

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



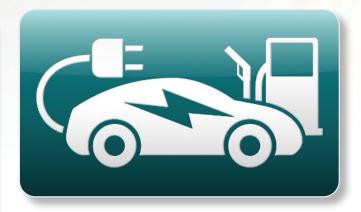
Today's Choices in Cars

Electric cars offer consumers affordable, efficient, and high-tech transportation. More models, including crossovers, minivans, hatchbacks, and sedans, become available every year. Today, new-car buyers can choose from about 40 models. By 2022, about 90 electric vehicles are projected.

An expanding nationwide charging network enables more consumers to consider electric cars, although most drivers still prefer to charge at home due to convenience and savings 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 electricity providers offer special electric vehicle rates.

Displacing gasoline with domestic 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. An electric vehicle might 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, also called all-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 10 to 50 miles on electricity before they switch to gasoline. Their gas tanks extend total range to between 300 and 600 miles. Some designs allow the driver to choose when to use electricity or gasoline.

All-electric vehicles can travel farther on electricity than plug-in hybrids, but their total range is limited by the battery size. As battery technology advances and costs come down, vehicle range is increasing. Most battery electric vehicles available today promise 100 to 240 miles on a charge, and some can travel even farther. Most future models promise even more range, 200 to 300 miles.

ELECTRIC VEHICLE AVAILABILITY

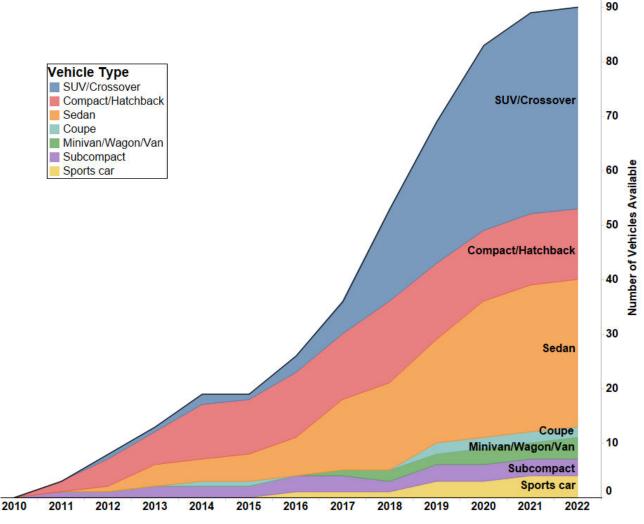
The modern electric vehicle market is evolving quickly. Today, you can buy an electric car in almost every vehicle class, as shown in Figure 1. Although electric cars account for roughly 1% of global new-car sales, they are a growing and increasingly competitive segment. Automakers are offering more choices in trim levels and body styles. Some even offer different powertrains—gasoline, battery electric, plug-in hybrid, or hydrogen fuel cell—for the same car.

Some electric vehicle models are available nationwide. Others are available only in California, the Pacific Northwest, and some Northeast states. Still others can be ordered through a dealer, even if that dealer does not have electric vehicles in stock.

Used electric cars are now available, as well. As people who bought the first generation of electric vehicles trade up to the newest models, their old cars are now for sale in the used-car market as affordable electric vehicle options.

In addition, several ultra-luxury models priced over \$150,000 are available. (They are listed in Table 1 on page 12 but not detailed in this guide.)

The following pages highlight new model-year electric cars that are available as of February 1, 2018.



The number and variety of electric vehicle models continues to grow. By the end of 2018, about 53 different models are expected to be available. By 2022, at least 90 models are projected.

Available Nationwide

2018 BMW 330e iPerformance



Type: Plug-in hybrid; Sedan **EPA electric range:** 14 miles

EPA total range (gas + electric): 350 miles

Charging time: 2.2 hours @ 240V; 7 hours @120V

2018 BMW 530e iPerformance



Type: Plug-in hybrid; Sedan **EPA electric range:** 16 miles

EPA total range (gas + electric): 370 miles

Charging time: <3 hours @ 240V; 7 hours @120V

2018 BMW 740e xDrive iPerformance



Type: Plug-in hybrid; Sedan **EPA electric range:** 14 miles

EPA total range (gas + electric): 340 miles Charging time: 3 hours @ 240V; 7 hours @120V

2018 BMW i3 REx and i3



Type: Plug-in hybrid (i3 REx); Battery electric vehicle (i3); Compact/Hatchback

EPA electric range: 97 miles (i3 REx); 114 miles (i3) **EPA total range (gas + electric):** 180 miles (i3 REx) **Charging time:** 5 hours @ 240V; Fast-charging capable



2018 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

2018 Chevrolet Bolt EV



Type: Battery electric vehicle; Compact/Hatchback

EPA electric range: 238 miles

Charging time: 9.3 hours @ 240V; Fast-charging capable

2018 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

2018 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



Type: Battery electric vehicle; Compact/Hatchback

EPA electric range: 115 miles

Charging time: 5.5 hours @ 240V; Fast-charging capable



Type: Plug-in hybrid; Sedan EPA electric range: 21 miles

EPA total range (gas + electric): 610 miles

Charging time: 2.5 hours @ 240V; 7 hours @ 120V

2018 Honda Clarity Plug-in Hybrid Photo courtesy of Honda

Type: Plug-in hybrid; Sedan **EPA electric range:** 48 miles

EPA total range (gas + electric): 340 miles

Charging time: 2.2 hours @ 240V; 16 to 24 hours @ 120V



Type: Battery electric vehicle; Compact/Hatchback

EPA electric range: 124 miles

Charging time: 4 hours @ 240V; Fast-charging capable



Type: Plug-in hybrid; Compact/Hatchback

EPA electric range: 29 miles

EPA total range (gas + electric): 630 miles

Charging time: 2.3 hours @ 240V; 10 to 14 hours @ 120V



Type: Plug-in hybrid; Sedan **EPA electric range:** 27 miles

EPA total range (gas + electric): 590 miles

Charging time: 2.7 hours @ 240V; 9 hours @ 120V



Type: Plug-in hybrid; SUV/Crossover

EPA electric range: 26 miles

EPA total range (gas + electric): 560 miles

Charging time: 2.5 hours @ 240V; <9 hours @ 120V



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



Type: Plug-in hybrid; SUV/Crossover **EPA electric range:** 12 miles

EPA total range (gas + electric): 270 miles

Charging time: 2 hours @ 240V; 4 to 6 hours @ 120V



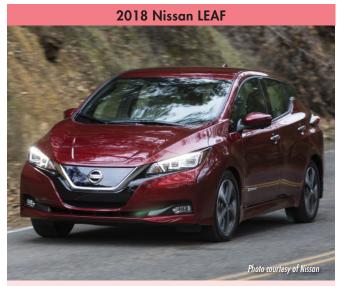
Type: Plug-in hybrid; SUV/Crossover

EPA electric range: 22 miles

EPA total range (gas + electric): 310 miles

Charging time: 3.5 hours @ 240V; 8 hours @ 120V;

Fast-charging capable



Type: Battery electric vehicle; Compact/Hatchback

EPA electric range: 151 miles

Charging time: 7.5 hours @ 240V; Fast-charging capable



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



Type: Battery electric vehicle; Subcompact

EPA electric range: 58 miles

Charging time: 3 hours @ 240V; 16.5 @ 120V



Type: Battery electric vehicle; Sedan **EPA electric range:** 220 to 310 miles

Charging time: 8.5 to 12 hours @ 240V; Fast-charging

capable



Type: Battery electric vehicle; Sedan **EPA electric range:** 335 miles

Charging time: 4.75 to 8.75 hours @ 240V; Fast-charging

capable



Type: Battery electric vehicle; SUV/Crossover

EPA electric range: 295 miles

Charging time: 6.5 to 9.5 hours @ 240V; Fast-charging

capable



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



Type: Plug-in hybrid; Sedan **EPA electric range:** 21 miles

EPA total range (gas + electric): 410 miles

Charging time: 3 hours @ 240V; 7 to 10 hours @ 120V



Type: Plug-in hybrid; SUV/Crossover

EPA electric range: 18 miles

EPA total range (gas + electric): 370 miles

Charging time: 3 hours @ 240V; 6 to 9 hours @ 120V



Type: Plug-in hybrid; SUV/Crossover

EPA electric range: 19 miles **EPA total range:** 380 miles

Charging time: 3 hours @ 240V; 6 to 9 hours @ 120V

Available in Select Markets

2018 Audi A3 Sportback e-tron



Type: Plug-in hybrid; Compact/Hatchback

EPA electric range: 16 miles

EPA total range (gas + electric): 400 miles

Charging time: 2.25 hours @ 240V;

8 hours @ 120V

2018 Cadillac CT6 Plug-in



Type: Plug-in hybrid; Sedan EPA electric range: 31 miles

EPA total range (gas + electric): 430 miles

Charging time: 4.5 hours @ 240V;

10 to 15 hours @ 120V

2017 Fiat 500e



Type: Battery electric vehicle; Subcompact

EPA electric range: 84 miles Charging time: 4 hours @ 240V

2018 Honda Clarity Electric



Type: Battery electric vehicle; Sedan EPA electric range: 89 miles Charging time: 3 hours @ 240V; Fast-charging capable

2018 Kia Soul Electric



Type: Battery electric vehicle; Compact/Hatchback

EPA electric range: 111 miles Charging time: 5 hours @ 240V;

Fast-charging capable

2018 Mercedes-Benz C350e



Photo courtesy of Mercedes-Benz

Type: Plug-in hybrid; Sedan **EPA electric range:** 9 miles

EPA total range (gas + electric): 410 miles

Charging time: 1.5 hours @ 240V;

7.3 hours @ 120V

2018 Mercedes-Benz GLE550e



Type: Plug-in hybrid; SUV/Crossover EPA electric range: 10 miles

EPA total range (gas + electric): 460 miles

Charging time: 2 hours @ 240V;

7.5 hours @ 120V

2018 Volkswagen e-Golf



Type: Battery electric vehicle; Compact/Hatchback

EPA electric range: 125 miles

Charging time: 5.3 hours @ 240V;

Fast-charging capable

Availability at a Glance

Table 1 - U.S. Electric Vehicle Availability

AVAILABLE NOW			
	MODEL NAME	RANGE (MI)1	WHERE
	SUV/CROSSOVER		
۳	Tesla Model X	295	Nationwide
ELECTRIC VEHICLE	COMPACT/HATCHBACK		
囯	BMW i3	114	Nationwide
I۳	Chevrolet Bolt EV	238	Nationwide
	Ford Focus Electric	115	Nationwide
2	Hyundai Ioniq Electric	124	Nationwide
~	Nissan LEAF	151	Nationwide
	Kia Soul Electric	111	Select Markets
ш	Volkswagen e-Golf	125	Select Markets
	SEDAN		
_	Tesla Model 3	220-310	Nationwide
~	Tesla Model S	335	Nationwide
쁜	Honda Clarity Electric	89	Select Markets
BATTERY	SUBCOMPACT		
B B	smart fortwo Electric Drive	58	Nationwide
	Fiat 500e	84	Select Markets

	EXPECTED IN 2018				
7		MODEL NAME	RANGE (MI) ¹	WHEN	
	SUV/CROSSOVER				
		2019 Audi e-tron Quattro	275	2018	
		BMW X7 iPerformance	TBA	2018	
		2019 Hyundai Kona Electric	200	Late 2018	
		2019 Jaguar I-PACE	220	Mid 2018	
		2019 Kia Niro Electric	200+	Late 2018	
	COMPACT/HATCHBACK				
		2019 Nissan LEAF (Gen. 2+)	225	Late 2018	
		Hyundai Ioniq Electric (Gen 1+)	200	2018	

		Fiat 500e	84	Select Markets	
		MODEL NAME	RANGE (MI) ¹	WHERE	
	SUV/CROSSOVER				
		BMW X5 xDrive40e iPerformance	14/540	Nationwide	
		Kia Niro Plug-in Hybrid	26/560	Nationwide	
		MINI Cooper SL Countryman	12/270	Nationwide	
		Mitsubishi Outlander PHEV	22/310	Nationwide	
		Porsche Cayenne S E-Hybrid	14/480	Nationwide	
		Volvo XC60	18/370	Nationwide	
		Volvo XC90	19/380	Nationwide	
		Mercedes-Benz GLE550e	10/460	Select Markets	
	CC	DMPACT/HATCHBACK			
۵		BMW i3 REx	97/180	Nationwide	
~		Chevrolet Volt	53/420	Nationwide	
<u>~</u>		Hyundai Ioniq Plug-in Hybrid	29/630	Nationwide	
PLUG-IN HYBRID		Toyota Prius Prime	25/640	Nationwide	
		Audi A3 Sportback e-tron	16/400	Select Markets	
Z	SE	DAN			
		BMW 330e iPerformance	14/350	Nationwide	
ဗျ		BMW 530e iPerformance	16/370	Nationwide	
듸		BMW 740e xDrive iPerformance	14/340	Nationwide	
₽		Ford Fusion Energi	21/610	Nationwide	
		Honda Clarity Plug-in Hybrid	48/340	Nationwide	
		Hyundai Sonata Plug-in Hybrid	27/590	Nationwide	
		Karma Revero	37/240	Nationwide	
		Kia Optima Plug-in Hybrid	29/610	Nationwide	
		Volvo S90	21/410	Nationwide	
		Cadillac CT6 Plug-in	31/430	Select Markets	
		Mercedes-Benz C350e	9/410	Select Markets	
	MINIVAN/WAGON/VAN				
		Chrysler Pacifica Hybrid	33/570	Nationwide	
	SP	ORTS CAR			
		BMW i8	15/330	Nationwide	

MODEL NAME	RANGE (MI) ¹	WHEN
UV/CROSSOVER		
Audi Q8 e-tron	37/620	2018
Bentley Bentayga	14/TBA	2018
Mercedes-Benz GLC350e	TBA/TBA	Summer 2018
Subaru	TBA/TBA	2018
EDAN		
Porsche Panamera E-Hybrid	22/TBA	Spring 2018
NINIVAN/WAGON/VAN	NIVAN/WAGON/VAN	
Porsche Panamera E-Hybrid Sport Turismo	22/TBA	Spring 2018
PORTS CAR		
BMW i8 Roadster	18/330	2018

Range: For battery electric vehicles is all-electric range. For plug-in hybrids is all-electric/combined (electric + gas) range. Sources for vehicles available now: www.fueleconomy.gov and manufacturer websites. Sources for vehicles expected in 2018: manufacturer and industry news websites, data subject to change.

Future Electric Vehicles

In 2017 and early 2018, carmakers made international headlines with strong, forward-looking statements about their electric vehicle development and deployment plans. Consultants and market analysts also made wide-ranging and sometimes very optimistic predictions about the electric vehicle market in 10 to 20 years.

Clearly, the automotive industry is going through a major transformation, and it appears electrification will play a significant role. Table 2 provides a summary of the major automakers' recent statements on electrification.

Table 2 - Automaker Statements on Future Vehicles and Electrification

Automaker	Number of Electrified ¹ Vehicles	Number of All-Electric Vehicles	Year Promised
Audi	20	10	2025
BMW	25	12	2025
Fiat Chrysler	One-half of vehicle lineup	Not specified	2022
Ford	40	16	2022
General Motors	20	Not specified	2023
Honda	Two-thirds of vehicle lineup	Not specified	2030
Jaguar Land Rover	One-half of vehicle lineup	Not specified	2020
Mercedes-Benz	Electrified equivalent of all new vehicles	Not specified	2022
Nissan/Mitsubishi/Renault	Electrified equivalent of all new vehicles	Not specified	2022
Porsche	One-half of global sales volume is plug-in vehicles	Not specified	2025
Toyota (and Lexus)	Electrified equivalent of all new vehicles	Not specified	2025
Volkswagen Group	All models electrified	15	2025
Volvo	Electrified equivalent of all new vehicles	Not specified	2019

¹ The term, "electrified" may mean conventional hybrid, not plug-in electric. Expanded use of electric drive systems helps reduce costs and build the broader market for electric vehicles.

Answers to Important Questions

How far do electric vehicles go on a charge?

Plug-in hybrids typically drive from about 10 to 50 miles on electricity alone, before the gasoline engine takes over. On electricity and gas combined, total range is 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 each year, with many current models traveling 100 to 240 miles on a charge, and a few capable of going much farther.

As with gasoline fuel economy, your driving behavior affects electric vehicle range. Many people find their electric car's range exceeds their daily driving needs and they need not charge every day.

How much does it cost to charge?

At the U.S. national average residential 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 do I charge my car?

Most drivers find it convenient and cost-effective to charge at home. Every electric car comes with a 120V charging cord that plugs into a standard household outlet. Charging at 120V delivers roughly two to three miles of range for every hour of charging, which is usually sufficient for plug-in hybrids. Charging at 120V may also be sufficient for some all-electric cars, depending on the car's range and the driver's daily needs.

For faster charging, you can install a 240V charging station at home. Many electricity providers offer discounted electric vehicle rates that encourage charging overnight when electricity is plentiful.

Public and workplace 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 to 40 minutes.

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?

Electric vehicles may 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 the car to precondition the interior and battery while it is plugged in. Pre-conditioning also makes a car more immediately comfortable for passengers. Windshield wipers, headlights, and similar accessories do not affect range.

Where can I get an electric vehicle?

Some electric vehicle models are available nationwide.

Others are available only in California, the Pacific

Northwest, and some Northeast states. Still others can be ordered through a local dealer, even if that dealer does not stock electric vehicles on the lot.

Used electric cars are now available, as well. As people who bought the first generation of electric vehicles trade up to the newest models, the used-car market offers affordable electric options for consumers.

What incentives are available?

A federal tax credit of up to \$7,500 may be available for qualified electric vehicles. Some state and local governments offer vehicle and charging station incentives. In some metros, electric vehicles can use carpool lanes with a single driver. Parking and charging perks are available in some cities. Some electricity providers offer rebates and incentives for electric vehicle charging. Incentives are subject to limitations and may change over time. More information is available at the <u>U.S. Dept. of Energy Office of Energy Efficiency and Renewable Energy</u>.



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 with its back-up internal combustion engine can provide a worry-free transition to electric vehicles. If you can charge at work you can effectively double your range.

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

Consider costs and benefits. With manufacturer lease options, discounted electricity rates, and government purchase incentives, electric vehicles can be less expensive to operate over their lifetime despite costing more to purchase.

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 publication, "Environmental Assessment of a Full Electric Transportation Portfolio" (Product ID 3002006881).

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.org

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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