The Beginners Guide to Electric Vehicles (EV)

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Published: August 2014

Updated: February 2017

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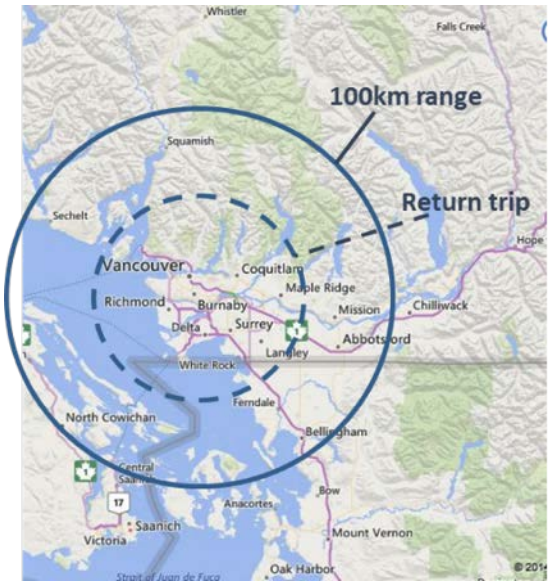
1. Why Electric Vehicles (EV)?

There are many reasons why people are moving to Electric Vehicles (EV) to get them to the places they need to be. These include:

- EV's are fun to drive because they are fast and smooth.
- Many studies show that the emissions from burning fossil fuels such as gasoline produce harmful greenhouse gases. EV's produce no smelly fumes or harmful greenhouse gases.
- EV's are innovative and cool.
- EV's only cost approximately $320 a year to operate compared to $2,400 for a gasoline vehicle.
- EV's are a smart and convenient choice.

2. How far can I drive before I have to recharge

The first question many ask is how far an Electric Vehicle travel before it needs to be recharged. Firstly, when was the last time you ran out of gas in your vehicle? For most people the answer is never, because they watch the fuel gauge and fill up their tank when it is almost empty. It's the same with an EV, you can pull into one of the 700+ public charging stations to "top up" or plug your car in each night at home just like you do with your cell phone and always leave home with a full battery. The average daily drive in BC is 30km and all electric vehicles today can drive at least 100km's before needing to be recharged which is illustrated on the map.



If you need more there are some BEV's that can drive up to 540km or you could look at a hybrid vehicle that also has a gasoline engine that can be used once the battery runs out.

3. What is the difference between an Electric Vehicle and a Hybrid?

There are 3 types of electric vehicle: Battery Electric Vehicle (BEV), Plugin Hybrid Electric Vehicle (PHEV) and Hybrid Electric Vehicle (HEV) and each are described in more detail below. With over 30 types of electric vehicle models available in Canada there is a good chance there is one that meets your requirements.

Battery Electric Vehicle (BEV)

A battery electric vehicle (BEV) runs entirely using electric motor and battery, without the support of a traditional internal combustion engine, and must be plugged into an external source of electricity to recharge its battery. BEVs can also, like all electric vehicles, recharge their batteries through a process known as regenerative braking, which uses the vehicle's electric motor to assist in slowing the vehicle, and to recover some of the energy normally converted to heat by the brakes.

Pros

- No emissions
- No gas or oil changes
- Ability to conveniently charge at home
- Fast and smooth acceleration
- Low cost of operation - about $33 a month.

Cons

- Shorter range than gasoline vehicles, although most people drive well within the range of today's BEV and could rent a hybrid for the rare long trips.
- Slightly more expensive than their gasoline equivalent although the gasoline savings pay off the difference in typically 5-6 years.

The following table shows the current model year 2017 Battery Electric Vehicles (BEV) available in Canada.

	Vehicle Model	Vehicle Type	Range	**Price**	**Charge Time L2**
	Chevy Bolt EV	BEV	383km	$42,895	9.5 hours
	Tesla Model X	BEV	381-475km	$116,200 - $178,300	5+ hours
	Tesla Model S	BEV	372-540km	$82,820-$120,000	5+ hours
	Nissan Leaf	BEV	135-172km	$33,998	3+ hours

	BMW i3	BEV	130-183km	$45,500+	6+ hours
	Mitsubishi iMiEV	BEV * 5 seats	95km range	$27,998	7 hours
	Ford Focus EV	BEV	185km	$31,998	4 hours
	Kia Soul EV	BEV	149km	$35,395	5 hours

	Hyundai Ioniq	BEV	200km	(Due Late 2017)	4.5 hours

For more information on available EV's please visit http://www.plugndrive.ca/ev-models

Plug-in Hybrid Electric Vehicle (PHEV)

Plug-in hybrids (PHEVs) use an electric motor and battery that can be plugged into the power grid to charge the battery, but also have the support of an internal combustion engine that may be used to recharge the vehicle's battery and/or to replace the electric motor when the battery is low. Because Plug-in Hybrids use electricity from the power grid, they often realize more savings in fuel costs than traditional hybrids electric vehicles (HEV).

Pros

- Longer range than BEV
- Less gas consumption than gas only vehicle
- Less emissions
- Very simple mechanics, less to go wrong.

Cons

- Produces emissions
- Needs gas and oil changes
- More expensive to operate than Battery Electric Vehicle (BEV) but less than traditional hybrid vehicle (HEV).

The following table shows the current model year 2017 Plug in Hybrid Vehicles (PHEV) available in Canada.

	Vehicle Model	Vehicle Type	Range	**Price**	**Charge Time L2**
	BMW i3 REX	PHEV	130-156km, +130km on gas	$45,500+	6 hours
	BMW i8	PHEV	24km, +506km on gas	$150,000 +	2 hours

	GM Chevy Volt	PHEV	85km, +606km on gas	$38,590	4.5 hours
	Porsche Panamera 4 E-Hybrid	PHEV	25km, +500km on gas	$113,400 +	2.5 hours
	Ford Fusion Energi	PHEV	34km, +900km on gas	$35,008	2-3 hours
	Ford Cmax Energi	PHEV	33km, +885km on gas	$29,828	2.5 hours

	Hyundai Sonata Hybrid	PHEV	43km, +900km on gas	$29,649	2.5 hours
	Porsche Cayenne S E-Hybrid	PHEV	22km, +749km on gas	$89,400	1-2 hours
	Volvo XC90 AWD PHEV	PHEV	22km, +540km on gas	$73,400	4-5 hours
	Audi A3 Sportsback e-tron	PHEV	26km, +585km on gas	$45,900	2.5 hours

	Chrysler Pacifica PHEV	PHEV	53km, +860km on gas	$56,495	4-5 hours
	BMW X5 xDrive40e	PHEV	28km, +667km on gas	$74,950	3 hours
	Mercedes-Benz S550e	PHEV	22km, +702km on gas	$117,900	2 hours

Hybrid Electric Vehicle (HEV)

Hybrid Electric Vehicles (HEVs) have two complementary drive systems: a gasoline engine with a fuel tank; and an electric motor with a battery. Both the engine and the electric motor can turn the transmission at the same time, and the transmission then turns the wheels. HEVs cannot be recharged from the electricity grid – all their energy comes from gasoline and from regenerative braking.

Pros

- Longer range than BEV
- Less gas consumption than gas only vehicle
- Less emissions than gas only vehicle

Cons

- Still produces emissions
- Complex mechanics – Gasoline + Electric

- Expensive to operate (8-10 times more expensive than BEV) but less than traditional gasoline vehicle.
- No ability to conveniently charge at home.

4. How do you charge your EV?

Now that you have chosen the EV that best fits your needs, how do you charge it up? Well it's as easy as charging your phone and can be done in the comfort of your home or at the 700+ public Level 2 charging stations in BC plus more across Canada and in the US.

- It's easy to charge every night they so EV drivers don't need as much one-time range as a typical gas-engine car driver who may refuel once a week or once a month.
- When you charge at home you can always leave with a full battery.
- With more than 700 public level 2 charging stations in BC there is a good chance you can charge your EV while you are at work, shopping, at the movies, at the mall, at the doctor or dentist, etc. so you can probably drive further than you think.

EV's will also re-charge whenever you brake or go downhill so sometimes you will have more range available at the bottom of the hill than you did at the top.

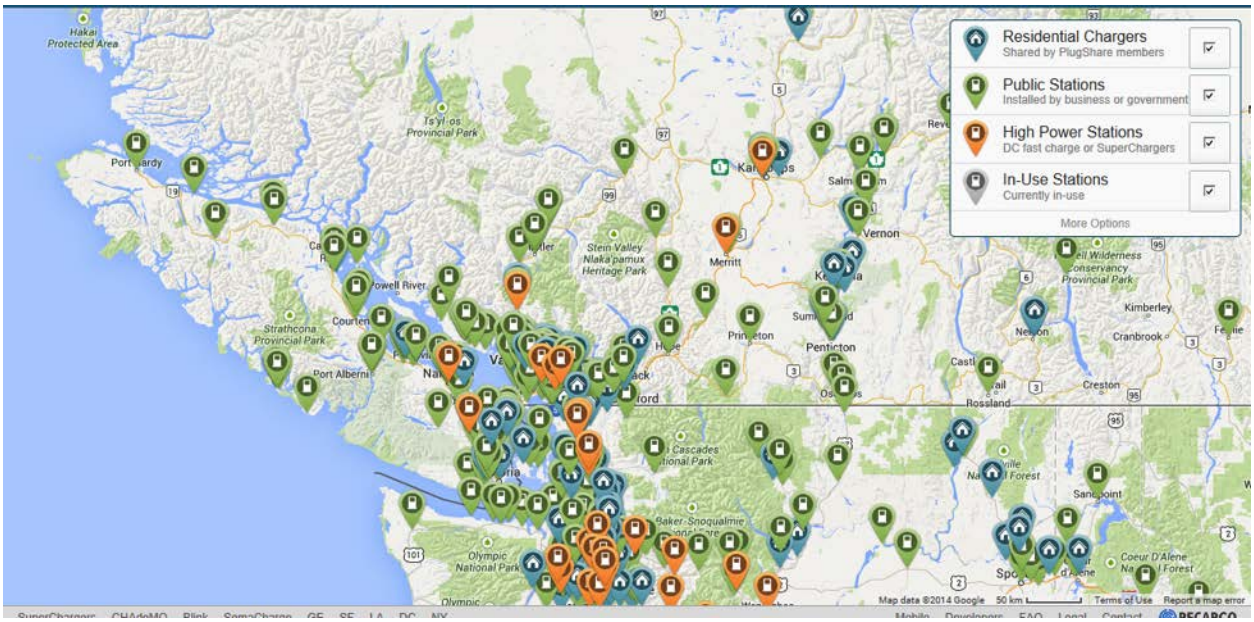
There are a couple of different types of charges each with different times it takes to charge your EV, the table below provides more details.

Level 1 – Trickle Charge		• You can plug your EV into any normal 110v plug just like you do to charge your phone. • This will add 8km of range to your EV per hour. • The charging cable will come with your EV.
Level 2 – Charge @ Home		• You can purchase a 240v charging station for your home for approximately $500 • A certified electrician will need to install this. • These chargers will add 42km of range per hour or typically take 4-8 hours for a full charge depending on battery size.

Level 2 – Public Charging Station		• There are 700+ public charging stations in BC and many are free of charge. • Find charge stations in your area using www.plugshare.com • These chargers will add 42km of range per hour or typically take 4-8 hours for a full charge depending on battery size. • Ensure you sign up for accounts at the providers like ChargePoint and Flo to allow you to use the chargers.
Level 3- FAST Charge (High Power Stations)		• Adds 136km of range to your EV in 30min! • There are 30 DC fast chargers in BC • Your EV needs to be equipped to support a Fast Charger • Find the quick charge stations in your area using www.plugshare.com or http://www.caa.ca/evstations/

5. Public Charging Stations in BC

With more than 700 public Level 2 charging stations and 30 DC fast chargers, there is bound to be somewhere you can top up while you are shopping, going to the movies, at work, grabbing a bite to eat. You can see from the map below courtesy of www.PlugShare.com that there are plenty of places for you to be able to charge while on the go plus give you the ability to do some super fun road trips!



6. Mobile Apps for your EV

Many EV's today are very technically advanced and have mobile apps that can provide you with information on your car such as how far you can drive given your current battery charge and even allow you to control your car like locking the doors or pre heating your car on a winter day. Be sure to check the app store of your mobile device for apps for your EV, for example ChargeHub, Leaf Spy and VERNetwork

7. Video: The Life Electric

Check out the EmotiveBC Facebook page! Some great videos show how easy it is to own an EV: https://www.facebook.com/emotivebc