Hydro Ottawa

ELECTRIC VEHICLES

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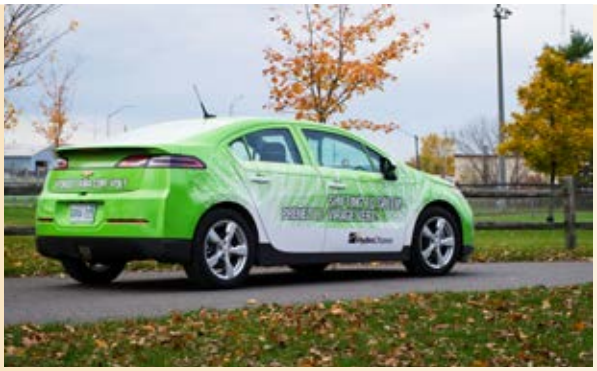
Types of Electric Vehicles

THERE ARE THREE TYPES OF ELECTRIC VEHICLES AVAILABLE IN ONTARIO:



1. A **battery electric vehicle** runs entirely on a battery and electric drive train, without the support of a traditional gasoline internal combustion engine. It must be plugged into an external source of electricity to recharge its battery. An example of a battery electric vehicle is the Nissan Leaf. It has a range of about 160 km before the battery is depleted. Approximately 85 percent of Ontario drivers commute less than 50 km a day to work.

2. A **plug-in hybrid electric vehicle** runs on a battery and electric drive train but also has the support of an internal combustion engine that may be used to recharge the vehicle's battery and/or to replace the electric drive train when the battery is low and more power is required. An example is the Chevy Volt, which has a range of approximately 60 km on battery power before the gasoline engine engages (providing another 415 km of range from a full tank of gasoline). Hydro Ottawa owns a Chevy Volt as part of its vehicle fleet.

3. A **hybrid electric vehicle** can have two complementary drive systems: a gasoline engine and fuel tank; and an electric motor, battery and controls. Both the engine and the electric motor can turn the transmission at the same time, and the transmission then turns the wheels. Hybrid electric vehicles are not "plug-in" vehicles and cannot be recharged from the grid — all their energy comes from gasoline. The Toyota Prius is an example of a hybrid electric vehicle.

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HOME CHARGING OF PLUG-IN ELECTRIC VEHICLES

Both the battery electric vehicles and the plug-in hybrid electric vehicles must be plugged in to charge the batteries. Home owners who also own one of these types of vehicles must have a charging outlet (typically in their garage).

A small vehicle may only require a conventional 120 volt outlet, already available in most home garages. Larger vehicles may need a 240 volt outlet (like those used for home clothes dryers) with an adequate amperage rating. According to Plug'nDrive Ontario, home charging will account for 85 percent of all charging of electric vehicles.

There are 11 electric vehicle charger manufacturers selling chargers to homeowners. A list is available at www.plugndriveontario.com/charge-my-car/chargers-2. According to Pike Research, sales of electric vehicle chargers for U.S. residences will rise from about 25,000 in 2010 to about 225,000 in 2015.

CHARGING OF ELECTRIC VEHICLES OUTSIDE THE HOME

According to Plug'nDrive Ontario, there are approximately 131 charging stations available to the public across Canada at this time, with more being added. Most are at auto dealerships. A map showing available charging stations is available at: www.plugndriveontario.com/charge-my-car

ENVIRONMENTAL AND ECONOMIC BENEFITS OF ELECTRIC VEHICLES IN ONTARIO

The average vehicle in Ontario operating on gasoline or diesel fuel uses more than 16 barrels of oil per year. All oil is imported into the province.

Because electric vehicles do not use fossil fuels to power their engines and instead rely predominantly on clean electricity from Ontario's electricity system, there are significant reductions in the amount of carbon dioxide (CO_2) emitted into the atmosphere.

When a litre of gasoline is burned in an internal combustion engine, it emits about 2.3 kg of CO_2 into the atmosphere. If it takes 7 litres of fuel to drive 100 km, that trip would emit about 16 kg of CO_2.

In an electric vehicle, however, the only CO_2 emitted is from the generation of electricity. Ontario has a relatively clean energy mix, especially overnight when most electric vehicles are charged. Overnight is also when Ontario has a surplus of clean hydroelectric, nuclear and wind power, the sources which supply almost all overnight generation. Because of Ontario's clean electricity mix, a 100 km trip would emit only about 1.7 kg of CO_2.

The average car drives 20,000 km over the course of a year. In this time a gasoline-powered car would emit more than 3,200 kg of CO_2 into the air — while the electric vehicle would be responsible for only about 340 kg.

In terms of economics, an electric vehicle charged overnight could travel 100 km for $1.66 (using off-peak electricity). A late-model, four cylinder car running on gasoline and getting a fuel efficiency of 7 litres per 100 km at $1.20 per litre would cost more than $8 to travel the same 100 km. Moreover, the electricity used in an electric vehicle is produced in Ontario.

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FINANCIAL INCENTIVES FOR PURCHASE OF ELECTRIC VEHICLES

Effective July 1, 2010, Ontario consumers are eligible for an incentive from the Ontario government ranging from $5,000 to $8,500 towards the purchase or lease of a new plug-in hybrid electric or battery electric vehicle. Hybrid electric vehicles which do not plug in to the electricity system, such as the Toyota Prius, are not eligible for this incentive.

The province's electric vehicle incentive program applies to new, highway-capable, plug-in hybrid electric vehicles or battery electric vehicles purchased on or after July 1, 2010. The value of the incentive is based on the vehicle's battery capacity and ranges from $5,000 for a 4 kWh battery to $8,500 for a 17 kWh battery. The value of the incentive for leased vehicles is scaled to the term of the lease.

WISE Report on Electric Vehicles in Ontario

The Waterloo Institute for Sustainable Energy (WISE) has released a report, "Towards an Ontario Action Plan for Plug-In-Electric (PEVs)". The executive summary is available at: www.plugndriveontario.com/resources/reports

Among its major findings are the following:

- It will take anywhere from 3 to 5 years for plug-in electric vehicles to begin to assume any noteworthy share of the market and longer for a critical mass to emerge.
- Workplace charge stations will be necessary to develop consumer acceptance of plug-in electric vehicles.
- A 10–15 percent penetration of plug-in hybrid electric vehicles in the light-vehicle transportation sector will have a minimal effect on the grid and electricity prices, as long as charging takes place at night (off-peak hours).
- Vehicles charged at night will have a positive effect on grid operation by reducing the growing generation dispatch problems in Ontario at base-load conditions.
- Charging of plug-in electric vehicles during on-peak hours will have a significant effect on the grid that will have to be planned for, especially in highly populated areas where early adoption may be significant.
- The projected levels of plug-in electric vehicle adoption should not threaten the stability of the electric grid as long as a good proportion of the chargers are "smart" and the utility has some override capability over charging.

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