

# Charging Your Electric Vehicle at Home

## A Guide for New EV Owners



<b>Charging Overview</b>	<b>2</b>
Definition of EVSE (Electric Vehicle Supply Equipment)	2
Types of Residential Charging Equipment	2
Connectors and Plugs	4
<b>Benefits of At-Home Charging</b>	<b>6</b>
At-home Charging Considerations	7
Can I Charge Here?	8
Equipment Styles	9
Smart or Basic	10
Efficiency	10
Warranties	10
Cost	10
Incentives	12
<b>Equipment Installation</b>	<b>13</b>
Timeline	13
Finding Qualified Electricians and Equipment	13
Permitting (if required)	13
Process	14
<b>At-Home Charging Checklist</b>	<b>16</b>
Determine Needs	16
Find an Electrician	16
Conduct a Power Assessment	17
Determine Location	17
Research Charging Equipment and Apply for Incentive	17
Install Equipment	17
Apply for Federal EV Charging Tax Credit	17
Plug In and Charge!	17
<b>Conclusion</b>	<b>18</b>
<b>Resources</b>	<b>18</b>



# Welcome

Ameren Missouri is your electric vehicle (EV) resource. EVs are increasingly showing up in our service territory, and Ameren Missouri is here to help ensure you are ready to charge your EV at home!

As part of our commitment to making the transition to driving electric as easy as possible for our valued customers, Ameren Missouri has created this Charging Installation Guide to help you understand what you need to know about charging your EV at home. Topics to be covered include different types of charging equipment, benefits of charging at home, and installation considerations including potential costs.

Data shows 80%<sup>1</sup> of EV drivers do the majority of their charging at home because it is often most convenient and least expensive. There are at-home charging solutions for both plug-in hybrid (PHEV) and all-electric vehicles (BEVs) and, depending on your driving needs, daily charging may not be required. This guide covers at-home charging options for drivers with a carport, garage, driveway, or other dedicated parking space. Helpful tips for EV owners living in apartments is provided at the end of the document.

For even more information about EVs and to access additional resources, visit [AmerenMissouri.com/EV](https://www.amerenmissouri.com/EV).

<sup>1</sup> <https://www.energy.gov/eere/electricvehicles/charging-home>

# Charging Overview

## Defining EVSE (Electric Vehicle Supply Equipment)

Electric Vehicle Supply Equipment (EVSE), colloquially known as “charging stations, charging equipment, or chargers,” is the equipment used to safely supply electricity to an EV from a power source. EVSE communicates with the EV to ensure safety for the user and vehicle. EVSE can be installed at residences, workplaces, retail, public places, and fleet facilities. How quickly an EV charges depends on multiple factors, including the design of the EV, the battery temperature, and the battery’s “state of charge” (current battery charge level). Another key factor is the type of EVSE and associated power level.

## Types of Charging Equipment

There are three levels of EVSE, two of which are available for at-home charging: Level 1 and Level 2.

### Level 1: Easy

Level 1 charging uses a standard 120-V outlet and typically provides about 4-5 miles of range per hour of charge. Most EVs include with purchase or lease a cord for Level 1 charging. If desired, a dedicated Level 1 charger can be installed, though access to a standard wall outlet is adequate in most cases. These chargers use a similar amount of power as a blow-dryer.

#### Determine Needs

Level 1 is best for drivers who:

- Have access to workplace charging;
- Mostly travel short distances (25-50 miles per day);
- Have the ability to let the vehicle charge for more extended periods; and
- Have access to a standard outlet that can safely handle the load.



## Level 2: Faster

Level 2 charging uses a 240-V circuit and typically provides about 25 miles of range per hour or a full charge for BEVs in 4-8 hours. These chargers are typically offered in “plug” style and hardwired versions. Professional installation of hardwired chargers or the 240V NEMA outlet for the plug style version is recommended. However, access to an existing unused 240-V outlet (used to power a large appliance such as a dryer or range) may be appropriate if the plug style matches the outlet.

Please note, Level 2 chargers are a standard type of connector that will work with any EV (including Teslas with an adapter). This will be described in the Connectors and Plugs section below.

### Determine Needs

Level 2 is best for drivers who:

- Drive longer distances;
- Require a faster charge;
- May require a range of 100-200 miles in one charging session; and
- Have access to a 240-V circuit (or can have one installed).

## On the Road Charging

When you find yourself in need of a charge away from home, you will most commonly have access to Level 2 chargers (the most widely available public charging) and DC fast chargers. DC fast chargers typically provide up to an 80% charge in about 30-45 minutes (The exact charge and time will depend on the vehicle and battery size). With over 370<sup>2</sup> public charging stations across Missouri and many more coming, finding charging stations along your route at public and retail locations is quite easy. Apps such as PlugShare and Open Charge Map can quickly locate available charging stations and even help you plan a route with access to DC fast charging along the way.



## Connectors and Plugs

Any vehicle can use Level 1 and Level 2 charging as the connector type is standardized. Since all major manufacturers support this standard (Tesla provides adapters for use with J1772), there is no need to be concerned about compatibility with the various charging stations.

Note: because Tesla has a proprietary connector type, other EVs are not able to connect to Tesla charging stations. However, Tesla owners have access to accessory adapters and can utilize SAE J1772 and CHAdeMO plugs.

*Though Level 1 and 2 are universal, DC fast charging varies by make - stations feature different connectors to support all vehicles. Different manufacturers use different plug types for fast charging including the CHAdeMO (used by Nissan through 2020) and Combined Charging System (CCS) (used by most automakers).*

## Level 1

**Voltage:** 120-V

**Charge Rate:** ~5 miles per hour

**Connector:** SAE J1772

**Auto Makers:** All (Tesla with adapter)



## Level 2

**Voltage:** 208-V or 240-V

**Charge Rate:** Up to 25 miles per hour

**Connector:** SAE J1772

**Auto Makers:** All (Tesla with adapter)



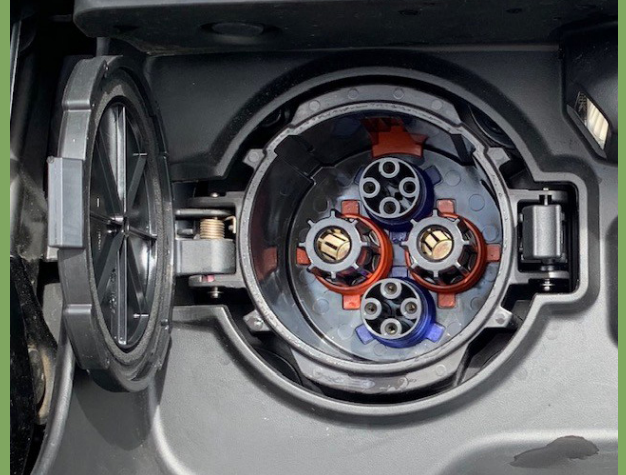
# DC Fast Charger

**Voltage:** 480-V

**Charge Rate:** Up to 80% in ~30 minutes

**Connector:** CHAdeMo

**Auto Makers:** Nissan, Mitsubishi  
(Tesla with adapter)



# DC Fast Charger

**Voltage:** 480-V

**Charge Rate:** Up to 80% in ~30 minutes

**Connector:** CCS  
(Combined Charging System)

**Auto Makers:** Most automakers including:  
BMW, Jaguar, Chevrolet,  
Audi/VW, Ford, Future Nissan



# Tesla

**Voltage:** 480-V

**Charge Rate:** Up to 80% in ~30 minutes

**Connector:** Tesla

**Auto Makers:** Tesla





# Benefits of At-Home Charging

It's estimated that the average household spends 20% of its total income on transportation expenses.<sup>3</sup> Charging your PHEV or BEV at home can reduce or even eliminate ever-fluctuating gasoline costs. At-home charging provides the convenience and flexibility to charge your vehicle based on your schedule and needs.



## Savings

"Refuel" for about half the cost of a gasoline vehicle.<sup>4</sup>

Find out how much you can save using the Ameren Missouri [Savings Calculator](#).



## Convenience

Charge your vehicle while you sleep (just like your cell phone) and wake up to a fully charged vehicle ready to hit the road every morning.

At-home charging is available for plug-in hybrids and all-electric vehicles.



## Smart Features

All EV models allow you to schedule charging sessions, giving you complete control of when you charge so you can take advantage of [utility rates](#) that may reduce your fueling costs even more.

Track your charging habits and energy use with vehicle or charger apps.

<sup>3</sup> <https://www.aceee.org/blog/2016/07/america-s-transportation-energy>

<sup>4</sup> <https://www.energy.gov/maps/egallon>





## At-Home Charging Considerations

The following are a few at-home charging considerations to keep in mind when determining the charger's location, equipment style, and calculating the associated costs.

### Location

Whether you are installing a Level 1 or Level 2 charger, there are a few essential considerations to address to ensure convenience and safety.

- Dedicated parking space is required for at-home installations.

*Charging equipment must be within sufficient reach of either a dedicated 120-V or 240-V circuit. Charging cord lengths vary from about 15' to 25' depending on the model.*

- There should be enough space to connect the charger to the vehicle safely.
- Eliminate location options that require a cord to be wrapped around or draped over the vehicle to reach the charging port.
- Prior to installation, consult with a certified electrician.

*Finding a qualified electrician and EVSE installer will be covered in the Installation section later in the guide.*



*Please note, charge port locations vary by vehicle make and model.*

### Choosing Location

Install Wall Connector in a location that allows the charging cable to reach the vehicle charge port without putting strain on the cable.









Recommended installation area for Wall Connector with 18 ft (5.5 m) cable



Recommended installation area for Wall Connector with 8.5 ft (2.6 m) cable



## Can I Charge Here?

Location		Can you Charge Here	Level 1 Appropriate	Level 2 Appropriate	Security Lock	Tips
Dedicated Garage		✓	✓	✓		The most common EVSE installation. Installing a charger here will limit exposure to the elements and often provides direct access to electrical infrastructure.
Carport		✓	✓	✓	✓	Must be protected and rated for outdoor use. Should have sufficient lighting to avoid tripping hazards.
Driveway		✓	✓	✓	✓	EVSE must be rated for outdoor use. Should have sufficient lighting to avoid tripping hazards.
Shared Garage (without dedicated parking space)		*✓	*✓	*✓	✓	<p>*This may require working with your property manager or a 3rd party. Ameren Missouri has resources for residents in these situations. Contact <a href="mailto:EVMissouri@ameren.com">EVMissouri@ameren.com</a> for more info.</p> <p>EV drivers without at-home charging access can still charge at public locations around town and, in some cases, at their workplace.</p>
On-street Parking		 **	n/a	n/a	n/a	<p>**This would require a dedicated parking space and access to install the necessary 120-V or 240-V circuit and equipment.</p> <p>EV drivers without at-home charging access can still charge at public locations around town and, in some cases, at their workplace.</p>

## Equipment Styles

There are two main mounting styles to choose from when looking at various EVSE brands for residential use. Depending on your EVSE needs and available space, you can use a portable charger or a standard wall mount. For households with multiple EVs, there are Level 2 chargers that offer dual ports.

As mentioned, all EVs come with a standard 120-volt Level 1 portable charger. You can use this charger to plug into a standard outlet, whether it's at your house or someone else's. Of course, you should always test the outlet first to ensure it can handle the load.

Wall-mounted chargers are available for both Level 1 and Level 2 stations. This version offers a simple design with many conveniences, especially for drivers who choose a Level 2 charger. You can even use this style outdoors with wall mount stations that are rated NEMA 3R or higher as they are rugged enough to handle all weather considerations. Additionally, it is recommended to find a locking unit for outside installation. Wall mounts can be hardwired for permanent installations or plugged into a receptacle for simple removal.

Ameren Missouri recommends cable management for all units. Cables should either be retractable or a cable organizer can be purchased if not supplied with the EVSE. Cables can create tripping hazards and should never be placed in walkways. A qualified electrician and installer will help you determine if your ideal location is the safest, best option. They will also ensure any electrical work follows all coding requirements.

Visit [AmerenMissouri.com/EV](https://www.AmerenMissouri.com/EV) for more information and to compare models.



### Portable Charging Cord (standard w/vehicle)

#### Requirements:

A 120-V or 240-V outlet that can safely handle the load.

#### Perks:

You can take this charger with you wherever you go!



### Wall Mount

#### Requirements:

Sufficient space for the charging cord to reach the vehicle.

#### Perks:

Available for EVSE Level 1 and Level 2 chargers for both indoor and outdoor use!



## Smart or Basic

Another factor to consider is if you would like a smart or basic unit. A smart charger offers additional options through an internet connection. Many offer access to charging data, the ability to schedule charging, connection to your smart home, and much more through apps. Before making a decision, be sure to check the WiFi connection at the location of your installation.

## Efficiency

Look for ENERGY STAR certified equipment when comparing available styles. All ENERGY STAR certified EV chargers are verified for safety and can help reduce costs as they are 40% more efficient in standby mode.

Find and compare ENERGY STAR equipment at [AmerenMissouri.com/EV](https://AmerenMissouri.com/EV).

## Warranties

The type of warranty included with the charger varies by manufacturer and can range from fixed-term to renewable. Ameren Missouri encourages you to ask about warranty options while researching the charger that works best for you.

## Cost

In addition to available charger locations, cost is often the second most crucial factor used when determining which style to install. Below is a breakdown of potential costs. For more detailed pricing information, please refer to the [Ameren Missouri EV Partner Network](#). Ameren Missouri partners are happy to help identify the correct model for you and provide a quote.

Cost considerations for charging at-home include: 1. Equipment Cost; 2. Cost to Charge; and 3. Maintenance Cost.





### Equipment Cost

EVSE equipment costs range from as low as \$300 to over \$2,000. The two main factors when considering costs are desired features and amperage (or how fast it charges the vehicle). A “smart” Level 2 charger is equipped with special features, including connecting to WiFi to monitor your charging and review statistics from past charging sessions which can increase the cost of the unit. Charger amperages determine how fast the vehicle battery charges and range from 16 to 80. Please note, it is recommended the electrical circuit be rated for 25% higher amperage than the output of the charger.

For installation costs, please visit the [Ameren Missouri EV Partner Network](#) to find a qualified electrician.



### Cost to Charge

The electricity cost associated with your charger will depend on two utilization factors - the time of use (if you are on a “time of use” rate) and overall energy use. However, even with longer charge times and more energy use, charging an EV at home will still save you money.

Ameren Missouri is rolling out several time of use rates for residential customers (<https://www.ameren.com/missouri/company/time-of-use>) and if you own an EV or you’re a night owl and use most of your energy between 10 p.m. and 6 a.m., the Overnight Savers rate may work for you.

A Consumer Reports study found that a typical EV owner who does most of their charging at home can save an average of \$800 to \$1,300 a year on fueling costs when compared to an equivalent gasoline-powered car. Calculate your savings based on how far you drive each day, each month, and how many miles you expect to drive in a year using the Ameren Missouri [Savings Calculator](#).



### Maintenance Cost

Typically, chargers require little to no maintenance. General maintenance includes properly storing charging cables, checking parts routinely, and keeping the equipment clean. Maintenance requirements can increase as you add more features to a charger, but most use a modular design that allows parts to be easily interchanged.

Cord and plug damage are the most frequently addressed maintenance items. Replacing cords and plugs outside of warranty can cost from \$60 to \$300 depending on the unit. More significant costs can occur when a Level 2 charger is damaged and needs to be replaced or repaired and is no longer under warranty. Some warranties even offer extended options such as on-site maintenance for an additional cost. As with any asset, insurance is always recommended.

5 <https://www.consumerreports.org/hybrids-evs/evs-offer-big-savings-over-traditional-gas-powered-cars/>

6 [https://afdc.energy.gov/fuels/electricity\\_infrastructure\\_maintenance\\_and\\_operation.html](https://afdc.energy.gov/fuels/electricity_infrastructure_maintenance_and_operation.html)

## Incentives

EV drivers are encouraged to take advantage of incentives for chargers when available. EVSE manufacturers offer incentives for chargers that can help with installation, maintenance, and repair. You may also qualify for a federal tax credit that can provide a 30% rebate (up to \$1,000) on installation costs for EVSE chargers. The tax credit can be used retroactively for installations as far back as 2017.<sup>7</sup>

For more information about incentives visit [AmerenMissouri.com/EV](https://AmerenMissouri.com/EV).



### Apartment and Workplace Charging

Ameren Missouri is currently offering an [EV Charging Installation Incentive](#) for its business customers that covers up to 50% of the total project cost. While this incentive is not available for homeowners, it is open to all businesses including apartment complexes and workplaces.

<sup>7</sup> <https://afdc.energy.gov/laws/10513>





# Equipment Installation

Depending on the level of charging you require and the type of EVSE charger style you prefer to use, you may need to install equipment. The following section explores EVSE installation, including how to find qualified electricians, contractors, and charging equipment.

## Timeline

The timeline for installation can vary depending on your needs. Though we always recommend consulting a certified electrician, if the parking space already has access to a 120-V or 240-V outlet with a dedicated circuit, installation is as simple as plugging the unit in. However, if upgrades are required to safely charge the vehicle, the process of finding an electrician and making the upgrades will take a little longer.

## Finding Qualified Electricians and Equipment

At Ameren Missouri, safety is our priority. That's why we always recommend contacting a certified electrician prior to any installation. The [Ameren Missouri Electric Vehicle Partner \(EVP\) Network](#) is your resource for finding a qualified electrician to ensure your installation is completed safely.

## Permitting (if required)

Though permits are not required in most cases, some municipalities may have permitting requirements for at-home charging. Permitting is made easy when you work with a professional from the Ameren Missouri EVP Network. Be sure to speak with your installer to see what permitting (if any) is required.

# Process

1.

Determine charging needs

2.

Research home charging units  
at [AmerenMissouri.com/EV](https://www.AmerenMissouri.com/EV)

3.

Find a certified electrician  
through the Ameren Missouri  
Electric Vehicle Partner (EVP)  
Network

4.

Conduct a site visit and obtain a  
quote







# 8.

Share your at-home EVSE project (or your EV drive experience) with Ameren Missouri at [EVMissouri@ameren.com](mailto:EVMissouri@ameren.com)!

# 7.

Tell Ameren Missouri about it! Complete the Ameren Missouri EV Survey

# 5.

Research permitting requirements

# 6.

Install charging unit





# At-Home Charging Checklist

Ameren Missouri has developed this at-home charger installation checklist to help ensure customers have everything they need to charge their vehicle at home safely. Please contact [EVMissouri@Ameren.com](mailto:EVMissouri@Ameren.com) with any questions or feedback.

## Determine Needs

Review the questions and answers below to determine if Level 1 or Level 2 Charging best suits your unique needs.

		Level 1 Charging	Level 2 Charging
1.	How many miles do you drive per day?	1 to 50 miles	51+
2.	Do you require 100-200 miles of range in a single charge?	No	Yes
3.	Are you able to charge the vehicle for at least 7 hours each evening?	Yes	No
4.	Do you have access to workplace charging?	Yes	No

## Still need help deciding?

Contact [EVMissouri@ameren.com](mailto:EVMissouri@ameren.com) with any questions or for more information.

## Find an Electrician

Ameren Missouri makes finding a qualified electrician easy with the Ameren Missouri Electric Vehicle Partner (EVP) Network. Electric Vehicle Partners have professional knowledge of current EV chargers, available incentives and are a valuable resource to help customers safely charge at home.

## Conduct a Power Assessment

Safety always comes first at Ameren Missouri. That's why we recommend having a qualified electrician conduct a power assessment before plugging in your vehicle. Even though Level 1 chargers typically do not require a service upgrade, an electrician can provide you with peace of mind knowing that your outlet can handle the load. They will also help you understand the electrical requirements to install a Level 2 charger. Be sure to discuss:

- Any required upgrades;
- The type of charger you want (Level 1 or Level 2);
- The cost of installation; and
- Project timeline.

## Determine Location

As part of the power assessment, be sure to determine the best location for the unit. As a reminder, be sure to note the charge port location of your specific vehicle. The location should provide hazard-free charging for your vehicle - cords should never be draped over vehicles or placed in walkways. The EV charger must also be guarded against the elements such as rain and snow if it is not outdoor rated.

## Research Charging Equipment and Apply for Incentives

Visit the Ameren Missouri website to compare available charging station models. An Ameren Missouri EVP can also help you make the best decision for your needs. And don't forget to compare manufacturer warranties and incentives.

## Install Equipment

Once you have chosen your charging unit, equipment installer, and location, it is time to install the equipment. Be sure to discuss any possible permitting requirements with your installer. Find a qualified electrician for installation on the Ameren Missouri website.

## Apply for Federal EV Charging Tax Credit

A federal tax credit of up to 30% (up to \$1,000) is available for residential charging installation. Be sure to save all your receipts to make filing for the credit easy using IRS Form 8911. Please consult with your tax professional to see how these credits can apply to you.

## Plug In and Charge!

Congratulations, you are ready to charge your EV! Plug in whenever you need and enjoy all the benefits of driving electric.

# Conclusion

Here at Ameren Missouri, we understand EV owners may have questions about at-home charging. As the demand for charging continues to increase across the region, Ameren Missouri is here to support our customers in their transition to driving electric.

For more information about electric vehicles, at-home charging, incentives, and additional resources, visit us at [AmerenMissouri.com/EV](https://AmerenMissouri.com/EV).

You can also submit a question related to EVs to our EV Experts at [EVMissouri@ameren.com](mailto:EVMissouri@ameren.com).

# Resources

## Electric Vehicle Partner Network

Find EV dealers, qualified electricians, and charging station manufacturers through the [Ameren Missouri Electric Vehicle Partner Network](#). Please note some auto dealers may provide additional assistance and incentives for at-home charging.

## Resources

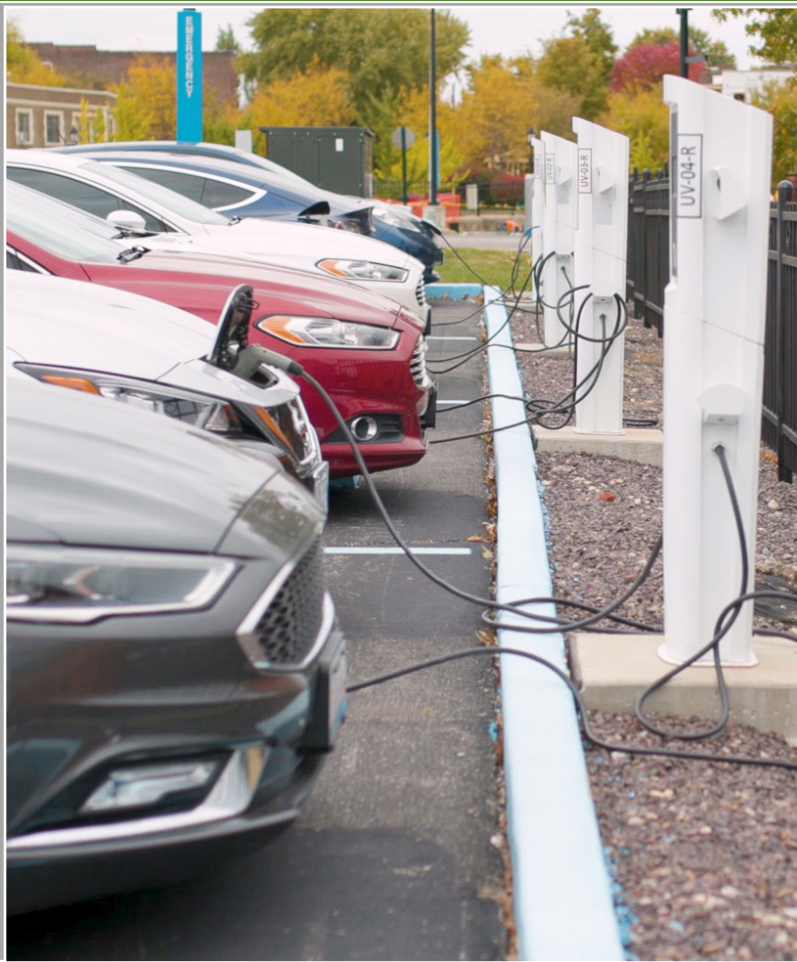
Check out these sources for even more information about electric vehicles and how to charge at home.

- [Potential Savings Calculator](#)
- [Estimated Monthly Savings Calculator](#)
- [Compare Level 2 Chargers](#)
- [Electric Power Research Institute Consumer Guide to EV Charging Oct. 2019](#)



## Interested in Workplace Charging?

Workplace charging may already be available where you work. Reach out to your facilities or human resource departments to see if EV chargers are available. If not, be sure to tell them about the [Ameren Missouri EV Charging Installation Incentive](#) that applies to Ameren Missouri business customers.



## Interested in Charging at Apartments?

Ameren Missouri is working with business customers to install EV charging equipment throughout its service territory, including apartment buildings. Speaking to your property manager is an excellent place to start when determining if at-home charging will work for you. Need tips and information to share before you reach out? Email [EVMissouri@ameren.com](mailto:EVMissouri@ameren.com).







[AmerenMissouri.com/EV](https://AmerenMissouri.com/EV)

Updated March 2021