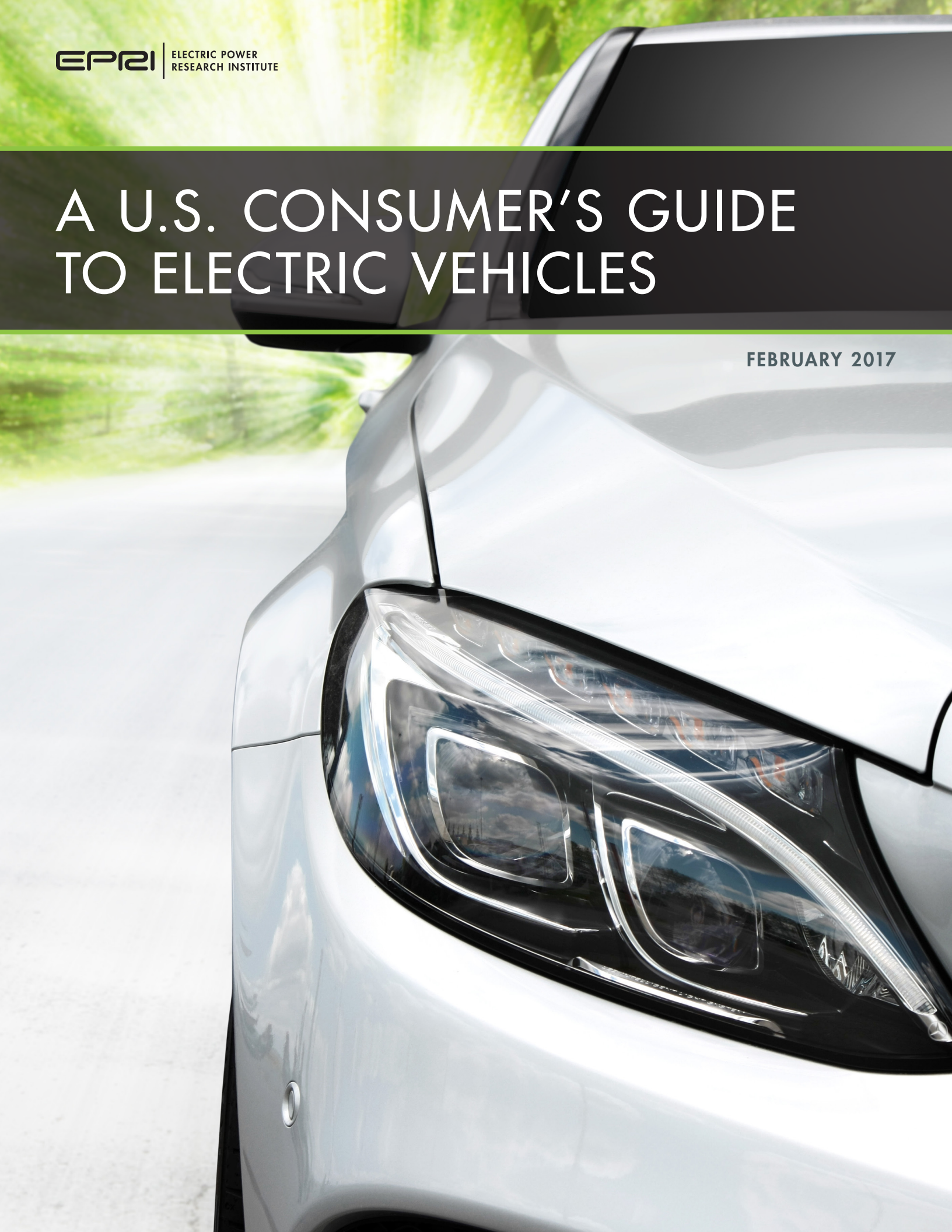
EPRI | ELECTRIC POWER RESEARCH INSTITUTE

A U.S. CONSUMER'S GUIDE TO ELECTRIC VEHICLES

FEBRUARY 2017



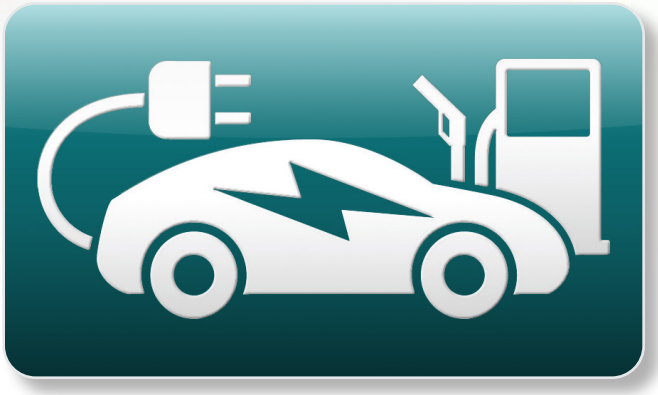
Today's Choices in Cars

From hatchbacks to luxury sedans, crossovers to minivans, about 30 electric vehicle models are currently available across the country, offering new-car buyers a range of choices. Soon, U.S. consumers will have even more options, with about 60 electric vehicles projected by 2021.

Plug-in electric cars offer performance, comfort, and safety. Drivers enjoy the convenience of charging at home using domestic electric fuel, and save money over time. At the U.S. national average price of 12.5 cents per kilowatt-hour (kWh), electricity is roughly equivalent to gasoline at $1 a gallon. Plus, many utilities offer special overnight rates bringing the dollar-per-gallon equivalency even lower.

Displacing gasoline with electricity cuts petroleum use and emissions, which benefits public health. Electrifying the transportation sector can reduce greenhouse gas emissions in 2050 by 57% relative to 2015 levels.

Take a look at your driving needs to see if an electric vehicle can work for you.



ELECTRIC VEHICLES

Plug-in electric vehicles have batteries that recharge by plugging into the electricity grid. There are two main types. Plug-in hybrids are powered by an electric motor(s) and battery, paired with an internal combustion engine. Battery electric vehicles are powered by an electric motor and battery alone, and never use gasoline.

Plug-in hybrid designs differ. Most drive on electricity alone using battery energy, and after the battery is discharged, continue driving using gasoline much like conventional hybrids. (Conventional hybrids have a smaller battery and do not plug in.) On average, plug-in hybrids can travel between 10 and 50 miles on electricity before they need to be plugged in. Their gas tanks extend total range to between 300 and 600 miles. Some designs allow the driver to choose whether and when to use electricity or gasoline.

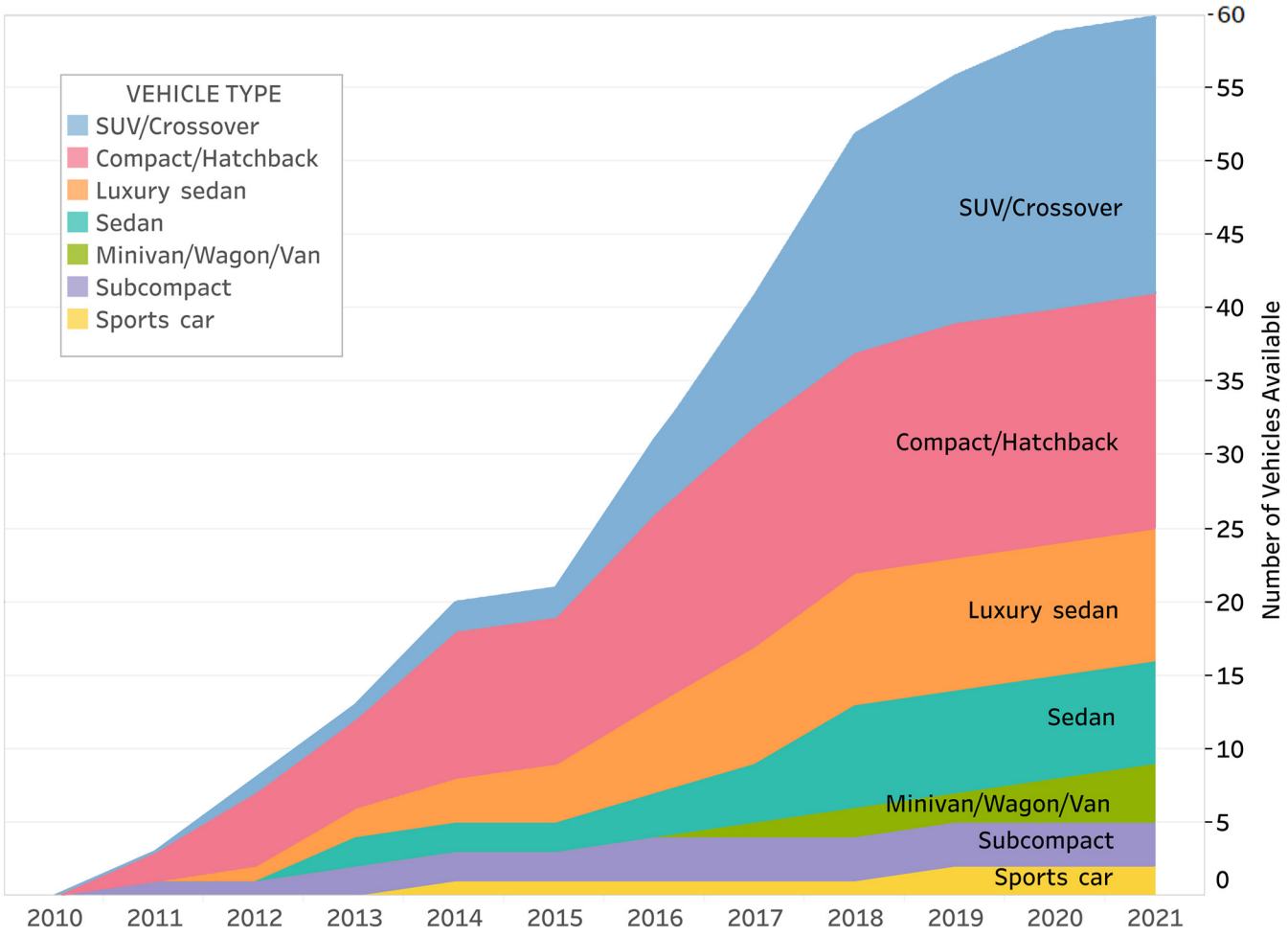
Battery electric vehicles can travel farther on electricity than plug-in hybrids, but their total range is limited by their battery size. Range is increasing as technology advances, with many second-generation models promising 100 to 200 miles on a charge. Some current models can travel more than 200 miles, and future models promise more range—around 300 miles.

WHAT CARS ARE AVAILABLE AND WHERE?

The modern electric vehicle market is evolving quickly. Today, you can buy an electric car in almost every vehicle class. Automakers are announcing plans to produce many more models in coming years.

Some electric vehicles are available nationwide. Others are available only in California, the Pacific Northwest, and some Northeast states. Automakers typically roll out electric vehicles in select markets, then expand availability in response to regulations, market demand and readiness. Dealer sales and service technicians may need special training on new technologies, which takes time and resources. Furthermore, individual dealers may choose not to stock and sell electric vehicles. As a result, availability in any given market may depend on dealer decisions. In many cases, models may not be on the lot but can be ordered.

The following pages highlight electric cars that are available as of February 1, 2017.



The number and variety of electric vehicle models continues to grow. By the end of 2017, about 40 different models are expected to be available. By 2021, at least 60 models are projected.

Currently Available Nationwide

2017 BMW 330e iPerformance

Photo courtesy of BMW

Type: Plug-in hybrid; Luxury sedan
EPA electric range: 14 miles
EPA total range (gas + electric): 350 miles
Charging time: 2.5 hours @ 240V; 7 hours @120V

2017 BMW 740e xDrive iPerformance

Photo courtesy of BMW

Type: Plug-in hybrid; Luxury sedan
EPA electric range: 14 miles
EPA total range (gas + electric): 340 miles
Charging time: 3 hours @ 240V; 7 hours @120V

2017 BMW i3 and i3 REx

Photo courtesy of BMW

Type: Battery electric vehicle (i3); Plug-in hybrid (i3 REx); Compact/Hatchback
EPA electric range: 114 miles (i3); 97 miles (i3 REx)
EPA total range (gas + electric): 180 miles (i3 REx)
Charging time: 4.5 hours @ 240V; Fast-charging capable

2017 BMW i8

Photo courtesy of BMW

Type: Plug-in hybrid; Sports car
EPA electric range: 15 miles
EPA total range (gas + electric): 330 miles
Charging time: 2 hours @ 240V; 10 hours @ 120V

2017 BMW X5 xDrive40e iPerformance

Type: Plug-in hybrid; SUV/Crossover
EPA electric range: 14 miles
EPA total range (gas + electric): 540 miles
Charging time: 3 hours @ 240V; 6 hours @120V

2017 Chevrolet Bolt EV

Type: Battery electric vehicle; Compact/Hatchback
EPA electric range: 238 miles
Charging time: 9.3 hours @ 240V; Fast-charging capable
**Availability: limited markets early 2017, nationwide fall 2017*

2017 Chevrolet Volt

Type: Plug-in hybrid; Compact/Hatchback
EPA electric range: 53 miles
EPA total range (gas + electric): 420 miles
Charging time: 4.5 hours @ 240V; 13 hours @ 120V

2017 Chrysler Pacifica Hybrid

Type: Plug-in hybrid; Minivan/Wagon/Van
EPA electric range: 33 miles
EPA total range (gas + electric): 570 miles
Charging time: 2 hours @ 240V; 14 hours @ 120V

2017 Ford C-MAX Energi

Type: Plug-in hybrid; Compact/Hatchback
EPA electric range: 20 miles
EPA total range (gas + electric): 570 miles
Charging time: 2.5 hours @ 240V; 7 hours @ 120V

2017 Ford Focus Electric

Type: Battery electric vehicle; Compact/Hatchback
EPA electric range: 115 miles
Charging time: 5.5 hours @ 240V; Fast-charging capable

2017 Ford Fusion Energi

Type: Plug-in hybrid; Sedan
EPA electric range: 22 miles
EPA total range (gas + electric): 610 miles
Charging time: 2.5 hours @ 240V; 7 hours @ 120V

2017 Hyundai Sonata

Type: Plug-in hybrid; Sedan
EPA electric range: 27 miles
EPA total range: 590 miles
Charging time: 2.7 hours @ 240V; 9 hours @ 120V

2017 Kia Optima

Type: Plug-in hybrid; Sedan
EPA electric range: 29 miles
EPA total range (gas + electric): 610 miles
Charging time: 2.7 hours @ 240V; 9 hours @ 120V

2017 Mitsubishi i-MiEV

Type: Battery electric vehicle; Subcompact
EPA electric range: 59 miles
Charging time: 7 hours @ 240V; Fast-charging capable

2017 Nissan LEAF

Type: Battery electric vehicle; Compact/Hatchback
EPA electric range: 107 miles
Charging time: 6 hours @ 240V; Fast-charging capable

2017 Porsche Cayenne S E-Hybrid

Type: Plug-in hybrid; SUV/Crossover
EPA electric range: 14 miles
EPA total range (gas + electric): 480 miles
Charging time: 3 hours @ 240V; up to 11 hours @ 120V

2017 Tesla Model S

Type: Battery electric vehicle; Luxury sedan
EPA electric range: 218 to 315 miles
Charging time: 4.75 to 8.75 hours @ 240V; Fast-charging capable

2017 Tesla Model X

Type: Battery electric vehicle; SUV/Crossover
EPA electric range: 238 to 289 miles
Charging time: 6.5 to 9.5 hours @ 240V; Fast-charging capable

2017 Toyota Prius Prime

Type: Plug-in hybrid; Compact/Hatchback
EPA electric range: 25 miles
EPA total range (gas + electric): 640 miles
Charging time: 2 hours @ 240V; 5.5 hours @ 120V

2017 Volvo XC90 T8 Twin Engine

Type: Plug-in hybrid; SUV/Crossover
EPA electric range: 14 miles
EPA total range: 350 miles
Charging time: 3 hours @ 240V; 4 hours @ 120V

Currently Available in Select Markets

2017 Audi A3 Sportback e-tron

Type: Plug-in hybrid; Compact/Hatchback
EPA electric range: 16 miles
EPA total range (gas + electric): 380 miles
Charging time: 2.5 hours @ 240V; 8 hours @ 120V

2017 Fiat 500e

Type: Battery electric vehicle; Subcompact
EPA electric range: 84 miles
Charging time: 4 hours @ 240V

2017 Kia Soul EV

Type: Battery electric vehicle; Compact/Hatchback
EPA electric range: 93 miles
Charging time: 4 hours @ 240V; Fast-charging capable

2017 Mercedes-Benz B250e

Type: Battery electric vehicle; Compact/Hatchback
EPA electric range: 87 miles
Charging time: 3.5 hours @ 240V

2016 Mercedes-Benz C350e

Type: Plug-in hybrid; Sedan
EPA electric range: 11 miles
EPA total range (gas + electric): 410 miles
Charging time: 1.5 hours @ 240V; 4 to 5 hours @ 120V

2017 Mercedes-Benz GLE550e

Type: Plug-in hybrid; SUV/Crossover
EPA electric range: 12 miles
EPA total range (gas + electric): 460 miles
Charging time: 2 hours @ 240V; 4 to 5 hours @ 120V

2017 Mercedes-Benz S550e

Type: Plug-in hybrid; Luxury sedan
EPA electric range: 14 miles
EPA total range (gas + electric): 450 miles
Charging time: 2 hours @ 240V; 4 to 5 hours @ 120V

2016 smart fortwo electric drive

Type: Battery electric vehicle; Subcompact
EPA electric range: 68 miles
Charging time: 6 hours @ 240V

2016 Volkswagen e-Golf

Type: Battery electric vehicle; Compact/Hatchback
EPA electric range: 83 miles
Charging time: 4 to 7 hours @ 240V; Fast-charging capable

U.S. Electric Vehicle Availability

BATTERY ELECTRIC VEHICLE

AVAILABLE NOW

MODEL NAME	RANGE (MI)[1]	WHERE
LUXURY SEDAN		
Tesla Model S	218 – 315	Nationwide
COMPACT/HATCHBACK		
BMW i3	114	Nationwide
Chevrolet Bolt EV	238	Nationwide
Ford Focus Electric	115	Nationwide
Nissan LEAF	107	Nationwide
Kia Soul EV	93	Select Markets
Mercedes-Benz B250e	87	Select Markets
Volkswagen e-Golf	83	Select Markets
SUBCOMPACT		
Mitsubishi i-MiEV	59	Nationwide
Fiat 500e	84	Select Markets
smart fortwo electric drive	68	Select Markets
SUV/CROSSOVER		
Tesla Model X	238 – 289	Nationwide

EXPECTED IN 2017

MODEL NAME	RANGE (MI)[1]	WHEN
COMPACT/HATCHBACK		
Hyundai Ioniq	124	Spring 2017
Kia Soul EV (Gen. 1+)	TBA	2017
Volkswagen e-Golf (Gen. 1+)	125	Summer 2017
SUBCOMPACT		
smart fortwo electric drive (Gen1+)	TBA	Spring 2017

COMING 2018 OR LATER, AND CONCEPT CARS

MODEL NAME	RANGE (MI)[1]	WHEN
SEDAN		
Honda Clarity	80	2018
Tesla Model 3	215	2018
COMPACT/HATCHBACK		
Hyundai Ioniq (Gen 1+)	200	2018
Kia Niro	TBA	2018
Nissan LEAF (Gen. 2)	200	2018
MINI Cooper	TBA	2019
VW I.D.	250 – 370	2020
SUV/CROSSOVER		
Jaguar I-PACE	310	2018
Tesla Model 3	215	2018
Audi e-tron quattro	250 – 300	2019
Volvo	TBA	2019
Mercedes-Benz EQ	TBA	2019 – 2020
BMW X3	TBA	2020
Ford	300	2020
Subaru	TBA	2021
MINIVAN/WAGON/VAN		
Chrysler Portal	250	2020
VW I.D. Buzz	270	2021
SPORTS CAR		
Porsche Mission E	300	2019

PLUG-IN HYBRID

AVAILABLE NOW

MODEL NAME	RANGE (MI)[1]	WHERE
LUXURY SEDAN		
BMW 330e iPerformance	14/350	Nationwide
BMW 740e xDrive iPerformance	14/340	Nationwide
Mercedes-Benz S550e	14/450	Select Markets
SEDAN		
Ford Fusion Energi	22/610	Nationwide
Hyundai Sonata	27/590	Nationwide
Kia Optima	29/610	Nationwide
Mercedes-Benz C350e	11/410	Select Markets
COMPACT/HATCHBACK		
BMW i3 REx	97/180	Nationwide
Chevrolet Volt	53/420	Nationwide
Ford C-MAX Energi	20/570	Nationwide
Toyota Prius Prime	25/640	Nationwide
Audi A3 Sportback e-tron	16/380	Select Markets
SUV/CROSSOVER		
BMW X5 xDrive40e iPerformance	14/540	Nationwide
Porsche Cayenne S E-Hybrid	14/480	Nationwide
Volvo XC90 T8 Twin Engine	14/350	Nationwide
Mercedes-Benz GLE550e	12/460	Select Markets
MINIVAN/WAGON/VAN		
Chrysler Pacifica Hybrid	33/570	Nationwide
SPORTS CAR		
BMW i8	15/330	Nationwide

EXPECTED IN 2017

MODEL NAME	RANGE (MI)[1]	WHEN
LUXURY SEDAN		
BMW 530e iPerformance	15/TBA	Spring 2017
Cadillac CT6	30/400+	Spring 2017
Porsche Panamera 4 E-Hybrid	31/TBA	Summer 2017
Volvo S90 T8 Twin Engine	TBA	Late 2017
SEDAN		
Hyundai Ioniq	TBA	Late 2017
COMPACT/HATCHBACK		
Kia Niro	TBA	Late 2017
SUV/CROSSOVER		
MINI Countryman	TBA	Summer 2017
Mercedes-Benz GLC350e	TBA	Late 2017
Mitsubishi Outlander	TBA	Late 2017

COMING 2018 OR LATER, AND CONCEPT CARS

MODEL NAME	RANGE (MI)[1]	WHEN
LUXURY SEDAN		
BMW i5	TBA	2018
SEDAN		
Honda Clarity	40/TBA	2018
SUV/CROSSOVER		
Audi Q8 e-tron	37/620	2018
BMW X3 eDrive	20/TBA	2018
Subaru	TBA	2018
Volvo XC40 T5 Twin Engine	TBA	2018
MINIVAN/WAGON/VAN		
Volvo V90 T8 Twin Engine	TBA	2018
SPORTS CAR		
BMW i8 Roadster	TBA	2018

1 Range for battery electric vehicles is all-electric range. Range for plug-in hybrids is all-electric/combined (electric + gas) range. On vehicles available now, source is www.fueleconomy.gov. On future cars, source is manufacturer or industry media, and is subject to change.

Answers to Important Questions

How far do electric vehicles go on a charge?

Plug-in hybrids can typically drive from 11 to 53 miles on electricity alone, before the gasoline engine kicks in. On electricity and gas combined their total range is about 300 to 600 miles. If you charge every day, you may be able to drive 1,000 to 2,000 miles between gasoline fill-ups.

Battery electric vehicle range is increasing as technology advances, with many second-generation models promising 100 to 200 miles on a charge. The Chevy Bolt is rated at 238 miles.

As with a gas car's fuel economy, your driving behavior affects electric vehicle range. Most people find that their electric car's range exceeds their daily driving needs, and many find that they don't need to charge every day.

How much does it cost to charge?

At the U.S. national average price of 12.5 cents per kilowatt-hour (kWh), "fueling" a car with electricity is roughly equivalent to buying gasoline at $1 a gallon.

How, when, and where will I charge my car?

You will probably find it most convenient and cost-effective to charge at home. Every electric car comes with a 120V charging cord that you can plug into a standard household outlet. Charging at 120V is a slow charge rate that's usually sufficient for plug-in hybrids, and may be sufficient for some battery electric vehicles – depending on your needs. For faster charging, install a 240V charging station. Many utilities offer lower electricity rates overnight or electric vehicle rates that encourage charging overnight when electricity is plentiful.

Some employers offer workplace charging, public charging availability is increasing nationwide, and fast-charging station networks are also expanding. A fast charger can charge a properly equipped battery electric vehicle to 80% full in about 30 minutes or less.

For more information, see EPRI publication, "A U.S. Consumer's Guide to Electric Vehicle Charging" (Product ID 3002009442).

Can weather affect my car's performance?

During very hot or very cold weather, and in certain driving conditions, electric vehicles draw energy from the traction battery for interior air-conditioning, heating, and window defrosting or defogging. This energy use can reduce driving range. To minimize the effects, you can program your car to pre-condition the interior and battery while it is plugged in. Windshield wipers, headlights, and similar accessories do not have a significant effect on range.

What incentives are available?

The federal government offers a tax credit of up to $7,500 toward the purchase of a qualified plug-in electric vehicle. Some state and local governments offer vehicle or charging station incentives. In some urban areas, electric vehicles can use carpool lanes with a single driver. Priority or free parking and free charging perks are available in some cities. Incentives are subject to limitations and may change over time.

What should I consider in making a purchase?

Consider your driving needs and lifestyle. If you have only one car, or often drive long distances, a plug-in hybrid could be a good choice. With their back-up internal combustion engine, plug-in hybrids provide a worry-free transition to electric-drive vehicles. If you can charge at work you can effectively double your electric range.

A battery electric vehicle could be a good choice if you have a predictable commute, have a second car for long trips, or if you like the idea of a gasoline-free driving experience. Access to workplace or public charging may alleviate any range concerns.

Consider costs and benefits. With manufacturer lease options, utility time-of-use rates, and government purchase incentives, electric vehicles can be less expensive to operate over their lifetime despite costing more to purchase. For more information, read EPRI publication, "Total Cost of Ownership for Current Plug-in Electric Vehicles: Update to Model 2013 and 2014 Model Year Vehicles" (Product ID 3002004054).

Consider environmental benefits. Electric vehicles have lower emissions than gasoline-powered vehicles, even in areas where much of the electricity is generated by power plants that use fossil fuels. For more information, read EPRI publications, "Environmental Assessment of Plug-In Hybrid Electric Vehicles" (Product ID 1015325), and "Environmental Assessment of a Full Electric Transportation Portfolio" (Product IDs 3002006875, 3002006876, and 3002006880).

FOR MORE INFORMATION

Explore automakers' websites for product updates and check your local electric utility website for information about electric vehicles. Other sources:

ELECTRIC DRIVE TRANSPORTATION ASSOCIATION
www.electricdrive.org
and
www.goelectricdrive.com

U.S. DEPT. OF ENERGY ALTERNATIVE FUELS DATA CENTER
www.afdc.energy.gov/fuels/electricity.html

U.S. DEPT. OF ENERGY FUEL ECONOMY INFORMATION
http://www.fueleconomy.gov/

PLUG IN AMERICA
www.pluginamerica.org

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