

What is electric vehicle supply equipment?

Electric vehicle supply equipment (EVSE) provides electricity to the EV charger—the part that plugs into the EV charging port, similar to a gasoline nozzle for vehicles with internal combustion engines (ICE). The speed of charging is a function of how many amps the EVSE can deliver, how fast the vehicle can store the energy, and the vehicle's battery capacity.

What are the levels of EV charging?

Level 1 (120 V AC): A standard outlet protected by a 15- or 20-amp circuit breaker with a ground fault interrupt. EVs and PHEVs typically come with an electrical connection cord for a Level 1 outlet that matches the charging port on the vehicle.

Level 2 (240 V AC): Utilizes a dedicated circuit protected by a circuit breaker rated for at least 40 amps. All EV models use the same standardized connector (SAE J1772). The price of Level 2 chargers has dropped rapidly, with some non-networked versions available for only a few hundred dollars. The larger cost is installation, which varies depending on the site.

DC Fast Charger (usually 480 V DC): There are three different fast charger standards, each with a different connector:

- The most common standard, CHAdeMO, is used by manufacturers including Nissan and Kia/Hyundai.
- European and American manufacturers are promoting a new standard (SAE Combo). The Combo standard is gradually becoming more common.
- Tesla employs its own proprietary standard.

Most DC fast chargers currently offer both CHAdeMO and SAE Combo connectors as they are being installed. Three-phase power is typically required, so locating DC fast chargers can be problematic with high installation costs.

Additional considerations

Level 1 and 2 DC chargers that operate at higher amp rates are in development, further reducing charging times. Battery capacities are also expanding, which means these vehicles will have to be charged less often.

Multiple-port chargers reduce installation costs by consolidating wiring and mounting locations, but longer charging times may result if multiple vehicles are charging simultaneously at ports that don't have separate dedicated lines. This shouldn't be a problem for fleets charging primarily at night.

How long does it take to charge vehicles currently available through the state contract?

A good resource for this information for light-duty vehicles is the [Clipper Creek charging schedule](#). These estimates assume the vehicles are completely out of battery power when charging begins. Most drivers will charge before then so the actual time needed to "top off" the batteries will likely be less.

Level 1 charging is best suited for use with plug-in hybrid vehicles or other very light-duty vehicles with smaller batteries.

Level 2 charging best suited for use with EVs that are usually parked for 2 to 4 hours at a time.

DC Fast Chargers are typically used for 20 to 50 minutes at a time and can deliver an 80 percent charge in that time.

Are state agencies required to install EV supply equipment?

[RCW 43.19.648\(5\)](#) directs agencies to install electrical outlets for charging EVs in each of the state's fleet parking and maintenance facilities, to the extent practicable. Efforts to implement this policy should take into account safety and ease of access, charging time, shared access, and other considerations.

Level 2 chargers are most desired for specific purposes, such as fleet charging, workplace charging for employee and visitor vehicles, or mid-day agency vehicle charging.

Are Level 2 chargers available under the state contract?

Yes. A variety of chargers are available through the state contract for [EVSE \(04016\)](#). At the state's request, a dual-port Level 2 charger was recently added that can simultaneously charge two vehicles on dedicated lines. Less expensive options may be available outside of the state contract.

How do I decide between charging equipment options?

Besides the power level choice, charger features may include timers, access controls (radio frequency identification, or RFID), data collection, multiple ports and charging levels, ability to collect fees and, in some cases, advertising. Level 2 charging is usually sufficient to meet fleet needs.

Unless you need to collect data regarding charging times and energy use, limit access through RFID cards, or eventually monetize your charging infrastructure, a basic unit without network connectivity will often suffice.

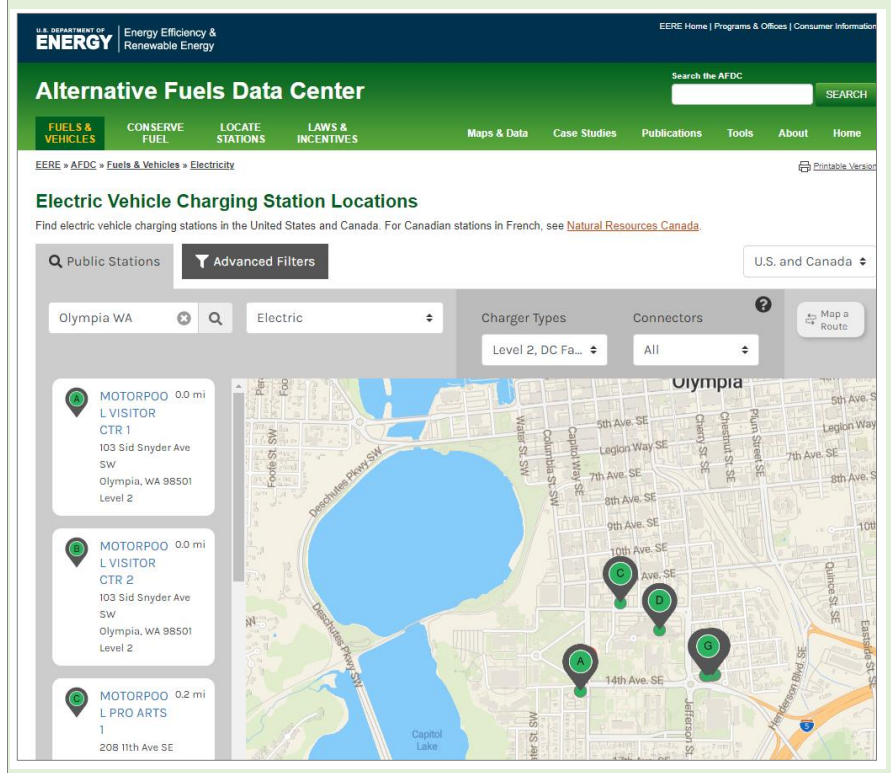
How can I find out where charging stations are located?

Many websites and smartphone apps provide charging locations, pricing, and availability.

Free charging may still be available through EV dealers, commercial establishments hoping to attract customers, or government offices as a public service. Increasingly, chargers are owned and maintained by charging networks, much like branded gasoline stations. Pricing can vary by

The [Alternative Fuels Data Center](#) at the U.S. Department of Energy (DOE) lists 1,541 public charging stations in Washington (with nearly 3,700 ports) – an increase of 133% in just five years.

The [EV Charging Station Locations](#) feature on the DOE website lists charging locations by geography, ownership type, charge levels, and payment systems. For example, charging locations in downtown Olympia are shown below.



The screenshot shows the 'Alternative Fuels Data Center' website. The main heading is 'Electric Vehicle Charging Station Locations'. Below the heading, there are search filters for 'Public Stations' and 'Advanced Filters'. The location is set to 'Olympia WA' and the charger type is 'Electric'. The map shows several charging stations marked with colored pins (A, B, C, D, E) in downtown Olympia. A list on the left provides details for three stations:

- MOTORPOO 0.0 mi L VISITOR CTR 1, 103 Sid Snyder Ave SW, Olympia, WA 98501, Level 2
- MOTORPOO 0.0 mi L VISITOR CTR 2, 103 Sid Snyder Ave SW, Olympia, WA 98501, Level 2
- MOTORPOO 0.2 mi L PRO ARTS 1, 208 11th Ave SE

time of day, duration, or energy consumption. Some networks even allow subscribers to reserve a charging station.

To help sort out charging options and plan your trip, we recommend using [PlugShare](#), a user-generated site that invites drivers to add locations, offer private chargers for public use, and alert other drivers when equipment is nonoperational. The driver comments regarding specific sites can be very helpful, especially when considering a trip with limited charging options.

Are public agencies required to set fees for visitor and employee charging?

Nothing prohibits or requires state agencies to charge a fee for visitors or employees to use charging stations. However, [RCW 43.01.250](#) encourages EV use by authorizing the purchase of power at state expense to allow charging by visitors and commuting employees. What is not clear is whether “commute vehicles” refers only to vehicles enrolled in commute trip reduction (CTR) programs, commute vehicles not enrolled in an official program but serving more than one employee, or any EV used for commuting purposes by a state employee.

Charging PEVs at public facilities
[RCW 43.01.250](#) “expressly authorizes the purchase of power at state expense to recharge privately and publicly owned plug-in electrical vehicles at state office locations where the vehicles are used for state business, are commute vehicles, or where the vehicles are at the state location for the purpose of conducting business with the state.”

Further, the responsibilities of local governments to provide charging is not clear. Many local governments have decided that not charging a fee for employees or visitors constitutes a “gift” of public funds. Some allow free use for an introductory period while others allow charging at no additional expense over standard parking fees.

The decision of whether to charge fees for employee or visitor charging may also need to acknowledge carbon emission reduction goals, union positions, and the cost to collect and manage fees. For employees, providing charging in dedicated parking spots for a flat fee with an automatic payroll deduction may be the simplest approach.

How could the various EV charging models impact our fleet?

It remains to be seen how charging infrastructure will be provided and monetized in the long run. Some pros and cons for popular billing models are presented below.

Model	Pros	Cons	Fleet Impact
No Cost	Easy to implement, especially when demand is fairly low	Employees may elect to only charge at work	Increases competition for charging during the day
Point-of-Sale Billing (flat fee or hourly)	Predictable; service provider can manage	More expensive hardware	Using system may make daily operations more complex
Memberships	Can be relatively simple; uses lower cost EVSE	Requires payment tracking and administration, often in advance; difficult for agencies	May be challenging to keep vehicles rotating on and off the chargers

Are EVs included in state agency Commute Trip Reduction (CTR) programs?

Although the state CTR law does not specifically address EVs, in June 2006 the State Ethics Board concluded the Ethics in Public Service Act would not be violated if an employee used state resources to plug in a personal vehicle used for commuting, as long as the employing agency included such usage in its policy consistent with state law regarding use of public funds for CTR ([RCW 43.01.230](#)) and the purposes of transportation demand management ([RCW 70.94.521](#)).