



Electric
Mobility
Canada

Mobilité
électrique
Canada

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EXECUTIVE SUMMARY

Contributing to Canada's Green Agenda

Many countries around the world have put in place ambitious programs to encourage and accelerate the development of electric powered transportation including both vehicles and related infrastructure. Most of those same countries are promoting electrified vehicles as the technology of choice for early actions in moving transportation away from fossil fuel dependency.

Canada has an opportunity now with the next budget to implement a targeted electric vehicle program that will put Canada on the map with other leading jurisdictions and contribute to Canada's green agenda

Plug in Electric Vehicles (PEVs), for personal and commercial uses are now available to Canadian consumers and have the potential to yield significant economic and environmental benefits. This presentation by Electric Mobility Canada¹ deals with a discussion of the global trends towards the electrification of transport, their benefits and actions required to get Canada ready for electric vehicles. The use of electric vehicles will result in significant savings in fuel to individuals and fleets as well as drastic reductions from emissions in the transport sector. They will also grow jobs in the automotive industry.

Four Recommendations

This submission contains four recommendations for new programs and represents a modest suite of actions by the Government of Canada needed to ensure that electric vehicles can be successfully launched in this country.. It could be implemented over one or two years. These actions, which are estimated at \$16.5 million are relatively minor when compared to the investments made by other G8 countries, are specifically what is needed to support the anticipated purchases of electric vehicles in the coming years and to identify a strategy for longer term actions in Canada.

1. Invest in the development of needed amendments to Codes and Standards
2. Invest in Charging Infrastructure for electric vehicles. t
3. Urge Federal fleets to lead by example
4. Initiate Canada's Green Highway

We also mention the **Canada's Green Highway** – a concept that would eventually allow Canadians to travel coast to coast to coast using alternative energy to power their vehicles and how PEVs can eventually make this possible.

¹ Electric Mobility Canada is a national not-for-profit organization dedicated to the promotion of electric mobility as a readily available and important solution to Canada's emerging energy and environmental issues. The membership of EMC-MEC includes companies engaged in the sale or distribution of vehicles or components or the delivery of professional services, representing all modes of surface transportation from bicycles to trains. Membership also includes providers of electric energy at the provincial and local levels; managers of the vehicle fleets of companies, governments, agencies, and others; related associations, societies, research centres and labour organizations; governments and their agencies; and individual supporters.

BACKGROUND

Most G8 countries have adopted electric traction as the technology of choice for early actions in reducing transportation's dependency on fossil fuels. Many other industrialized nations have adopted similar policies and support programs at the national and sub-national levels, aimed at individuals or fleets in the purchase of plug in electric vehicles.

These programs also include demonstration projects, support for industry and support for improvements to the electrical infrastructure for the charging of PEVs. The countries leading this effort are found in Asia, Europe and North America (USA). While other alternative transportation technology options are not entirely abandoned, investments are being primarily dedicated to electric vehicles.

The auto manufacturers (OEMs) are responding by offering a variety of Plug in Hybrid Vehicles (PEVs) and/or Battery only Electric Vehicles (BEVs) but they have indicated that they will focus their marketing efforts in jurisdictions that are becoming PEV ready through the installation of charging infrastructure and financial incentives for early adopters.

Canada is uniquely positioned to benefit from the electrification of transportation. It has an unusually broad range of core competencies in all areas of transportation electrification—from battery development, to electric-vehicle systems integration, to battery management and power-management systems. Canada is also uniquely positioned—based on our supply of electricity from renewable sources – to power PEVs from green electrons and achieve significant greenhouse gas (GHG) reductions.

Timely and effective commercialization of PEVs demands that Canada link its PEV technical and promotional efforts with those of its primary auto-market partner, the U.S., in our integrated North American automotive industry. The vehicle manufacturers and component suppliers, including battery designers and developers in Canada, are generally past the research-and-development (R&D) stage and are in the early stages of commercialization. This is a key stage in the adoption of new technology, in which support from government agencies is critical to bridge the gap to full- scale commercialization.

At this point in time, Canada is not among the national governments investing in the early adoption of electric vehicles. While Canada is encouraging R & D and other support available to industry, it lacks programs specific to electric vehicles at the national level.

1. Economic Benefits of Electric Vehicles

The auto industry — including the Tier 1 and Tier 2 suppliers - many of which are located in Canada, are gearing up quickly to provide PEVs. The industry is investing heavily in electric vehicles: as much as \$500 million is needed to launch a new vehicle for volume production. For example, the Chevy Volt, launched this year, uses components supplied by more than 20 Ontario-based companies, and some of its design and engineering was completed in Canada.

Another example is the Ford-Azure Transit Connect electric van that is on sale now. Most of the engineering for this vehicle was conducted in Vancouver.

And recently, Toyota announced that it will be building its RAV4 Electric Vehicles in Ontario and this move was supported by Canada and Ontario. This is a key economic gain for Canada and more of the same can occur.

A study by the Aspen Institute predicts 250 new jobs for every 10,000 electric vehicles.

Canada has nearly 200 companies dedicated to the manufacture of components and systems needed for electric transport. These include producers of batteries, chargers, power

management systems etc. These entities are involved in domestic and export activities for their products and services, and their contribution to the recruitment and training of Highly Qualified Personnel (HQP) is also important. They are primarily located in British Columbia, Manitoba, Ontario and Quebec but most of their sales are for the export markets.

Until the technology for PEVs becomes more mature and production volumes approach those of internal combustion engine vehicles, buyers of PEVs can expect to pay a premium price when purchasing their vehicle. At this time, this premium price ranges from 20 to 60% more than the price of an equivalent internal combustion engine. The industry acknowledges that this is a major price difference but recognizes that this difference is common when new technologies are first introduced. Section 5 describes the support programs available in key Canadian provinces.

Notwithstanding the above, there are operating cost savings to owners of PEVs when the full life cycle costs are considered. Given that the cost of electricity for PEVs can be as low as 1 cent per kilometre compared to 7 cents for gasoline, the energy cost savings over the life of the vehicle can be substantial. Assuming about \$1500 per year in gasoline costs for gasoline engine passenger vehicles, the potential energy savings alone can be as much as \$1,000 per year for each vehicle owner.. Added to these energy savings are lower maintenance costs as the direct results of fewer parts and regenerative braking that extends brake life. Experiences in this area are already recording significant maintenance savings.

It can therefore be concluded that over the life of the vehicle, the operating costs of a PEV will be lower than for a comparable internal combustion vehicle. And, these savings are expected to be more pronounced as the price of petroleum continues to rise.

Finally, there are potential for significant reductions in the amount of imported fuel for transportation. Despite being an energy producing nation, Canada imports much of its oil, particularly from Ontario east. The billions of Canadian dollars used for fuel import can be reduced over time leaving this money in Canadian hands for other Canadian priorities.

2. Environmental Benefits of Electric Vehicles

There are nearly 20 million passenger cars and light-duty trucks in Canada. Annual sales are in the order of 1.5 million vehicles. Virtually all these vehicles operate on fossil fuels as their energy source.

Light-duty vehicles currently account for 75 percent of vehicle kilometres travelled in Canada. These vehicles contribute roughly 18 percent of all greenhouse gas (GHG) emissions in Canada, with transportation in total contributing 25 percent.

Hybrid vehicles have been around for nearly 10 years and when driven properly can yield up to 50% in fuel savings. Plug in Hybrids can yield up to 80% in fuel savings and pure battery vehicles up to 100%.

Less than 25 per cent of electricity generated in Canada comes from fossil fuels and this number is decreasing as renewable fuel sources continue to emerge. On average, 60 percent of Canada's electricity is currently produced from hydroelectric sources and according to the Canadian Hydropower Association; much more electricity can be produced from hydro.

In four provinces—Newfoundland, Quebec, Manitoba and British Columbia—the proportion of non-fossil fuel generated electricity is more than 95 per cent. Canada compares very favourably to the U.S. in this regard: in the U.S., more than 70 per cent of the country's electricity is generated from fossil fuels and they are still favouring electric vehicles, mainly for energy security reasons. Switching to electric traction, with resulting reduction of GHG emissions, is thus much more feasible from the outset in our country.

The current carbon intensity of an average compact car with an internal combustion engine (ICE) vehicle in Canada is over 190 grams of CO₂ per kilometre. A similar size vehicle with electric traction will produce nearly zero emissions in provinces like BC, MB, QC and NF. Even in provinces where electricity is largely generated from fossil fuels, emissions will still be reduced by over 30%. This is largely attributed to the super efficiency of electric motors. We acknowledge that light-duty ICE vehicles have significantly lowered their smog forming emissions over the past 40 years.

Transportation is critical to Canada's economy and to Canadian lifestyles. Technical solutions for emission reduction in fossil-fuel vehicles are reaching their maximum potential, unless vehicle weights and power are downsized - which is not aligned with current consumer preferences. Transforming light-duty vehicles to electric drive has the potential to achieve a quantum decrease in GHG emissions from transportation.

To summarize, in Canada near zero emissions are created in generating the power for an electric vehicle, and near zero emissions are produced when the power is consumed by the vehicle.

3. Impact of Electric Vehicles on the Electrical Grid in Canada

If a PEV consumes 3,000 kWh² in moving 15,000 kms a year (200 Wh/km³ for a medium-sized vehicle), the 500,000 EVs targeted by the Electric Vehicle Technology Roadmap to be on Canadian roads by 2018 will use an additional 1.5 TWh⁴ of electrical energy. This would be about 0.2 per cent of the projected total energy supply from electricity available in that year, and should not present a challenge with respect to generation.

Night-time charging of a PEV battery would not require new generation capacity and would also help in consuming the excess capacity now produced by some generating stations. While clusters of PEV load could stress certain feeders and the associated local distribution transformers, the solutions are readily available and commonly used. A smart grid, as well as smart chargers, is expected to alleviate much of this, but eventually some replacement or upgrades could be required.

Unlike electric trains and trolley buses, which are continually connected to the grid, electric vehicles are the first mobile electrical load to be served by utilities. PEVs are occasionally connected and not always at the same location. The interface between the vehicle and the grid needs to be managed in a safe and secure manner as PEV owners connect or disconnect their vehicles from the grid. This requires a new level of collaboration between Original Equipment Manufacturers (OEMs) and utilities. This is now occurring to an unprecedented level with several utilities and industry partners in Canada, through cooperation on the development of new electrical- code standards and the deployment of PEVs in demonstration projects in several urban centres across the country, such as Vancouver, Calgary, Winnipeg, Toronto, Montréal and Saint-Jérôme. In addition, technology has evolved to manage the charging of PEVs such that they draw on the grid in non-peak times.

4. Provincial and Municipal Actions in Canada

Manitoba, Ontario and Quebec are currently leading provincial efforts to encourage the adoption of EVs in Canada. With variances in each province, their support for PEVs includes financial incentives for PEV buyers and for the installation of charging stations, demonstration projects

² Kilowatt hours.

³ Watt hours per kilometre.

⁴ Terrawatt hours

and support to industry for vehicle and component developments. Ontario currently offers up to \$8,500 to purchasers of PEVs and Quebec offers up to \$8,000. While Manitoba has no vehicle purchase incentives at this time, it is under consideration. In the interim, they are offering financial support to industry for technology and vehicle developments. British Columbia, Alberta, Prince Edward Island and Saskatchewan have limited tax rebates for the acquisition of hybrid vehicles. Ontario recently announced a program of \$80 million for electric vehicle charging infrastructure.

Major municipalities in Canada are supporting PEVs in their fleets as a means of reducing their energy and maintenance costs. Municipalities are also involving OEMs and their utilities in demonstrating EVs in their communities. Other municipalities are at the planning stage for both PEV and infrastructure demonstrations.

5. The Government of Canada and Electric Vehicle Leadership

The Government of Canada has already demonstrated leadership in the area of electric vehicles by working with EMC and our industry members to develop the Electric Vehicle Technology Roadmap for Canada. It is available at <http://www.emc-mec.ca/eng/advocacy.php>.

Now that the roadmap is available, Budget 2012 is a unique opportunity to announce a new program to move this strategy forward.

The involvement of the Government of Canada in supporting electric vehicles will lead to more growth in the industry and market penetrations, with resulting economic growth and environmental benefits. Not getting involved at this stage will likely see the OEMs focus sales in other jurisdictions that have established programs to support and encourage this transformative green-transportation technology.

Compared to programs in other G8 nations' programs, our recommendation for a two-year program to encourage early adoption of electric vehicles in Canada is a modest investment, and is aligned with the federal government's practical GHG reduction objectives. Acting on the recommendations contained in this submission would send a significant signal to Canadians, the electric vehicle industry, future consumers of electric vehicles and to the international community that Canada is taking advantage of its green electrons and is supporting electric vehicles as a mean of achieving GHG reductions in transportation and in stimulating its electric vehicle industry.

6. Building Canada's Green Highway

Canada's Green Highway is a vision initiated by Electric Mobility Canada which is quickly gaining the attention of many stakeholders across the country.

The energy that fuels today's modern transportation is changing from predominantly fossil fuels (gasoline and diesel) to a variety of alternative energy sources. These energy sources include electricity; fuel cells, ethanol blend, bio-diesel blend, natural gas from renewable sources and other renewable fuels that will help Canada reduce its emissions.

Building **Canada's Green Highway** is a vision that will provide a nationwide opportunity to have every community connected through 'Alternative Energy Stations' to supply all vehicles of the present and future. These 'Alternative Energy Stations' will include the current offering of petroleum products but as we move forward the following elements should be added:

- Electricity and the accompanying infrastructure to support charging of electric vehicles (EVs) which can be fueled by renewable energy sources, such as solar power, geothermal power, hydroelectric power, tidal power and wind power.

- Ethanol blend, biodiesel blend, natural gas and other renewable and clean burning fuels can also be categorized as an alternative when used to power cars and trucks.

Canada's Green Highway concept will encompass all provinces and territories, utilities and cities across Canada providing Canadians the opportunity to travel coast to coast to coast using alternative energy sources. It will also help educate Canadians to re-evaluate the importance of finding and utilizing alternative sources of energy. This concept will evolve over time starting at local level, extending to regions and then eventually to a national scope.

RECOMMENDATIONS

Electric Mobility Canada recommends a modest new program to continue the work already started in making Canada ready for electric vehicles. This program will provide a boost to the EV industry in Canada and begin laying the groundwork for Canada's Green Highway. It can be achieved by adopting the following recommendations over a one or two year period. The total investment required is estimated at \$16.5 million.

Recommendation 1 – Invest in the development of needed amendments in related Codes and Standards.

An investment of \$2 Million to complete the current effort by the Canadian Standards Association (CSA) and industry members to achieve codes and standards that are harmonized among federal departments, among provinces, and within North America. This work has begun but needs resources to see it completed. Although this action is the one that requires the least funding, it is the most urgent item.

Without appropriate codes and standards, electric vehicles may not be able to be sold in Canada, and installation of necessary charging infrastructure will be delayed.

Additionally, the National Research Council should amend the National Building Code to require the installation of electrical provisions for charging stations in all new homes and in 20% of commercial parking spaces. Estimated costs of remaining work by CSA - \$2 million.

Recommendation 2 – Extend Charging Infrastructure Support

Infrastructure investments are needed for Canada to be ready for PEVs. This involves financial support to homeowners, businesses and municipal governments for the installation of charging stations in residences and places of business for overnight charging as well as fast charging stations at business and public locations in major cities.

We applaud the recent announcement by Natural Resources Canada to fund electric vehicle infrastructure R & D using renewable energy through the eco Energy Initiative. While this program will help further develop the electric vehicle infrastructure through targeted R & D, the charging technologies are now commercially available and we urge the government to extend a funding opportunity to private and fleet consumers.

Regular charging stations can cost up to \$2,000 and fast charging stations up to \$100,000. At this stage, we propose financial support for regular charging stations (referred to as Level II Charging stations in the industry). A 50% subsidy for 10,000 regular charging stations would cost \$10 million. In addition, the installation of 50 fast charging stations at strategic locations across Canada could cost up to \$5 million or \$2.5 million for a 50% subsidy. The installation of chargers in homes should also be part of the next round of the ecoEnergy home retrofit program. Estimated costs: \$12.5 million.

Recommendation 3 – Urge Federal fleets to lead by example

EMC believes that the Canadian Government should lead by becoming a purchaser of electric vehicles for its own fleet. Fleet procurement practices today typically consider their contribution to sustainability issues including the health impacts of their emissions. A reasonable approach would be to model its fleet procurement practices after other nations who require that new vehicles be hybrid, plug-in hybrid or battery electric vehicles unless it can be demonstrated that there are no such vehicles available for the applications intended. Estimated costs: *Marginal, for the temporary higher costs of these vehicles.*

Recommendation 4 – Initiate Canada’s Green Highway

As noted in Section 6, planning to offer Canadians the opportunity to travel coast to coast to coast using alternate energy vehicles will offer a great deal of support to those wishing to travel away from local areas without using fossil fuels. This is a long term concept that needs definition and clarity to send the appropriate signal to Canadians. EMC therefore recommends that \$2 million be dedicated to a study that would: define the green highway concept, the technologies admissible, siting criteria for the energy stations, needed partners and a funding mechanism to launch the process. *Estimated costs: \$2 million.*

SUMMARY

We strongly believe that with this modest investment proposed, Canada will be set to join those countries around the world that are preparing for the adoption of electric vehicles. The program detailed in this report will allow Canada to be able to proceed to make the required investments in a few targeted areas summarized below to prepare Canadians for electric vehicles.

1. Invest in the development of needed amendments to Codes and Standards Work
2. Extend Charging Infrastructure Support
3. Urge Federal fleets to lead by example
4. Initiate Canada’s Green Highway

On behalf of Electric Mobility Canada and all of our members, we thank the Standing Committee of Finance for the opportunity to table our Submission for consideration as you prepare for Budget 2012.

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