SUBMISSION TO THE GOVERNMENT OF CANADA

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Executive Summary

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 have adopted electric traction as the technology of choice for moving transportation away from fossil fuel dependency. Canada faces 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.

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 Canada [1] 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.

The three recommendations contained in this submission identify a modest two-year program of actions by the Government of Canada needed to ensure that PEVs can be successful in Canada. These actions estimated at $79 million over 2012 and 2013.

1. Background

All G8 countries, except Canada, have adopted electric traction as the technology of choice for moving transportation away from fossil fuel dependency. Many other industrialized nations have adopted similar policies and support programs aimed at individuals or fleets in the purchase of PEVs. These programs also include demonstration projects and support for industry. The countries leading this effort are found in Asia, Europe and North America (USA). While other alternative transportation technology options are not entirely abandoned, funding in other countries is being primarily dedicated to electric vehicles. The auto manufacturers are responding by offering a variety of Plug in Hybrid Vehicles or Battery only Electric Vehicles but they have indicated that they will focus their efforts in jurisdictions that are becoming PEV ready through the installation of charging infrastructure and financial incentives for early adopters.

[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.

Canada 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 financial support from government agencies is critical to bridge the gap to full- scale commercialization.

2. Economic Benefits of PEVs

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. And, most of the engineering for the Ford-Azure Transit Connect electric van that is on sale now was conducted in Vancouver.

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

As electric vehicles enter the marketplace and as Canadian utilities are producing more electricity from renewable sources, the construction of more hydro capacity should be supported. The development of more hydro-electric sources will not only meet increasing domestic demands from PEVs, but will also create more energy for export purposes. Over the next decade, hydropower project development can benefit Canada with more than $50 billion in investments and more than 150,000 jobs.

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 80% 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.

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 vehicles, the potential energy savings alone can be as much as $1,000 per year per vehicle. 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.

3. Environmental Benefits

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.

Only about 25 per cent of electricity generated in Canada comes from fossil fuels. On average, 60 percent of Canada's electricity is produced from hydroelectric sources. In four provinces—Newfoundland, Quebec, Manitoba and British Columbia—the proportion 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 and other 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 the average Internal Combustion Engine (ICE) vehicle in Canada is over 190 grams of Co^2 per kilometre. We acknowledge that light-duty ICE vehicles have significantly lowered their smog forming emissions over the past 40 years.

The transition to electric vehicles allows all emissions to be reduced considerably more, especially GHG emissions when the electricity used is not generated from fossil fuels, as will be the case for most of the electricity generated for PEV use in Canada.

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.

4. Impact of PEV's on the electrical grid in Canada

Without additional load from road PEVs, by 2018 the Canadian electric grid would be required to supply a further 17 per cent more than the 2006 total capacity generated. If a PEV consumes 3,000 kWh in moving 15,000 kms a year (200 Wh/km 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 TWh 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. Infrastructure for fast public charging (120–600 V) may have to be added in some locations.

Electric vehicles are the first mobile electrical load to be served by utilities. Unlike electric trains and trolley buses, which are continually connected to the grid, 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 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.

5. 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 and support to industry for vehicle and component developments. British Columbia, Alberta, Prince Edward Island and Saskatchewan have limited tax rebates for the acquisition of hybrid vehicles or PEVs. 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. Several municipalities, as noted above, are already involved in demonstration projects for PEVs. But, these are limited in scope and lack sufficient resources to deploy at the needed scale. Other municipalities are at the planning stage for both PEV and infrastructure demonstrations.

The Government of Canada

The Government of Canada has worked 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, the next budget is a unique opportunity to announce a 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 PEVs in Canada is modest in cost, aligned with the federal government's practical GHG reduction objectives, and will foster good media coverage of government actions to reduce GHGs in Canada.

Acting on the recommendations below would send a significant signal to the PEV industry, potential consumers of PEVs and to the international community that Canada is taking advantage of its green electrons and is supporting electric traction in transportation as a mean of achieving GHG reductions in transportation and in stimulating its electric vehicle industry.

6. Recommendations

Electric Mobility Canada recommends a two year program to make Canada ready for PEVs. This can be achieved by adopting the following three recommendations aimed at the Government of Canada:

Recommendation 1 - Codes and Standards

A two-year investment of $2 Million to complete the current effort by the Canadian Standards Association and industry members to achieve codes and standards that are harmonized among federal departments, among provinces, and within North America. Although this action is the one that requires the least funding, it is the most urgent item. Without appropriate codes and standards, PEVs 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 - $2 million.*

Recommendation 2 – Extend Charging Infrastructure Support

Infrastructure investments are needed to be ready for PEVs. This involves financial support to homeowners, businesses and municipal governments for the installation of regular 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 through the eco Energy Initiative. While this program will help develop the infrastructure through targeted R & D projects, we urge the government to extend a funding opportunity to consumers. Regular charging stations can cost up to $2,000 and fast charging stations up to $100,000. A 50% subsidy for 10,000 regular charging stations and for 50 fast charging stations could cost up to $35 million. *Estimated costs: $35 million.*

Recommendation 3 – Incentives for the purchase of electric vehicles by individuals and fleets (private and public). Consumer financial incentives are a key factor in the acceleration of PEV sales. This is supported by the literature and sophisticated economic modelling. EMC believes that the Canadian Government should become a purchaser of electric vehicles for its own fleet and establish a consumer and fleet purchase incentives program that is aligned with the existing US government program. A reasonable program would be to provide financial incentives for the first 6,000 electric vehicles over the next two years. This would likely occur with a small market penetration in 2012 and growing thereafter. The cost to the federal government of such a program, assuming $7,000 per vehicle, would be $10.5 million in 2012 and $31.5 million in 2013. *Estimated costs $42 Million.*

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