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EVCHARGE4U

An Introduction to EV Charging Stations

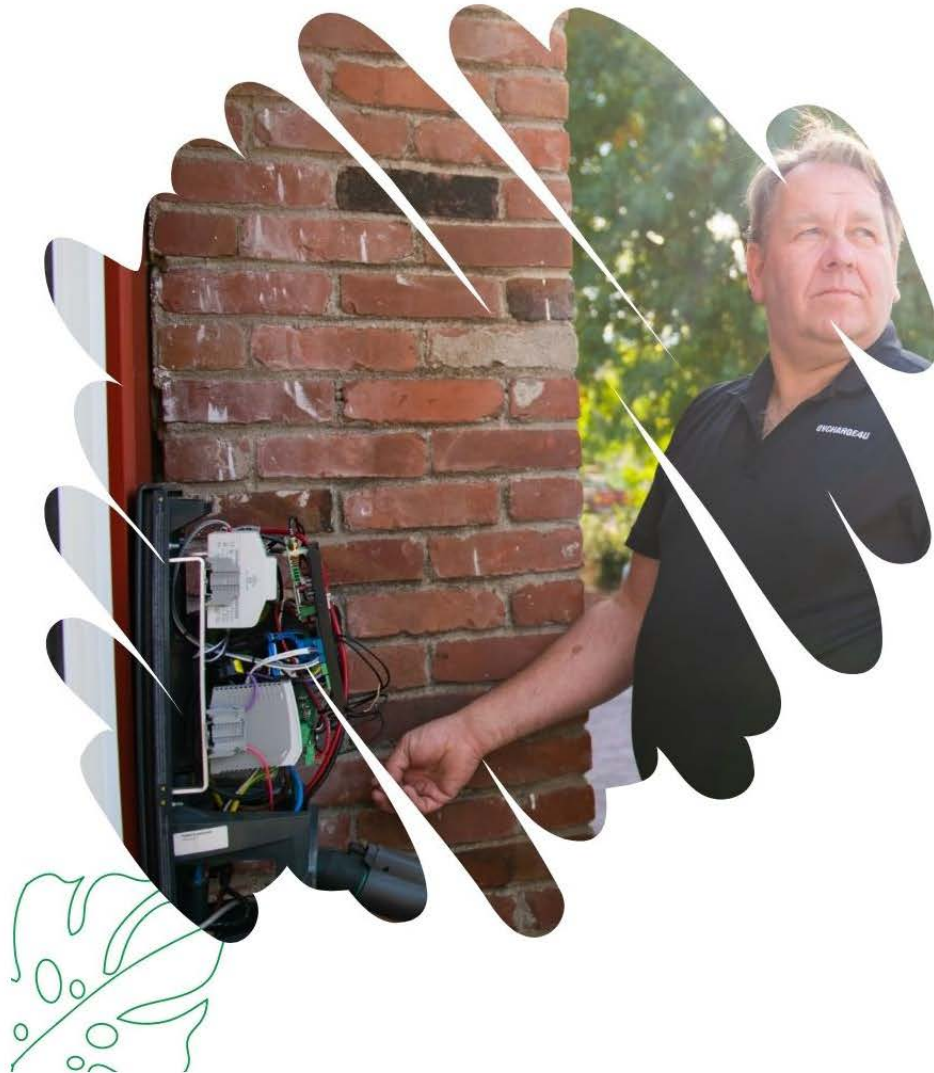
Presented by Paul Nijssen of
EVCHARGE4U INC.
EV Charging Station Experts





About Us

EVCHARGE4U is a licensed and bonded electrical contractor serving the greater San Francisco Bay Area. We specialize in the installation of electric vehicle charging stations but have decades of experience in residential and commercial electrical work in both Europe and the US. Our knowledgeable, detail-oriented expertise ensures that buildings are safely brought into the 21st century.



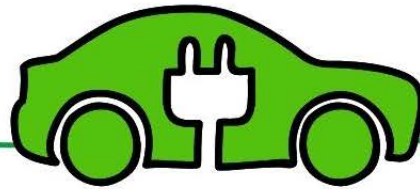


Learning the Language



ICE

Most motor-powered vehicles of today, from motorcycles to jumbo jets, still contain an Internal Combustion Engine. In cars, this is usually a conventional diesel or petrol engine.



EV

EV simply means Electric Vehicle, an umbrella term for all sorts of vehicles running on electricity as opposed to other things, such as petrol, diesel, sunflower oil, hydrogen, or muscle power even. EVs tend to emit far fewer planet-warming greenhouse gases than conventional cars. EVs include lots of subcategories.



BEV & ZEV

BEV or Battery Electric Vehicle – a vehicle powered by 100% battery, with zero pollution.
ZEV or Zero Emission Vehicle

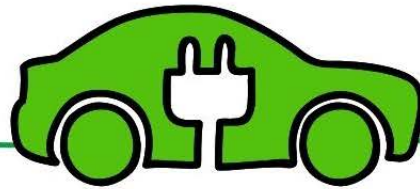


Learning the Language



HEV

Stands for Hybrid Electric Vehicle, or a car that contains both an internal combustion engine and an electric motor. The Toyota Prius being a good example. Hybrid cars are more efficient than cars that run on gas, cutting down on both fuel and emissions, especially for inner city driving. An HEV will run a certain distance on electricity only, before the ICE will take over. The battery charges by Regenerative Breaking (see: Regen) or by burning fuel through the ICE.



PHEV

A Plug-In Hybrid Electric Vehicle has a bigger battery than a hybrid electric vehicle, giving it more electric miles before the normal motor kicks in and greenhouse gases start coming out of the exhaust. A PHEV's battery can be charged not just by driving the car itself, but also by plugging it into a wall socket.



FCEV

A Fuel Cell Electrical Vehicle is a vehicle running on electricity provided by a fuel cell. The fuel cell is usually fed by hydrogen and oxygen, emitting water vapors only – cutting down carbon emissions.

Also: FCV or Fuel Cell Vehicle
HFCV or Hydrogen Fuel Cell Vehicle

How EV's Work

EVs need electricity to drive and thrive. You plug them in to charge the battery – EVs mostly run on lithium-ion batteries as they are particularly good at storing energy. Charging your car basically works the same as charging your smartphone or laptop for wireless use. (Yes, smartphones and laptops use lithium-ion batteries too.)

There are three levels of charging: Level 1, Level 2, and Level 3. The higher the number, the faster your car gets charged.



Charging Levels



Level 1 (household)

LEVEL 1



Level 2 (homes, businesses,
multi-level units)

LEVEL 2



Level 3

DC FAST CHARGE
(SuperCharging
Stations)

Level 1: 120-Volts

Every EV comes with a cord set. It works just like any other electrical appliance: just plug one end into a normal 120-volt AC (alternating current) wall outlet, and the other (called the connector) into the car's charge port. At level 1, every hour of electricity input gives you 3 to 5 miles of driving range. This charging speed may be fine for hybrids as they have smaller batteries to fill. For most BEVs, however, this charging speed is pretty slow. Some call it trickle charging.

Level 1 connectors: J1772 (also called: J plug), Tesla



Level 2: 208- to 240-Volts

At 12 to 80 miles* for every hour you're plugged in, level 2 charging is a must for most EV drivers. You can't use any old wall socket though – you'll need to have a 240-Volt wall box installed by a qualified electrician.

For those prone to daily drives over longer distances, upgrading to a Level 2 charging unit is a good investment. A Level 2 unit will charge at 10 to 30 miles of driving range per hour, depending on the amperage of your unit – a 50-amp charger, for instance, adds around 37 miles an hour to your battery! – giving you a lot more distance to play with once you rev up your ride in the morning. The surety of having a level 2 charger is a huge leap forward in reducing that pesky range anxiety.





A Level 2 home charging unit needs a 240-volt electrical circuit. They're pretty much standard in new homes, but if you don't have one, you'll need a certified electrician to install it beforehand.

A 32-amp charger will do for today's ev's but if you want to future-proof your set-up, you could go up to a 50-amp charger. The National Electrical Code requires the amperage of your electrical circuit to be 25% higher than the charger's output – for a 32-amp charger, you'll need a circuit that can handle 40 amp.





Level 3: 400- to 900-Volts

The fastest way to charge your car is at a public DC Fast Charge / Tesla Supercharger point. If you find yourself running low on battery power while out and about, a top-up at a direct-current (DC) fast-charging station can be a lifesaver. A 20-minute pit stop at one of these will easily give you another 60 to 80 miles of driving. It's not the most budget-conscious option though: topping up at a DC Fast Charge point can be two to three times more expensive than charging at your Level 2 Home Charging Unit.

Level 3 charging units are not available for private homes – they're run by private networks, where you'll need an account. A smartphone app will give you instant access.

Level 3 connectors: CCS (combined charging system, also called combo-plug), CHAdeMO, Tesla





Dynamic load management (DLM)

Charging an EV (or two) can sap electricity away from other appliances in use at your home. Dynamic load management (also called dynamic load balancing or DLB) will make sure the available electricity for your home is balanced between your car and appliances, preventing circuit overload and blown fuses. At EVCharge4U, our favorite Load Balancing solution for single homes, apartment buildings and Home Owner Association buildings (HOA's) is the Demand Charge Controller (DCC). Read more about Load Management solutions [here](#).

* The exact charging speed depends on the power output of your charger and your vehicle's max charge rate.



Types of EV Plugs



J1772 Plug

The "J-Plug" is used by all EV's sold in the United States and work with Level 1 and Level 2 charging stations.



Combined Charging System

Cars in the United States that use Level 3 DCFC use either CCS (which is the most common) or CHAdeMO plugs, depending on the brand of car.



Teslas

Teslas have their own plugs and use the same proprietary plug for all levels of charging—including at Tesla Supercharger stations. They also sell a J1772 Plug adapter

California Laws

You will need a permit
in California.
PERIOD.

