

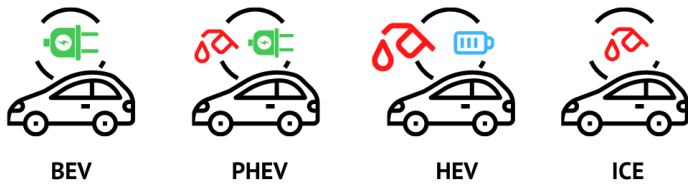
EV Ownership Basics

January 2023

Are you considering buying an EV and wondering what it will be like to own and drive? Or, perhaps you have already taken the plunge and now you are looking for some help figuring out some of the basics. Either way, this is for you! We'll walk you through the basic steps for charging, maintaining and driving your car throughout the year.

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Vehicle Types



BEV - Battery electric vehicle. Uses electricity only.

PHEV - Plug-in hybrid electric vehicle. Uses electricity and gasoline.

HEV - Hybrid electric vehicle. Uses gasoline only, but has a small battery and electric motor to improve efficiency.

ICE vehicle - Internal combustion engine vehicle. Currently, most vehicles on the road fall into this category. Uses gasoline/diesel exclusively.

We focus on BEVs but PHEV owners may find some of the information helpful.

Charging Levels/Speeds

Here are some common terms used when talking about EV chargers.

Level 1



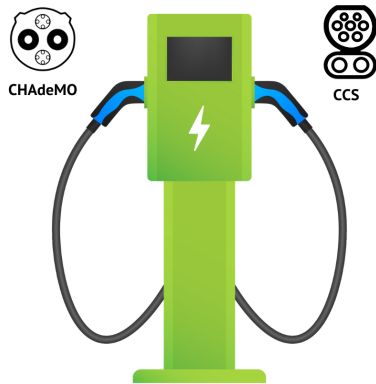
This refers to charging from a regular household 120 volt outlet. All EVs come with a kit, also referred to as a mobile charger, which allows you to do this. This is the slowest charging method but even so, many EV drivers find an overnight charge at Level 1 is more than enough for a typical day's driving. Maximum charging power is $15 \text{ amp} \times 80\% \times 120 \text{ volt} = 1.4 \text{ kW}$. Depending on battery temperature, a 10-hour overnight charge could add over 75 km of range.

Level 2 or destination



Level 2 chargers all require 240 volt power, similar to an electric oven or dryer. These chargers are installed at home and at commercial locations such as stores and hotels. These chargers have either a J1772 plug or a Tesla plug. An EV may even come with a cable which plug directly into a 240v outlet. The most common is the J1772 plug. Adapters are available to allow Teslas to use J1772 plugs and non-Teslas to use a Tesla plug. Maximum charging power varies from about 7 kW to 11 kW or more. Depending on current battery charge and temperature, a 5-hour charge at 7 kW could add over 190 km of range.

DCFC (direct current fast charging) a.k.a. Level 3

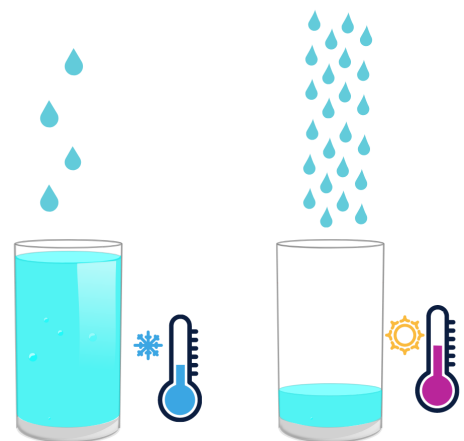


DCFC chargers are used when you want or need to minimize the time spent charging. That typically happens when your road trip is longer than one charge will take you. The fees for this charging are higher for this convenience. There are two types of plugs for DCFC charging: CCS and CHAdeMO (aka Chademo). All EVs can use one or the other although Teslas need an adapter. Maximum charging power is at least 50 kW but can go as high as 350 kW. Actual charging power/speed depends on current battery charge and temperature. Note that most PHEVs do not support DCFC.

Supercharging. Superchargers are really just Tesla's proprietary version of DCFC chargers. In North America, these only have Tesla plugs. Maximum charging power is at least 120 kW and as high as 250 kW. Actual charging power/speed depends on current battery charge and temperature.

Conditions Affecting Charging Speed

In addition to the capability of the charger and the EV, charging speed depends on the current charge level of the battery and the battery temperature. As a general rule a battery which is hot or cold or close to fully charged or almost fully discharged will charge slower than a warm battery with a partial charge. If you always charge at home you may never notice this effect. When using a fast (DCFC) charger, such as you would on a road trip, this effect becomes very noticeable. As a guideline, it tends to be faster and cheaper to plan to charge from 10-20% to 80-90% at each stop.



Charging at home (Level 1 / Level 2)



One of the best benefits of an EV is that it can be conveniently and cheaply charged overnight at home. Most EV owners do most of their charging at home where it's cheap and convenient. You can install a wall mounted charger or simply plug your EV into a regular (120v) or 240v wall outlet. Typically, an EV driver arrives at home at the end of the day, plugs in their EV and doesn't think about it again until it's time to leave in the morning. All EVs come with the ability to schedule charging for off-peak times. That allows you to automatically reduce the peak load on your local power utility and reduce your power costs in areas with off-peak rates.

EV batteries are designed to last 10-15 years or more. You can ensure you get the most life out of your battery by keeping the charge level between 20% and 80%. This is easy to do by using the charge scheduling features built into your EV to finish charging to 80% just prior to your departure each day. Some recent EV models use LFP (lithium ferro-phosphate) batteries. If your EV uses a LFP battery then you can simply top it up to 100% each night, if you wish, without affecting its lifetime capacity.

When you do fully or almost fully charge your EV then it is best to minimize the amount of time that the battery sits at a high charge level by driving soon afterwards. 80% is considered a conservative guideline, not a rule, so don't worry about bending it. As suggested above, this does not apply to EVs with a LFP battery. Check with your manufacturer/dealer.

Using Public chargers (Level 1 / Level 2 / DCFC)

Most public chargers are set up in networks provided by companies that require that you set up an account with them in advance. A few examples include eCharge, FLO, ChargePoint, Circuit Electrique, and Tesla but there are many more. Fees are displayed as \$ per hour rate but are, thankfully, billed by the minute. Some public chargers are free to use, some require a special condition (e.g. you need to be a customer of the business that owns it), and some will accept a credit card at the charger station (e.g. Petro-Canada charging stations).

To decide which network(s) would be best for you, find out which has chargers in areas you are likely to travel to or through. The best facility for finding chargers is the website [plugshare.com](https://www.plugshare.com).

Once you've created an account the charger network will issue you a card and/or provide a smart phone app either of which can be used to activate charging. One last thing, you'll need to

use your credit card to add funds to the account which are reduced each time you charge. The only exception to that rule is Tesla which automatically dings your credit card each time you use a Tesla supercharger.

Public charging etiquette



Occasionally, you may find that a public charger has been blocked by an ICE vehicle parking in a “EV Charging Only” spot. The common phrase for that is “the charger has been ICE’d.”

Many ICE drivers are unfamiliar with the importance of leaving access to chargers open for EVs. Although being unable to access a charger can be frustrating, it is good etiquette and most effective, to choose to do education rather than complain. If the driver is present then ask them to move and explain why. If not, leave a note with an explanation. You could draw a comparison to blocking access to a gas pump. Often, people are simply not thinking in those terms. Our goal as early EV adopters is to gain awareness and understanding.

Also, don’t forget the “Charging Only” part of “EV Charging Only”. If you don’t need to charge or have finished charging then move your EV so the charger is available for others.

Please help the EV community by checking in on [plugshare.com](https://www.plugshare.com) when you charge. This is helpful for many reasons:

1. EV drivers looking for a charge can tell at a glance which chargers are already in use.
2. If you have problems using a charger you can indicate that on [plugshare.com](https://www.plugshare.com) which will warn other EV drivers.
3. Chargers can break down or have intermittent issues so seeing that a charger has had lots of recent successful check-in’s can be very reassuring.
4. Adding a comment or photo to the charging station on [plugshare.com](https://www.plugshare.com) can help the next driver find and use the station especially if it has any special quirks.

Range



The range of a specific EV model is how far it can travel on a 100% charge. The most commonly used estimate of range is published by the US Environmental Protection Agency (EPA). The EPA combines highway (55%) and city (45%) range estimates together to produce a single number which represents typical vehicle usage.

EVs are far more efficient driving in the city than on the highway due to their regenerative braking and the fact that electric motors do not need to idle (at red lights). That means they will exceed the EPA estimate in the city but not on the highway. It's a good idea to try out the efficiency of your EV on the highway before heading out on a long trip. That will help you more accurately plan your charging stops.

Another factor in range is the friction caused by air resistance at highway speeds. This plays a major role in reducing vehicle efficiency for both ICE and EV. Even worse, air resistance goes up dramatically as speed increases. A head wind contributes to this. Simply driving at the posted highway speed limit usually contributes to a very good range. Slowing down even 5 km/h at highway speeds can result in significant savings.

A final note about range is the effect of weather. A warm battery performs better than one which is cold or hot. Also, cold/hot weather places more demands on the battery as the cabin air needs to be heated or cooled to keep the passengers comfortable. Wet or snowy roads will also reduce range.

To minimize the effects of temperatures extremes on range try these tips:

1. Warm up (cool down) the cabin air before unplugging your EV from the charger.
2. In cold weather, schedule charging so that it finishes just before you leave. Charging warms the battery.
3. In hot weather, park your car in the shade or other cool spot.

Use these features freely as they use very little power:

1. Radio and/or sound system.
2. GPS navigation.
3. Phone charger.
4. Electrically heated seats.
5. Heated steering wheel

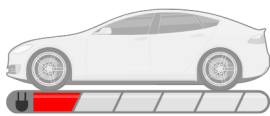
Road trips



Road trips do require a little preparation.

1. Plan your charging stops in advance. [Plugshare.com](https://www.plugshare.com) and [abetterrouterplanner.com](https://www.abetterrouterplanner.com) are both excellent sources of charger location and availability. If you expect wet or snowy roads or a strong head wind then expect to use more energy between chargers.
2. To reduce charging costs, book your overnight stays at places with chargers or at least an available 120 volt outlet.
3. Preheat (precool) your EV before unplugging. Once the cabin has been heated it takes much less energy to keep it heated. Also, note that using heated seats to help stay warm uses far less power than heating the cabin.
4. For safety and the best range, check your tire pressure for the recommended level.
5. When you are on the highway and you notice that the charge level is going down faster than you expected then here are a few things to try.
 - Slow down. Even driving 5 km/h slower makes a significant difference at any speed above 90 km/h..
 - Reduce the amount of cabin heating. Use your heated seats more/instead.
 - Check to see if there is a closer charger. Even a level 2 charger should be able to quickly add enough charge to get you to the next fast charger.

Running out of charge



Uh-oh. All that careful planning but you still ended up on the side of the road with not enough charge to get you to your destination. Here are some things you can do to help get you to the next charger. It's best to always keep your mobile charger in the EV, just in case.

1. Check your EV's navigation system or [plugshare.com](https://www.plugshare.com) for a nearby charger. Be sure to check for level 2 or 3 or even a publicly available outlet. Chargers are continuously being added so one may be closer than you think. Some people even add their home charger to [plugshare.com](https://www.plugshare.com) to help out fellow travellers.
2. When you realize that you are not going to make it to the next charger try stopping at a business and ask if you could plug into an (120v) outlet for a while.
3. Some roadside assistance services, such as CAA, may provide roadside charging although this service is not yet widely available.
4. If all else fails then get your EV carried on a flatbed tow-truck to the nearest charger.

Winter driving



Freezing temperatures both lower battery performance and increase power demands due to the need to heat the passenger cabin. You may experience a 10-30% decrease in range depending on weather conditions, EV model and driver experience. See the section on range for tips on reducing the effect of cold weather on range.

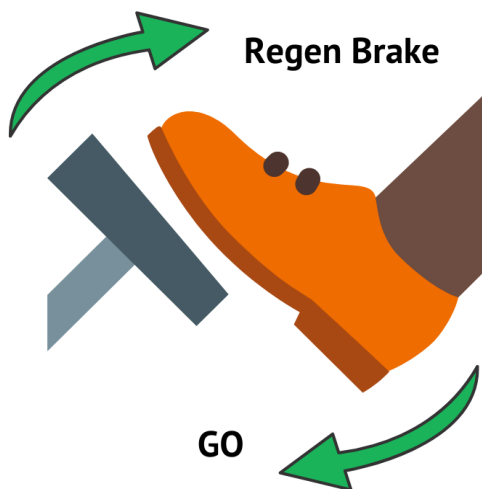
When an EV is parked in the cold (especially below 0C) it will use battery power to keep the battery itself from getting too cold. That means, if you do need to park in cold weather for an extended period, e.g. days, then it's a good idea to keep your EV plugged in.

An EV battery is heavy and located at the bottom of the car. This tends to improve traction and stability but it's always a good idea to install good quality winter tires for the snowy season.

Regenerative (regen) braking

Regenerative or regen braking uses the motor to slow down the EV and uses the energy to charge the battery. It saves power, extends range, and reduces wear of regular hydraulic brakes.

Regen braking is automatically activated when you reduce the pressure on the accelerator pedal. Some EVs also provide a stalk or paddle on the steering wheel column to activate regen braking. Just like in an ICE vehicle, reducing pressure on the accelerator pedal slows you down. The difference with an EV is that you'll notice that the same action has more effect. People call it "one pedal driving" because you can both speed up or slow down simply by adjusting how much you press on the accelerator pedal. Note that the effect of regen braking may be reduced if the battery is cold or nearly fully charged. Of course, the brake pedal is still there if you need to brake more quickly.



Maintenance

EVs have very little maintenance compared to an ICE vehicle. No oil changes or annual tune-ups! No exhaust system to fix or spark plugs to replace. To identify the few things you do need, check the manual for your EV. You may need to use the manual to convince shops inexperienced with EV that you don't need any more.

One thing in particular to keep in mind is the regular hydraulic braking system. Thanks to regenerative braking, that system doesn't tend to work very hard. That can cause the abundance of salt and sand on winter roads to creep into your brakes, reducing your driving range. To avoid a loss in range and unnecessary brake wear, be sure to have the brakes cleaned and lubricated each spring when you take off your winter tires.



Home charger installation

One of the best benefits of an EV is that it can be conveniently and cheaply charged overnight at home. While a regular plug may be sufficient, many EV owners install a wall mounted level 2 charger for flexibility. The setup of a charger involves installing a circuit similar in power to that used for an electric oven. Mount your charger inside your garage or outside as close to your parking area as possible. Charger models range from basic to Internet-based features. Some models may be eligible for rebates in your area. Check before buying.

EVs draw a lot of power so for any electrical work it is best to hire an electrician to ensure the installation is safe and reliable.



Ordering Your First EV

Buying any vehicle, electric or not, is a big decision and needs careful consideration. Here are a few recommendations for everyone, including long-time vehicle owners.

1. Consider your need for range. Too little range can be frustrating and too much range means you've bought a battery too big/expensive for your needs. That said, no one complains about too much range.
2. Think about how you'll charge for a typical week of driving such as commuting, etc. The best is being able to charge at home but that's not always possible, especially for apartment dwellers.
3. Ask lots of questions of those of us who own EVs, especially those who have the vehicle you are considering. Don't worry about asking stupid questions, they make us feel smart.
4. Delivery times for many vehicles, especially EVs, are currently (in 2022) quite long. Check the wait period for the vehicle(s) you are considering and plan appropriately.

Support

Do you still have questions? No problem! Many EV owners are very happy to help out by answering questions, walking you through your first public charge, etc. Just ask. Here are just some of the many EV groups across Canada:

- EV Society Canada (evsociety.ca)
- EV Association of Atlantic Canada (evaac.ca and on Facebook)
- New Brunswick EV Owners Group (on Facebook)