

Kern Electric Vehicle Charging Station Blueprint

EV Charging Infrastructure Toolkit

Public Institutions



Why Install Electric Vehicle Charging?

Electric vehicle (EV) adoption is experiencing rapid growth. In 2018, nearly 8% of new car sales in California were EVs.¹ Plug-In Electric Vehicles (PEV) are projected to reach 4.56% of total vehicle market share in Kern County by 2025.² California policy, such as Governor Brown's 2018 Executive Order (EO) B-48-18, set ambitious targets for EV adoption and supportive infrastructure. Local governments play a crucial part of transforming California's transportation sector to zero emission vehicles.

Installing EV charging at public institutions is a visible display of commitment to local clean air and sustainability efforts and providing services to the community. Whether located at a public location like a park or library or at an administrative center, EV charging stations (EVCS) provide many benefits to the public and to local governments. EV charging is an increasingly valuable service for visitors as well as employees. Adding EVs to your fleet can significantly lower operating costs through reduced fuel and maintenance needs. EVCS installations can be paired with other sustainability upgrades at your site, such as solar arrays, which can help to offset the increased electricity use.

In short, EVCS is a good fit for many types of public institutions. While different use cases will involve diverse considerations, many resources and case studies are available.

¹ California New Car Dealers Association. California Auto Outlook. Vol. 15 No. 1. Available at: <https://www.cncda.org/wp-content/uploads/Cal-Covering-4Q-18.pdf>

² EMFAC, 2017

Potential Locations for EV Charging

Fleet Yards

Administrative
Centers

Public Parks

Public Libraries

Agency Offices

Community
Centers

Public Site EV Charging Checklist

While each installation is unique, many locations 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.

This checklist is presented in a linear format, but 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. Check availability of existing EVCS nearby using PlugShare or other EVCS maps.
- 2. Contact site employees/visitors to gauge interest; survey to quantify charging needs.
- 3. Estimate average employee/visitor dwell time – what speed of EV charging is appropriate?

STEP 2: Consider EVCS Options

- 4. Consider appropriate charging equipment types based on estimated demand, visitor dwell time (Level I typically suit low mileage & long dwell, Level II mid/long mileage & mid/long dwell, and DCFC for short dwell)
- 5. Examine physical siting constraints (e.g., access to electrical infrastructure, ADA, visibility etc.).
- 6. Weigh EVCS ownership models – public agency 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 the installation of make-ready spaces to account for growing demand, reducing future capital costs related to site development (e.g. trenching, wiring).

STEP 3: Estimate Capital Costs

- 9. Determine the number and type of EVCS you want to install onsite.
- 10. 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).

- 11.** Determine if your electrical service/panel requires an upgrade (engage utility or technology provider).
- 12.** Have technology provider estimate operations & maintenance costs (e.g., electricity use, demand charges, networking fees).

STEP 4: Evaluate Cost Recovery Options

- 13.** 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.
- 14.** Consider contracting with EVCS network provider to recover ongoing charging costs.

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

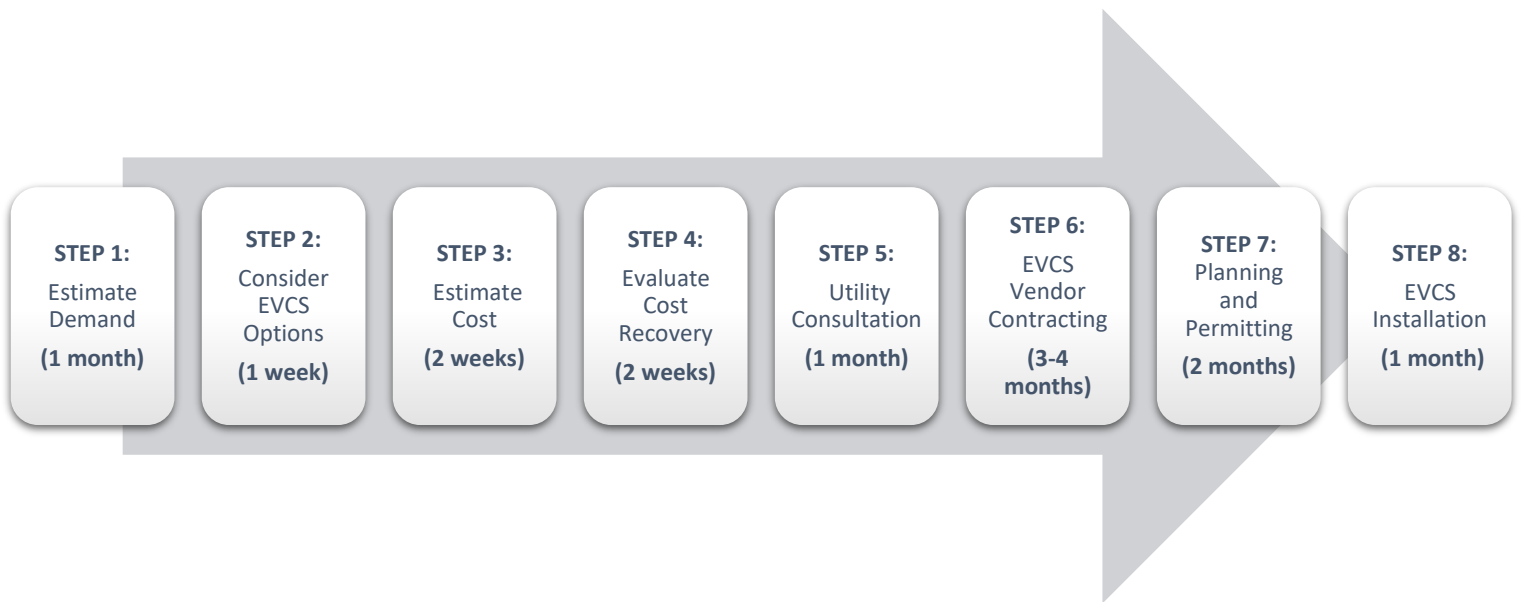
STEP 6: Contract with Vendors - Choose from offered equipment and service contracts

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

STEP 8: Implement Management Policies

- 15.** Ensure compliance with ADA regulations, consider general parking and traffic flow issues.
- 16.** Contact insurer regarding potential liability issues.
- 17.** Consider installing signage guiding visitors to EV charging.
- 18.** Communicate with site staff/stakeholders regarding installation and use of EVCS.
- 19.** 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 public location will require reaching out to stakeholders at your site and researching existing EV charging locations nearby. A simple first step is to contact each stakeholder at the site to inquire about EV charging interest for their staff and visitors. A key question will be evaluating the typical vehicle dwell times at your site to consider the appropriate charging speed.

Tool 1: EV Charging Demand Sample Survey



The U.S. Department of Energy has prepared a sample survey for workplaces to gather information on employee EVCS demand. This may not be appropriate for tenants at your site unless they have many employees, but it gives a good idea of what types of questions to consider:

https://afdc.energy.gov/files/u/publication/WPCC_sample_employee_survey_0816.pdf

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>.

Considerations for Charging Fleet Vehicles

For public agencies operating a vehicle fleet, part of estimating demand will involve deciding whether to acquire EVs as fleet vehicles. Determining what type and model of EV may be appropriate for your needs can be a daunting process, but many resources are available to help. Many public agencies find the sustainability benefits and reduced fuel and maintenance costs are worth the higher purchase price of EVs, especially factoring in the available incentives and rebates. When thinking about setting up EVCS for fleet purposes, you'll want to evaluate battery-electric vehicles (operate on electricity only) versus plug-in hybrid vehicles (gasoline and electricity), based on driving radius and charging needs. Fleet vehicles may not need to have usage tracked and can stay parked overnight; nonnetworked Level 2 or even simple Level 1 solutions can be an appropriate, low-cost strategy. You'll need to decide if your site layout and operational needs call for separate fleet-only EVCS or whether they can share use with the public or employee vehicles. Consider upsizing your installation to prepare for future EV purchases. As prices and technology continue to improve, more fleet applications will be appropriate for EVs.

Tool 3: Ready Set Charge Fleets Report



The Bay Area Climate Collaborative has prepared a detailed guide for implementing EVs as fleet vehicles, including EVCS considerations. <http://baclimate.org/wp-content/uploads/2015/10/Ready-Set-Charge-Fleets-EV-Fleet-Guide.pdf>

Tool 4: Vehicle Incentive Projects



California's Clean Vehicle Rebate Project provides funding for eligible EV purchases, including rebates up to \$7,000 for public agencies in designated areas:

<https://cleanvehiclerebate.org/eng/fleet>. Additionally, the San Joaquin Valley Air Pollution Control District offers an incentive of up to \$20,000 for each vehicle purchased by a public entity (maximum overall incentive \$100,000 per year).

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. Level 1 may be adequate to serve employee vehicles parked for many hours at a time, while Level 2 and Level 3 (DCFC) are typically the most appropriate for visitors at public locations or daily high-mileage fleet vehicles.



Tool 5: 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>

EVCS Types Summary

	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. If providing EV drivers will want reliable access to a charger for at least a portion of their workday. EVCS intended to serve fleet vehicles may need to be separated from public access unless they only need an occasional charge. If visitors only occasionally utilize EVCS, 1-3 public access charging ports may be sufficient, but the number will also depend on the level of equipment selected. Faster charging speeds means more vehicles can be served by the same EVCS, and strategically locating units between parking spaces can help facilitate switching cords between vehicles. In general, you want to provide enough EVCS that users are frequently able to charge, but not so many that the EVCS are underutilized. Due to the rapid adoption of EVs, and the fact that EVCS have an expected useful life of at least 10 years, you may want to consider increasing the size of your planned installation to meet future demand. One way to go about this is to install more in-ground infrastructure (often called stub-ups) than chargers. Another strategy is to install a mix of DCFC charging and Level 2 or Level 1 charging, depending on fleet needs and available funds.

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 6: 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. These consist primarily of the cost of electricity and any other impacts to utility bills, such as increased service or demand charges, but may also include monthly or annual payments to network service providers.

STEP 4. Evaluate Cost Recovery

Installing EV charging will often require a considerable up-front capital expenditure. Site hosts may wish to recover the costs of installation and ongoing use from employees and visitors based on individual usage or elect to absorb the cost themselves and provide EV charging as a free amenity. California law ([AB 2414](#)) specifies that providing free EV charging is not a gift of public funds. 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 7: 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 8: 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 9: 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

suiting 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.

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, reviewing case studies and past projects is important before finalizing a contract.



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 site stakeholders, staff and visitors will be key to success. Distributing a written use and management policy 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/>

California GoBiz – The Governor’s Office of Business provides a number of EV-related resources, including an extensive Community Readiness Guidebook to help local governments facilitate EVCS installation with templates, tools and resources. <http://businessportal.ca.gov/zero-emission-vehicle-program/zev-resources/>



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