Residential Charging **Do's and Don'ts**

What to think about before adding charging infrastructure for light-duty plug-in electric vehicles

The general public is increasingly buying plug-in electric vehicles (PEVs), which include battery electric vehicles (BEVs) and plug-in hybrid electric vehicles (PHEVs). As a result, many people are considering installing charging infrastructure in their garages or at off-street parking locations. Here are things to consider when adding home charging infrastructure.



Charging infrastructure levels, performance and costs

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Charging Level	Charge Time to go 25 miles	Hardware Costs	Installation Costs*
Level 1 – 110 V	6 hours	\$0 to \$500	\$0 to 2,000
Level 2 – 220 V	< 2 hours	\$500 to \$4,000	\$250 to \$8,500

Source: INL data

*Installation costs vary widely by site.

Levels 1 and 2 electric vehicle supply equipment (EVSE) are the interface between the electric grid and PEVs. EVSE safely provides AC electricity to PEVs, in which the battery charger is located. Level 1 EVSE can be hard-wired to an electrical circuit or it can be portable and plugged into a 110/120-volt outlet. Level 2 EVSE is normally hard-wired to an electrical circuit and is often mounted on a wall.

Level 1 and 2 EVSE both have a standard SAE J1772 plug that connects to a J1772 charge port found in all PEVs. If a shorter charge time is desired, then Level 2 EVSE would be more suitable than Level 1.

Between 2010 and 2013, The EV Project installed Level 2 EVSE at 8,000 residences. The average installation cost was \$1,354, ranging from \$775 in Atlanta to \$1,828 in Los Angeles. The highest cost was \$8,500 when a significant electrical service upgrade was required. The lowest Level 2 EVSE installation cost was \$250 where there already was an existing 40 amp / 240 volt receptacle in the garage.

It is typically required that the homeowner or electrician obtain a building permit before installing the EVSE. Permit fees ranged from \$50 in Oregon to \$210 in San Diego and \$160 in San Francisco.



Installation Cost Savings

- Save money when installing EVSE by using a plug-in EVSE rather than a hard-wired one.
- Try to find an existing electric service panel with at least two open spaces (to allow installation of a double-pole breaker and 40 amps total).
- Install the EVSE around a clear wall and floor space.
- Install the EVSE near the electrical distribution panel.
- Using a separate meter allows EVSE installation without affecting the existing service or requiring an upgrade to the service panel to accommodate the new charging load.











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Consider Time-of-use Electricity Rates

- Many electric utilities offer time-of-use (TOU) rates intended to encourage homeowners to charge their PEV at night.
- TOU rates help utilities lower daytime electricity demand.
- Charge times can be set via the PEV or a smart EVSE.
- Check with your local utility to determine if you are eligible for TOU electricity rates for charging you PEV.

San Diego Gas & Electric PEV TOU rates example at right



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Recommendations

People considering Level 1 and 2 EVSE installation decisions should evaluate:

- Purchasing a PHEV (smaller battery) versus a BEV (larger battery).
- Installing the EVSE at close siting distances from the electrical service.
- Opting for TOU rates if the utility offers them.
- Installing the EVSE before purchasing the PEV.
- Buying EVSE at common stores such as Home Depot and Lowe's.
- Choosing a reputable electrician to ensure a safe installation.