EV charging and your electrical panel

One of the most common questions about charging an electric vehicle (EV) at home is if you need an upgrade to your electrical panel. The answer is, not necessarily. A panel upgrade (installing a higher capacity electrical service panel) is most often not necessary. The following are several questions to ask and options to consider if you think you may need a panel upgrade.

Questions to consider include:

- How far do I drive on any given day?
- Is EV charging available at work?
- What's the range of my EV – does it need to charge every day?
- How much charge during SMUD's **EV discount period of midnight to 6 AM** do I need to meet my needs?

Level 1 charging. Level 1 charging refers to charging your EV with a charger that plugs into a standard 120-volt household outlet and will add an average of about 4 miles of range for every hour of charging on most EVs. Most of us drive about 40 miles or less per day so for many, Level 1 charging is adequate. If you drive more than 40 miles per day, Level 2 charging might be a better option for you.

Tip: Have your regular plug/outlet replaced with a heavy-duty outlet to better handle frequent plugging and unplugging.

Level 2 charging. For Level 2 charging, 240-volt wiring needs to be present at the charger location. Power output varies by EV charger model and generally ranges from 16 amps (20-amp circuit breaker; about 75 miles of range midnight to 6 AM), to 50 amps (60-amp circuit breaker; about 235 miles midnight to 6 AM). The higher the power, the faster the charge.

For most Level 2 home charging applications, SMUD recommends a 32-amp output charger, which will operate on a 40-amp circuit breaker and provide about 25 miles of range per hour of charging – about 150 miles midnight to 6 AM for most EVs. Learn more about the SMUD **Charge@Home** EV charger and circuit installation rebate program.

Some Level 2 EV chargers have even higher output levels and may charge your EV faster, but the higher the amperage of an EV charger the higher the likelihood that a panel upgrade may be necessary, depending on the amount of power your EV is capable of receiving. All EV's and chargers are a little different. Visit **ElectricForAll.org** to determine the charging speed for your preferred EV.

Are there options to avoid a panel upgrade but still charge my EV faster with a Level 2 charger? Yes, and SMUD has rebates!

Circuit sharing devices

If you have an electric dryer in your garage (or other 240-volt outlet) a circuit sharing device can allow you to share the single dryer outlet between both the dryer and EV charger. When the dryer is running, all the power goes to the dryer. When the dryer is off, all the power automatically switches to the EV charger. This can avoid the need for a new circuit to be installed and helps avoid a panel upgrade. Typical output allowed by these devices is about 25 amps, about 115 miles of range midnight to 6 AM. These can also share power between two EV chargers instead of a dryer and EV charger.

Energy management devices

Energy management devices monitor your total household electricity usage and when that reaches 80% of total panel capacity, it turns off power to the EV charger. When other appliances turn off and the total power usage goes back down, the device flows power to the EV charger. This helps avoid panel overloading and tripping your main breaker and can allow an EV charger to be installed without upgrading your panel. These devices generally cost much less than a panel upgrade and must be installed by a qualified electrician. You should consult a licensed electrician to ensure an energy management system is right for your application.

See SMUD's list of **qualified circuit sharing and energy management devices**, rebate amounts and links to where you can review and purchase them.

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