



Powering the Future

Why your next car might be electric

You may not know it yet, but British Columbia is on the front line of a revolution poised to reduce the world's dependence on oil. In 20 years, one in every three vehicles on B.C.'s roads could be electric. That adds up to more than one million electric vehicles.

If that many electric vehicles were on the province's roads right now, oil demand would be reduced by about 12 million barrels per year — more than twice the amount of oil spilled in the Gulf of Mexico during BP's Deepwater Horizon disaster — and B.C.'s annual greenhouse gas emissions would be reduced by 7%, or 4.7 million tonnes.

To get there, we need governments to continue taking steps to ensure the right infrastructure and incentives are in place.



Top 5 Reasons Why Electric Vehicles Are Right for B.C.

- 1 About 93% of the electricity generated in B.C. comes from renewable sources.
- 2 British Columbians have switched to hybrid vehicles at double the rate of the Canadian average, suggesting they are ready to adopt green technologies.
- 3 About 95% of all car trips in B.C.'s urban areas are less than 30 kilometres, ideal for electric vehicles. The cars being introduced in B.C. in 2011 can drive up to 160 kilometres on battery power alone.
- 4 B.C. has the most ambitious carbon tax in North America, which will make electric vehicles powered by renewable energy increasingly competitive as the tax increases.
- 5 Local governments are implementing policies, enticing automakers and establishing partnerships to make B.C. a Canadian leader in electric vehicles.





Away From Oil: Electric Vehicles Mean Cleaner Air, Less Greenhouse Gas Emissions

For the past century, oil has fuelled our transportation needs, but oil brings with it oil sands mining and offshore drilling, along with habitat destruction and the risk of oil spills. When burned in a car's engine, gasoline produces dangerous air pollution, as well as greenhouse gas emissions.

Electric vehicles provide us with the opportunity to transition away from oil and its consequences, but an electric vehicle is only as good as the electricity that powers it. In B.C., 93% of electricity is generated from renewable sources, making electric vehicles a clear solution to air

quality concerns and climate pollution. Electricity generation from renewable sources does have other environmental impacts. Energy conservation can reduce the amount of electricity needed and good planning can minimize the impacts of any new projects.

A battery electric vehicle operated in B.C. emits 80% fewer greenhouse gases in its lifetime than a conventional vehicle and improves air quality by eliminating tailpipe air pollutants such as carbon monoxide, volatile organic compounds and particulate matter, which cause smog and respiratory ailments.

Life Cycle Greenhouse Gas Emissions for Personal Vehicles in B.C. (grams/km)

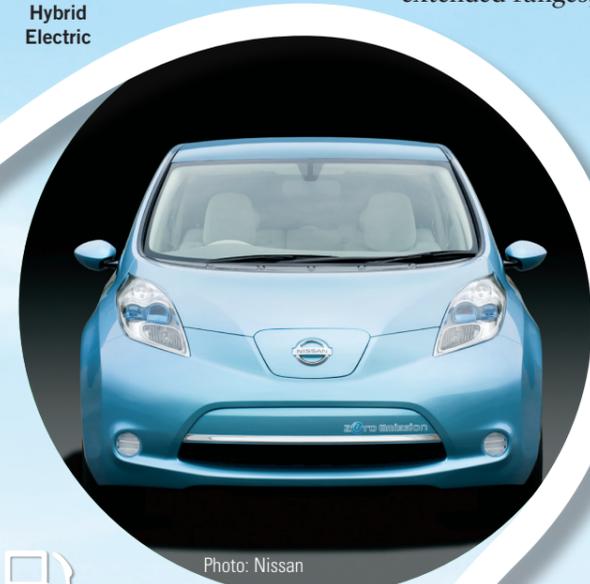
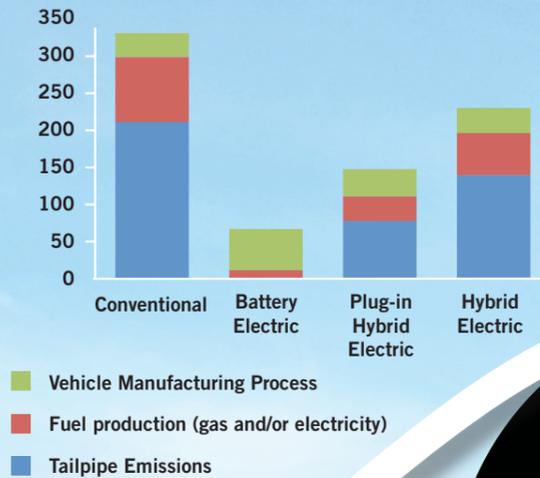


Photo: Nissan



Getting Charged Up



The battery electric vehicles being introduced to the B.C. market in 2011 will be able to drive up to 160 kilometres on one charge and reach highway speeds of 140 km/h, meeting the needs of most drivers in Metro Vancouver, where the median daily commuting distance is 15 kilometres. Plug-in hybrids offer extended ranges, because

they also carry a gasoline engine onboard.

Still, charging may present challenges, especially in the first few years. While most cars can recharge overnight if plugged into a standard outlet (for between six and 16 hours), not all people have access to an outlet at home. In recent years, Vancouver has made electric vehicle charging outlets mandatory in all new

homes and 20% of multi-family parking stalls. This is a step in the right direction, but it needs to be replicated by other local governments.

Higher voltage outlets — which can recharge a car's battery in as little as 30 minutes — stationed in convenient locations would also help alleviate range concerns. A private company is planning public charging stations for all major Canadian cities by 2012.



Photo: Nissan



How Much Will an Electric Vehicle Cost?

The first electric vehicles coming to market are expected to cost between \$30,000 and \$45,000. While the cost may be hard to justify right now, advancements in battery technology are expected to rapidly decrease the cost of electric vehicles during the next few years. Governments should

also implement policies to make electric vehicles more affordable.

Living in B.C., you can expect to save \$1,200 a year on fuel by filling up with clean electricity instead of oil. Electric motors also require less maintenance than fossil fuel engines (just think: no more oil changes, exhaust repairs or radiator flushes).

Let's Talk Business

Electric vehicles make great fleet vehicles, since fleet vehicles tend to accumulate high mileage, travel defined routes and have a common place to charge. Businesses can invest in electric vehicle-charging infrastructure to earn revenue during the day and recharge their own fleets overnight.

What's In a Name?

The term "electric vehicle" can apply to a battery electric vehicle, a plug-in hybrid — or even a hydrogen fuel cell electric vehicle. In this primer, we focus on plug-in electric vehicles.

BATTERY ELECTRIC VEHICLE: A battery electric vehicle runs entirely on an electric motor, powered by a battery. The battery is charged through an electrical outlet. The Nissan Leaf is a battery electric vehicle being released in Vancouver in January 2011. The Leaf will have a range of 160 kilometres and reach speeds of 140 km/h.

PLUG-IN HYBRID ELECTRIC VEHICLE: A plug-in hybrid vehicle has both an electric motor and a gasoline engine onboard. These vehicles generally run on the electric motor until the battery is depleted, at which point the gas engine kicks in, extending the car's range. The main battery in a plug-in hybrid is charged through an electrical outlet. An example of a plug-in hybrid is the Chevrolet Volt.

HYBRID ELECTRIC VEHICLE: A typical hybrid electric vehicle is fuelled by gasoline and uses a battery and motor to improve efficiency, thus is not considered a plug-in electric vehicle. The battery is never plugged into an electrical outlet, but instead is powered by a combination of the gasoline engine and regenerative braking. The most common hybrid electric is the Toyota Prius.



Photo: ©GM Corp





Preparing the Power Grid for a Seamless Transition

The power load of an electric vehicle is equivalent to about four plasma televisions. While that might not seem like a lot, if a significant number of electric vehicles start driving on B.C.'s roads, they will place new demands on the electricity grid.

According to BC Hydro, if all drivers in B.C. switched to electric vehicles today, the increase in electricity consumption would be approximately 15%, or 9,000 GWh per year. Fortunately, the adoption of electric vehicles will be gradual, so we'll have time to plan for how to best meet those demands. BC Hydro is preparing to become a major transportation fuel provider and is working to develop strategies to efficiently meet this new electricity demand.

What will happen if a lot of cars plug in at the same time? The answer depends on the time of day. Charging more for power during peak times would encourage drivers to plug in overnight, when demand is lower. The current B.C. power grid can distribute enough electricity to charge between two and nine million electric vehicles overnight, according to a study by the Pacific Institute for Climate Solutions.

The bottom line is that the increased electricity demands of electric vehicles can be managed.

By the Numbers

1 million The number of electric vehicles that could be on the road in B.C. by 2030.

12 million The number of barrels of oil that would be saved each year if one million electric vehicles were on the road today. That's more than twice the amount of oil spilled in the Gulf of Mexico during BP's Deepwater Horizon disaster.

80% The greenhouse gas emissions saved by choosing a battery electric vehicle instead of a conventional car in B.C.

2:1 The ratio of British Columbians who have switched to hybrid vehicles compared to the Canadian average.

93% The percentage of electricity generation in B.C. that comes from renewable sources.

160 The number of kilometres you can travel on a single charge with the battery electric vehicles coming to market in B.C. in 2011.

1/3 The fraction of B.C. vehicles that could be electric by 2030.

Want More Information?

- For more information, download the *Powering the Future* backgrounder at bc.pembina.org
- Find out more about electric vehicles in Vancouver at vancouver.ca/ev

This fact sheet was created by Katie Laufenberg, Jeremy Moorhouse and Emma Gilchrist of the Pembina Institute.

