ELECTRIC VEHICLE CHARGING STATION PLANNING GUIDE

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Electric Vehicle charging stations (also EV Service Equipment, or EVSE) do not fit within normal assumptions about either fueling, parking, or electrical equipment, so it's important to clarify what we're dealing with before planning an installation project to avoid unexpected complications. Nothing is likely to be insurmountable, but there could be significant unexpected expenses, so they're best reviewed and addressed early.

Charging stations are fuel stations but they're more akin to phone chargers than to gas pumps. Full recharge times can take hours. Most experienced EV drivers will recharge frequently for shorter intervals, rather than wait until the 'tank is empty' like many drivers of internal combustion vehicles. But that isn't always possible, so given the long charging times, it's sensible to recharge at locations where the vehicle may sit for several hours anyway, such as worksite, residential, or campus parking lots.

However, parking at charging stations is a refueling activity, NOT parking. This may be challenged by people who are accustomed to parking in the area where new stations have been installed. As an effort to address this, WA RCW 46.08.185 specifies signage for EV charging spaces and defines a fine of $124 on any vehicle parked at a charging station that is not plugged in.

Most EVSE will have some visual indicator of whether charging is in progress. Similarly, stations and the vehicles themselves can often provide an app notification or text to drivers to inform them when the vehicle is charged, or other events occur. It's not uncommon for other EV drivers to become contentious about needing to plug-in when someone else is parked at the station without charging, so station hosts/owners can find themselves caught up in the interpersonal dynamics among the drivers.

Strategies to address these potential user issues include:

- Parking policies that limit total time in the space (perhaps 2 – 4 hours). BUT this strategy should fit normal user behaviors. It won't be effective if students or faculty are in class for longer time stretches and can't easily return to move their vehicle.

- Stations can be located so that one charging head can physically reach two parking spaces on either side of the station for shared access. This strategy is complicated by the "no-parking, charging only" requirement in state law. So, some enforcement flexibility will be necessary.

- Secured-access parking that restricts the use to a smaller group with agreed-upon protocols. This can be effective for fleet or small, employee-only parking areas.

EV chargers are also large electrical appliances that may significantly impact existing electrical service infrastructure. Providing the appropriate level of service and running conduit and cable to the station(s) is often the most expensive part of the project, since parking spaces are seldom conveniently near high-capacity electrical service. Some stations now have load management configurations available, when multiple chargers are running off one service panel, which helps to spread a limited level of electrical service.

When assessing site electrical service, also check with your utility. Charging stations do have an impact on their demand profiles – sometimes good, sometimes bad – and many of the utilities are offering incentive programs to support and manage expanded charging infrastructure. See if they can help you.

There are three defined levels of EVSE.

Level 1 is a wall outlet, normal 110-120v service. You don't need to install a station; the EV owner should have their own cord. These can be useful for long-term, 8 – 10 hour parking locations, but most newer EV's need a higher level of charging service.

Level 2 charging is 220-240v service. This is the most common, and most likely service station you'll install. These stations require a minimal 40A service and newer stations can draw up to 80A per station.

Level 3, DC Fast Charge, requires 3-phase, 480v service. They are expensive installations and serve a different user profile than Level 2. These stations are best for travelers who need a fast re-charge in a short time, or potentially for some fleet uses such as transit, where the vehicles can't run all day on a single charge but can only be out of service to refuel for short times.

There are also different charging connectors (plugs). Dept of Ecology and Commerce grant programs will specify what plugs are required. If you're funding a project by other means, take time to define the commonly accepted plug set that fits your circumstances. The plug connector types are driven by vehicle manufacturers and the market standard is not static. Also be aware that there is Tesla equipment, then a different set of other equipment that's used by everyone else (in the personal vehicle market). Tesla drivers can adapt to the other plug set, but most others are not prepared to adapt to Tesla.

Finally, there are different management options.

"Dumb" chargers are simply plug-in appliances. There is no data tracking or metering. These chargers are inexpensive, but best suited for fleet charging locations where you'll know exactly who is plugging in and why, and you have a sub-meter or other means of tracking the fueling expenses.

"Smart" networked chargers are the common standard for publicly accessible chargers. These chargers collect and report usage data and allow for individual payment per charging session. Paid stations in WA state are now required to have credit card readers and pay management platforms are offered by several private vendors. Such systems will require a cellular or other network connection and monthly subscription fees.

While it is legal to provide free public charging at a state institution ([RCW 43.01.250](#)) it isn't

required, and paid charging stations will generally recoup the costs of the electrical and network services, plus a small amount of additional revenue that could be reserved for future maintenance and replacements.

You should be planning for future maintenance and replacements. EV's and their supporting infrastructure are still a young, evolving market. Vehicle batteries are getting larger and charging speeds are increasing as well to meet that load demand, which drives up the appliance amperage demand in turn. The effective lifetime of this equipment may only be 10 years, or less, for general purpose, publicly accessible uses. (There will always be some older vehicles out there, of course, but newer vehicles may not get sufficient service from older stations.) Also keep in mind that the software and management platforms, like any other software system, can have shorter lifespans and/or lose support from the vendor. So, choose your supplier(s) thoughtfully, using some of the same criteria you would use for building automation control systems.

Charging stations will require some regular attention and maintenance. You'll need:

- A posted point of contact for customer concerns or complaints.

- Service breaker resets (the first troubleshooting step for functional faults).

- Security from plug cord theft, and/or replacement cords.

- Administrative management of revenues and reports.

- Electrical maintenance/service support on-call when needed.

There are suppliers of charging appliances, and others for software platforms, as well as suppliers of turn-key services which include the stations and software management platforms. The Department of Enterprise Services maintains a state contract for EVSE, and other turnkey service options may be accessed via SourceWell or other group contracts. (See the WSU Energy Green Transportation Program for more specifics.)

The best choice vendor will need to fit your location and your users. Look around to see what stations/vendors are already present in your area (Plugshare.com). A provider with a strong local presence may be better prepared to support new infrastructure at your campus and your drivers would be familiar with the equipment. Ultimately though, as the owner/host, you want reliable equipment and responsive support.

Finally, there are potential connections with automotive or electrical curriculum that may be worth exploring within your institution.

Resources/References

WSU Energy Green Transportation Program is a great resource for more detailed information on vehicles, chargers, planning, and funding.

Dept of Commerce grants and planning guidance

PSE EV Programs

[Tacoma Power EV Programs](#)

[Snohomish PUD Level 2 Charger Incentive](#)

Check with your local electrical utility to see if they have any protocols and/or incentive programs.