

## **Recommended options from Electric Mobility Canada for EV advancement in British Columbia**

To the Select Standing Committee on Finance and Government Services  
For Budget 2015 Consultations

### **1. CONTEXT AND OBJECTIVES**

Increased adoption of electric vehicles (EVs) in BC is important to achieve greenhouse gas (GHG) reduction targets, improve urban air quality, create jobs and stimulate economic growth. In this document, Electric Mobility Canada (EMC) recommends policies that will encourage adoption of EVs in BC. These policies are consistent with the government's broader energy strategy for domestically produced alternative energy and low carbon fuels such as LNG and clean hydroelectricity.

The benefits of EVs for GHG reductions are well known and result from the fact that transportation is the single largest (38%) contributor of greenhouse gases. If all personal vehicles were EVs, approximately 18% of GHG emissions in BC would be eliminated, while reducing a large part of the \$5 billion spent importing refined petroleum products from out of province.

The substantial economic benefits of EV usage have been studied in many other jurisdictions. The key drivers are that fuelling transportation with electricity is cheaper than petroleum and that electricity is produced within BC while petroleum has to be imported. The EV growth dividend is a result of expenditure shifting: household and enterprise fuel savings are spent on new vehicle technology, and other consumer goods and services. Because the latter two categories of spending create many more jobs per dollar of demand than the fossil fuel supply chain, the result of this shift is substantial employment growth in different job sectors with more regional impact. Moreover, with copper and aluminium representing a large part of lithium-ion batteries, there is a potential positive impact for BC's mining. In addition, the industrial sector in BC related to batteries, motors, controllers, chargers and other enabling technologies is diverse and would benefit from provincial and national growth in EVs <sup>1</sup>.

Electrification of the transport system would also create demand for electric power generated in BC, and would support, in the future, clean electricity development opportunities. A stable local market for electricity would benefit the province. In the all-EV scenario, demand for electricity would increase by 18% according to BC Hydro, and most of this demand could be met with current capacity during off peak loads.

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<sup>1</sup> Delaware Power Systems Corporation - lithium battery modules with intelligent management and thermal systems / E-One Moli Energy (Canada) Limited, Lithium-ion R&D, cell design and manufacturing / Exergy Power Systems Inc, Integrated Energy Management systems for mobile and stationary application / Mountain Power, Large capacity rechargeable lithium ion batteries / Retrieval Management Ltd., Battery, recycling - primarily lithium batteries / Delta - Q Technologies Corp, Battery chargers and integrated DC-DC converters / PowerUp Systems Inc, Electric Vehicle Charge Stations - Level 1 and Level 2 / Powertech Labs, clean energy consulting, independent testing and power system solutions / Future Vehicle Technologies Inc., drivetrains, motors, BMS, controllers.

## 1.1 Summary of Recommended Options for 2015 to 2017

Based on the analysis of best practices in leading countries and provinces in Canada, EMC, the only national industry association dedicated to the advancement of electric mobility, consulted many experts and stakeholders<sup>2</sup> in order to identify the policy options that would have a significant impact on increasing adoption rates of EVs in British Columbia.

	Option	Expected Impact On Uptake	Cost range for 3 years 2015-2017
1.	Financial support mechanisms for vehicles purchases and infrastructure.	High	\$40 to \$50MM for 3 years adding about 4,800 to 5,800 EVs.
2.	Building code amendments and strata act amendments to support Infrastructure for home, condominiums, and workplace.	High	\$100,000 (one time)
3.	Extended Infrastructure for “on the go charging” - DC fast Charging stations (DCFC)	High	\$1.5 M
4.	Regulatory changes for EV infrastructure.	High	Low
5.	Green License plate and related programs.	Medium	\$200,000 (one time)

**Table 1: Summary of Recommend Options to Increase EV uptake in BC**

## 1.2 The Current Situation in BC

The Government of BC has in place a number of policies that already support the need for electric vehicles, namely:

- Legislated GHG targets for the years 2020 and 2050, and a carbon neutral public sector
- Life-Cycle Low Carbon Fuel Requirement Regulation:
  - 10% reduction in carbon intensity by 2020
  - Electricity is part of the regulation
  - Part 3 Agreements
- Clean Energy Act
- Pacific Coast Collaborative
  - Commit to actions to achieve a 10% zero emission vehicle (ZEV) penetration of new vehicle purchases in private and public sector fleets by 2016
- Jobs Plan
- Minister Bennett’s Mandate Letters:
  - #6: Implement the 10-year electricity plan that will continue to find efficiencies at BC Hydro, building required infrastructure and keep rates affordable for British Columbians reporting these outcomes to Cabinet.
  - #7: Work with the Clean Energy sector to ensure that there remains cost effective opportunities for renewable energy companies to provide power in British Columbia.

The BC Clean Energy Vehicle (CEV) Program has proven to be effective in many ways, placing BC in a preeminent role:

<sup>2</sup> List of consulted participants: Aparc systems, BC Hydro, BCIT, City of Surrey, City of Vancouver, ejtc, Fraser Basin, Metro Vancouver, National Research Council, Powetechlabs, Toxco, Suncountry Highways, University of Victoria, VEVA, VRD, Clean Energy Canada.



- 1,166 EVs on the road as of August 2014
- 550 public Level 2 charging stations
- 30 DC fast charging stations planned (nine deployed so far)
- 306 residential Level 2 charging stations
- Student training, Research & Development in electric vehicles and charging infrastructure
- The development of guides and tools for planning and installing infrastructure in the public space and in strata-owned buildings
- Public outreach strategy and campaign

The adoption of EVs in Canada has been strongest in those provinces that have incentive programs in place: Quebec, Ontario and BC.

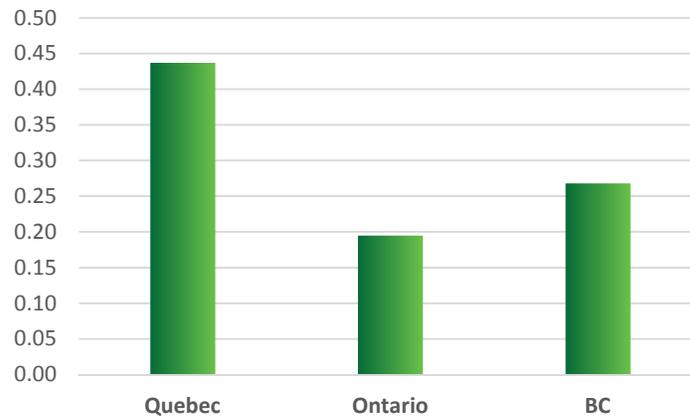


Figure 1: Electric Vehicles per 1000 Residents by Key Provinces

While those programs are continuing in full force in Quebec and Ontario, the BC CEV Program has ended and has not yet been replaced. There are early indications that the elimination of consumer incentives is negatively impacting EV adoption —while EV purchases in other provinces continues to accelerate.

The public charging infrastructure program has been largely successful in addressing range anxiety. However, more work needs to be done to enable smaller communities to participate to the transition towards electric vehicles. In addition, more stations are required to service EV drivers who do not have sufficient garage or private parking space to charge at home overnight.

This document presents options for the government to pursue or review to help BC residents, families and organizations increase their adoption of EVs. These measures will confirm BC's leadership in environmental stewardship, and continued enhancement of its capacity for technological and social innovation, leading to future economic benefits from product export, technology development, and expertise advancement. It presents different options to improve the availability of EVs for purchase and to remove barriers to adoption, while preventing some 5 billion dollars of spending on foreign fuels.

The policy options outlined below focus on those that can be undertaken in the next three years, yet also provide the ability to scale for longer periods and support the uptake of wide-spread electric transportation in the medium-to-long term.

## 2. RECOMMENDED OPTIONS

### 2.1 Financial Support Mechanisms for Vehicles Purchases and Infrastructure Provision

A range of financial mechanisms may be offered by the Provincial Government, such as:

- **Financial support for the purchase of EVs, including rebates, applicable to both fleet and private sales.**
- **Provincial Sales Tax (PST) exemptions**
- **Financial support for the installation of EV chargers in homes and businesses.**



Furthermore, the 2008 Greenhouse Gas Reduction (Renewable and Low Carbon Fuel Requirements) Act and the Renewable and Low Carbon Fuel Requirements Regulation can help to support projects facilitating the introduction of EVs. These regulations were enacted to reduce greenhouse gas emissions in the transportation sector through the use of renewable and low carbon fuels. “Part 3 Agreements” provide a mechanism for certain fuel suppliers to generate credit by making investments in low-carbon types of activities in order to further assist suppliers in complying with the Regulation.

Financial incentives, of various descriptions, have proven to be very effective in many jurisdictions, and are considered a top priority by EMC. In addition, there are a suite of complementary options that could be considered. These include:

- **Dealer incentives to ensure adequate EV inventory within dealer showrooms**
- **Support for technology companies to engage in advanced vehicle applications, R&D and product development**
- **Innovative auto insurance premium structures for EVs**

### **Rationale : for the purchase of EVs**

EVs typically cost 25% more than an internal combustion engine (ICE) vehicle and most EV buyers will need to install home charging capability, requiring electrical upgrades to the home. As EV technology matures, vehicle costs will decrease. However, in the early stages of development, the higher ‘up front’ expenditure required by consumers is impeding sales. Lower fuel cost for EVs offsets these initial entry costs but the literature supports the reality that the vast majority of purchase decisions are influenced not by total cost of ownership but rather by price alone.

In addition to supporting consumer vehicle purchases, incentives for public and private fleet purchasing would help BC reach its goal under the Pacific Coast Collaborative, for 10% of new fleet purchases to be zero emission by 2016. It has been shown that even a modest incentive can tip the business case for EVs in fleets. As seen when hybrids first came to market, fleets can play a significant role in mainstreaming new vehicle technology.

### **Rationale : for the installation of infrastructure**

The availability of charging infrastructure is also a key factor in accelerating EV adoption. Since roughly 90% of charging occurs overnight, while the EV is parked at home, the availability of home charging is critically important. The importance of home based charging is followed closely by workplace charging, then by public charging. BC currently leads the country in providing public level 2 charging infrastructure. However, more support is needed for residential charging, as well as for workplaces. Financial investment that addresses this critical infrastructure will enable vehicle uptake that otherwise would not be feasible.

### **Opportunities and Risks of Implementation**

1. Without continued purchase support for EVs, there is a risk that OEMs will not deliver their vehicles to the BC market, compounding weak sales, maintaining the downward trend of EV sales in BC.
2. In addition, BC will lose its market share if it fails to keep up with incentives being offered in other provinces and neighbouring states. Continued support for both the purchase of EVs and installation of infrastructure is required to achieve the environmental and economic that are so important to British Columbians.

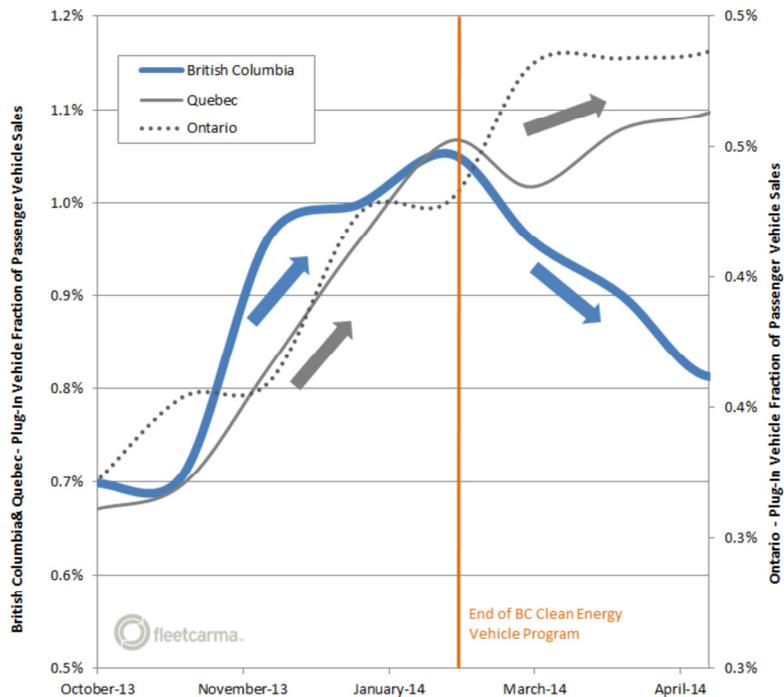
### **Experience Outside BC**

The enclosed graph shows clearly the impact of incentives of \$8,500 in Ontario and \$8,000 in Quebec. These levels of incentives have been chosen to be greater than a PST exemption, and have proven effective. Consumer purchase incentives are clearly a very effective policy tool. Clear evidence of this is provided in the following graph. To evaluate the impact of the loss of the BC incentive, the sales in Quebec, Ontario and BC were compared.

### **Rationale**

The ending of the purchase incentive for clean vehicles has had a clear impact on EV sales, see *Figure 2*.





**Figure 2 : Fraction of Passenger Vehicle Sales that are plug-in for the provinces of Quebec, Ontario and BC**

Source : FleetCarma, September 2014, fraction of plug-in car sales, using three month trailing averages to eliminate seasonal sales variations.

The results clearly show the plug-in sales fractions were accelerating all in all three jurisdictions until February 2014 after which BC shows a dramatic drop in plug-in sales fraction, coinciding with the termination of the CEV for BC point-of-sale incentive, while Ontario and Quebec have shown continued acceleration.

When considering the installation of infrastructure, direct financial incentives are available in Ontario and Quebec for the purchase and installation of EVSE at home, and also applicable to Ontario businesses (up to \$1,000 or 50% of the total purchase and installation cost), and for Quebec, at workplaces and businesses (up to \$5,000 or 75% of purchase and installation costs).

### Industry Summary

Currently, the automotive OEMs are prioritizing the delivery of vehicles to markets with purchase incentives in place. Without a resumption of purchase incentives, EV uptake is being significantly impeded.

### Economic Opportunity

Supporting a new business sector through a broad range of actions such as the financial support mechanisms recommended can positively impact vehicle sales, electrical trades, and technology developers. The incentives would also reduce the financial overhead for vehicle purchases which customers may then spend elsewhere in the economy. On average, a dollar saved at the gas pump and spent on other goods and services that households want can create a significant multiplier of the number of provincial jobs. Unlike the fossil fuel supply chain, the majority of new demand financed by PEV fuel cost savings goes to in-province services, a source of diverse, bedrock jobs that are less likely to be outsourced.

A study by Berkely University, conducted for the Californian market, states that “Because, on average, household demand is 16 times more job-intensive than the fossil fuel supply chain, every dollar saved at the gas pump and spent on the other goods and services consumers traditionally buy adds stimulus to state incomes, employment, and real wages.”<sup>3</sup>

<sup>3</sup> [http://are.berkeley.edu/~dwrh/CERES\\_Web/Docs/ETC\\_PEV\\_RH\\_Final120920.pdf](http://are.berkeley.edu/~dwrh/CERES_Web/Docs/ETC_PEV_RH_Final120920.pdf)



## Scalability

Primary financial support for EV purchases, complemented by the addition of financial support for infrastructure, offers an opportunity that can be greater than the sum of its parts. The level of commitment can be varied to meet the financial resources available and can easily be sunset so as not to over-commit the Province.

## Delivery Mechanism and Partnerships

In BC, NGOs such as Fraser Basin Council, BOMA BC and the New Car Dealers Association of BC have effectively managed Plug-In BC, with moderate provincial involvement.

### EMC recommends:

***That the BC government extend the CEV for BC rebate program for 3 years, with a budget of \$40 MM to \$50MM for financial support for the purchase of EVs.***

***That the BC government financially support the installation of EV chargers at residences, workplaces and businesses.***

***The approval and support of Part 3 fuel suppliers under the Low Carbon Fuel Requirements Act, in projects that reduce the economic barriers of electric vehicles.***

## 2.2 Building Code and Strata Act Amendments to Support Charging Infrastructure for Home Condominiums and Workplaces

In order to better plan for the future and support current EV adoption, the Province of BC can make amendments to:

- **The Building code to support EV charging in new construction;**
- **Strata regulations to facilitate the provision of EV charging in existing multi-unit residential buildings.**

### Rationale

For EV drivers to use their vehicle effectively, they must have the opportunity to charge their vehicle first at home, where 90% of charging will occur overnight. Since close to 50% of urban dwellers live in Multi-Unit Residential Buildings (MURBs), it is critically important to provide charging relevant to these buildings. Current strata provisions make it difficult to effectively retrofit and make available EV charging for those who do wish to purchase an EV. Changes to Strata regulations are required to overcome this barrier.

It is always less costly, easier and more efficient to prepare for the installation of infrastructure at the time of construction than consider a retrofit later on. It is important to start now with building code amendments in order to prepare for the future as an increasing number of vehicles will be electric. Therefore, the building code affords an important regulatory conduit to support EV infrastructure that no other mechanism addresses, and that can be applied to commercial/mixed-use buildings.

### Opportunities and Risks of Implementation

1. If stratas continue to block the installation of infrastructure, it will impact the adoption rate of an important portion of potential EV buyers.
2. Retrofitting existing buildings in order to provide charging capability is both costly and complex. Amending the building code to plan for EV charging will alleviate the need for future modifications to buildings.
3. Currently, there is a patchwork of zoning and other regulation at the municipal level to work around the building code's shortcomings. Having greater harmonization to negate this municipal need would support easier development, reduce costs and help avoid the concentration of EVs, and the associated challenges of such concentrations, in areas with preferential regulations/facilities.



## Experience Outside BC

Vancouver was the first in the world to enact a building code amendment and the news was extremely well received in jurisdictions worldwide. West Vancouver and others have followed. Other jurisdictions such as NYC, California and Hawaii have also implemented Building Code changes to support EV charging.

## Industry Summary

Developers in Vancouver now know how to meet the building code. The BC Government has studied, with the Condo Home Owners Association, changes to facilitate the installation of infrastructure in condos. For example, Bosa properties, Vancouver's building developer, is now offering infrastructure in their properties, with easy, affordable and, most importantly, accessible stations for condominium owners<sup>4</sup>.

## Economic Opportunity

Installation costs are an investment in the BC economy using local skilled trades and material. This option would receive support from trade associations, designers and architects.

## Scalability

The immediate cost of preparing for the installation of EV chargers without requiring the chargers themselves to be installed ensures the initial are low and are born by developers, not the Province. Also, the support scales with vehicle numbers, as vehicle numbers increase building stock turnover ensures that charging infrastructure grows concomitantly. Furthermore, the specific requirements of the change mean that an increasing proportion of parking stalls could fall under new regulations providing significant scalability and phased implementation. The ability to enact similar regulatory changes to commercial and mixed use buildings provides an enhanced ability to scale EV charging support both through stock turnover and the extent to which EV charging provision is deployed.

## Delivery Mechanism and Partnerships

Regulatory amendment.

### EMC recommends:

***Amendments to the BC Building Code to install infrastructure in all new construction.***

***That the Strata Act be amended to prevent strata organizations from blocking the development of charging infrastructure.***

## 2.3 Extended Infrastructure for "on the go charging" – expansion of the DC Fast Charger Network in BC

### Rationale

Current battery technology limits EV ranges to about 150 km, and it is expected that range will remain a limitation in the short-to-medium term. To ensure that EV drivers can travel between urban centres across the province, a broadly distributed provincial DCFC network is required. These DCFC stations will also support intensive fleet operations, EV car-sharing and enhanced residential charging support. There is a need for minimal coverage to travel on all main highways in the province, and this need is partially met currently with BC Hydro's deployment of 30 DCFC. A minimum of 50 DCFC would be required to ensure BC's major transport corridors are serviced.

<sup>4</sup> [http://bosaproperties.com/promontory/interiors\\_volt.php](http://bosaproperties.com/promontory/interiors_volt.php)



## Opportunities and Risks of Implementation

1. A comprehensive DCFC network is required to ensure long distance travel. Without the ability to travel throughout the province, potential EV buyers will be reluctant to consider a full battery electric vehicle. This will negatively impact EV sales.
2. Given the lack of clear business models associated with the DCFC network, particularly at this early stage of technology development, the deployment of the network requires public sector leadership.
3. There is a charging connector standards debate underway with two technologies vying for ascendancy. The outcome is unclear at this point. A phased approach will mitigate technology risk with future deployments timed to coincide with resolution of this issue. In the interim, installations can be provisioned with both standards.

## Experience Outside BC

The West Coast Electric Highway<sup>5</sup> is an extensive multi-state network of public DC fast charging stations, funded by the US Department of Energy (DOE). It spans over 585 miles from Canada to California along Interstate 5 with DC fast charging available every 40 to 60 miles and connects into the BC DCFC infrastructure. Experience from the US suggests this DCFC infrastructure provides additional benefits to tourism, as seen in Oregon, with the promotion of sustainable travel and tours.

## Industry Summary

A comprehensive DCFC network provides the necessary reassurance to EV drivers, not only on main highways, but in urban or semi-urban locations, while also serving fleets and EV car-sharing services.

## Economic Opportunity

Installation costs are an investment in the BC economy using local skilled trades and material. This option would receive support from trade associations and has a proven track record in catalyzing EV tourism.

## Scalability

The deployment of DCFC can be scaled, to meet demand. It can also be geographically optimized to meet local need and the needs of specific transportation corridors.

## Delivery Mechanism and Partnerships

For this option, the responsibility to pursue the deployment of a minimum number of DCFC given to BC Hydro is appropriate, and optimal, considering the experience, positive results, and the capacity to act quickly.

### EMC recommends:

***That the BC Government continue existing funding to BC Hydro to extend the original plan for 30 stations to a minimum of 50 stations strategically located.***

## 2.4 Regulatory Changes for EV Infrastructure

In EMC's view there is a clear need that

- **Regulatory changes must be enacted to ensure that a robust business case can be made for the medium and long term provision of EV charging (both DCFC and Level 2) at residential and public sites, as well as workplaces.**

## Rationale

Currently, regulatory restrictions on the resale of electricity make the development of a robust business case and a cost recovery mechanism difficult for non-utility entities. At present, the installation of EV charging is undertaken for its peripheral benefits rather

<sup>5</sup> <http://www.westcoastelectrichighway.com/>



than as a revenue stream. Allowing third parties to resell electricity for vehicle charging will potentially entice the private sector to invest in charging infrastructure, alleviating the burden on the taxpayer. Changes to regulation would be required so that electric vehicle service providers are not under the same extensive regulations as utilities. These barriers render charging infrastructure business models unfeasible. In addition, regulatory change could allow fuel providers to supply and sell electricity as a low-carbon transportation fuel, helping them to meet the renewable and low carbon fuel requirement regulation through investments in electric vehicle infrastructure.

### **Opportunities and Risks of Implementation**

1. Given the right regulatory environment, increased numbers of EVs on the road will lead to higher utilization of public charging infrastructure. This and a growing demand for DCFC will create the necessary conditions for a profitable business case.
2. In the absence of a clear business case, businesses and stratas will not install EV charging in any significant numbers. Without deployment of sufficient infrastructure, the demand for EVs will be curtailed and their uptake detrimentally impacted.

### **Experience Outside BC**

Since very few DCFC are currently installed, all jurisdictions are seeking robust business models that would afford long term business security able to support the investment. There are outstanding questions to be answered on the role and the financial commitment of different stakeholders, private and/or public. Some states, such as Oregon, have implemented regulations through their Public Utility Commission to allow non-utilities the ability to resell electricity for the use of motor-fuel, while expressly exempting a non-utility EVSE provider from being defined a public utility<sup>6</sup>.

### **Industry Summary**

To date, EV provision has been provided on a philanthropic basis to EV drivers through perceived peripheral benefits to business or to deliver on corporate social responsibility mandates. This approach can only get the market so far. There is a clear need for cost recovery mechanisms for the provision of charging services, particularly given the growing number of EVs on the road. The ability to generate revenue from the provision of EV charging is a business imperative.

### **Economic Opportunity**

These changes provide a new business opportunity in a growing sector, allowing business, public and private entities of many descriptions to enter the service industry and provide enhanced services to a new and growing customer base. With the right amendments, there is a large range of different business models that could be undertaken to meet both provider and customer needs.

### **Scalability**

There are a number of regulations and changes that could be made to support the business case for EV infrastructure and as such, the extent of the changes determines the level of support. Beyond this, it will be the appetite of private entities that determines how the initiative scales.

### **Delivery Mechanism and Partnerships**

Regulatory amendment.

#### **EMC recommends:**

***That the BC Government mandate a working group to propose regulatory amendment to allow public and/or private entities to undertake profitable EV infrastructure installation and allow utilities to move forward more affirmatively to support EV use.***

<sup>6</sup> <https://apps.puc.state.or.us/orders/2012ords/12-013.pdf>



## 2.5 Green License Plates and Related Programs

The implementation of a “green license plate” that provides EV drivers certain perks is a simple and effective way to support all low carbon vehicles, and can lead to many advantages.

### Rationale

Identification of low-carbon vehicles with a specific type of license plate allows for certain incentives to be bestowed on the occupants such as preferential parking, HOV lane access, reduced/no toll rates, *etc.* The change is administratively straight forward yet from this single change a range of programs could be delivered with easy vehicle identification. The implementation of such a program also brings attention to EVs, and recognizes the commitment to a cleaner environment.

### Opportunities and Risks of Implementation

1. Since few EVs are on the road, the advantages given to green license plate drivers to use HOV lanes (even with only one passenger) or access parking would be manageable up to high EV penetration rates accepted.
2. The policy can be rolled back as the number of EVs increases.

### Experience Outside BC

In Ontario, allowing electric vehicles to use HOV lanes (until July 1, 2015) is a way to reward early adopters of electric vehicle technology and make it more attractive to buy and drive electric vehicles, thereby reducing greenhouse gas emissions in the transportation sector. In California, the expiry date for HOV lane access is currently January 1<sup>st</sup> 2019.

### Industry Summary

The EV manufacturers see this option as being part of a package of measures to help promote EVs.

### Economic Opportunity

There are clear economic benefits to businesses from having improved transportation and lower transportation related overheads. The carbon tax is an exemplar of supporting businesses to make more environmentally responsible choices while ensuring their economic viability not only remains, but becomes, more resilient. A green license plate program would, with lower cost and simpler implementation, have similar effects to that of a carbon tax.

### Scalability

The introduction of a ‘green license plate’ allows easy identification which could then be applied to a number of programs the extent of which could be rationalized and varied over time, with clear sun-setting terms

### Delivery Mechanism and Partnerships

Regulatory change with administration through ICBC and other organisations with transportation and parking authority.

#### EMC recommends:

***The introduction of a green license plate program, and that a first advantage be to allow all plug-in EVs in HOV lanes.***



### 3. CONCLUSION

The province of British Columbia has taken a leadership role in domestically produced alternative fuels, and low carbon fuels, such as electricity, and in supporting low carbon emissions standards. Up to recently, successful rebate programs have proven to be effective.

With EMC's recommended options for the next three years, comprised of targeted and scalable measures, accessible to all regions, and ease of implementation, the government of BC could benefit from all the advantages of a greener economy, regional jobs growth, and lead the way to a longer term strategy.

The overall economical and environmental impacts not only include a reduction in foreign oil spending per year, and its equivalent impact reduction in tonnes of GHG within 3 years, but also the investment of about \$50 M, and its important impact on provincial economy, with the shift to growing local skills trades and new business opportunities.

EMC is available to discuss these recommendations and help determine the adopted path to successful implementation.

