EV Charging Installation Guide for Business





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Welcome

Ameren Missouri is your EV charging resource. EVs are increasingly showing up at workplace and community parking lots throughout our region. Ameren Missouri will help ensure you are prepared when your employees and/or customers begin asking to charge their cars at your location.

As part of our commitment to making this transition as easy as possible for our valued customers, Ameren Missouri has created this QuickStart Guide to help you understand what you need to know about charging equipment, the steps to plan for installation, and the benefits of providing this service.

For more information about vehicles, fleet options, incentives, and additional resources visit AmerenMissouri.com/EV.



Introduction

Over 1.5 million electric vehicles (EV)¹ are now on the road across the United States and sales of EVs are growing here in Missouri. With more than 40 models now available and many more poised for release over the next several years - including fleet, medium, and heavy-duty options - the demand for charging options to power the vehicles is also anticipated to continue growing. Business owners across our region have the opportunity to join this rapidly growing sector by installing EV charging infrastructure at workplace, multi-family dwelling, or other consumer destination locations. Offering charging can provide many benefits including attracting and retaining top workforce talent, establishing your company as a leader in sustainability, and increasing customer satisfaction and time spent at your establishment.

This guide will help you understand the different kinds of charging equipment, how to choose the best location to install chargers, the benefits to offering charging at your business, and potential installation costs. A project checklist is also included to help you get started.

1 https://www.eei.org/issuesandpolicy/electrictransportation/Pages/default.aspx



Charging Overview

Defining EVSE (Electric Vehicle Supply Equipment)

Electric Vehicle Supply Equipment (EVSE), colloquially known as "charging stations," 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, vehicle, and power grid. EVSE can be installed at residences, workplaces, retail, public places, and fleet facilities. How quickly a battery charges depends on multiple factors including the type of battery, vehicle considerations, and the type of the EVSE.

Types of Charging Equipment

Level 1: Easy

Level 1 charging uses a standard 120-V AC plug and typically provides about 4-5 miles of range per hour. Most EVs come with a cord for level 1 charging. If desired, a dedicated level 1 charger can be installed at workplaces or community locations, though for at-home charging, access to a standard wall outlet is adequate.

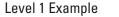
Level 2: Faster

Level 2 charging uses a 240-V or 208-V electrical connection and typically provides about 25 miles of range per hour or a full charge in 4-8 hours. Level 2 EVSE requires a dedicated circuit of 20-80 Amps depending on the specific requirements of the chosen EVSE. It is common for workplaces, retail, public places, and homes to have Level 2 charging. Level 2 chargers are essentially a universal connector that will be described in the Connectors and Plugs section below.

DC Fast Charging: Fastest

A DC fast charger can typically add up to 80% charge in 30 minutes. DC Fast Charging is fundamentally different from Level 1 and Level 2 charging. It requires a higher power supply, typically 480V and 100+ Amps. The charging rate depends on the battery design of the EV and the maximum rate of the charger. Today's EVs can accept DC charging rates ranging from 50kW to 150kW, while some near-future EVs will have charging rates above 300kW. DC fast chargers today have the capability of delivering power at a rate of 50kW to 350kW. Before a DC charging session begins, the EV and the charger communicate to determine the appropriate charging rate for the EV batteries. DC Fast charging uses several types of connectors as described below that vary depending upon make and model of the vehicle. DC fast charging infrastructure is essential for enabling long-distance EV travel and is being developed throughout the country to connect cities.







Level 2 Example



DC Fast Charging Example

Connectors and Plugs

Any vehicle with a standard SAE J1772 receptacle will be able to use Level 1 and Level 2 charging. Since all major manufacturers support this standard (Tesla provides adapters), there's no need for drivers to be concerned about compatibility with the charging infrastructure. Different manufacturers use different adapters for fast charging including the CHAdeMO (used by Nissan) and Combined Charging System (CCS) (used by most automakers).

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.

Summary Table

Level	Voltage	Charge Rate	Connector	Auto Makers
Level 1				
	120-V	~5 miles per hour	SAE J1772	All
Level 2				
	208-V or 240-V	~up to 25 miles per hour	SAE J1772	All (Tesla with adapter)

Level	Voltage	Charge Rate	Connector	Auto Makers
DC Fast Charger				
	480-V	~up to 80% in 30 minutes	CHAdeMo	Nissan Mitsubishi
	480-V	~up to 80% in 30 minutes	CCS (Combined Charging System)	Most automakers including: BMW Jaguar Chevrolet Audi/VW Ford
	480-V	~up to 80% in 30 minutes	Tesla	Tesla

Recommendations

When thinking about what kind of EVSE to install, consider your goals, how it is most likely to be used, and how to bring the most benefit to both your intended users and your organization. Assuming you want to encourage use of EVs, convenience for drivers is a key consideration.



Workplace

Workplaces and homes are ideal for EV charging given the long dwell times. The energy needed for Missouri's average daily commute of 40 miles can easily be recovered using a level 1 or level 2 charger during the workday. While dedicated workplace charging is recommended, there are two approaches to consider.

- For smaller campuses that make moving vehicles or charging connectors relatively easy, 32 Amp level 2 chargers may be shared and allow multiple users in one day. Another consideration is length of employee commutes.
- For larger campuses with hundreds of employees when moving vehicles is inconvenient and a distraction from core work and sharing chargers is not practical, 16 Amp Level 2 chargers can be used to provide an ample 12 miles of range per hour of charge. This also may allow more stations to be installed due to lower power requirements for each charging plug. Some charging stations have the ability to split a single electrical feed into two 16 Amp stations as well to provide this type of charging while only having to wire one circuit to the unit. This can also save on installation costs as well as electrical panel requirements.

Employees view workplace charging as a great benefit. It also helps to create a stronger culture of sustainability and encourages the growth of electric vehicle adoption.

Additional workplace considerations include fleet vehicles such as security and campus use vehicles. For vehicles with a range of 200 or more miles, an overnight level 2 charge will provide the vehicle a full charge at the start of each day.



Multi-Family Dwellings

A multi-family dwelling like a large apartment building is another place where charging station installation can be a great benefit. Dedicated 32 Amp level 2 charging stations are preferred for residents who drive EVs to ensure they have the peace of mind to access charging whenever needed without the difficulty of coordinating with neighbors.

There are several ways to offset the cost of the energy such as implementing a small EV parking fee or including usage in the rent payment. Increasingly, multi-family property owners are choosing to offer EV charging as an amenity to differentiate their property and attract new residents or retain clients.

Public Locations



Retail

Retail destinations like malls, restaurants, grocery stores, hotels, and more can often benefit from level 2 charging. Visitors are able to top off their vehicle while at these locations utilizing services, shopping, or staying overnight. This approach can also attract new customers for these businesses by offering charging as an amenity.



Parking Facilities

Another great location for EVSE installation are public parking garages and lots. These lots, depending on the rate of traffic, can benefit from the installation of both level 1 and level 2 charging. A parking garage or lot with long dwell times is a great opportunity to offer the benefit of level 1 charging. Similarly, a surface parking lot averaging two to three hour dwell times is a great candidate for level 2 charging.

Retail and public locations adjacent to highways or major routes through and between cities can be good candidates for DC fast charger installations where drivers on long-distance trips can refuel their EVs for 30-60 minutes while taking a break and patronizing local businesses.

Summary Table

Location	EVSE Recommendation
Workplace	Level 2
Multi-Family Dwelling	Level 2
Public/Around Town	Level 2, DC Fast Charger



Workplace Charging

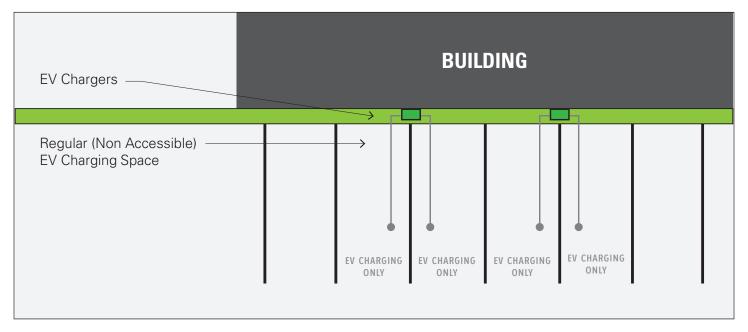


Multi-Family Dwelling Charging

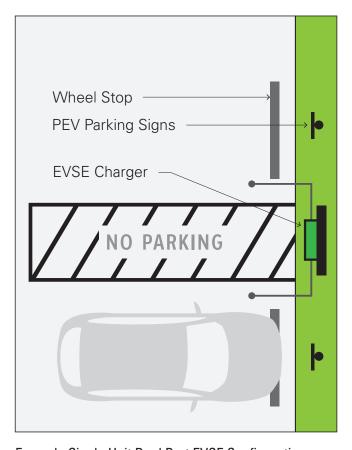


Public/Around Town Charging

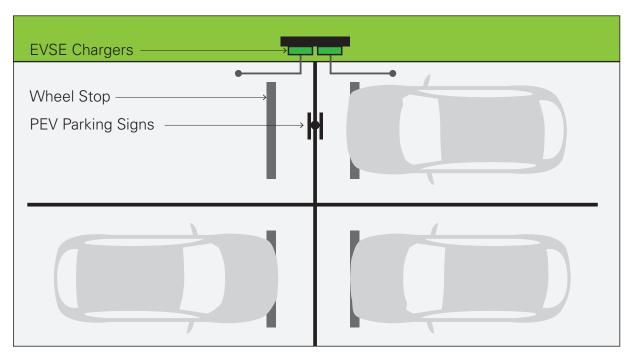
Diagrams of parking configurations with ports/cars.



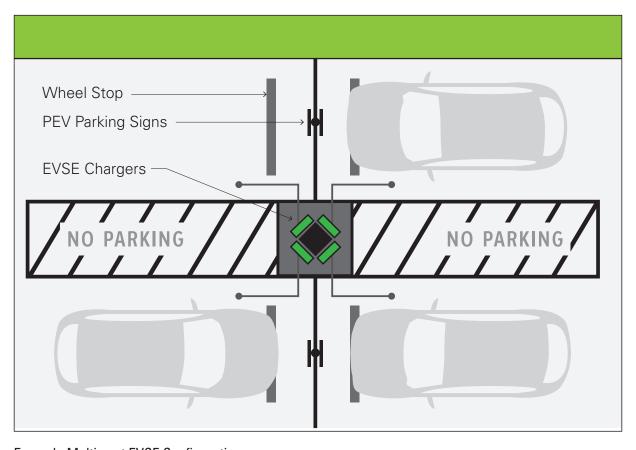
Example Wall-Mounted EVSE Configuration



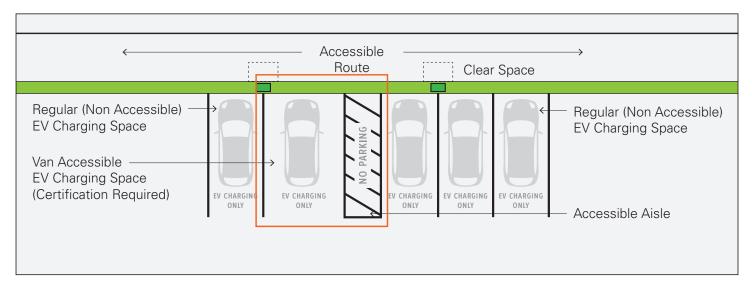
Example Single Unit Dual Port EVSE Configuration



Example Dual Unit EVSE Configuration



Example Multi-port EVSE Configuration



Example ADA Accessible EVSE Configuration

'Smart' or Basic Charging?

A key factor when planning to install EVSE is to determine if smart or basic EVSE will best fit your needs. The distinction between smart and basic systems is the ability to actively control the charging stations, collect charging information to get insights about utilization, and charge fees. This can include monitoring time and electricity use for the unit overall or a single charge session to determine peak usage, the ability to modulate the output of electricity provided to the unit during peak times and track users. A smart system connects to Wi-Fi or other available platforms like LTE wireless to share the information - thus a "smart" network.

Alternatively, a basic charger does not allow for user payments, capture and report out information on usage, or provide the owner control over the output of the unit beyond on and off. Basic charging is the simplest and least expensive option, however, provides the same charging capability as a smart charger without all the additional features.

While the initial cost can be higher than using a basic system, smart charging provides many benefits. For some organizations making the choice to utilize a smart charging system will make the most sense, especially when managing a fleet of all electric vehicles.

If you are unsure if networked equipment is necessary, consider choosing equipment with the Open Charge Port Protocol which will allow the station to be more easily and cost-effectively upgraded if needed/desired.

Payment Options

While offering access to free charging may be beneficial in particular settings, it is not practical in all instances. Most operators of public-facing DC fast chargers do offer this as a paid service. Smart systems enable the operator to collect fees via the network - several payment models are available including providing a monthly subscription service or structuring payment by use. By use payment structures offer flexibility to accommodate peak rates, total usage rates, and more. Depending on the network provider, payment structures may be customized. In addition to various payment structures, there are several ways to collect payment from users as well. Some models feature credit card readers for payment, others use smart phone enabled apps or RFID cards to enable the charging station. There are various costs associated with offering these options which will be discussed later in this guide.



EXAMPLE:

A retail center may choose to offer the first hour of charging free to customers. Every hour thereafter will be charged by kWh.

Monitoring and Reporting

Smart charging stations optimize the charging infrastructure by allowing the operator to manage the use of electricity. Smart chargers can also generate reports to help site hosts better understand demand which in turn can help them plan for future capacity, avoid peak demand charges that can cause higher electric bills, and design policies to better balance station usage. The ability to monitor and in turn regulate the system is a top consideration when determining which type of EVSE to install. Many businesses may find this data useful in determining how long people are using the chargers and can also help determine if there are certain times/days which are prime use hours. This can also be helpful when planning future expansion with more EVSE.

Visit <u>AmerenMissouri.com/EV</u> to connect with providers, through Ameren Missouri's EV Partner Network, that can assist with determining the right EVSE to fit your needs.

Considerations

There are many important considerations to take into account when determining if an EVSE installation is right for your organization and then, if so, how to plan for the project.

Location

When evaluating available parking, the ideal location to install EV charging is near existing electrical infrastructure to reduce installation costs. The farther away chargers are installed from this infrastructure the more complicated the installation process and, ultimately, the higher the costs. During initial construction is an ideal time to run conduit under parking areas to remote spaces to enable future EVSE installs. When installing conduit it is recommended to plan for additional spaces to be electrified in the future as many more EVs are expected on the roads in the years to come.

Convenience

Keep in mind that you'll want to locate the chargers in a convenient location with easy access to walkways and buildings if possible. Many operators choose to locate EV charging in optimal parking locations to raise awareness and encourage use of the chargers. If the chargers are difficult to access or burden the driver unnecessarily, they may choose not to charge. Locating chargers near prime parking locations can also help to encourage people to drive EVs. Another consideration would be the length of cables for the charging connector. Different EVs locate their charge ports in different locations so longer cables are recommended to not require vehicles to park a certain direction. Longer cables also allow EVs in two different parking rows to share the cable, when appropriate, to allow more access to the same station.

Driver Safety

Employee, tenant, and customer safety should be a top priority when designing your installation. The chosen area should be well lit to allow drivers to easily read all signs and instructions. Most charging stations are fully outdoor rated and safe to be used outside in the elements however it is recommended to verify this for your selected model. If a lot of chargers will be located along the same parking row it may be good to use cable management to keep cables up off the ground and help to mitigate any tripping hazards. Cable management will be covered below.

Mounting Type

Different configurations are available for mounting chargers, depending on your needs and available space. Wall mounts and pedestals are common options to consider when trying to choose the right equipment for your available space. In parking lots, typically pedestal mount chargers are used and for parking garages, wall mount chargers help to simplify installation. There are several other mounting styles as shown below:







Example Wall Mount

Internet Connection

Check the chosen chargers to see if they need Ethernet, Wi-Fi, or LTE wireless access to handle certain functions, including basic operation, usage data, or collecting payments. Keep this in mind as the installation process moves forward. Many chargers are capable of several connection types to make this process simpler for the user. Verify that the location chosen has the appropriate communications signal access, as appropriate, as some parking areas may be too distant from Wi-Fi to connect to the chargers.

Protecting Chargers

Curbs, wheel stops, bollards, and other mounting methods can be used to protect the charging equipment from potential collisions with cars.



Example Wheel Stop



Example Bollards

Aesthetics

If the aesthetics of the charging infrastructure is important, consider how it fits into the existing landscape. Screens or walls can be used to keep the chargers from public view. Additionally, if desired, many chargers can be branded using company logos or other graphics to customize aesthetics.

Signage and Marking

Call attention to all charging stations clearly with visible signs over the parking areas. Standard "EV Charging Only" signs are available through most signage companies that offer common road and parking signs. Also, consider adding clear markings on the ground to indicate the area is reserved for charging. It is recommended to paint the entire parking space if possible a bright green to highlight the spaces are reserved for EV charging.







Example Signage





Example Markings

Accessibility

While there is not yet the widespread application of the Americans with Disabilities Act (ADA) compliance requirements in Missouri, your organization or community may want to consider this. If so, ensure charging infrastructure complies with the ADA and other applicable local accessibility requirements. Considerations include the height of the curb, connectors, or providing accessible charging spaces. For these types of spaces wheel stops and curbs are not recommended so that users can easily access the charger from all sides. Bollards can be used to protect the charger from vehicles when they are parking.

Potential for Growth

When planning the installation location, consider how needs might increase as electric vehicles become more popular. A key question to consider is if you will want to add more charging capacity in the future. Planning for increased need from the start will help to save costs on design and construction for the longer term for items such as running conduit or adding electrical capacity for future EVSE installs.

Cable Management

Charging equipment comes with cords and keeping them organized and neat is important for the safety of the users and overall maintenance of the equipment and surrounding landscape. Many charging cords are loose, requiring the user to wrap the cord around a holder after each use. While this is simple and low cost, it can result in cables being left on the ground and subject them to unnecessary wear and cause an obstacle for landscape care. Planning for cable management is an important step when choosing the correct EVSE. Many charging stations are designed with cable management functions to ensure that cables are properly put away after each use as well as kept up off the ground during use. Options include pole or wall-mounted cable management reels as well as overhead cord management built into the charger.







Example Cable Management

Benefits of Offering Charging

Installing EV charging stations can provide an important benefit to your customers, employees, and community while helping establish your leadership in sustainability and innovation. Fleet operators can save on the total cost of vehicle ownership through fuel and maintenance savings while reducing emissions. Workplaces and businesses can provide vehicle charging options to employees and/or customers as an incentive while enhancing employee and customer recruitment and retention efforts, among other benefits.

	H			
	Workplace	Fleet	Multi-Family Dwelling	Public Locations
Attract and retain top talent				
Attract new and repeat customers			•	
Create an advantage over your competitors				*
Increase employee satisfaction and productivity				
Increase customer satisfaction and shopping dwell time				
Potentially add a new revenue stream				
Potentially increase rent and occupancy rate				
Potentially Increase Property Value	*			•

Associated Costs

When considering an EV charging installation, there are a few cost areas to take into consideration. Equipment, installation, network, maintenance, and energy use are all costs to factor into the overall budget. There are, however, several ways to lower costs, including incentives offered by Ameren Missouri* as well as a federal tax incentive.

Equipment

The first consideration is the charging equipment itself - the cost of EVSE varies by brand, number of charging port connectors, networking capabilities, and more. When selecting the right equipment for your building, consider the features you most need or desire, and that fit your budget. For example, many higher end units feature data collection and require networking which will also add to overall cost considerations. Other questions to consider include:

- Do you need theft deterrent features?
- How many changing port connectors do you need?
- Do you wish to collect data?
- Would you like the ability to remotely manage the units?
- Is cable management preferred at your location?

Summary Table

Level 1	Level 2	DC fast charging
\$300 (wall mounted) – \$1,500 (pedestal unit)	\$400 (non-networked) – \$7,200 (smart)	\$10,000 — \$40,000+

For more detailed EVSE pricing information, please refer to the Ameren Missouri EV Partner Network. Our partners will be happy to help identify the correct EVSE for you and provide a quote.

^{*}Incentives offered by Ameren Missouri are available to current Ameren Missouri business customers.

Installation

Installation costs can vary widely and are dependent on what electrical infrastructure exists, what upgrades are required, and local fees and permits. A few ways to reduce installation costs include choosing an installation location with existing electrical access, pairing the project with other needed construction, or installing multiple units. Locating new charging installations as close to existing electrical service as possible, when practical, will help to keep conduit and cable runs shorter. Also, selecting the proper mounting type of EVSE can help to reduce costs. For example, consider a wall mount unit in a parking garage or mounted to the side of a building near parking so that concrete work is not required when installing the units. If pedestal mount chargers are preferred however, perhaps pair installation with routine parking lot resurfacing so that boring or trenching costs can be minimized.

Installation Cost Considerations

- Concrete Work
- Electric Panel Work/Requirements
- Trenching
- Boring
- Running Conduit/Expanding Service Reach
- Permitting
- Signage and Markings

Internet Connection

If you have chosen networked or "smart" chargers, establishing a network connection may be an additional cost consideration. Beyond the network connection cost, depending on the vendor, there may also be an additional subscription charge for data collection and transmission. If you choose to collect payment at the chargers, there may also be fees associated with the transaction service. It is recommended to check with the supplier of the equipment to see what fees are required to operate the units when selecting a smart charger.

Maintenance

The type of warranty included with the charger varies by manufacturer and can range from a fixed-term to renewable. Level 1 chargers typically require little maintenance. Basic level 2 chargers typically require little to no maintenance. Level 2 units with additional features may require slightly more maintenance, however, they are frequently modular in design to allow parts to be easily interchanged. DC fast chargers require more regular maintenance as they have more complex systems which include cooling systems, filters, and other components.

Of course the more features the charger includes, the more likely it will be to require service. Additionally, EVSE units come with warranties depending on the manufacturer with some offering extended options as well as onsite maintenance for an additional cost. Cord and plug damage are the most frequently addressed maintenance items for EVSE. Replacing cords and plugs outside of warranty can cost from \$60 to \$300 depending on the unit. As with any asset, insurance is always recommended.

Energy Use

The electricity cost associated with your stations will depend on two utilization factors - time of use and overall energy use. For example, during peak demand times the cost of electricity may be higher, depending on the type of utility rate - monitoring and regulating the flow of electricity to the station through a network can help reduce this cost. The needs of each location will differ based on expected utilization.

Incentives

Cost-saving incentives are available to entities willing to make charging infrastructure available at their locations. It is recommended that you seek pre-approval before beginning any installation activities.

Ameren Missouri Incentive

Ameren Missouri is offering incentives for businesses seeking to install EV charging stations at workplaces, multi-family dwellings, and publicly accessible locations. The program is open to all Ameren Missouri business customers and includes:

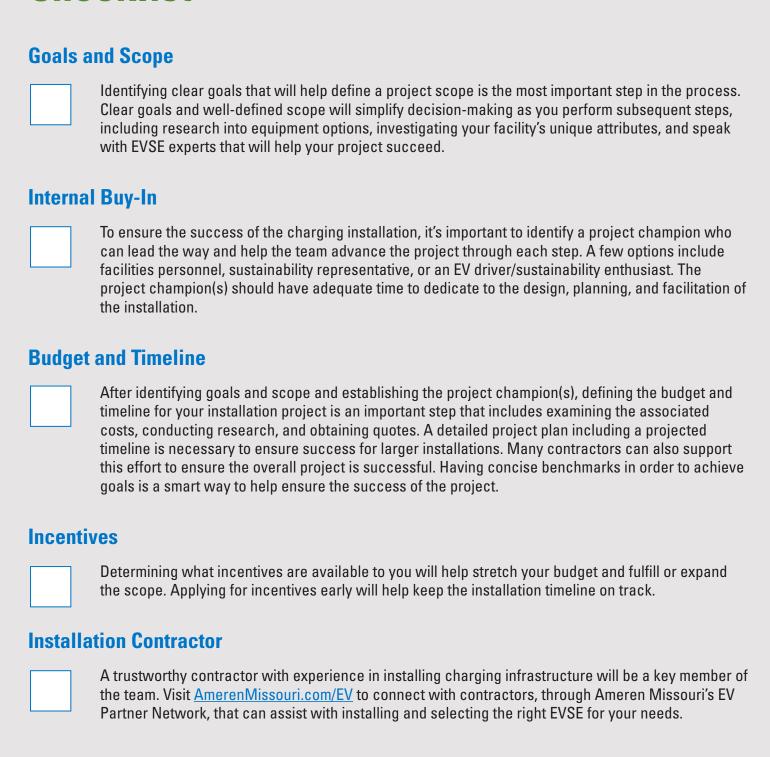
- Up to \$5,000 incentive per Level 2 port (40 Amp max);
- Up to \$20,000 incentive per DC fast charging port (50kW nominal max); and
- A maximum incentive totaling 50% of the total project cost.

For more information visit AmerenMissouri.com/EV.

Federal

Businesses who purchase and install qualifying charging infrastructure before December 31, 2020 are eligible to receive a tax credit of 30% of the cost up to \$30,000 under the Alternative Fuel Infrastructure Tax Credit. The credit is available on both the cost of the equipment and the installation costs, though, does not include permitting and inspection fees. More information can be found on the Department of Energy website.

Checklist



Project Design

Power Assessment

Installations are most cost-effective when placed near an existing power source. A power assessment can help identify the most advantageous locations for the installation. Conducting an audit of your site's energy usage and available power sources early on in the process will ensure only viable locations are considered and help you identify the type of equipment best suited to your location.

Location

This step requires an assessment of available spaces, power sources, safety and much more. Throughout the process it will be important to consult with facilities managers, security, and other individuals with a vested interest.

Equipment

At this step you will determine the type of equipment to be installed. This includes:

Smart or Basic Charging? You likely need smart charging equipment if:

You want users to pay a fee through the station;

You want to restrict charging to only specific users;

You want to get data on how the chargers are being used; and

You want to control charging to avoid utility peak demand charges.

- Single or dual connector?
- Cable management? Manual or mechanical assist?

Permitting

Most installations require permits for various aspects of the installation project. Start this process by conducting research and contacting your local permitting office or inquire with your chosen electrical contractor or service provider.

EV Charging Policy

Organizations offering workplace charging can benefit from setting clear guidelines regarding usage and sharing to help ensure a safe and successful charging experience for all. To develop a charging policy, consider engaging the intended users - for example through a survey - in the effort to fully understand their charging needs. When the time comes to develop a policy, an <u>example of a workplace charging policy (PDF)</u> by the U.S. Department of Energy can help you get started.

Promotion

Once you have installed your charging stations, engage with targeted users on how they can take advantage of this benefit. Promoting your charging infrastructure will help make the intended user aware of the offering and provide an opportunity to highlight your company's efforts. Promotional opportunities include a ribbon-cutting/unveiling ceremony, hosting an EV test drive event, educational sessions, and registering on charging station apps if they are publicly available. In addition, internal company communications such as intranet or all company mailing or virtual signs are a great way to promote the amenity of charging stations to employees.

Conclusion

Here at Ameren Missouri, we understand the intricacies an EVSE installation poses to your organization and are here to support your goals and serve as your EV resource. As the demand for charging continues to increase across the region, Ameren Missouri is here to help ensure you are prepared when your community begins asking to charge their cars at your location.

For more information about vehicles, fleet options, incentives, and additional resources visit us at AmerenMissouri.com/EV

You can also ask our experts any questions relating to installing charging stations by sending an email to EVMissouri@ameren.com.

Additional Resources

- 1. Electric Vehicle Charging for Multi-Unit Dwellings
- 2. Alternative Fuels Data Center Workplace Charging
- 3. Lynda.com Case Study





AmerenMissouri.com/EV