What's Complicated about Charging your Electric car?

by Steve Wehr. September 2020.

For most people, the answer to this question is … "Nothing, really". Charging your electric car is easier and much less costly than going to a gas station. It's just that it's so *different* from what we have always done. There is new terminology to learn, new habits to form, and maybe new equipment to buy. Feeling comfortable that you can easily and conveniently *charge* your electric car is one of the keys to feeling comfortable enough to *purchase* an electric car.

To introduce you to the topic of charging, I have broken this into three sections – Home, Destination, and Travel charging. Home charging, you have probably already guessed, is charging your car at home for all the trips you make daily. Destination charging is charging you can do when you stop at a destination for hour or longer – a hotel, a restaurant, at work, a grocery store, to play some tennis, or go to the library. Travel charging is what you need when you take a long trip, beyond the range of your car's fully charged battery.

Now some terminology… Home charging is also called Level 1 charging, and it can take 20-40 hours to get a full charge from near empty. Destination charging is called Level 2 charging, and it can take several hours for a full charge. Travel charging is called Level 3 or DC Fast Charging (DCFC), and will charge your car in less than an hour, often less than 30 minutes.

Charging speed depend upon two main factors:

- How much electrical power the charger is giving to your car.
- How much power your car can receive.

These two factors account for the wide variability in time it will take to charge your car using L1, L2, and especially L3 chargers.

Now let's look at the three main ways you will charge your electric car.

Home Charging

For most Electric Vehicle (EV) owners, charging at home is how you will charge 90-95% of the time. When you get home at the end of the day, you can plug in your car and you will have a full "tank" the next morning.

You have several options for how to plug in at home:

- **120V outlet**. This is the standard outlet we all have in our homes. Almost all EVs include a charger that can be used in a 120V outlet. But because of the low electrical power this type of outlet can send to your car, it will take many hours to charge from empty. You can expect to get about 40-60 miles of range charging for 12 hours.
- **240V outlet**. This is the familiar "dryer" outlet in many homes and provides twice the power output of a 120V outlet. You can have an electrician install one of these in your garage or parking space for about $250. Your car's included charger may include a plug to use this type of outlet, or you may be able to buy one from your dealer. You can expect to get about 80-140 miles of range charging for 12 hours.
- **Dedicated EV charger**. Many companies sell home chargers that are wired directly into your service panel. Because of this connection, the charger can supply much more electrical power than even a 240V outlet. These are Level 2 chargers, the same type you may find out around town, and will add 20-40 miles of range per hour. Installing one will cost around $1000 -- $500 for the charger hardware, and $500 to install it.
  You can lower the cost of a dedicated L2 charger by taking advantage of incentives:
  - Federal tax credit for 30% of the cost of installing a charger at your home or business. (Form 8911.)

- NY State tax credit for 50% of the cost of installing a charger at your home or business.
- $450 rebate on home chargers purchased through Central Hudson.

You can reduce the cost of charging at home by switching your electric plan to an “Electric Vehicle Time of Use Rate” like the one offered by Central Hudson. This rate plan charges you less for charging your car off peak.

But what if you live in an apartment? You can still use an outside 120V outlet or ask your landlord to install a 240V outlet or a charging station.

- NYSERDA provides rebates of $4,000 per charging port for Level 2 charging stations installed public, workplace, and multi-unit dwelling parking lots.
- Tesla will provide free destination charger hardware.

And if those options are not available, you can use public Travel Chargers near your home.

So those are the options you have for home charging. But what about when you are on the road around town?

Destination Charging

As the name implies, this type of charging is used when you are stopping at a “destination” for an hour or more – your workplace, a hotel, restaurant, or shopping mall. These are Level 2 chargers that will add 20-40 miles of range per hour. All electric cars have sockets that accept the plugs from these chargers, or if you have a Tesla you can use an inexpensive adapter.

The difference from home charging is that you will sometimes have to pay for the charge you receive from these chargers. And since most chargers do not take credit cards, you will need to setup an account ahead of time to use these chargers, even if they are free.

ChargePoint is by far the largest provider of these chargers, with hundreds of them in the Hudson Valley alone. Many of these are provided by municipalities for free. To use ChargePoint chargers, setup an account at their website or through the app. You can then use the app to easily start charging. Other charging providers work the same way – you set up an account ahead of time, then you can simply use that account at any of their chargers. Tesla and some other destination chargers are even simpler, just plug in your car, no account required.

Often, there is no fee for this type of charging. The charge is a perk provided by the Hotel or business, or town. Where fees are charged they are usually modest.

Travel Charging

Here’s where charging can get a little tricky. All the chargers we have talked about so far operate on standard household Alternating Current (AC), but Level 3 charging (Travel Charging) operates on Direct Current (DC). This is needed to handle the large amount of power being sent directly to your car’s battery, which also operates in DC.

Most electric cars in the US use the “CCS Combo” socket to accept DCFC. Nissan uses a socket named CHAdeMO, and Tesla has their own proprietary socket. So when picking a DCFC charger for your car, you have to make sure your car can accept the plug that charger offers. The good news is that all car manufacturers seem to have settled on the CCS standard socket, and even Nissan’s future cars will use that socket. Tesla is still using their own sockets.

This type of charging will not be free. Most charging stations will charge you for a rapid charge, but a few in NY are free. You will need to setup an account ahead of time to use most of these chargers, but some do offer credit card payment options, so no account needed for those.

Tesla cars can use the Tesla Supercharger network, with over 1000 charging stations in the US. Cost is typically $0.26/kWh (about $13 for a full charge). Learn more at https://www.tesla.com/supercharger. Teslas can also use all the networks below with a $500 adapter.

For all other cars, there are many charging networks you can use, similar to brands of gas stations. And just like gas stations, prices can vary widely by network and location. As of Sept 2020, these are the networks you will find nationwide, with prices from the Hudson Valley region:

- **Electrify America** has about 450 stations in the US. $0.43/kWh. Some states charge by the minute, and the rate is $0.32/min for 150 kW, or $0.16/min for 50kW. Many located at Walmarts. https://www.electrifyamerica.com/locate-charger/
- **EVgo** has 800 stations in the US. $0.27/min for 50kW. https://www.evgo.com/charging-locations/
- **EVolveNY** is project of NY State to install fast chargers along major travel routes. The first site in the Hudson valley opened in Sept 2020. 50 stations will be operational in NY State by end of 2021. $0.35/kWh.
- **EV Connect** has about a hundred charging stations in the US, including at the NYS Thruway rest areas. $0.30/kWh.
- **Chargepoint** has hundreds of charging stations in the US. Price varies by station owner.
- **Greenlots**. $0.01 - $0.50/kWh as set by station owners.

How do you find a charger when travelling? The PlugShare app (or website) lists chargers from all companies. You can set the app to show only the chargers that have plugs that will work in your car. Also, often your car's GPS will tell you if you need a charge before you arrive at your final destination, and route you to a compatible charger.

Conclusion

The charging infrastructure is growing rapidly throughout the country, and especially in NY state and the Hudson Valley. Talk to owners, ask them about their experiences. You'll find that charging is simple enough to do at home, work or on the road. New habits are pretty easy to form – if you can remember to plug in your phone, you can plug in your car. And you really won't miss gas stations.