

# Electric Vehicle Frequently Asked Questions

Maricopa County Electric Vehicle (EV) Infrastructure Plan  
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## ELECTRIC VEHICLE FREQUENTLY ASKED QUESTIONS

### 1. Are EVs expensive?

Although the initial purchase price of an electric vehicle may be more than a similar vehicle that runs on gas or diesel, when you consider the total cost of ownership, which includes the purchase price, rebates, fuel costs, insurance, and maintenance, the cost of owning and operating an electric vehicle is less over the lifetime of that vehicle. Additionally, EVs are expected to become more affordable over the next 5 to 10 years, as economies of scale are created, and more models are available in the marketplace.

### 2. Are EVs dependable?

EVs will last as long or longer than gas- or diesel-powered vehicles. Since there are significantly fewer moving parts in an EV compared to a traditional vehicle, less routine preventative maintenance is needed. EVs do not need oil changes, tune-ups, or new spark plugs. Brake life is extended on EVs since the motor is used to slow the car, recapturing the kinetic energy, and storing it back in the battery. Electric motors will also outlast the body of the vehicle.

### 3. What are some challenges with EVs?

Locating adequate charging opportunities for your EV when taking long trips to remote areas can present challenges. Planning your driving route for these types of trips to ensure charging availability is key! Additionally, just like a traditional vehicle, pulling a trailer behind an EV can reduce the driving range. Finally, extreme wind and temperatures, especially cold weather, can impact the driving range of an EV.

### 4. What happens if an EV catches fire?

An EV can catch fire if the lithium-ion batteries are damaged in a crash. However, EVs are much less likely to catch fire, compared to traditional gas-powered vehicles. According to the National Fire Protection Agency, if your EV catches fire, call 911. Do not attempt to put out the fire yourself. Fires involving lithium-ion batteries can be difficult to extinguish and require a significant amount of water to resolve. Firefighters have also been trained on how to disconnect the EV's high-voltage system.

## **5. Can an EV drive through water?**

EVs have ingress protective systems that protect the vehicle from dust and water. The higher the IP number, the more protection the vehicle has. EVs today have an IP67 rating, which means the vehicle can endure three feet of water for 30 minutes without risk to the battery terminals or high voltage components.

## **6. How far can an EV go before having to charge?**

Driving range depends on the size of the battery pack. EVs today typically have a range between 150 miles and more than 300 miles. For example, the Chevy Bolt has a range of 259 miles and the Ford F-150 Lightning can travel between 240 and 320 miles depending on the model.

It's important for EV drivers to understand how far they typically travel each day to ensure the battery range of the vehicle can accommodate their day-to-day needs. For longer trips, it's important pre-plan by identifying public charging locations along the route which can be used for either opportunity charging or to fully charge the battery if necessary.

## **7. What is regenerative braking?**

Regenerative braking allows EVs to capture energy normally lost during braking by using the electric motor as a generator and storing the captured energy in the battery. This helps drivers to extend battery range and/or reduce the amount of time needed to fully charge their vehicle.

## **8. How can I extend battery range?**

Utilizing regenerative braking is one way to extend battery range. Practicing good driving behaviors will also extend battery range. For example, using gentle acceleration and deceleration, maintaining properly inflated tires, and not running the heat or AC on full blast for extended periods of time will all help to maximize the battery range of your EV.

## **9. Where can I charge an EV?**






Unlike traditional vehicles that can fuel at gas stations, EVs can be charged anywhere there is a charger – at home, at work or at any public charging location.

## 10. How long does it take an EV to charge?

Charging time takes into consideration two key elements, battery size and type of charger. Figure 1 identifies the three types of chargers. Depending on the size of the battery and the speed of the charger, fully charging a battery can take anywhere from 30 minutes to over 24 hours.

Level 1 chargers are most commonly used for at-home charging. The EV Infrastructure Plan will utilize Level 2 and DC Fast Charging options for vehicle charging.

Figure 1: Type of Chargers

	Level 1	Level 2	DC Fast Charging
Input Voltage	Single Phase 120VAC	Single Phase 240VAC	Three Phase 480VAC
Charge Power	1.4 – 1.9 kW	3.5 - 19.2 kW	50 - 350 kW
Charger to Ports	1 per dispenser	1 charger to 3 ports	1 charge cabinet to 1 post
Charge Time	12 - 24 hours	4 - 8 hours	80% charge in 20 - 30 min
Typical Location	Home	Home, Work, Public, Depots	Work, Public, Depots
Charge Port	 J1772 charge port	 J1772 charge port	   J1772 CCS1 combo    CHAdeMO    Tesla combo

Slow ←————→ Fast

## 11. How much does it cost to charge and EV?

It is much less expensive to charge an EV than it is to fuel a similar gas- or diesel-powered vehicle; but exactly how much depends on the electricity rates. In Arizona, the price of electricity is approximately \$0.1321 per kWh.

- To fully charge a Chevy Bolt with a 65 kWh battery, it will cost around \$8.58.
- To fully charge a Ford F-150 Lightning with a 98 kWh battery, it will cost about \$12.94.

## 12. How much does it cost to drive 25 miles?

As described in the Figure 2 below, it costs approximately \$0.83 to drive a Chevy Bolt 25 miles and \$1.35 to drive a Ford F-150 Lightning the same distance. This represents a savings of \$1.70 and \$2.87 respectively, compared to similar gasoline-powered vehicles.

Figure 2: The Cost to Drive 25 Miles

Electric	Chevy Bolt		Ford F150 Lightning	
	Range	259 miles	Range	240 miles
	Battery Capacity	65 kWh	Battery Capacity	98 kWh
	Fuel Efficiency	120 MPGe	Fuel Efficiency	68 MPGe
	kWh/Mile	0.25	kWh/Mile	0.41
	Electricity Cost per kWh	\$0.13	Electricity Cost per kWh	\$0.13
	Electricity Cost per Mile	\$0.03	Electricity Cost per Mile	\$0.05
	<b>Cost to Drive 25 Miles</b>	<b>\$0.83</b>	<b>Cost to Drive 25 Miles</b>	<b>\$1.35</b>

Gasoline	Toyota Corolla		Ford F150	
	Range	462 miles	Range	483 miles
	Fuel Tank	13.2 gallons	Fuel Tank	23 gallons
	Fuel Efficiency	35 MPG	Fuel Efficiency	21 MPG
	Gallons per Mile	0.03	Gallons per Mile	0.05
	Gasoline Cost per Gallon	\$3.55	Gasoline Cost per Gallon	\$3.55
	Gasoline Cost per Mile	\$0.10	Gasoline Cost per Mile	\$0.17
	<b>Cost to Drive 25 Miles</b>	<b>\$2.53</b>	<b>Cost to Drive 25 Miles</b>	<b>\$4.22</b>

## 13. How can I extend the overall life of the battery?

Some tips to extend the life of your battery include charging at a slower rate, i.e., charging more at home and less at high voltage public chargers, not fully charging the battery to 100%, or letting the battery charge run down below 10%. It's good practice to charge the battery to about 80% of its capacity and plug in again when the battery runs down to about 20%.

## 14. How can I find public charging locations?

Most EVs come with charger locating apps pre-installed. Additionally, there are several app and website resources available for consumers to find charging locations for their EVs. [Electrifyamerica.com](http://Electrifyamerica.com), [pluginaustralia.org](http://pluginaustralia.org), and [evgo.com](http://evgo.com) are all great resources for identifying charging locations.

In Arizona alone, there are currently 929 public charging stations with 2,517 available charging ports. Depending on the station, drivers might use a network card, credit card, phone, cash, or even simply enter an account

number. There are also free chargers where users can plug in and charge, but they are typically the slower Level 1 chargers.

Figure 3:  
Public Charging Stations in AZ

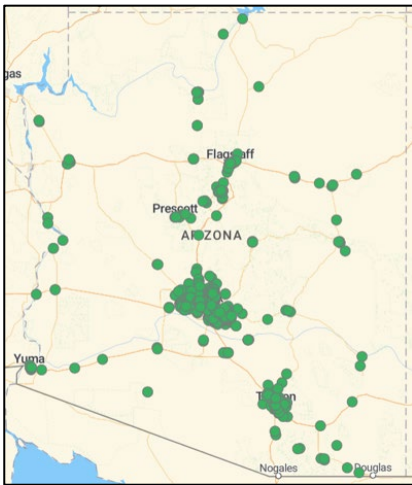
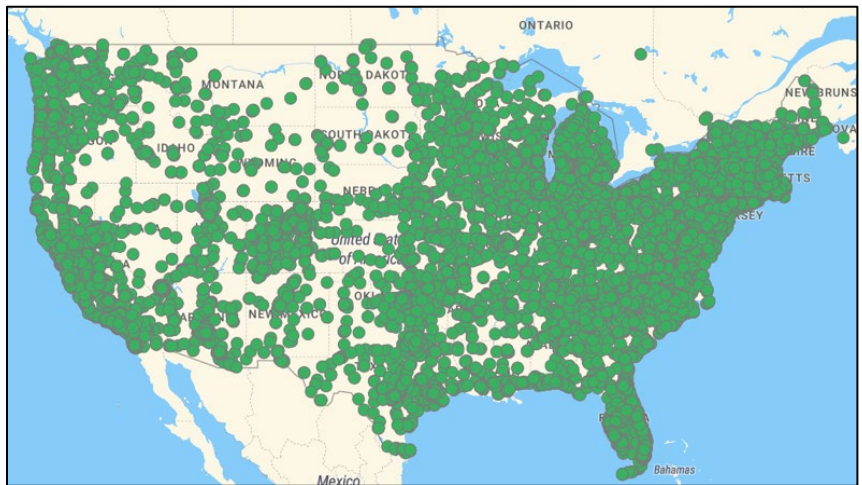


Figure 4:  
Public Charging in the U.S.



## 15. Are EVs good for the environment?

EVs definitely have environmental benefits! EVs produce zero tailpipe emissions, which means they do not contribute to harmful air pollution which can exacerbate symptoms related to asthma and other respiratory ailments, as well as heart conditions. EVs do not produce any direct greenhouse gas emissions (GHG) which contribute to climate change. EVs are very quiet, significantly reducing noise pollution.

The International Council for Clean Transportation recently conducted a study which evaluated the life cycle assessments (LCA) of both EVs and traditional gas- or diesel-powered vehicles. The LCA evaluated the environmental impact of the material extraction, manufacturing, packaging and transportation, use, and end-of-life, and concluded EVs have much lower greenhouse gas emissions over the life of the vehicle.

The GHG emissions associated with EVs are considered indirect emissions because they come from electricity generation, as opposed to directly from the tailpipe. Utility companies can further reduce the total GHG emissions impact by utilizing renewable energy sources like wind, solar, and water to make the grid cleaner.

## **HELPFUL RESOURCES**

Official US government source for fuel economy information: **[fueleconomy.gov](https://www.fueleconomy.gov)**

Alternative Fuels Data Center: **[afdc.energy.gov](https://afdc.energy.gov)**

Plug In America: **[pluginamerica.org](https://www.pluginamerica.org)**

North American Council for Freight Efficiency: **[nacfe.org](https://www.nacfe.org)**

NACFE's Run on Less Electric event: **[runonless.com](https://www.runonless.com)**

International Council for Clean Transportation: **[theicct.org](https://www.theicct.org)**

National Renewable Energy Lab: **[nrel.gov](https://www.nrel.gov)**

EV Charging Locator Map: **<https://www.maricopa.gov/5842/ELECTRIC-VEHICLE-Charging-Locator-Map>**