Frequently Asked Questions: DC Fast Charging

What are DC fast chargers, and what are they used for?

DC fast chargers offer the quickest charge available, with vehicle dwell times around 30 minutes or less, depending on several factors, including how depleted the battery is, battery capacity, and power output of the fast charger. Fast charging enables electric vehicle (EV) drivers to travel beyond their home base, making long-distance trips doable in a shorter amount of time. Additionally, they are important in metropolitan settings, with public and private fleets, and for those without good access to home charging. They also boost prospective EV owners' confidence and reduce perceived range anxiety, helping to increase EV adoption. Furthermore, fast charging stations are critical for increasing EV adoption amongst transportation network companies like Uber and Lyft.

Three standards exist in the United States and are used by different vehicles, as shown below.

CCS-1 (or SAE Combo)

Usage: American/European and certain Asian EVs. Examples include the Chevrolet Bolt, BMW i3, Kia e-Niro, and Jaguar I-Pace. Also used by heavy-duty vehicles like transit buses.
Energy output: 50 kW-350 kW

CHAdeMO

Usage: In North America, only the Nissan Leaf and Mitsubishi Outlander. Tesla vehicles can also use with an adapter. An announcement made in 2020 signals the shift away from CHAdeMO for new vehicles.
Energy output: 50 kw-150 kW

Tesla Supercharger

Usage: Tesla vehicles only
Energy output: Up to 350 kW

Note: kW stands for kilowatt.

How long does it take to charge an EV on a DC fast charger?

DC fast chargers have different power outputs—the higher the output, the quicker the charge. The most common station output is 50 kilowatt (kW), providing vehicles with 80-90 miles of range in 30 minutes. The faster 150 kW is becoming more common, offering increased convenience. Tesla V3 Supercharging stations with a peak efficiency of 250 kW can charge a 2020 long-range Model 3 (322-mile range) ~23 percent in about 5 minutes, 80 percent in about 20 minutes, and 100 percent in less than 25 minutes. Ultra-fast charging stations with an energy output of 350 kW can charge vehicles with large batteries (100 kilowatt hour+) to 80 percent in about 15 minutes, but vehicles that can accept that power level are only now starting to enter the market. Additionally, vehicles take longer to charge in cold weather.

What type of maintenance is required for DC fast charger stations?

Ongoing maintenance includes checking parts regularly for wear and replacing them when needed. Additionally, stations operating in cold climates need a snow management plan in place to ensure accessibility when winter weather strikes.

How much does it cost to install a DC fast charger station?

DC fast chargers have significant capital investment associated with purchase and installation. A basic 50 kW unit may cost $25,000-$40,000 depending on manufacturer, and total turnkey installation may cost $60,000-100,000. Higher power levels that are more suitable for longer-range travel cost more. For example, 150 kW DC fast chargers generally cost $75,000 or more just for the unit. Installation costs—which can be reduced by locating the unit close to an existing transformer—include utility power extensions, three-phase switchgear, parking space paint and signage, associated groundwork, and protection devices like bollards. Additionally, ongoing software and network, operating, and maintenance costs can be significant and should be considered prior to installation.

How much does it cost to use a DC fast charger?

Most DC fast charger owners assess user fees to recoup costs, which vary widely. Some assess a per kilowatt-hour fee (e.g., $0.30/kilowatt-hour or more), others assess a per-hour fee (e.g., $12/hour), and still others assess a connection fee in addition to a per kilowatt-hour or by minute or hourly fee (e.g., $2.50 to connect and $0.35/kilowatt-hour). User fee information is reported on a per station basis on PlugShare.com and the Alternative Fuels Data Center website (www.afdc.energy.gov/stations/#/find/nearest).

Who owns publicly available DC fast charger stations?

There are three primary ownership models for publicly available DC fast charger stations:

- A site host purchases, owns, and operates a charger from a third-party provider, which may also provide software and networking services. Site hosts receive revenue generated from providing the service to EV drivers, but development costs are generally high in relation to expected revenues, making this model challenging without significant financial incentives.
- A network operator develops, owns, and operates charging infrastructure (e.g., ZEF Energy, Electrify America, EVgo, and Tesla). In these cases, agreements with site hosts are usually developed to install the station on private property. Excluding Tesla, significant public funds are needed to make this model work.
- Electric utilities develop, own, and operate the charger provided by a third-party EV services provider.

What is a demand charge, and how is it connected to DC fast chargers?

Electric utilities assess demand charges for peak demand events to cover additional costs needed to manage them. Demand charges are often based on the highest peak demand within a billing period. Since DC fast chargers deliver a high amount of energy in a short period of time, they create peak demand events. Rates available to DC fast charger owners, however, do not typically correlate to high demand, system peak, or typical industrial rates offered. Consequently, demand charges for DC fast chargers can be higher than needed to cover system costs. Some electric utilities now offer reduced demand charges, demand charge holidays for a certain period, or alternative rate structures that can help grow the market and address this challenge.