

# How do Electric Vehicles work?

An electric car is any vehicle that is powered by a battery that has been charged by an external electricity source.

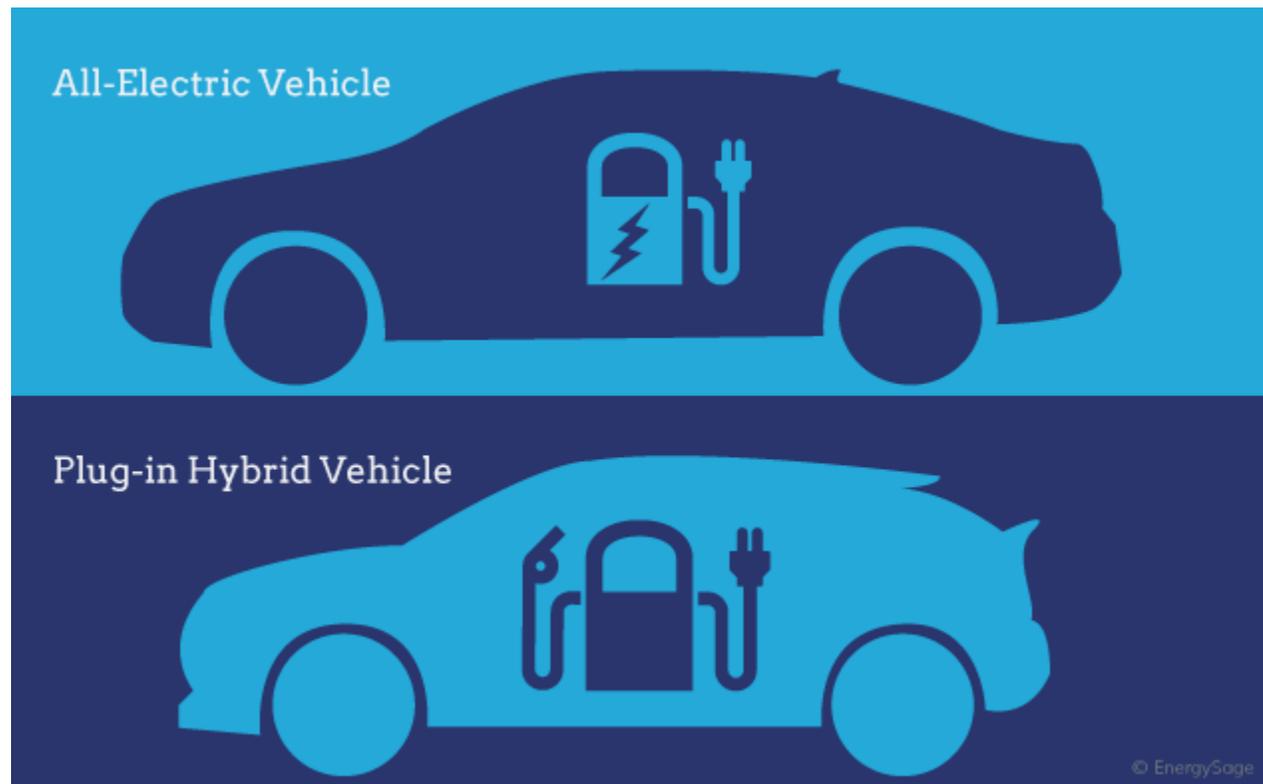
Since the release of the Toyota Prius in the early 2000s, companies such as Tesla, Chevrolet, and Nissan have all released cars with electric vehicle technology.



## Types of electric cars

The term “electric car,” also known as an EV (electric vehicle), refer to any vehicle that derives all or part of its power from electricity supplied by the electric grid. There are two main types of electric vehicles: vehicles that run entirely off of electricity, known as all-electric vehicles (AEVs), and plug-in hybrid electric vehicles (PHEVs), which use a combination of plug-in charging and petroleum-based fuel.

Electric vehicles also employ a technology known as regenerative braking, which generates electricity from some of the energy usually lost when conventional gas-powered cars brake. This can help the charge on the car last longer, especially when used in driving conditions such as cities where drivers are required to brake more frequently.



## All-electric vehicles

All-electric vehicles (AEV), as their name suggests, run solely on electricity. AEV motors are electric and powered by rechargeable battery packs. Depending on the type of battery, a vehicle recharge may take as little as 30 minutes (via fast charging) or up to a full day (when using Level 1 charging). They typically have a [range](#) of 60 to 120 miles, and some luxury models have a range of as much as 300 miles.

An AEV will take longer to charge than a PHEV as they have a larger battery. Charging your all-electric car on a regular basis and not allowing the battery to run out fully will help maintain a higher vehicle range. AEVs on the market include the Nissan Leaf, [Tesla Model S and X](#), Chevrolet Bolt and Spark, and BMW i3 BEV.

## Plug-in hybrid electric vehicles

Plug-in hybrid vehicles have both a battery and a gasoline-powered engine, which give them a longer range than all-electric cars. They typically run on electricity for shorter ranges (anywhere from 6 to 40 miles) and then switch over to gasoline to power the internal combustion engine. From this point, PHEVs function like a hybrid electric vehicle by consuming less fuel and producing fewer emissions than similar conventional vehicles. This allows for a driver to go longer distances and may have the option to use a fuel other than gasoline as the alternative power source once the battery runs out. PHEVs on the market include the Chevrolet Volt, Ford Fusion Energi, and BMW 330e.

## How are electric vehicles charged?

Much like filling a conventional car with gasoline at a gas station is a necessary aspect of ownership, understanding charging stations and the various options available are an integral part of owning an electric vehicle. In fact, a key difference between owning a gasoline-powered car versus electric vehicle is this: unlike gasoline car owners, most EV owners complete over 80 percent of their charging at home, as it is the least expensive option and can supplement charges at public charging stations.

To [charge an electric vehicle](#), you plug your car into a charger connected to the electric grid. Chargers are also known as electric vehicle supply equipment (EVSE), and come in three main categories:

- **Level 1 chargers** use a 120 V AC plug and do not require the installation of additional equipment. These chargers deliver 2 to 5 miles of range per hour of charging and are most often used at home.
- **Level 2 chargers** use a 240 V (for residential) or 208 V (for commercial) plug and require the additional charging equipment. These chargers deliver 10 to 60 miles of range per hour of charging and are used in homes and at public charging stations.
- **DC Fast Chargers** use 480 V AC input and require highly specialized, high-powered equipment as well as special equipment in the vehicle itself. These chargers can deliver 60 to 100 miles of range in 20 minutes of charging. However, most PHEVs do not have this charging capability.

All electric vehicles have standard plugs and receptacles that work with any Level 1 or Level 2 charger but because of the specialized equipment needed for DC Fast Chargers, there is not a standard plug at this time.

## What does electric vehicle charging have to do with solar power?

When you use electricity to charge your car, you can integrate renewable resources like solar into the fueling process. Much of the electric grid is still powered by non-renewable fuel sources, such as coal and natural gas. As a result, to truly ensure a reduction in greenhouse gas emissions, [integrating solar panels with your EV charging is vital](#).

Solar panel systems and electric vehicles go hand-in-hand and can help reduce emissions and costs both in the home and at public charging stations.