

Electric Vehicle Charging Level Options and Considerations



What You Need to Know

- Real estate developers will benefit from having a firm understanding of the different types of electric vehicle charger and the appropriate use cases for different locations and user types.
- Choosing the appropriate charger for your property should be taken with a sense of strategy in mind to keep tenant and operator satisfaction high for years to come while minimizing costly future retrofits to meet market demand.

Current Options

As of Summer 2023, the industry offers four levels of power and equipment for EV charging:

Type of EV Charging (Voltage Required)	Miles of Range per Hour	Miles of Range per 8- Hour Charging Session	Use Case
Level 1 Charging (L1) (120V circuit)	2-5 miles	20-40	7+ Hours Overnight/All Day Parking Best for longer dwell times in residential, work, and school applications
Low-Power Level 2 Charging (LPL2) (208/240V circuit)	8-12 miles	50-150	4-7+ Hours Overnight/All Day Parking Best for long dwell times in residential, work, schools, and some retail & public access applications
Level 2 Charger (L2) (208/240V circuit)	20-30 miles	150-240	2-7+ Hours of Parking Best for medium to long dwell times in residential, work, schools, retail, public access, travel corridors, and fleet center applications
DC Fast Charger (DCFC or L3/Level 3 Charger) (480V, 3-phase power required)	100-200 miles	Typically, battery is 80% charged in <1 hour	<1 Hour Quick Charging Example: On the road charging or regular quick daily charging for drivers without access to L1 or L2 chargers

Pro Tip: Higher levels of charging will add range to EVs faster but will require greater electrical capacity to be installed at the premise, which can add costs to your project. Higher power charging can also incur higher electric rates if not properly managed.

The **EV Charge SF Technical Assistance Team** can guide you through equipment options and help your design team choose the best charger types for your needs.

Charging Needs

The appropriate Electric Vehicle Supply Equipment (EVSE) varies depending on setting, EV users' charging needs and expectations, and how the EV is used.

Appropriate Charging Level	Dwell Time (Hours)				Setting				
	<1	1-2	3-6	7+	Fleet Center	Travel Corridor or Refueling Stations	Retail or Public	Work or School	Residential
DCFC					✓	✓			
L2					✓	✓	✓	✓	✓
LPL2							✓	✓	✓
L1								✓	✓

Smart Chargers

Owners may want to consider purchasing smart chargers with capabilities such as advanced payment options, tracking, load management, time of use charging, and remote access. These “smart” technologies can improve the user experience as well as the operators' ability to minimize costs.

Future Charger Requirements to Consider

Owners are encouraged to consider the installation of ISO-15118 compliant chargers when selecting equipment. ISO-15118 provides a communication link to coordinate charging with local grid conditions and supports the exchange of data including estimated departure time, energy (kWh) needed by the vehicle, current electricity prices, current carbon intensity of local electricity, and other relevant information. While not required, ISO-15118 compliance will enable participation in future load shifting, demand response and other programs offered through the SFPUC, PG&E and statewide.

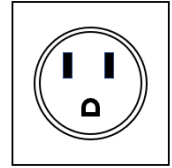
Charger Alternatives: Smart Outlets and Bring Your Own Cord (BYOC)

Many EV charging stations are installed and hardwired into the building's electrical system. However, installing L1 or L2 outlets in lieu of charging stations can save on both project and operational costs due to lower upfront installation costs, fewer parts to maintain/replace, and likely reduced maintenance by in-house or contracted staff. This outlet option requires drivers to bring their own charging cord, which can make sense in many residential or workplace settings, especially if energy use is not being actively tracked for billing purposes.

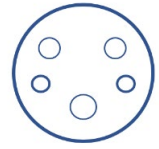
If the owner still wants the capabilities of a smart charger, smart outlets offer some capabilities similar to smart chargers, with the EV driver still supplying their own cord.

Standard Connector Types

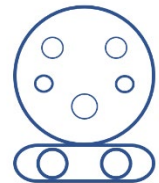
Most EVs come standard with a Level 1 “convenience charger” with a typical three-pronged NEMA 5-15 or 5-20 plug which can use a standard 120V wall outlet on a 15 Amp circuit. This “trickle charge” can provide ample charging to meet typical daily driving of most Americans.



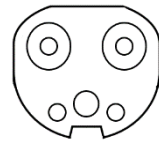
In North America, the standard EV connector (also known as a “plug”) is the Society of Automotive Engineers (SAE) J-1772, more commonly referred to as the “J-plug.” The J-plug can be used for L1, LPL2, and L2 charging. At present, most convenience chargers provided with new electric vehicles have this J-plug connector type, as do almost all non-Tesla Level 2 EV charging stations.



The “Combined Charging System” (CCS), or the “DC Fast Combo,” connector uses the J-plug plus two additional connectors at the bottom to provide direct current fast charging (DCFC, AKA “Level 3”). Only DCFC charging stations (those not in Tesla’s charger network) have this connector type.



Tesla’s proprietary “North American Charging Standard” (NACS) charging connector also allows L1, LPL2, L2, and DCFC charging. Recent decisions by some EV manufacturers to design new cars with the NACS inlet means those drivers will need adapters to charge at stations that use the J-plug or CCS port.



Tesla drivers can already use an adapter to access EV chargers equipped only with J-plug or CCS connectors. Likewise, drivers of EVs with J-plug inlets can purchase an NACS-to-J-plug or NACS-to-CCS adapter to access NACS-type EV chargers. Using adaptors, in addition to being less convenient, can limit some functionality of the charger... and now are expected to be increasingly common for EV drivers.

Next Steps

Now that you’re familiar with the basic EV charging equipment options, it’s time to start thinking about how installing EV charging infrastructure will impact your project’s electrical plans, which you can learn about in another fact sheet: “Futureproofing Your Electrical System for EV Charging” on the [EV Charge SF webpage](#).

Questions?

Contact **San Francisco Public Utilities Commission** at (415) 554-0773 or email PowerPrograms@sfgwater.org

For more information about SFPUC’s **EV Charge SF program**, please visit our program [webpage](#).

Prepared By: CLEAResult for SFPUC’s EV Charge SF Program

