

EV Charging Infrastructure Toolkit –

Multi-Unit Dwellings



Why Install Electric Vehicle Charging?

Providing electric vehicle charging can be an excellent differentiator to attract and retain multi-unit dwelling (MUD) residents with a desirable amenity and increase the value of your property. EV charging stations (EVCS) also contribute to sustainability goals and count toward Leadership in Energy and Environmental Design (LEED) certification.

Installing EV charging at multi-unit dwellings (MUDs) has numerous benefits. While public and workplace charging play a significant role, most EV owners will want an option for charging their vehicles at home. In addition to growing resident demand, recent policy and code developments encourage increased installation of EV charging at MUDs. Current state law prevents MUD property owners from unreasonably restricting tenants from installing EV charging at their dedicated parking spaces. CALGreen Building Code (Title 24, Part 11) is changing to require additional EVCS readiness in new construction. Future-proofing your property by installing EV charging ensures you will be able to compete with newer properties and accommodate accelerating EV ownership rates.

Benefits of EV Charging

**Attract New
Tenants**

**Enhance
Property
Value**

**Improve
Environmental
Image**

Site Owner EV Charging Checklist

While each installation is unique, many properties have similar questions and challenges when planning for EV charging stations (EVCS). This document summarizes common steps to help you consider options and understand how and when to engage the experts – your local utility, licensed contractors and EVCS vendors. The toolkit provides general information and helpful resources to guide you through each step of the checklist provided below.

While this checklist is presented in a linear format, the process of installing EVCS will be dynamic, with various interrelated considerations. Steps 1-4 will be preliminary explorations of issues that can be revisited with expert help once you've decided to move forward and contacted your utility and/or EVCS vendors. Actions listed are from the perspective of the project lead for your site. Your utility, vendors, and contractors will guide you through actual installation steps and more detailed considerations.

STEP 1: Estimate Demand

- 1.** Survey Residents to determine who current owns an EV, who plans to purchase an EV, typical daily driving distance, workplace charging availability, and similar data to inform decision-making.
- 2.** Find MUD with similar parking spaces and tenants that has already installed EVI for comparison and reference for investment.
- 3.** Estimate volume of EVs visiting MUD (non-residents) to determine if charging is needed in common spaces or visitor parking areas.

STEP 2: Consider EVCS Options

- 4.** Consider appropriate charging equipment types based on estimated demand. Explore Level I solutions for tenants that do not have long daily travel needs and will charge overnight. Explore Level II solutions for tenants with long daily commutes. DCFC is not recommended for most MUDs.
- 5.** Examine physical siting constraints (e.g., access to electrical infrastructure, ADA, visibility etc.).
- 6.** Weigh EVCS ownership models - tenant, property owner, or third-party vendor.
- 7.** Determine if you want to measure EVCS use and require payment from users This will lead to other considerations, such as EVCS software (networked vs. non-networked EVCS), in-house or third-party payment companies, using pricing to drive parking space turnover, etc.
- 8.** Consider increasing installation size to account for growing demand, reducing future capital costs.
- 9.** Decide if electricity will be supplied from residents' individual meters or from a common load meter. If common load, determine how users will be billed.
- 10.** Determine ownership (e.g., residents, property owner, or Homeowners Association [HOA]).

STEP 3: Estimate Capital Costs

- 11.** Determine the number and type of EVCS you want to install onsite.
- 12.** Measure distance to EVCS location from power point of connection to estimate make-ready costs, which cover laying the infrastructure needed for the immediate installation of a charging station in the future (e.g., trenching and conduit installation).

- 13.** Determine if your electrical service/panel requires an upgrade to handle increases in load, or to separately meter EVCS from other electrical demand (engage utility or technology provider).
- 14.** Have technology provider estimate operations & maintenance costs (e.g., electricity use, demand charges, networking fees).

STEP 4: Evaluate Cost Recovery Options

- 15.** Research available incentive and funding programs (e.g., PG&E Fast Charge Program & EV Charge Network Program, SCE Charge Ready Program, CALeVIP, EKAPCD DMV Grant, SJVAPCD Charge Up! Program etc.) Note that some programs (ex. CALeVIP) require approval prior to equipment purchase to guarantee coverage.
- 16.** Consider contracting with EVCS network provider to recover ongoing charging costs.
- 17.** Look into vendors offering free charging for advertising space.

STEP 5: Contact Utility (PG&E or SCE) to Conduct Site Evaluation

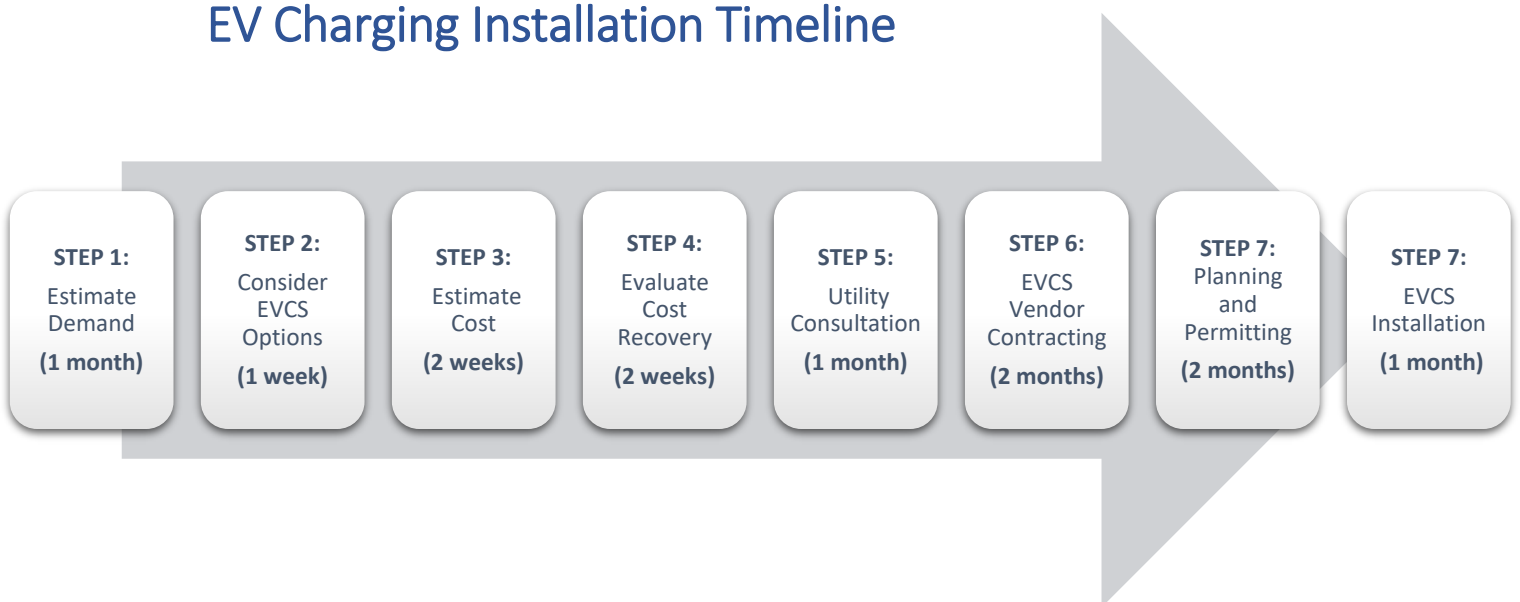
STEP 6: Contract with Vendors - Choose from offered equipment and service contracts

STEP 7: Hire Installers - Work with utility, vendors to plan, permit, and install EV charging

STEP 8: Implement Management Policies

- 18.** Ensure compliance with ADA regulations, consider general parking and traffic flow issues.
- 19.** Contact insurer regarding potential liability issues.
- 20.** Consider installing signage guiding visitors to EV charging.
- 21.** Communicate with site tenants and other stakeholders regarding installation and use of EVCS.
- 22.** Set schedule to review EVCS usage and contracts with third parties to consider adjustments.

EV Charging Installation Timeline



EV Charging Resources

STEP 1. Estimate Demand

What is your current EV charging need, and how will it grow into the future? Weighing the need for EVCS at your commercial destination will require reaching out to stakeholders at your site and researching existing EV charging locations nearby. A simple first step is to contact each tenant or property stakeholder at the site to inquire about EV charging interest or their employees or visitors. A key question will be evaluating the typical vehicle dwell times at your site to consider the appropriate charging speed.



Tool 1: Resident Sample Survey

The California Plug-In Electric Vehicle Collaborative and Veloz prepared a sample survey for residential buildings to gather information about potential demand. It gives a good idea of what types of questions to consider: <https://www.veloz.org/resource/empower-resident-survey/>



Tool 2: EV Charging Location Maps

Use these maps to see where nearby chargers are located, how many chargers are available, and their rates and access rules. Keep in mind that demand will continue to grow. PlugShare: <https://www.plugshare.com/>. U.S. DOE: <https://afdc.energy.gov/stations/#/find/nearest>.

STEP 2. Consider EVCS Options

What charging speeds, controls and billing capabilities do you require? You will want to consider the demand and dwell times of visitors to your location to select appropriate charging equipment. The table below provides a summary of EVCS types. Levels 1-3 offer increasing charging speed but with added cost and complexity.



Tool 3: EV Charging Information

The U.S. Department of Energy maintains a clearinghouse of information and resources for alternative fuels, including EV charging: <https://afdc.energy.gov/fuels/electricity.html>

	Level 1	Level 2	Level 3 (DCFC)
Charging Speed	3-5 miles of range/hour	10-54 miles of range/hour	75-300 miles of range/hour
Typical Locations	Single-family homes Townhomes Multi-family dwellings Office buildings	One and two-family homes Townhomes Multi-family dwellings Office buildings	Public access Retail shops Highway corridors Hospitality & recreation facilities
Equipment Description	Standard 120 VAC outlet and cord set charger that typically comes with EV Metering and billing not available	240 VAC outlet and wall-mounted or bollard style charging port Networked units available, allowing for advanced controls, billing options	Commercial-grade 208, 440 or 480 VAC converted into direct current (DC) through large standing unit Often requires upgrades to a site's electrical service Not all EVs can utilize

An important consideration is the number of EVCS that you will install at your location. California green building codes for new construction currently require that 6% of parking spaces be EV-ready, meaning with electrical capacity and raceway to support future charging. Charging stations placed in 3-6% of spaces is appropriate for

an initial installation, with future expansion based on demand. When trenching to install conduit for chargers, it is cost-effective to install additional conduit to support future charging.

The most common MUD charging scenario is where electricity is supplied to EVCS from a common load electrical panel or subpanel, located near the parking area. The property manager or HOA will have electrical conduit installed from the panel either to a point near the parking area or to each individual parking space. Residents that wish to install an EV charger will then pay for any additional electrical conduit run to their parking space, purchase the EV charger unit, and pay for installation costs.

Another option for MUD EV charging from a common load meter is to install chargers next to common or visitor parking spaces. EV drivers can park in common spaces to charge, and then move their vehicle to their assigned parking space once their charging session has finished.

Tenants that rent are less likely to purchase an EV charger or pay for the installation of electrical conduit to their parking space. In this case, the property manager may elect to absorb the entire cost of installation and amortize it in the form of higher rent.

STEP 3: Estimate Cost

The cost of installing EV charging varies considerably based on specific site requirements. Aside from the actual cost of the EV charging equipment, often referred to as electric vehicle supply equipment (EVSE), typical installation costs include trenching for electrical conduit and upgrades to the site’s electrical service.



Tool 4: EV Charging Cost Report

The U.S. Department of Energy has prepared a report on average equipment and installation costs for non-residential EV charging projects:

https://afdc.energy.gov/files/u/publication/evse_cost_report_2015.pdf

The table below provides a simplified estimation tool based primarily on costs provided in the Department of Energy report. It includes average potential costs that may or may not apply to every project. Early consultations with your utility and EVCS providers will help refine these estimates.

EVCS Installation Cost Estimator

Cost Driver	Average Costs	Example
Installation Costs		2x Dual Port (4 Ports)
Equipment – Level 2 (Non- Networked)	\$500 - \$2,000 x Ports	=
Equipment – Level 2 (Networked)	\$1,500-\$6,000 x Ports	= \$3,000 x 4 Ports
Equipment – DCFC Equipment	10,000-\$40,000 x Units	=
Installation – Level 2 Equipment	\$3,000 - \$6,000 x Ports	= \$3,800 x 4 Ports
Installation – DCFC Equipment	\$8,500 - \$51,000 x Units	=
Trenching for Electrical Conduit	\$100 x Feet	= \$100 x 45 feet
Transformer Upgrade	\$10,000-\$25,000	=
Total Estimated Cost:		= \$31,700

Additionally, site hosts must consider the ongoing costs of EV charging. The primary ongoing cost for EV charging stations is the cost of electricity used to charge EVs, and demand charges. In the case of MUD charging, the

property manager will typically select a networked charging solution by which electricity usage is tracked and EV owners pay for the cost of electricity associated with their individual charging. In this case, the property manager may need to cover ongoing network operation and data fees.

STEP 4. Evaluate Cost Recovery

Installing EV charging will often require a considerable up-front capital expenditure. A MUD site owner/operator may recover cost through increased rent and lower tenant turnover, or by billing residents directly; this section describes additional ways to either decrease or recover the up-front investment.

Site hosts may wish to recover the costs of installation and ongoing use from tenants and visitors based on individual usage, incorporate these costs into rent or lease terms, or elect to absorb the cost themselves and provide EV charging as a free amenity. No matter what cost recovery strategy you choose, there are additional resources that can provide funding for eligible EV charging installation projects, as listed below.



Tool 5: CALeVIP Incentive

The California Electric Vehicle Infrastructure Project (CALeVIP) is a California Energy Commission-funded project that provides incentives for Level 2 and DC fast charging in select locations throughout the state: <https://calevip.org/>



Tool 6: AFDC Incentive Listing Tool

The U.S. Department of Energy's Alternative Fuel Data Center (AFDC) hosts a comprehensive listing of currently available EV incentives within the state of California. Please note that certain programs (ex. CALeVIP) are time-limited: <https://afdc.energy.gov/fuels/laws/ELEC?state=ca>



Tool 7: Add Solar photovoltaics to EV infrastructure

The National Renewable Energy Laboratory created a summary of considerations for adding distributed solar PV with EV charging: <https://www.nrel.gov/docs/fy14osti/62366.pdf>. Solar Sage provides an easy [online calculator](#) for estimating solar panel costs based on electricity demand.

STEP 5. Contact Utility

Once you taken time to consider the items listed in Steps 1-4 of the checklist, you'll be well prepared to begin speaking with your utility, EV service providers and electrical contractors who will be able to recommend solutions suited to the needs and constraints of your location. These experts can also help refine cost estimates and potential recovery strategies. The utility specifically can help walk you through any necessary electrical service upgrades, potential electricity bill impacts, and other technical aspects of the project.



Tool 8: Pacific Gas & Electric EVCS Resources

Explore PG&E's EVCS-related programs and resources, such as the EV Charge Network and a contractor search tool. Contact your account representative for additional support. https://www.pge.com/en_US/small-medium-business/small-medium-business.page



Tool 9: Southern California Edison EVCS Resources

Explore SCE's EVCS-related programs and resources, such as the Charge Ready program. Contact your account representative for additional support. <https://www.sce.com/business/electric-cars>

STEPS 6 & 7: Contract with Vendors & Hire Installers

EVCS equipment and network providers offer a variety of products, services, and unit ownership arrangements. Speaking with several vendors and reviewing case studies and past projects is an important step before finalizing a contract with your chosen provider.



Tool 10: CALeVIP Connects

CALeVIP Connects is provided as part of the CALeVIP incentive program. It is a free online directory that allows you to connect directly with EV service providers and request information for potential EV charging projects. <https://calevip.org/find-an-evsp>

STEP 8: Implement Management Policies

Once your EVCS is operational, you will want to take steps to ensure it is well utilized and enhances your site. Communication with property stakeholders, staff and visitors will be key to success. Distributing a written use and management policy to tenants and installing signage to direct potential users to charging units are two important steps. You may also want to set a schedule to review utilization and ongoing costs to decide whether your current EVCS and services are still serving your needs.



Tool 11: Veloz Accessibility and Signage Guide

Veloz provides a number of EVCS-related resources on its website, including a report with recommendations on parking management, accessibility and signage.

<https://www.veloz.org/resource/accessibility-signage-for-pev-charging-infrastructure/>

Additional Resources

Alternative Fuels Data Center (AFDC) – The U.S. Department of Energy’s AFDC is an information clearinghouse with useful resources like case studies, an EV charging locator and a list of relevant laws and incentives. <https://afdc.energy.gov/fuels/electricity.html>

Veloz/PEV Collaborative – Veloz provides many useful resources – including case studies, templates and fact sheets on their website. <https://www.veloz.org/veloz-resources/>

San Joaquin Valley Clean Cities Coalition – Based in Bakersfield and operated by Project Clean Air, the Clean Cities Coalition and Electric Vehicle Partnership offer a variety of support services to help connect businesses interested in EVCS with the support they need. <http://projectcleanair.us/sjvccc/>





Kern Council of Governments

Contact:
Linda Urata, Regional Planner
Kern Council of Governments
lurata@kerncog.org

FUNDING PROVIDED BY THE
**CALIFORNIA
ENERGY
COMMISSION**

