GREAT PLAINS INSTITUTE

Expanding Charging Infrastructure Playbook

Acknowledgments

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Definitions

The following definitions are sourced from the Great Plains Institute's Electric Vehicle Glossary and Drive Electric Minnesota.

Electric vehicle (EV): A vehicle that is at least partially powered by one or more electric motors using electricity stored in rechargeable batteries.

Battery electric vehicle (BEV): An electric vehicle that operates entirely on electricity stored in its onboard battery pack. BEVs do not have an internal combustion engine and produce zero tailpipe emissions.

Plug-in hybrid electric vehicle (PHEV): A type of hybrid EV that combines an internal combustion engine with an electric motor and a rechargeable battery. PHEVs can operate in all-electric mode for a certain range before switching to the combustion engine or hybrid mode.

Zero-emission vehicle (ZEV): A vehicle that produces no tailpipe emissions of pollutants during operation. Emissions may still occur in other phases of the vehicle's lifecycle. Examples include BEVs and hydrogen fuel cell vehicles.

Charging Levels

Level 1 charging: Charging a vehicle at "Level 1" means plugging into a standard 120-volt outlet (a typical household electrical outlet).

Level 2 charging: Charging a vehicle at "Level 2" means plugging into a 240-volt outlet (the same kind that powers appliances like dryers). On average, Level 2 stations provide 10 to 50 miles of range per hour the vehicle is connected.

Direct current fast charger (also DC fast charger, DCFC, or Level 3 charger): A high-speed public charger for EVs designed to significantly reduce the time it takes to replenish an EV's battery. While fast charging is convenient for quickly adding range, it can lead to faster battery degradation over time compared to using Level 1 and 2 chargers.

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Introduction

This is one of four playbooks intended to help local governments advance through their transportation electrification journey, providing step-by-step guidance on supporting EV adoption and expanding public charging infrastructure.

This playbook focuses on deploying public EV charging infrastructure, while other playbook topics include the following:

- Planning for EVs
- Engaging with utilities on EVs
- Municipal fleet electrification

Each state may have unique contexts to consider when implementing the actions outlined in this playbook. We recommend reviewing your state's rules and regulations before pursuing the suggested actions. You can reach out to the Great Plains Institute for assistance. In many cases, we can assist your organization at no cost.

Playbook Structure

Actions within this playbook are organized into the following sections:

Start Here: Actions within this section are suitable for communities beginning their electrification journey and can typically be accomplished with minimal capacity and resources. These actions are often the first steps that lay the foundation for subsequent actions.

Ramping Up: These actions include more advanced steps that communities can take to facilitate EV adoption and expand charging infrastructure. They may require more time and resources.

Full Speed Ahead: These actions represent advanced tasks that communities should consider after a solid foundation has been laid and the community is prepared to advance to cutting-edge transportation electrification efforts.

The playbook also provides real-world **community examples** of implementation and success, **cost considerations,** action-specific **resources and assistance**, as well as additional implementation considerations such as **staff time** required, **department roles**, **county roles**, and **partners**. Furthermore, implementation considerations are categorized using the

notations **minimal, moderate, and significant** to indicate the amount of time, effort, or resources that may be expended to complete the action.

Degree of difficulty	 Amount of time, effort, or resources to complete an action, categorized as minimal (yellow), moderate (orange), or significant (red).
Staff time	The amount of staff time a community should plan to spend completing an action, along with key factors that may influence required staff time.
Departments involved	The city departments that may be involved in completing an action.
County role	Potential options for counties to support local governments on an action, or ways in which the county may directly address the action.
Partners	Potential partners that may support local governments or be involved in an action.

Playbook Purpose

While this playbook provides a broad overview of the various strategies local governments can pursue to support transportation electrification by expanding public charging infrastructure within their communities, it is not intended to be comprehensive.

The strategies highlighted in this playbook are actions identified as particularly useful, those that would benefit from additional expert guidance, and those with the highest impact on emissions reduction. Other topics, like engaging and educating the public on sustainable transportation, are not the focus of this resource. Other free resources are available on these topics from programs like Charging Smart.

WHY FOCUS ON TRANSPORTATION ELECTRIFICATION?

The transportation sector is one of the leading sources of emissions at the national level and contributes more direct emissions than any other sector.[1] Emissions from transportation have a direct negative impact on public health, the climate, and the economy, making the

[1] "Sources of Greenhouse Gas Emissions," Environmental Protection Agency, last updated March 31, 2025.

decarbonization of the transportation sector an increasingly high priority for many communities.

Addressing the environmental impact of the transportation sector will require multiple solutions working together. One such strategy that communities are increasingly pursuing is transportation electrification. More specifically, local governments are increasingly taking action to facilitate and support the transition from gas-powered cars to EVs. Reflecting this growing trend, many communities have expressed interest in tools and resources to better understand the actions they can take to facilitate this transition.

While a mass transition to EVs on its own won't fully mitigate the transportation sector's environmental impact, it is a necessary step and one that can benefit communities in a variety of ways in both the short and long term. As electrified transportation becomes more prevalent and accessible, transitioning to EVs can rapidly reduce emissions.

EVs can produce as little as zero tailpipe emissions, and despite being resource-intensive to manufacture, over their useful lifespan, EVs emit approximately 110 grams of carbon dioxide (CO_2) per mile driven compared to 410 grams per mile for new internal combustion engine cars.[2] EVs have the highest potential to reduce emissions when the electricity powering them is generated from renewable sources. However, recent research suggests that EVs still produce significantly less CO_2 than traditional vehicles, even when the electricity is generated by fossil fuels.[3]

Emission reductions provide public health benefits by improving air quality and reducing noise pollution. Increased transportation electrification also provides opportunities for economic development by creating new jobs related to EVs and attracting EV-driving visitors to communities and businesses that have invested in charging infrastructure. It is increasingly feasible to realize these and other benefits in your community as new EV models become cost-competitive with traditional vehicles.

CHARGING SMART

Much of the content and information within this playbook is adapted from the technical assistance and designation program Charging Smart, of which the Great Plains Institute is a lead partner. Charging Smart is a program funded by

[2] River James, "Carbon Footprint Face-Off: A Full Picture of EVs vs. Gas Cars," Recurrent Auto, January 20, 2025.

[3] Emmy Curtis, Gabrielle Olson, M. Moaz Uddin, "Lifecycle Emissions Study: EVs vs. Conventional Vehicles," Great Plains Institute, April 28, 2025.

the US Department of Energy's Vehicle Technologies Office (VTO) that offers free technical assistance to local governments, giving them the tools to facilitate and accelerate transportation electrification in a way that ensures its benefits are accessible to all.

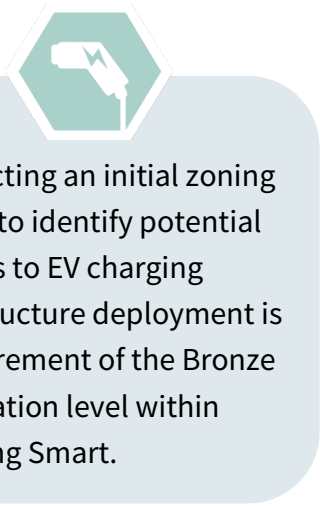
Participants work toward achieving Bronze, Silver, or Gold designation—with each subsequent designation level signifying increasingly advanced actions. Achieving a Charging Smart designation demonstrates that a community has taken steps to become EV-friendly by addressing planning, zoning, permitting, and coordinating with the local utility. This playbook contains callout boxes—designated by the hexagonal EV charger icon—that indicate how certain actions can support Charging Smart designation. Send an email to info_communities@gpisd.net for more information on Charging Smart and details on how to participate.

Expanding Charging Infrastructure

1.1 Start Here: Conduct a zoning review to identify EV barriers

Conducting a review of zoning codes and land use regulations can help identify intentional or unintentional barriers to EV infrastructure deployment.

Potential barriers or shortcomings may include outdated definitions related to EVs, unclear guidance on where charging infrastructure is permitted, a lack of accessibility and/or design standards, and failure to include EV-specific parking spaces in parking requirements.



Conducting an initial zoning review to identify potential barriers to EV charging infrastructure deployment is a requirement of the Bronze designation level within Charging Smart.

An example of an unintended barrier is when EV charging stations are categorized as fueling stations in the city code. This categorization would likely trigger unwarranted levels of environmental reviews that can be prohibitive. Communities are encouraged to note findings and recommendations in the zoning review template (provided below) for use during updates to the municipal code.

RESOURCES + ASSISTANCE

Charging Smart zoning review template: The template was developed as part of the Charging Smart program and is intended to streamline the zoning review process. Communities can

use this resource to better understand how current land use and zoning regulations may support or impede electrification efforts.

Planning and Zoning for Electric Vehicle Charger Deployment: This guidance document from the Sustainable Energy Action Committee (SEAC), the Interstate Renewable Energy Council (IREC), and RMI is intended to help local governments plan and zone for EV charger deployment.

ADDITIONAL IMPLEMENTATION CONSIDERATIONS

Degree of difficulty	Minimal
Staff time	Conducting an initial review of zoning and land use codes should require minimal staff time.
Departments involved	Planning, zoning.
County role	Counties can review existing land use and zoning ordinances in the townships where they have authority.

1.2 Start Here: Establish a best practice-based permitting system

Developing a streamlined and transparent permitting process with clear requirements and expectations for owners and installers is a critical step toward expanding EV infrastructure. Making this process clear and predictable will reduce uncertainty for entities interested in installing EV charging infrastructure.

Adopting a standard charging infrastructure permit application process and developing a charging infrastructure permitting checklist are both required for a Bronze Charging Smart designation.

COMMUNITY EXAMPLES

City of Rochester, Minnesota: Rochester requires an electrical permit for Level 2 charging infrastructure and a building permit if the installation requires non-electrical construction. The city provides permitting checklists for residential and commercial charger installations to clarify the process.

- Commercial permitting checklist
- Residential permitting checklist

City of Rockford, Illinois: The City of Rockford requires a permit for the installation of residential and commercial charging infrastructure. Below, we have linked to information provided by the city about the permitting process and the permitting checklist, which was developed to make the process more transparent for incoming developers.

- Permitting information
- EV charger permit checklist

RESOURCES + ASSISTANCE

Alternative Fuel Vehicle Training: The National Fire Protection Association (NFPA) has developed a series of free online training modules related to EV preparedness. Communities are encouraged to incorporate the relevant courses into their training programs for city staff involved in EV infrastructure permitting and inspections.

Planning and Zoning for Electric Charger Deployment: This guidance document from SEAC, IREC, and RMI is intended to help local governments plan and zone for electric vehicle charger deployment.

ADDITIONAL IMPLEMENTATION CONSIDERATIONS

Degree of difficulty	Moderate to Significant
Staff time	Developing new permitting processes from scratch may require substantial staff time and capacity. However, in some cases, this may be as simple as consolidating existing permitting processes into a single location, with clear step-by-step guidance.
Departments involved	Planning and permitting, public works, sustainability.
County role	Counties can coordinate with local communities to ensure that permitting processes are similar across the region.
Partners	Peer municipalities that have accomplished this action, electric utilities.

2.1 Ramping Up: Update zoning ordinance

Zoning and land use ordinances determine where charging infrastructure is allowable, address how EV-specific parking spaces relate to parking minimums or maximums, and establish accessibility standards for EV chargers.

Examples of ways to support EV adoption and infrastructure deployment through changes to the zoning code include the following:

- Permitting chargers as an accessory use by right to surface parking lots and structured parking facilities across all zoning districts.
- Defining when charging stations would be a distinct primary use (separate and distinct from a motor vehicle fueling station) and permitting this use widely, including in all commercial, industrial, and mixed-use zones.
- Allowing EV-reserved parking spaces to count toward minimum parking requirements.

Permitting EV charging stations as an accessory use to parking lots by right and allowing EV charging parking stalls to count toward minimum parking requirements are both required to achieve Silver designation in the Charging Smart program.

- Implementing requirements for EV parking spaces and EV chargers that ensure compliance with the Americans with Disabilities Act (ADA), US National Access Board, or other accessibility standards.

COMMUNITY EXAMPLES

City of Madison, Wisconsin: The City of Madison has added EV-related language into its zoning code, which includes clear definitions and allows charging infrastructure as permitted uses.

- EV definitions: Defines key terms like electric vehicle, electric vehicle charging station, and electric vehicle supply equipment.
- Permitted uses: EV charging facilities are permitted as a use in the Downtown Core, Urban Office Residential District, Urban Mixed-use Districts, Parks and Rec District, Airport District, Traditional Employment District, Suburban Employment, and Employment Campus District (28.017, 28.082, 28.061)

Borough of Red Bank, New Jersey: Red Bank's zoning code includes a section on EV zoning within its chapter on off-street parking.

- EV definitions: Defines key terms like electric vehicle, charging level, EVSE, and make-ready parking space (often referred to as EV-ready parking space).
- Permitted uses: All EVSE or make-ready parking spaces are considered an accessory use in all zoning districts.
- Requirements and standards: The code sets standards for electrical compliance, safety, signage, and installation. It also notes requirements for compliance with existing permits and building codes.

RESOURCES + ASSISTANCE

Electric Vehicle Ordinance Considerations: A guide for local governments: Developed by GPI, this guide walks through best practices and provides examples of zoning ordinances that support EV adoption and infrastructure deployment.

Planning and Zoning for Electric Charger Deployment: This report from SEAC provides considerations for zoning updates on pages 22–45. For each consideration, it discusses challenges, recommendations for overcoming challenges, and community examples.

ADDITIONAL IMPLEMENTATION CONSIDERATIONS

Degree of difficulty	 Minimal to Moderate
Staff time	The required staff capacity and time to complete this action will be comparable to any changes to the community's zoning code.
Departments involved	Planning and zoning, sustainability.
County role	Counties can support communities within their jurisdictions in adopting their own.
Partners	Peer communities that have already adopted a zoning ordinance.

2.2 Ramping Up: Identify locations for charging infrastructure placement

Communities should identify potential locations for EV charging infrastructure based on projected demand, current charging infrastructure, and municipality goals.

Municipalities may consider factors such as population density, travel patterns, grid capacity, and future development. Additionally, communities should consider prioritizing charging infrastructure in locations where residents may not have access to at-home charging, such as near multifamily housing.

As part of this process, local governments are encouraged to reach out to their electric utility early and often to coordinate on topics like available grid capacity in the desired site and the interconnection process for connecting the installed charger to the electric grid. More information about engaging with the utility can be found on page 6 of the Utility Engagement Playbook.

COMMUNITY EXAMPLES

Dane County, Wisconsin: Identifying priority locations for future EV charging infrastructure is a key component of the *Dane County Electric Vehicle Charging Infrastructure Plan* created by the Greater Madison Metropolitan Planning Organization. Within the section Expanding Dane County's EV Charging Network (p. 48), high-impact locations for Level 2 and Level 3 charging

stations were identified by analyzing travel routes, dwell time, trip distances, origins and destinations, and other related metrics.

City of St. Paul, Minnesota: The City of St. Paul worked along the City of Minneapolis, HOURCAR, and local electric utility, Xcel Energy, to create a network of public EV charging hubs across the two cities. The program is called the EV Spot Charging Network, and it supports both public charging and charging stations for the local EV car share. Locations were chosen by considering equitable coverage of neighborhoods, important destinations, existing transit facilities, and other considerations for the sites, such as the ability to install ADA-compliant infrastructure and availability of curb-side loading. In Minneapolis, sites were also determined in coordination with their mobility hub network.

RESOURCES + ASSISTANCE

EVI-LOCATE: A tool developed by NREL to help assess EV charging station deployment and plan for infrastructure location and cost. To access the tool, create a public user account. If your community is outside the bounds of this tool, consider connecting with your local Clean Cities Coalition chapter, which can provide the analysis or connect you with an appropriate entity.

EVI-Pro Lite Daily Charging Need Tool: A tool provided by the Alternative Fuels Data Center that estimates charging infrastructure needs to support typical daily travel. Currently, the tool functions at the state or metropolitan area levels. However, your local Clean Cities Coalition chapter can provide more specific data for your community or connect you with an appropriate entity.

Grid Up: Accelerating Charging in Communities (GUACC) tool: The GUACC tool from RMI allows communities to forecast when and where demand for electricity associated with transportation electrification will increase. Communities can use this tool to determine where investments in the electrical grid will be necessary to support future EV charging demand.

PlugShare EV charging station map: A mapping tool by PlugShare showing public EV charging stations. Users can search by location to see charging infrastructure within their community and across the country.

ADDITIONAL IMPLEMENTATION CONSIDERATIONS

Degree of difficulty	Moderate
Staff time	The amount of time and capacity required will vary based on the level of analysis. For some communities, free tools and readily available data may prove sufficient. For a more in-depth analysis, communities may consider working with a third party.
Departments involved	Planning, sustainability, community development, public works.
County role	A county-wide analysis could be completed and communicated to municipalities within the county's jurisdiction. A county or regional approach to charging infrastructure planning can ensure a vigorous and well-thought-out network.
Partners	Businesses, property owners, neighboring communities, county, metropolitan planning organization, regional planning commissions.

3.1 Full Speed Ahead: Adopt an EV-ready ordinance or similar incentive programs

EV-ready ordinances can be effective tools to expand charging infrastructure in key destinations. An EV-ready ordinance generally requires a certain number or percentage of parking spaces to be EV-ready, EV-capable, or EV-installed.[4]

These requirements can apply to specific development types or zoning categories (single-family residential, multifamily residential,

Adopting an EV-ready ordinance or plan for new construction is required for Gold designation within the Charging Smart program. However, for communities in which EV-ready ordinances are not legally allowed or feasible, other actions can be completed to earn Gold designation.

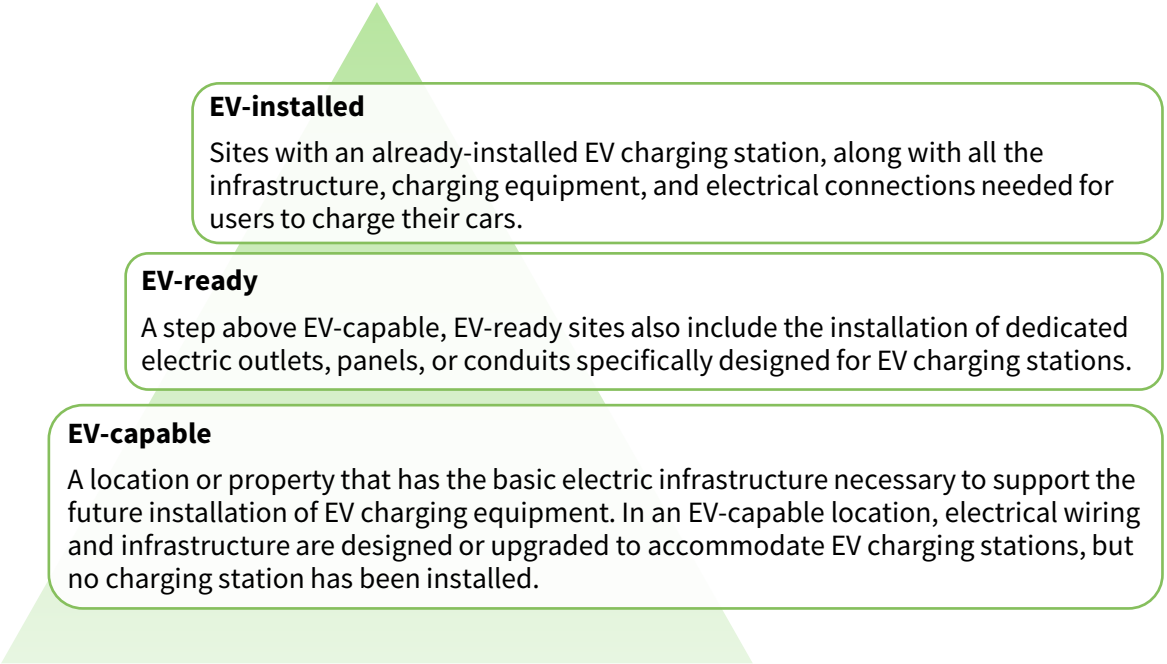
[4] Great Plains Institute, *Electric Vehicle Glossary* (Great Plains Institute, March 2024), 15.

commercial buildings, etc.) and can be required for new construction, major renovations, or both.

These ordinances should include requirements for electrical capacity, conduit types, and power requirements that can support a wide range of current and future EV charging technologies, rather than calling for any specific charging technology.

COMMUNITY EXAMPLES

Figure 1. Types of charging infrastructure deployment requirements in city codes or ordinances



Source: Great Plains Institute.

City of Stevens Point, Wisconsin: The City of Stevens Point requires that developers benefiting from Tax Increment Financing (TIF) incentives install EV charging infrastructure as part of their development agreement. Because many TIF districts are located in key strategic destinations (downtown and along major transportation corridors), this requirement results in EV charging infrastructure being deployed in heavily trafficked areas where it is often most needed.

Additionally, Stevens Point calls for the deployment of charging infrastructure in public spaces, such as public parking lots or public property, where possible. If these publicly

available locations are limited and chargers are installed on private property, access agreements and/or easements are required. The type and quantity of required EV chargers vary by location within the city, as outlined in tables 1 and 2.

Table 1. EV infrastructure required for TIF-funded projects in Stevens Point, Wisconsin

Use	EV infrastructure level	# of stalls
Mid-density residential	Level 1 and Level 2	See table 2
High-density residential and mixed-use	Exclusively Level 2	See table 2
Commercial/office/manufacturing	Exclusively Level 2	See table 2

Source: City of Stevens Point, *Electric Vehicle Infrastructure Economic Development Guide* (City of Stevens Point, 2022).

Table 2. Minimum required EV infrastructure based on Parking Stalls in Stevens Point, Wisconsin

Number of parking stalls	Multiple-family residential uses and mixed uses	Non-residential uses
0–5	0	0
6–25	1	1
26– 50	2	3
51–75	3	5
76–100	4	8
101+	5% of total stalls provided	10% of total stalls provided

Source: City of Stevens Point, *Electric Vehicle Infrastructure Economic Development Guide* (City of Stevens Point, 2022).

City of St. Louis Park, Minnesota: The city of St. Louis Park requires all new, reconstructed, or expanded parking lots with 15 or more spaces to include electric vehicle charging. The city sets a required percentage of Level 2 charging stations based on land use. In multifamily

residential buildings, they require stations to serve at least 10 percent of spaces and include at least one accessible parking space. Additionally, the city requires these lots to include electrical capacity for future charging infrastructure in at least 50 percent of their surface parking spaces.

RESOURCES + ASSISTANCE

EV Readiness in American Cities Climate Challenge Cities—Policy Options and Peer City Research: This resource from the American Cities Climate Challenge provides an in-depth review of EV-ready ordinances, key considerations, and real-world examples from communities that have already implemented such ordinances.

ADDITIONAL IMPLEMENTATION CONSIDERATIONS

Degree of difficulty	 Moderate to Significant
Staff time	The staff time and capacity required to complete this action will vary based on local conditions. Prior to undertaking this action, determine whether there is state-level legislation related to EVs and/or EV-ready ordinances that local governments must adhere to.
Departments involved	Finance, planning, community development.
County role	Counties can develop their own ordinance and/or support communities within their jurisdiction to adopt their own.
Partners	Property owners, property developers.

3.2 Full Speed Ahead: Contract, procure, and/or install a public charger

Communities should deploy EV charging infrastructure on government property for public use, based on the municipality's established goals and strategies. Specific locations that communities may consider include public facilities (libraries, city hall, government buildings, etc.), within the public right-of-way (curbside), and within walking distance of multifamily housing.

Contracting, procuring, and/or installing a publicly available EV-charger is required to earn Gold designation in the Charging Smart program.

Communities should establish best practice protocols for installation, maintenance, and inspection, ensuring that all infrastructure meets national or state/local standards.

COMMUNITY EXAMPLES

City of Aledo, Illinois: The City of Aledo provides three public Level 2 charging stations, two at a local park and one in the city hall parking lot. Users can pay $3.00 per hour to charge at these stations.

City of Sun Prairie, Wisconsin: The City of Sun Prairie offers two Level 2 EV chargers available for public use at the city hall building. These chargers are free to the public and are also used to charge city fleet vehicles overnight. The City of Sun Prairie has also recently installed additional Level 2 charging stations at the public library, which charge a fee for electricity delivered to be compliant with Wisconsin Act 121.

RESOURCES + ASSISTANCE

EV Charging and Public/Private Partnerships RFP Template: Forth's RFP template can help communities develop an RFP for EV charging on city property owned and operated by a partner vendor.

Public Electric Vehicle Charging Infrastructure Playbook: The Joint Office of Energy and Transportation developed this playbook, which provides guidance on procurement, ownership models, and revenue and fee structures. Select the Procurement and Revenue menu options to jump directly to those sections.

COST

The Alternative Fuels Data Center explains that the costs of installing charging infrastructure are influenced by various factors, including site location, charging level, charger type, related infrastructure needs, and construction costs. See figure 1 for more cost estimates. A public/private partnership may reduce costs for the municipality.

ADDITIONAL IMPLEMENTATION CONSIDERATIONS

Degree of difficulty	 Moderate to Significant
Staff time	The siting and permitting process for EV charging stations will vary based on local regulations. A public/private partnership may reduce the staff time needed.
Departments involved	Sustainability, public works, planning, finance.
County role	Counties can install public chargers in their jurisdictions and/or support communities within their jurisdiction in developing their own charging infrastructure.
Partners	Qualified electricians, renters, residents, local businesses, multifamily property owners, EV vendors, charging providers or developers, electric utilities.