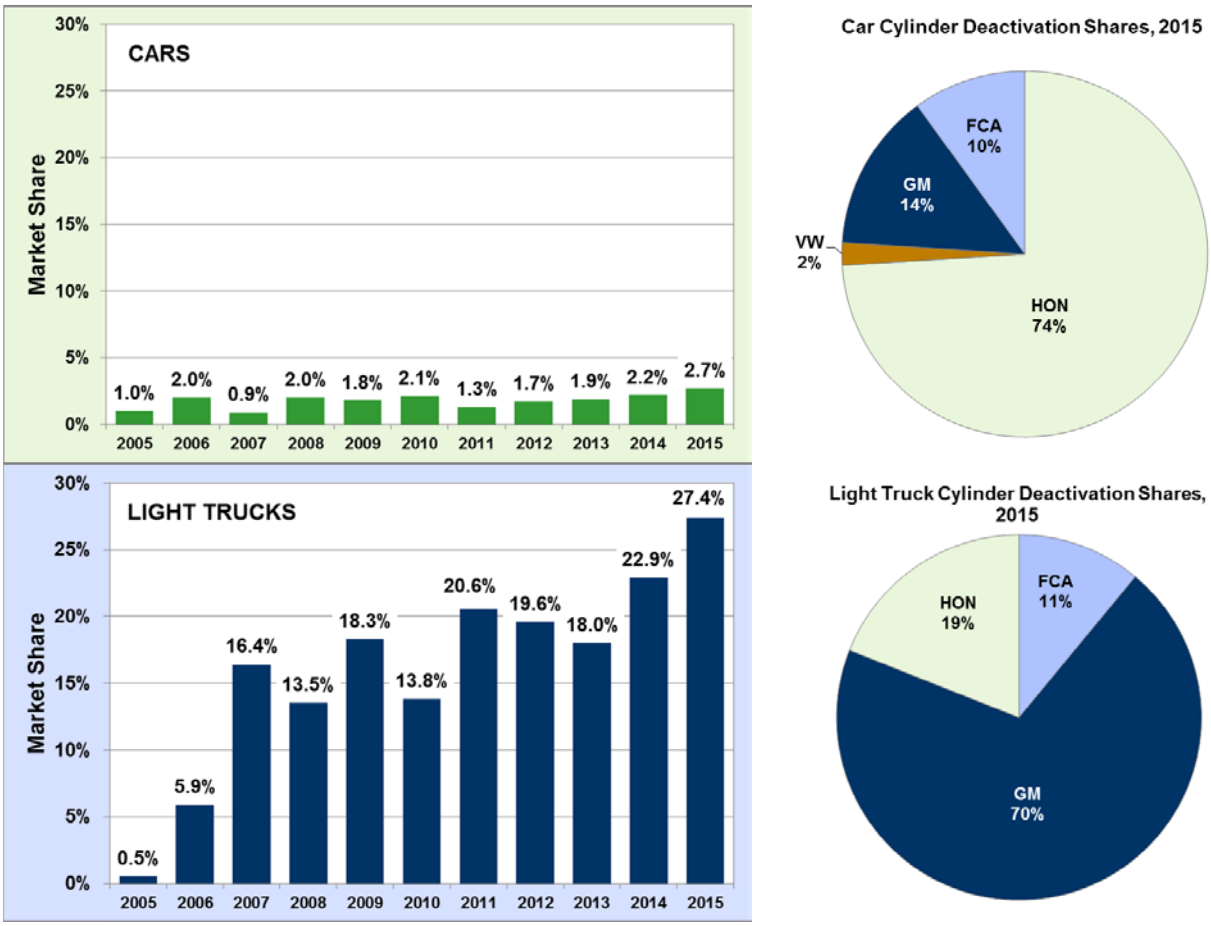


FIGURE 53. Cylinder Deactivation Market Share, 2005-2015 and Manufacturer's Share, 2015

Source:

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

Seven Manufacturers Are Using Stop-Start Technology to Boost Fuel Economy

In 2015 stop-start technology was used by seven different manufacturers as a fuel saving measure. Ford and FCA dominate the stop-start light truck market (87% combined). Mercedes and BMW together make up 70% of the stop-start car market. Stop-start technology penetrated 7.4% of the car market and 5.5% of the light truck market.

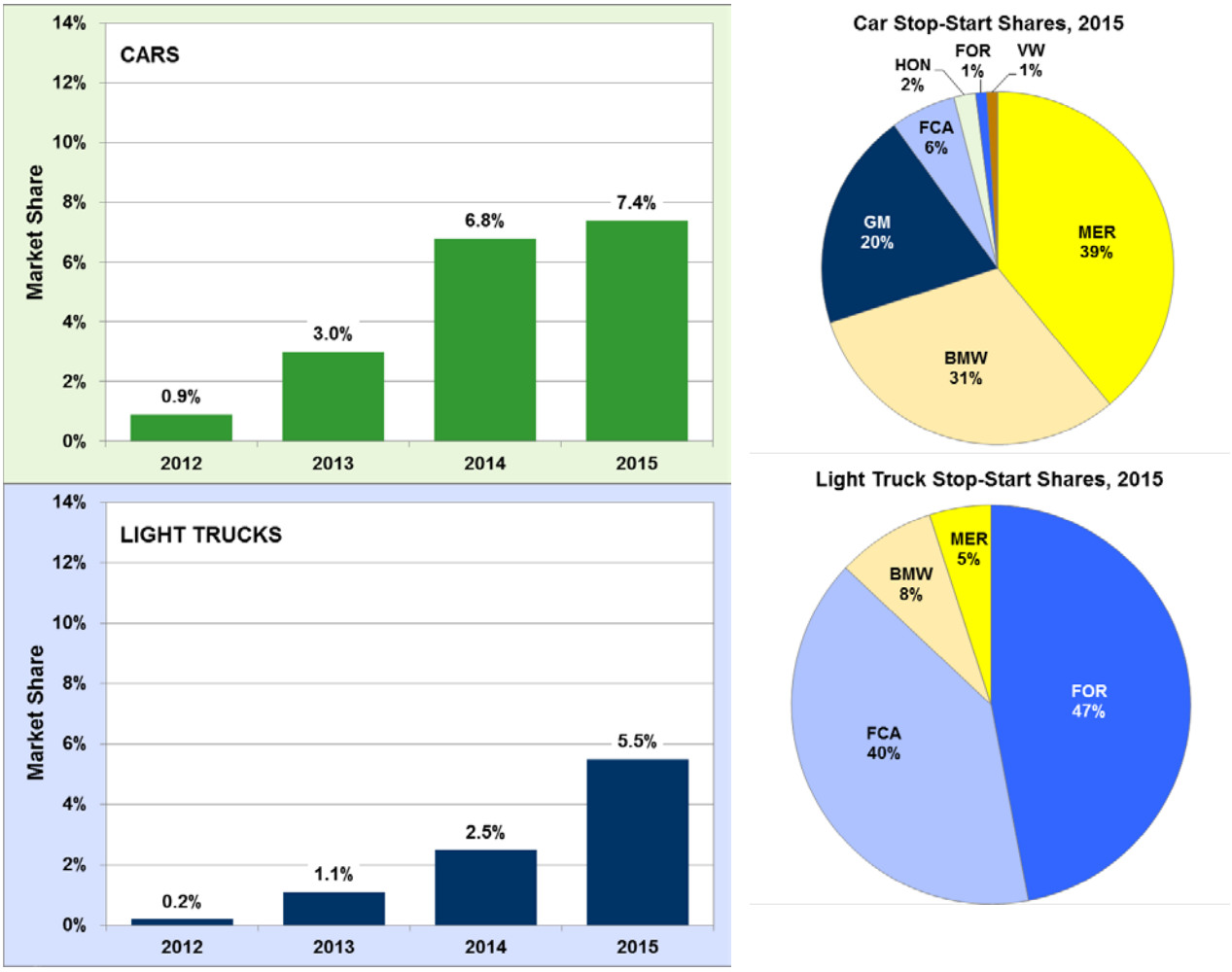


FIGURE 54. Stop-Start Technology Market Share, 2012-2015 and Manufacturer's Share, 2015

Note: MER = Mercedes.

Source:

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

Most Transmissions Are Six-Speed or More

The number of transmission speeds in new light vehicles has been growing. A greater number of gears improve fuel economy and performance by more closely matching the wheel speed to the optimum engine speed. By 2015, over half of all cars and light trucks were 6-speed. The 7-, 8-, and 9-speed transmissions grew to 14% of cars and 19% of light trucks. Continuously variable transmissions (CVTs) were more than one-quarter of the car market and 12.5% of the light truck market.

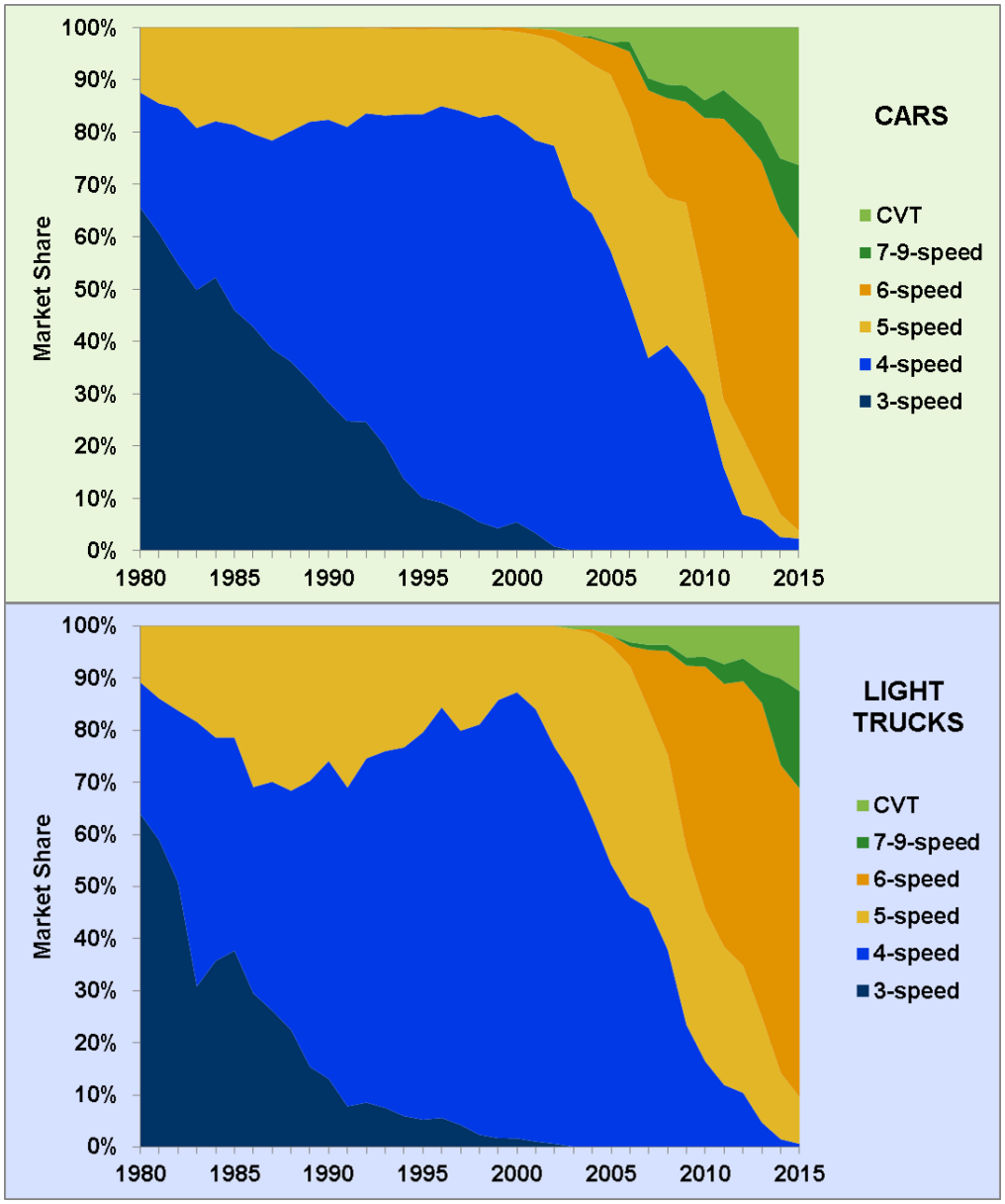


FIGURE 55. Market Share of Transmission Speeds, 1980-2015

Source:

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

More than 20 Models of Light Vehicles Were Diesel in Model Year 2015

In the early 1980's gas prices were high, the economy was in a downturn, and the cost of a gallon of diesel fuel was much less than that of a gallon of gasoline. Many manufacturers at that time produced diesel cars and light trucks. In model year (MY) 1984, there were 101 different models of light vehicles with diesel engines, including many common models like the Chevrolet Chevette, Ford Escort, Buick Regal, and Toyota Camry. Diesel engines in light vehicles, however, were not widely embraced by American consumers, with many finding them noisy, dirty, and hard to start in cold weather. By MY 2000, Volkswagen was the only manufacturer selling diesel light vehicles. Recently, advanced diesel technologies, combined with a nationwide switch to ultra-low-sulfur diesel fuel, have given light vehicle manufacturers new impetus to invest in diesel models. In MY 2015, five different manufacturers have 23 light vehicle models for sale with diesel engines.

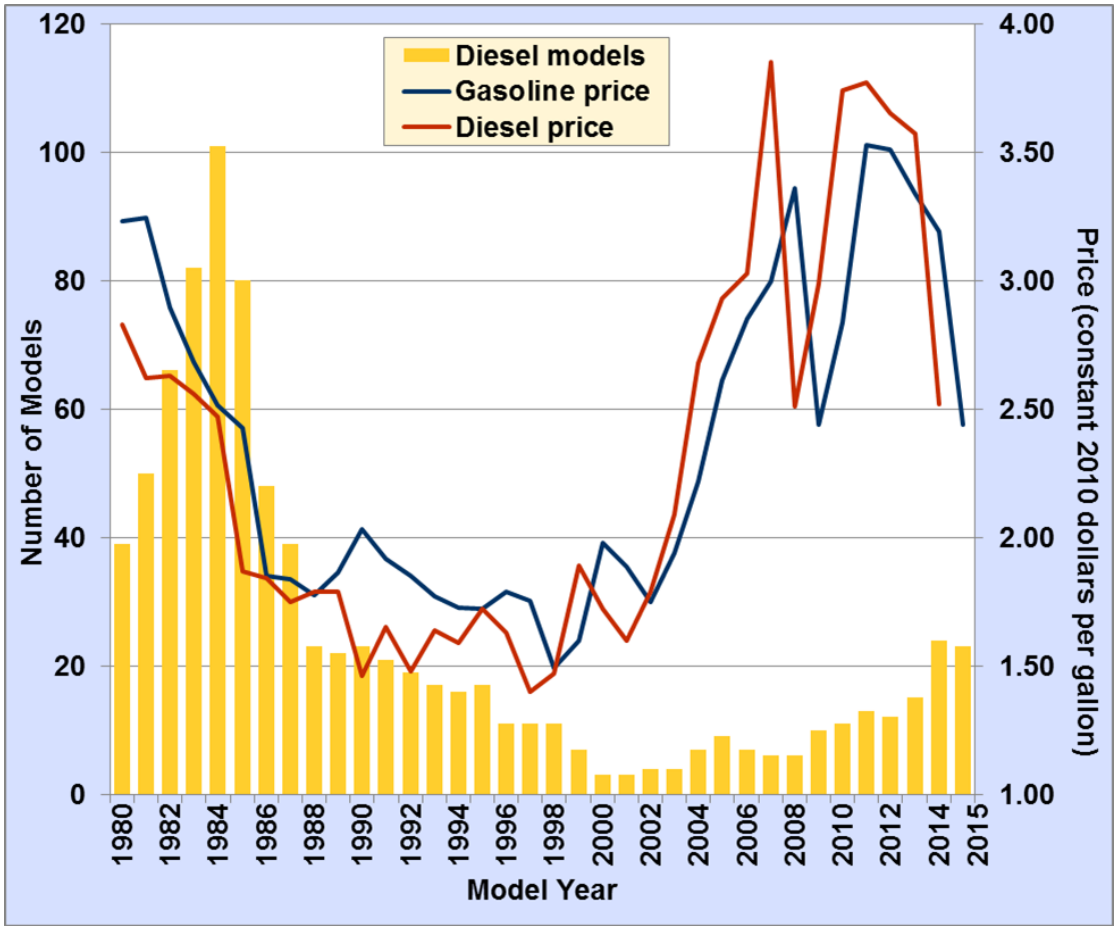


FIGURE 56. Number of Diesel Models and the Price of a Gallon of Gasoline and Diesel, 1980-2015

Note: Vehicles from VW that are currently under investigation are included in these data.

Sources:

U.S. Department of Energy, Fuel economy data, http://www.fueleconomy.gov. Data accessed February 2016.

Energy Information Administration, "Petroleum and Other Liquids Data Tool." http://www.eia.gov/petroleum

Fleet Sales Are More than 20% of Ford, GM, and FCA Retail Sales

Ford's light vehicle fleet sales were 28% of retail sales in 2014 and 2015. GM and FCA were not far behind. Hyundai/Kia had the largest increase in fleet sales share from 2014 to 2015. GM was the only company shown that decreased the fleet sales share from 2014 to 2015.

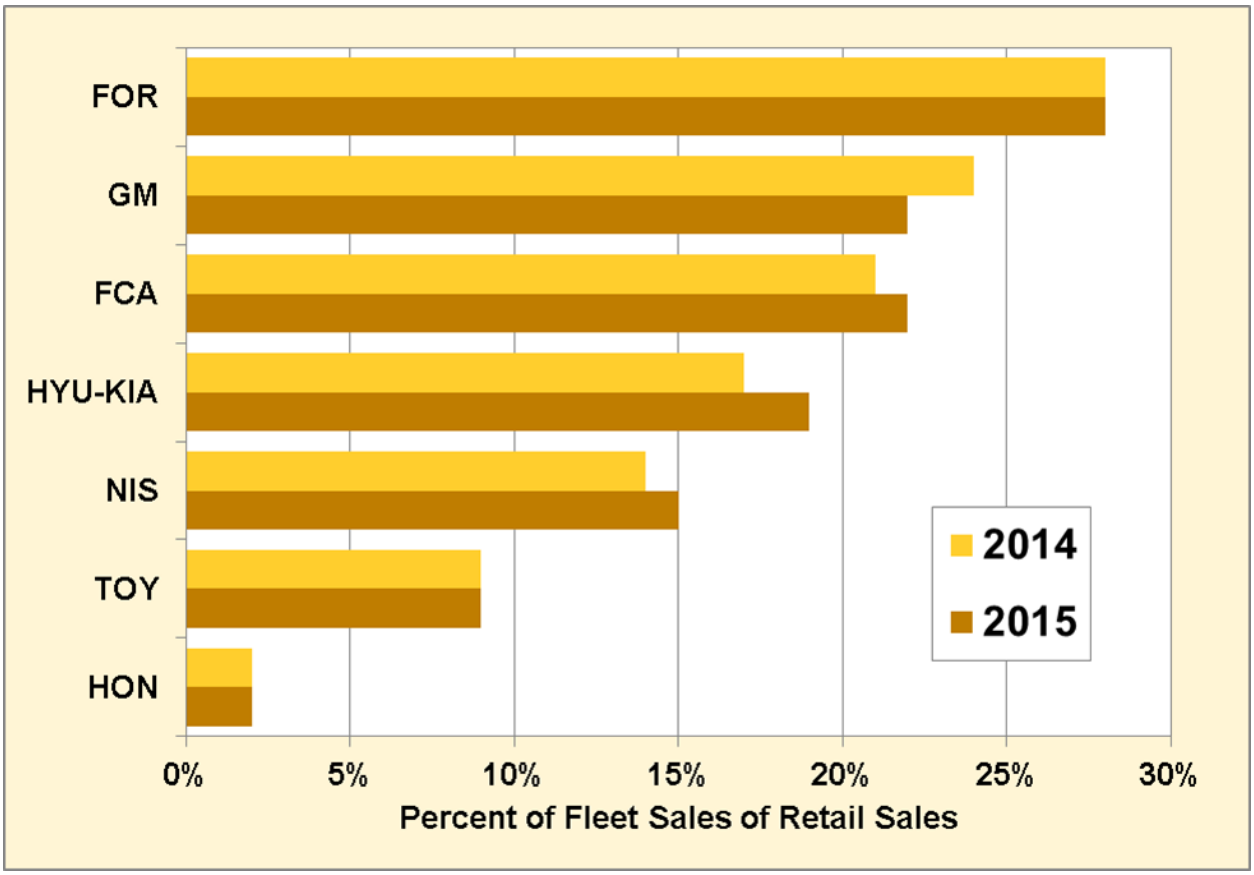


Figure 57. Share of Fleet Vehicle Sales by Manufacturer, 2014 and 2015

Source:
Crain Communications, Automotive News Data Center, U.S. Fleet Sales, January 2016.
http://www.autonews.com

Fleet Management Companies Remarket Vehicles On-Line

The top ten fleet management companies owned or managed over 3.6 million vehicles in 2014. They remarketed 12% of those vehicles during the year. Remarketing is often done by auctioning the vehicles through established auction houses. However, remarketing vehicles on-line is becoming more common. Twenty-five percent of the vehicles remarketed in 2014 by the top ten fleet management companies were remarketed on-line. Emkay and Merchants Fleet Management remarketed over 80% of their vehicles on-line.

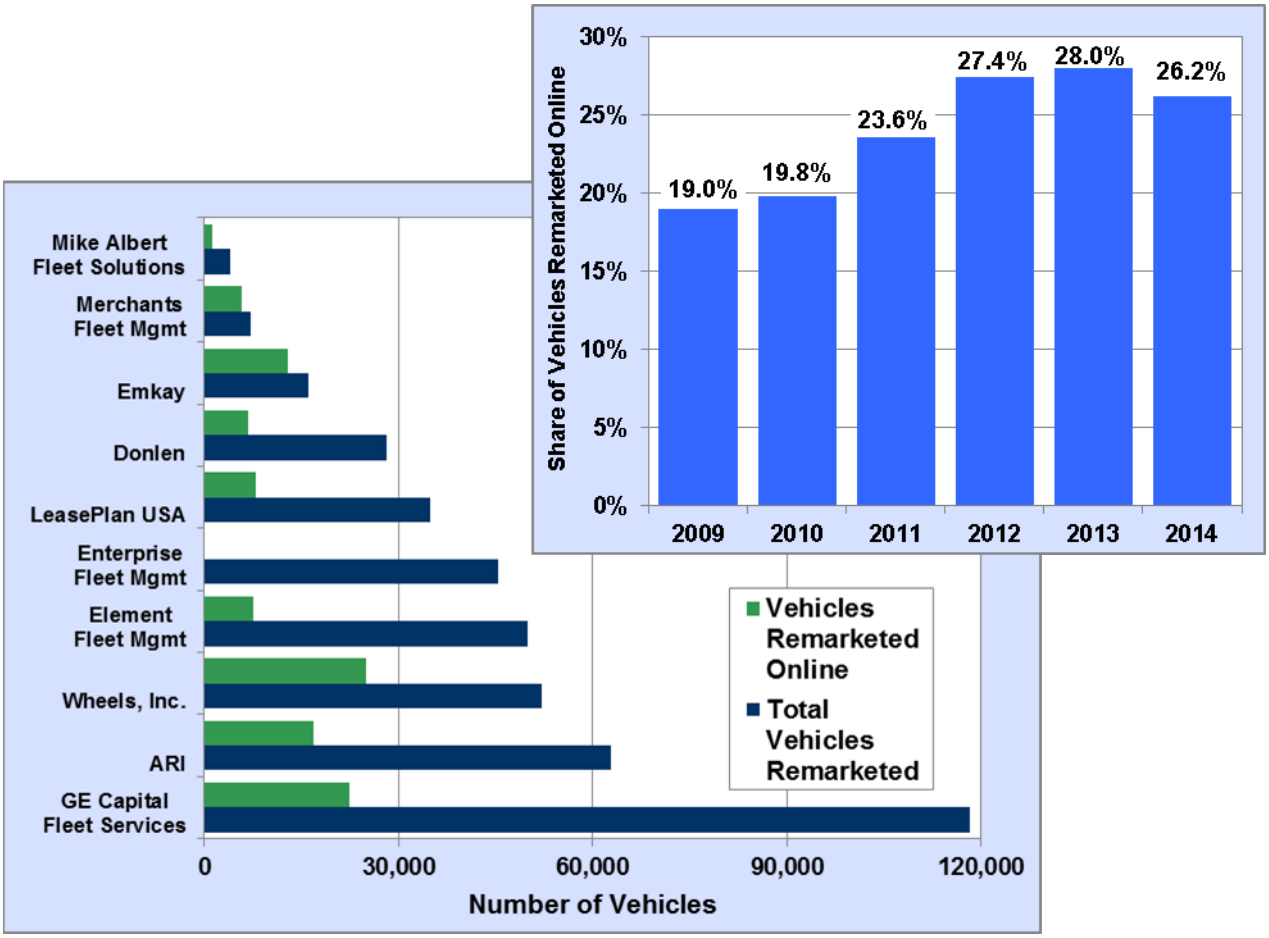
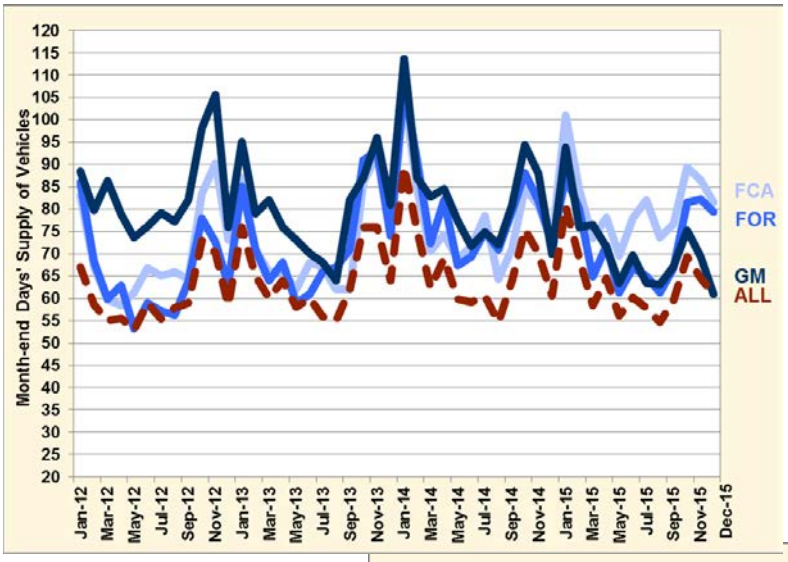


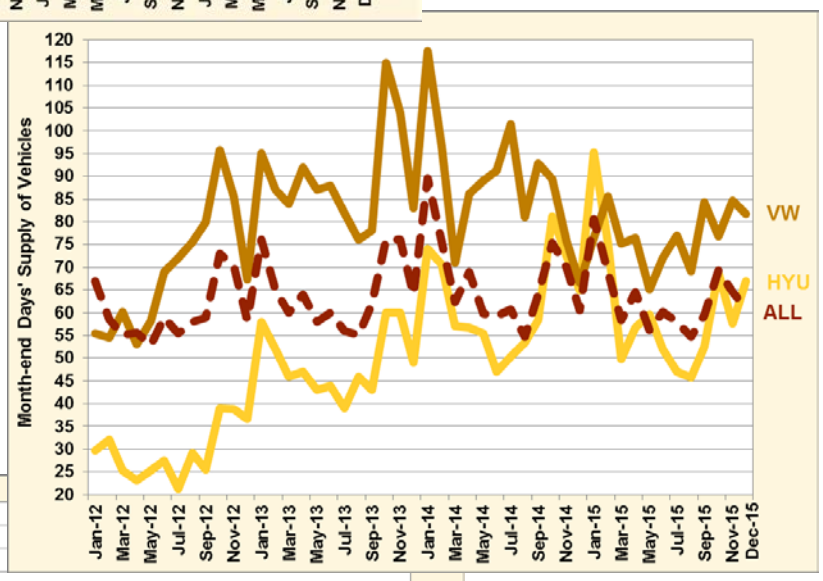
FIGURE 58. Vehicles Remarketed by the Top Ten Fleet Management Companies, 2014, and Share of Vehicles Remarketed On-Line, 2009-2014

Source:
Bobit Publishing Company, *Automotive Fleet Factbook 2015*. http://www.automotive-fleet.com/statistics

Light Vehicle Dealer Supplies Change Rapidly



Light vehicle dealer inventories change quickly throughout the year because they are affected by so many different variables: dealer or manufacturer financial incentives, economic news, supply disruptions.



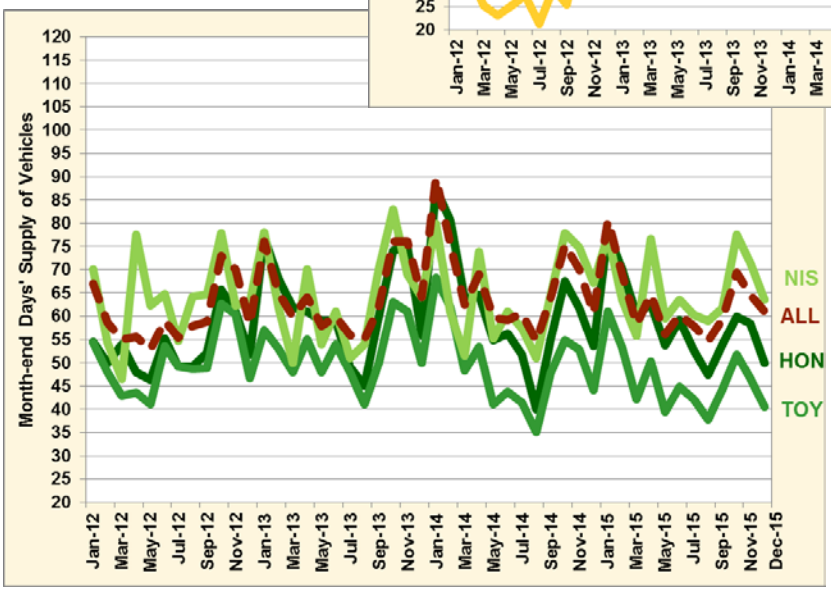


FIGURE 59. Monthly Dealer Supplies by Manufacturer, 2012-2015

Note: ALL = Average of all manufacturers. HYU includes Kia.

Source:
Ward's Automotive Group.
http://wardsauto.com

"Days to Turn" Trend by Vehicle Class

"Days to turn" is an automotive industry term that refers to the number of days that vehicles stay in dealer inventories before they are sold (i.e., the time a vehicle stays on the dealer's lot). There are many factors that influence this number including fuel prices, the economy, and supply disruptions. For these reasons days to turn by vehicle class is very volatile. During the two-year period from December 2013 to December 2015, compact trucks had the lowest days to turn. Large cars, for the most part, had the highest days to turn. Large crossover SUVs, particularly in the last year, have seen a decline in days to turn.

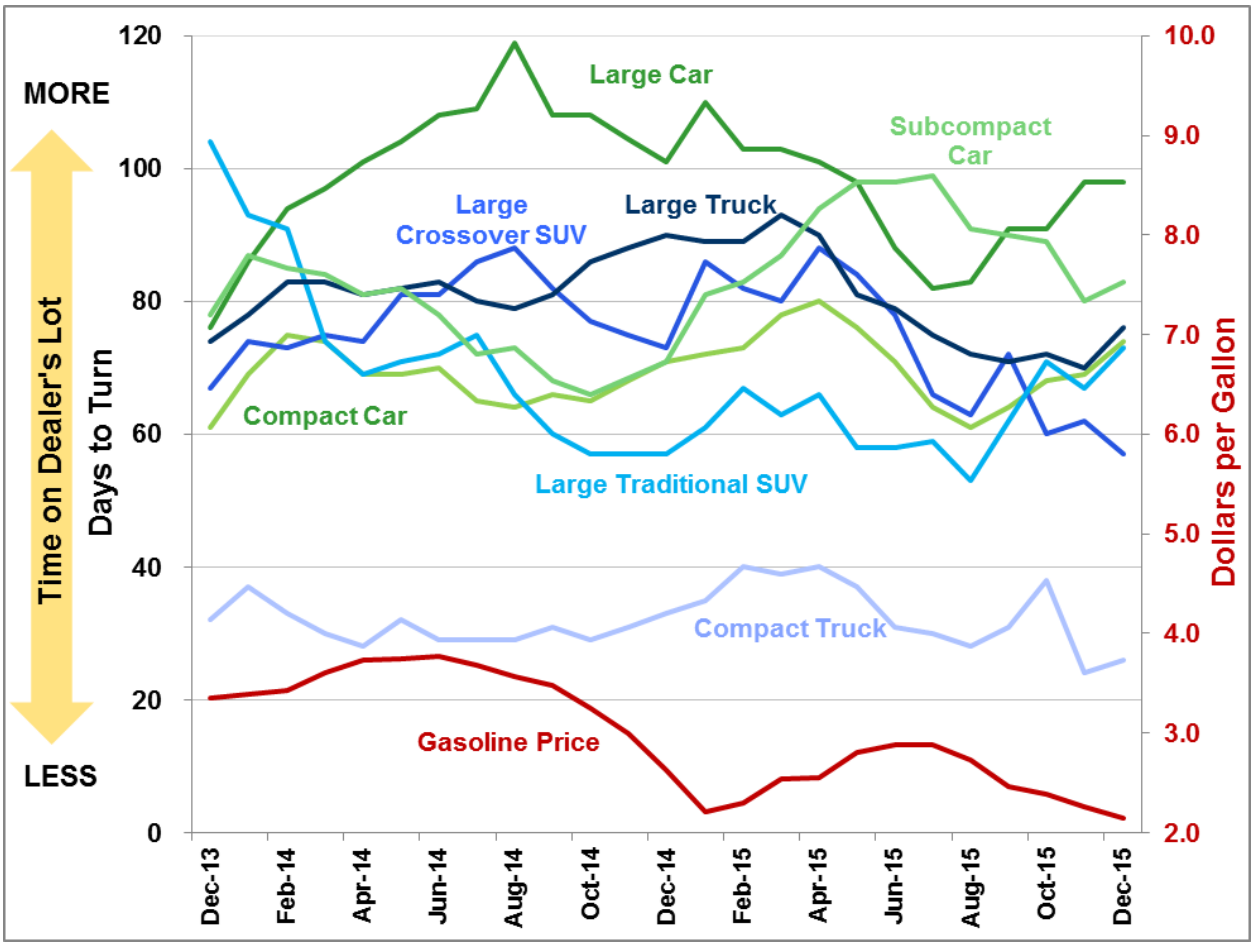


FIGURE 60. Days to Turn Trend by Vehicle Class, 2013-2015

Sources:

Edmunds website data, www.Edmunds.com.

U.S. Department of Energy, Energy Information Administration, International Statistics website, January 2015.

Many Tier 1 Suppliers Sell More in Europe and Asia than in North America

In the automotive industry, a Tier 1 supplier is a company that sells directly to the original equipment manufacturer (OEM). Globally, Robert Bosch GMbH is the top supplier with over $44 billion in parts sales to OEMs in 2014. Within the top ten suppliers, only one–Magna International, Inc.–has the majority (54%) of its sales to North America. The other companies in the top ten sell to North America, but sell more in Europe and Asia combined.

TABLE 19. List of Top Ten Tier 1 Global Suppliers, 2014

			Market Share				
Rank	**Company**	**Company Headquarters**	**North America**	**Europe**	**Asia**	**Rest of World**	**Total**
1	Robert Bosch GMbH	Germany	19%	50%	28%	3%	100%
2	Magna International, Inc.	Canada	54%	39%	5%	2%	100%
3	Continental AG	Germany	23%	49%	25%	3%	100%
4	Denso Corp.	Japan	22%	12%	64%	2%	100%
5	Aisin Seiki Co., Ltd.	Japan	18%	8%	73%	1%	100%
6	Hyundai Mobis	Korea	20%	11%	68%	1%	100%
7	Faurecia	France	25%	56%	14%	5%	100%
8	Johnson Controls, Inc.	United States	48%	39%	11%	2%	100%
9	ZF Friedrichshafen AG	Germany	20%	56%	20%	4%	100%
10	Lear Corp.	United States	38%	40%	17%	5%	100%

Note: Rank based on total global OEM automotive parts sales in 2014.

Source:
Crain Communications, *Automotive News Supplement,* "Top 100 Global Suppliers," June 2015.
http://www.autonews.com/

Top U.S.-Based Tier 1 Suppliers Sell Globally

There are ten U.S.-based companies in the top 50 automotive global suppliers. Of these companies, only one (Flex-N-Gate) had more than half of their sales in North America in 2014. Three others—Johnson Controls, Tenneco, and Dana—had nearly half of their sales in North America.

TABLE 20. U.S.-Based Tier 1 Suppliers in the Top 50, 2014

Rank	Company	Percent North America Sales	Products
8	Johnson Controls, Inc	48%	Complete automotive seats & seat components, lead acid & hybrid vehicle batteries
10	Lear Corp.	38%	Seating & electrical distribution systems
12	TRW Automotive Holdings Corp.	41%	Steering, suspension, braking & engine components; fasteners, occupant-restraint systems, electronic safety & security systems
13	Delphi Automotive	35%	Mobile electronics; powertrain, safety, thermal, controls & security systems; electrical/electronic architecture; in-car entertainment technologies
27	Tenneco, Inc.	49%	Emission-control systems, manifolds, catalytic converters, diesel aftertreatment systems, catalytic reduction mufflers, shock absorbers, struts, electronic suspension products & systems
29	BorgWarner, Inc.	29%	Turbochargers, engine valve-timing systems, ignition systems, emissions systems, thermal systems, transmission-clutch systems, transmission-control systems & torque management systems
31	Visteon Corp.	29%	Cockpit electronics, thermal energy management
39	Dana Holding Corp.	47%	Axles, driveshafts, sealing & thermal management products
46	Flex-N-Gate Corp.	91%	Interior & exterior plastics, metal bumpers & hitches, structural metal assemblies, forward & signal lighting, mechanical assemblies, prototyping & sequencing
47	Goodyear Tire & Rubber Co.	36%	Tires

Note: Rank based on total global OEM automotive parts sales in 2014.

Source:
Crain Communications, *Automotive News Supplement,* "Top 100 Global Suppliers," June 2015.
http://www.autonews.com/

U.S.-Based Tier 1 Suppliers Have Been Diversifying Globally over the Past Five Years

There are eleven U.S. automotive parts suppliers that sold more than $5 billion in parts to original equipment manufacturers in 2014. Most of these companies have been diversifying their customer base over the last five years. Nine of the companies increased their share of sales in North America. Goodyear and Dana are the only two companies that decreased their sales share to North America between 2010 and 2014. Dana is the only company listed that increased sales share to Europe in the 5-year period.

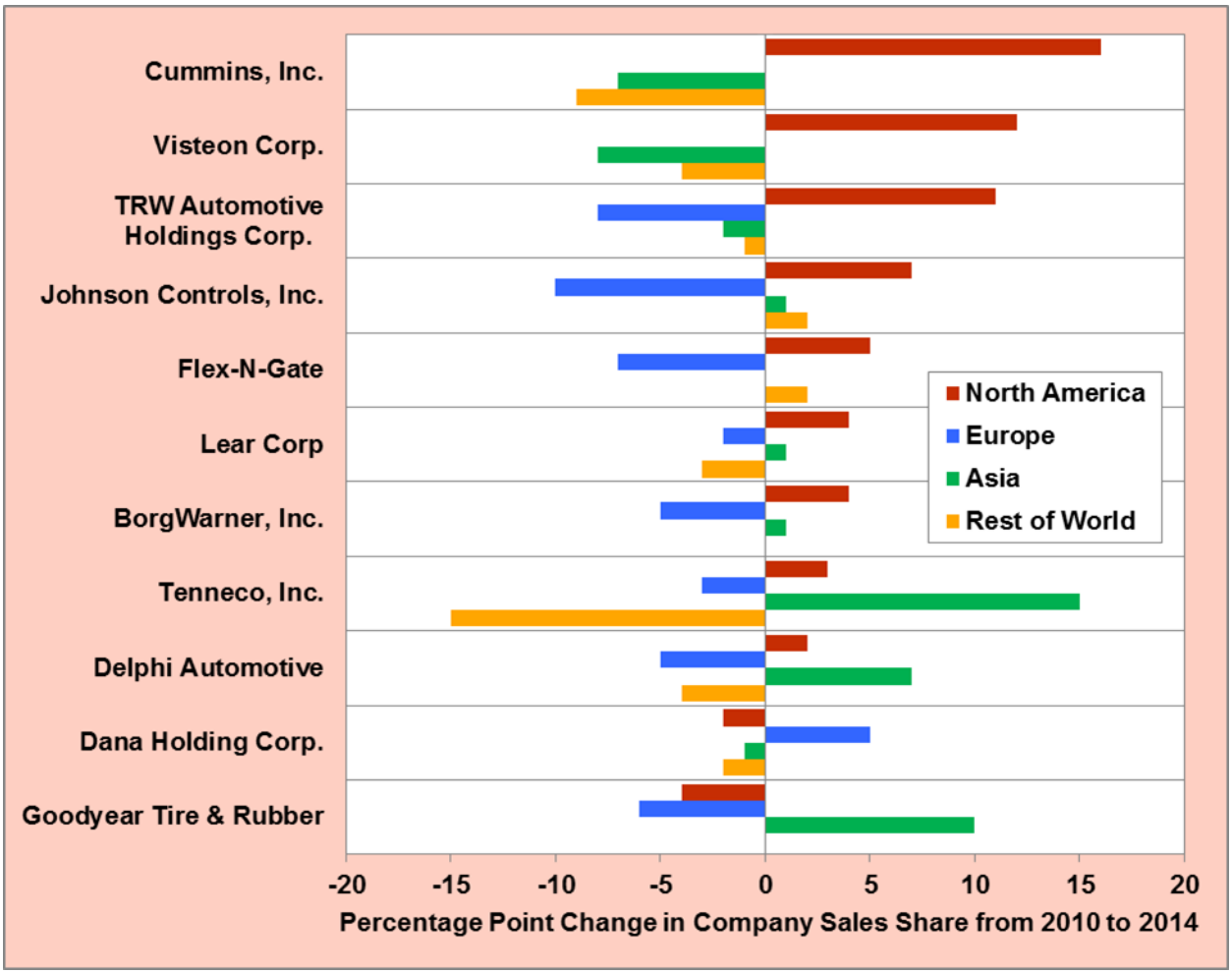


FIGURE 61. Change in Company Sales Share of Top U.S.-Based Tier 1 Suppliers, 2010-2014

Source:

Crain Communications, *Automotive News Supplement,* "Top 100 Global Suppliers," June 2015 and June 2011. http://www.autonews.com/