Business
Electric Vehicle Charging

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Business Electric Vehicle Charging

Driving the San Diego Region Into the Future

About Plug-in San Diego (Plug-in SD)

Plug-in SD is a partnership between the San Diego Association of Governments and Center for Sustainable Energy with funding from the California Energy Commission. Its mission is to assist property owners in acquiring electric vehicle (EV) charging and better understanding the technologies, incentives and installation options available.

Among Plug-In SD's services, it provides free consultations to property owners in San Diego County interested in installing EV charging infrastructure. While each installation is unique, many properties have similar questions and challenges when planning EV charging. This document summarizes common solutions for **businesses that want to provide EV charging for their customers** identified through consultations and serves as a starting point for EV charging installation projects.

This document provides information, guidance and resources that can help you get started on installing EV charging for customers at your business location, as well as tools to find incentives to help fund projects and identify vendors to design and implement EV charging solutions.

Background

Electric vehicle (EV) adoption is experiencing rapid growth, especially in California. In 2018, nearly 8% of new car sales in the state were battery electric (BEV) or plug-in hybrid electric (PHEV) vehicles.[1] As more drivers adopt EVs, charging at destinations of interest becomes increasingly important, especially for EV owners without reliable home charging options and those traveling long distances.

Installing EV charging at your business has numerous benefits. The availability of EV charging can attract new customers, as well as encourage existing customers to stay longer. A case study by ChargePoint, an EV charging station (EVCS) manufacturer and network provider, noted an average charging session duration of 72 minutes, whereas average visitor dwell time at the

Considerations important to EV charging

- **Estimate demand**
  What is your current EV charging need, and how will it grow into the future?
- **Choose ownership and billing model**
  Will an individual tenant or the property manager pay for the cost of EV charging installation? Will customers pay to charge, or will charging be provided as a free amenity?
- **Choose design level**
  What charging speeds, controls and billing capabilities do you require? Will you provide fast charging or only Level 2 charging? How will these considerations impact the cost of your EV charging project?
- **Evaluate cost recovery options**
  Do incentives or tax credits exist that can help offset the upfront costs of purchasing and installing EV charging? Will you partner with an EV service provider whose business model does not require capital expenditure on your part?

[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.

same retail location was only 20 minutes.[2] Additionally, customer surveys conducted by EVgo, an EV network provider, found that 89% of EV drivers make a purchase while using their charging stations at retail locations and that 83% of EV drivers prefer to shop at locations that offer charging.[3] In short, EV charging attracts new customers and improves customer loyalty – EV owners often choose to support businesses that support their EV lifestyle.

Additionally, offering EV charging can help boost your business's environmental image, increase property value and improve tenant attraction and retention.

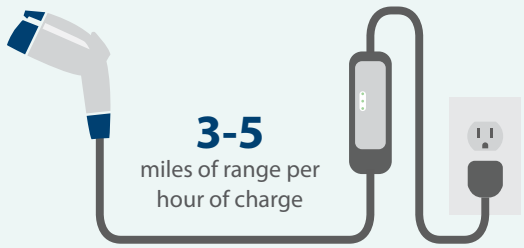
[2]https://www.chargepoint.com/files/casestudies/cs-retail.pdf.
[3]https://www.evgo.com/ev-charging-business/retail/.

Types of EV Charging

Electric vehicle charging is available at three levels, based on the rate at which a vehicle is able to recharge. Higher levels indicate faster charging rates but are typically costlier and are more likely to require upgrades to a site's electrical infrastructure. The following provides a brief overview of the various levels of EV charging, and Table 1 includes common use cases for each charging level.

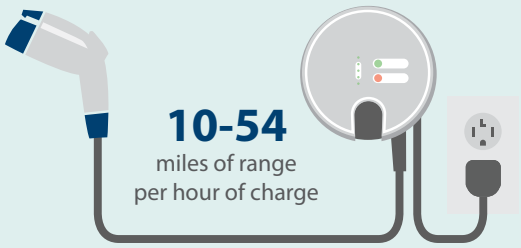
Level 1 charging

Level 1 charging uses a standard 120-volt alternating current (VAC) outlet available in all residential and commercial locations. Almost all plug-in vehicles come with a Level 1 cord set charger as standard equipment. Level 1 charging is the lowest cost and slowest EV charging option, providing around 3-5 miles of electric range per hour. Level 1 charging is a good option for homes and workplaces, where a vehicle can charge for upwards of eight hours at a time.



Level 2 charging

Level 2 charging uses 240 VAC and provides between 10-54 miles of electric range per hour. Level 2 uses the same connector and charge port as Level 1. Level 2 charging units are more expensive than Level 1, typically with more advanced controls and monitoring capabilities and are a good option for homes and workplaces, as well as commercial properties that want to provide EV charging to customers.



DC fast charging (DCFC)

Direct current fast charging (DCFC) is the fastest and the most expensive EV charging option. DCFC uses commercial-grade 208, 440 or 480 VAC that is converted into direct current (DC) to add 75-300 miles of electric range per hour. Because of its high power demands, DCFC often requires upgrades to a site's electrical service. DCFC is ideal for sites where EVs need to gain a maximum amount of range in a short time, such as along highway corridors and at retail shops. Additionally, not all EVs are equipped with the hardware required for DCFC.

Table 1 *Electric Vehicle (EV) charging levels and common use cases*

	Level 1	Level 2	DC fast charging
Charging Speed	3-5 miles of range/hour	10-54 miles of range/hour	75-300 miles of range/hour
Typical Locations	Single- and two-family homes Townhomes Multifamily dwellings Commercial office buildings	Single- and two-family homes Multifamily dwellings Commercial office buildings Public and private fleets	Highway corridors Public charging depots Retail shops Hospitality & recreation facilities

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Typical Cost Drivers

The cost of installing EV charging varies considerably based on specific site requirements. Aside from the actual cost of the EV charging equipment, typical installation costs include trenching for electrical conduit and upgrades to the site's electrical service.

Additionally, site hosts must consider the ongoing costs of EV charging. These consist primarily of costs for 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. Site hosts may wish to recover these costs 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.

Electrical service upgrades

The addition of EV charging can add significant electrical load to a site and may require upgrades to the site's electrical service. Larger Level 2 and DCFC installations also may require upgrades to the local electrical distribution grid, such as transformer upgrades, which can cost between $10,000-$25,000.[4]

For smaller installations, the site's electrical service panel may have room to install several Level 2 chargers without requiring an upgrade. A professional electrician can examine a panel to determine if there's room for additional capacity. Each Level 2 EV charger will typically require its own 40-amp circuit. Should a panel not have room for the additional circuits, it may require a panel upgrade.

Trenching

Installing EV charging in an existing paved parking lot may require digging trenches to bury electrical conduit. Trenching and patching an asphalt surface typically costs around $100 per linear foot and can add significantly to installation costs. When possible, run electrical conduit above ground and install EV charging stations close to the electric service panel to reduce the length of electrical runs. If a project requires trenching, consider any plans to expand EV charging and include extra electrical runs to avoid additional future costs.

Ongoing costs

The primary ongoing cost for EV charging is the cost of electricity and any other utility bill impacts, such as increased monthly service or demand charges.[5] These costs vary greatly, depending on the size of the installation and level of utilization.

A recent case study by ChargePoint found an average charging session time of 72 minutes at a retail shopping center in California.[6] During that time, a typical EV will consume between 4-8 kilowatt-hours (kWh) of electricity, for a total estimated cost of $0.92-$1.85.[7] Note that this cost can be 2-3 times greater if charging occurs during summer peak time-of-use (TOU) periods (currently 4-9 p.m., June 1–October 31) when electricity is more expensive.

DCFC will typically draw up to 50 kilowatts (kW) of power at a time, with higher-powered models now able to draw upwards of 100 kW. While the duration of a DCFC session is typically shorter, the higher power draw can have a significant impact on your property's demand charges, especially if multiple DCFC are in use simultaneously. Consult with a utility account representative to better understand the potential impacts of increased demand charges from DCFC.

For a networked charging system, typical network fees cost between $100-$900 annually, depending on the installation.[8]

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[4] https://afdc.energy.gov/files/u/publication/evse_cost_report_2015.pdf.
[5] Demand charges apply to some, but not all, commercial electricity rates. Consult your latest utility bill or speak with a utility customer service representative to learn more about your current electric rates and potential impacts to your utility bill.
[6] https://www.chargepoint.com/files/casestudies/cs-retail.pdf.
[7] This assumes an electricity cost of $0.23/kWh.
[8] https://afdc.energy.gov/files/u/publication/evse_cost_report_2015.pdf.

Ownership Scenarios

An important consideration when installing EV charging at a business is who will own the EVCS and how the purchase and installation costs will be covered. This is often dictated by which party initiates the installation of EV charging

Property owner or manager purchases the EVCS – If the property owner or manager elects to install EV charging, they will typically cover the purchase and installation cost. Additionally, the EVCS should be supplied electricity from a submeter on the property owner's electricity service, so that tenants' utility bills are not impacted. The property owner will need to review parking agreements with tenants prior to installing EV charging.

In this scenario, the property owner will likely want to use networked Level 2 charging. Though more expensive, networked Level 2 EVCS allow for simplified billing, remote access control and advanced analytics. Additionally, networked Level 2 charging allows for time-varying rates, which can help the property owner offset increased electricity costs during peak time-of-use (TOU) periods.

Tenant purchases the EVCS – If a tenant wishes to install EV charging, they may work with the property owner to agree on the location and usage rights of EVCS. Single tenant properties, such as stand-alone grocery stores, may elect to use this model, with the tenant deciding whether they wish to charge customers for EV charging or provide it as a free amenity.

In a shopping center or strip mall with multiple tenants, only anchor tenants, like grocery and department stores, will typically have enough standing to negotiate installation of EV charging with the property manager. Note that while the tenant that initiates the installation of EV charging may cover the purchase and installation costs, ownership of the actual EVCS will remain with the property once the equipment is installed.

Ideally, the EVCS would be connected to the utility meter of the tenant that requested installation. This would simplify billing, as energy costs from EV charging would be reflected on the tenant's utility bill. If this is not possible, the property owner may have a submeter installed that supplies the EVCS and bill the tenant for electricity costs.

Third-party owner-operator
Some EV service providers employ an owner-operator model, by which they own the equipment and pay for the cost of installation. In this case, the EV service provider profits from use of the EVCS or by selling advertising space on the actual EVCS. The property owner and tenants benefit from the availability of EV charging without the need for capital expenditure. Additionally, the EV service provider may agree to lease payments and/or revenue sharing to compensate the property owner for use of the space. The EV service provider will typically establish its own utility account with a dedicated meter installed for the EVCS, bill drivers for their use of the EVCS and pay the utility directly for the cost of electricity.

Charging System Designs

Once you have determined the ownership model, you will need to determine some key components of the system design. An EV service provider and/or installer can help make recommendations specific to your site, but some general considerations include the following.

- Will you require networked Level 2 charging that allows for advanced billing, access control and data analytics or will a less expensive, nonnetworked Level 2 solution meet your needs?
- Will you install DC fast charging?
- If customers will pay for charging, will they pay based on how long they are connected or how much energy they consume?
- How will you accommodate Americans with Disabilities Act (ADA) and California Building Code (CBC) requirements for accessible parking spaces?

Networked vs. nonnetworked Level 2

Nonnetworked Level 2 EVCS may be an appropriate lower-cost option for a single-tenant property, where the tenant wishes to provide EV charging as a free amenity. For example, Whole Foods Market stores provide nonnetworked Level 2 charging at many of their locations – users do not need an account, they can simply park in the designated stall and charge while they shop. A nonnetworked Level 2 charger typically costs between **$500-$2,000 per unit**.

For sites with multiple tenants, or where customers will pay to use the EVCS, a networked Level 2 EVCS is preferable due to its advanced billing capabilities. A network service provider monitors usage and collects payments from users through a user account. Users create an account, link their payment information and access chargers using a radio-frequency identification (RFID) card or smartphone app. The network provider will typically charge monthly fees, as well as payment processing fees. The property manager or tenant can work with the network provider to establish charging fees that will cover both the cost of electricity as well as the network provider's fees.

Whether networked or nonnetworked, Level 2 charging requires installing a 240-volt, wall-mounted or bollard style charging unit next to parking spots located as close as possible to the subpanel or electrical room. Ideally, the units would be served by wall-mounted conduit, avoiding the need for expensive trenching. Bollard style units will likely require trenching, so that electrical conduit is protected and does not present a tripping hazard.

Level 2 EVCS with network capabilities typically cost between **$1,500-$6,000**, not including the cost of installation and ongoing network fees. Installation costs for Level 2 chargers vary greatly, depending on the site, but average around $3,000 per unit.[9] The total cost for equipment and installation for nonnetworked Level 2 chargers is typically **$3,500-$5,000 per unit** and **$4,500-$9,000 per unit** for networked Level 2 chargers.[10]

DCFC

DC fast chargers are a great option for rapid charging of longer-range EVs and can be an effective way to attract new customers to your commercial or retail location. DCFC requires up to 480 VAC, three-phase power and a 40- to 80-amp dedicated circuit to provide a direct current (DC) output range between 31-62 kW. This option will require a dedicated meter and possibly a dedicated line from the utility transformer. Due to the higher energy demands, this option is more likely to require expensive upgrades to the site's electrical service and potentially to the electric distribution grid transformer that serves the site.

[9] https://afdc.energy.gov/files/u/publication/evse_cost_report_2015.pdf.
[10] https://afdc.energy.gov/files/u/publication/evse_cost_report_2015.pdf.

Some higher powered DCFC models offer power output of up to 200 kW and are designed to accommodate next generation EVs that will be capable of fast charging at this higher rate. These high-powered DCFC are more appropriate for highway corridors and urban fast-charging depots, where drivers are more likely to remain with their vehicle while charging. If an EV driver can gain as much as 100 miles of range in 10 minutes, they are less likely to venture from their vehicle and spend time shopping.

Plug-in SD recommends placing DCFC away from the building, preferably in the center of a four-car parking area to maximize vehicle rotation.

DCFC units range in price from $10,000-$40,000, and transformer upgrades to accommodate the increased power demands can cost between $10,000-$25,000. While average DCFC installation costs are around $21,000, they can range anywhere between $8,500-$51,000.[11] Along with equipment costs, installing a DCFC can cost **between $30,000-$100,000 per unit**.

Number of EVCS

An important consideration is the number of EVCS that you will install at your location. A business will want to provide enough EVCS that potential customers can charge reliably while visiting your business, but not so many that the EVCS are underutilized. For stand-alone properties and smaller strip malls, this can mean 2-4 Level 2 EVCS, and for larger shopping malls or commercial complexes anywhere between 6-20 Level 2 EVCS. For example, the Westfield UTC shopping mall in San Diego has three dual-connector Level 2 EVCS (six total Level 2 connectors). ChargePoint's smartphone app reports between 60–80% usage during weekdays and approaches 100% usage on weekends from midday through early evening, suggesting there is demand for additional EVCS.

For new construction projects, the California Green Building Standards Code contains requirements for "EV-ready" spaces, based on the total number of parking spaces. EV-ready means that the electrical infrastructure capable of supporting a 40-amp branch circuit for EV charging is installed at the time of construction and that the service panel has sufficient capacity to support charging at full amperage but does not necessarily require the actual installation of EVCS. This requirement ranges between 1-10 EV-ready spaces for properties with between 10-200 parking spots and 6% of spaces for projects with greater than 200 total parking spaces.[12]

Due to the rapid adoption of EVs, and the fact that EVCS have an expected useful life of at least 10 years, Plug-In SD recommends that you consider doubling the size of your planned installation to meet future demand.

Fees for charging

If you will charge customers for use of EVCS, an important consideration is whether customers will pay based on how long they are connected to the EVCS or how much electricity they consume. While a time-based charge may seem more intuitive, not all EVs are able to charge at the same rate. For example, a Chevy Volt can charge at a maximum rate of 3.6 kW, while a Nissan Leaf can charge at approximately double that rate. Many EV drivers are keenly aware of the price of electricity and how much charge they will receive per hour; drivers of slower-charging EVs may shy away from the use of EVCS with time-based pricing.

PlugShare is a useful resource that displays public EVCS and information like accessibility and pricing. You can view EVCS in your area to get a sense of how other businesses have set prices for EV charging.

[11] https://afdc.energy.gov/files/u/publication/evse_cost_report_2015.pdf.
[12] 2016 California Building Code (CBC), Part 11, Chapter 5.106.5.3.

Accessibility

When providing EV charging to public or unassigned parking spaces, the property will likely trigger Americans with Disabilities Act (ADA) and California Building Code (CBC) requirements for accessible parking spaces. One van accessible space is required if providing 1-4 EVCS, and one van accessible plus one standard accessible space is required if providing 5-25 EVCS. Refer to Chapter 11B of Part 2 of the CBC for specific requirements based on the number of EVCS at the property.[13]

EVCS Rental Option

While most EVCS are purchased, some equipment manufacturers offer rent or lease options as an alternative. This may be a useful option if your EV charger system requires expensive units that offer networked keycard access and billing management, yet you would like to budget this as a monthly expense instead of an upfront cost.

Most rental offerings require the property to provide the conduit and wiring to the area of installation. The charging equipment manufacturer will then install, maintain and update and/or upgrade the equipment throughout the rent/lease term. Renting may be a good option if your company has a shorter-term property lease or is planning to move locations soon and does not want to purchase EVCS. Most charger unit rent/lease terms are three, five or 10 years. When the agreement schedule is complete, the manufacturer will remove the chargers unless the rent/lease term is extended.

Cost Recovery

Installing EV charging will often require a considerable upfront capital expenditure. While a business may recover these costs through increased sales and a property manager may recover them through increased rent and lower tenant turnover, this section describes additional ways to either decrease or recover the upfront investment.

Incentives and tax credits

Incentive programs and tax credits can help property owners recover some of the upfront costs of installing EV charging. Air pollution control districts (APCDs) and electric utilities are common sources for rebate programs, however, note that incentive availability changes frequently. The California Electric Vehicle Infrastructure Project (**CALeVIP**) website maintains a list of additional incentive projects, and the California Air Resources Board offers an incentive search tool on the **DriveClean.ca.gov** website.

Usage fees

If customers will pay for EVCS use, the upfront cost of installation can be recovered over time by setting a price that more than covers the ongoing electricity and network provider fees. As noted earlier, EV drivers are typically well aware of the cost of electricity and may avoid charging stations that they deem as too expensive.

Advertising

EVCS provide a good advertising opportunity. Some EV charging providers, such as Volta, cover all the costs of installation, maintenance and energy usage through revenue from ads placed on display panels on their EVCS. While this ad revenue would not go to the property manager or retail business, this business model can mean little to no capital expenditure for the property.

[13] 2016 California Building Code (CBC), Part 2, Chapter 11B-228.3.

CALeVIP offers incentives for Level 2 and DCFC at a variety of commercial and public locations in specific areas throughout the state.

While not a rebate, the California Capital Access Program (**CalCAP**) provides financing with favorable terms for EV charging projects for small businesses, lowering the overall cost of ownership. Public agencies are not eligible for CalCAP loans.

Finally, EV charging equipment can be depreciated like any other business asset, reducing your organization's tax liability. Be sure to consult with a tax professional regarding depreciation of EVCS.

Getting Started – A Recap

Follow the four main steps to starting an EV charging project.

1. **Estimate demand** – Use publicly available resources, like PlugShare, to see where nearby chargers are located, how many chargers are available and their rates and access rules. Keep in mind that EV adoption is expected to grow rapidly as more models become available and as EVs enter the used vehicle market.
2. **Choose ownership and billing model** – Determine whether the property manager or an individual tenant will pay for the purchase and installation cost of EVCS. Decide if customers will have to pay for EVCS use or if it will be provided as a free amenity.
3. **Choose design level** – Based on the ownership and billing model, determine if you will need networked Level 2 chargers or if nonnetworked Level 2 chargers will meet your need. Consider if the additional customers you may attract by offering DC fast charging warrants the additional expense.
4. **Evaluate cost recovery options** – Research available incentives and/or tax credits for installing EV charging infrastructure. Discuss with the EV service provider how LCFS credits will be treated. Additionally, consider contacting EV service providers that will install EV charging with no capital expenditure on your part, either through the owner-operator model or by generating advertising revenue.

Once you have worked through the four steps, you'll be well prepared to begin speaking with EV service providers and electrical contractors who will be able to recommend solutions suited to the needs and constraints of your retail location. The following section includes tools for finding incentives to defray costs and identify vendors to design and implement electric vehicle charging solutions.

Low Carbon Fuel Standard (LCFS) credits

In 2009, the California Air Resources Board created the Low Carbon Fuel Standard (**LCFS**) to encourage the use of less carbon-intensive transportation fuels. Electricity is considered a lower-carbon fuel, and businesses that offer EV charging can generate credits that may be sold in California's LCFS market. The sale of LCFS credits can provide an additional revenue stream, offsetting the cost of installing and operating your EV charging stations. Businesses may choose to capture and sell these LCFS credits for themselves, or they may cede their credits to their EV service provider. Discuss with your service provider how ownership of LCFS credits will be treated and how your business will be compensated if you choose to cede your right to your credits.

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Additional Resources

CALeVIP – 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.

CALeVIP Connects – CALeVIP Connects is a free online directory that allows you to connect directly with EV service providers and request information for potential EV charging projects.

Incentive Search Tool – DriveClean.ca.gov provides a search tool to help you find incentives for EVs and charging infrastructure.

Plug-In SD FAQ – A list of frequently asked questions from Plug-In SD covering the basics of charging, costs, incentives and more.

The Alternative Fuels Data Center (AFDC) – An information clearinghouse maintained by the U.S. Department of Energy (DOE) that is home to useful resources, as well as a list of relevant laws and incentives.

Veloz/PEVC Case Studies – Veloz provides several useful case studies and fact sheets on their website.

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