

## **Public Transit Federal Funding For e-Buses**

**Submission by Electric Mobility Canada**

December 19, 2016

Canada's population continues to urbanize. This is a worldwide phenomenon that is expected to result in a tripling of demand for mobility in our urban areas by 2050<sup>1</sup>. Already congested and polluted cities will have increasing difficulty meeting the needs of increased mobility. A more sustainable mobility solution will be necessary.

Electric Mobility Canada (EMC), the national organisation promoting electrification of transportation, is submitting a request to the government to financially support electric transit solutions for Canada's public transport operations as the most sustainable mobility solution for Canadians living in urban areas.

The recent Fall Economic Statement has indicated that this government will continue to invest heavily over the next decade in Canada's public transit systems through infrastructure programs. EMC requests that funding from the Public Transit Infrastructure Fund or the Green Infrastructure Fund, serve to facilitate additional investments and activities supporting electric public mobility in Canada.

### **A Solution of Interest**

Leading public transit authorities such as Edmonton Transit System (ETS) have committed to purchasing electric buses. Other important authorities are planning an important transition period. E-bus technology is progressing rapidly, with cost reductions, and more range being announced and soon to be available in Canada.

The higher capital cost of e-buses is expected to drop significantly with increasing volumes and rapidly decreasing battery costs. As for charging systems, a wide selection of solutions exists, allowing transit systems to overcome every challenge associated with e-bus deployment.

As a result, there is a growing number of routes and duty cycles where there is a strong business case in favour of using electric vehicles. Indeed, in many

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<sup>1</sup> Arthur D. Little: *The Future of Urban Mobility*, 2014

instances, the total lifecycle cost of e-buses is lower than that of all other technologies. There is therefore a need to determine the conditions (number of e-buses, type of infrastructure, duty-cycle, garage facility readiness, etc.) required to produce a positive business case for transit systems across Canada. Existing tools and proven expertise are available in Canada to support transit systems in their attempt to determine the right technology fit and document their business case.

## **Some Facts**

According to the statistics from the Canadian Urban Transit Association, there were 15,919 transit buses in revenue service at the end of 2015 with an average age of 7.7 years. Each of these buses replace 40 vehicles on our roads, save 70,000 liters of fuel and keep 168 tons of pollutants out of the atmosphere each year<sup>2</sup>. But older diesel buses contribute significantly to emissions of particulate matter, nitrogen oxides, carbon monoxide and hydrocarbons. Newer generations are appreciably cleaner, but far from the zero-emissions mark. So, with the exception of a limited number of hybrid or natural gas buses, most of the 1000 buses replaced annually are still powered by diesel engines and will continue to contribute to our GHG emissions for 18 to 20 years.

Nearly half of the buses in service in Canada are operating in fleets of fewer than 50 vehicles. These transit systems have limited resources and cannot afford testing new technologies on their own. They not only require information and guidance, but also support in developing the business case that will sustain their presentations to local and provincial authorities for an appropriate level of funding for a transition towards a clean and sustainable fleet.

## **A North American Opportunity**

Canada is exceptionally well positioned to supply electric buses to urban transit authorities across North America. Two Canadian urban bus manufacturers, with strong reputations and leading market shares in the US and Canada, have developed full-sized urban transit buses and will soon commercialize them: New Flyer Bus Industries, headquartered in Winnipeg, MB, and Nova Bus Inc., headquartered in St. Eustache, QC. These manufacturers supply most of the Canadian and a significant part of the American bus market.

Marketing technologies abroad is significantly faster and easier when the manufacturers can demonstrate that their products have been successfully implemented in their domestic market. Two relatively new American manufacturers, BYD and Proterra, are already well positioned to gain market share

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<sup>2</sup> Source: Environment Canada: [http://www.ec.gc.ca/scitech/4B40916E-16D3-4357-97EB-A6DF7005D1B3/EnvTech\\_Air\\_Story\\_8.5x11EN.pdf](http://www.ec.gc.ca/scitech/4B40916E-16D3-4357-97EB-A6DF7005D1B3/EnvTech_Air_Story_8.5x11EN.pdf)

in the US and will capture this promising market unless we can support the deployment of e-buses in Canada and thereby provide our manufacturers with meaningful references ahead of their competitors.

More demonstrations of these electric buses in Canadian settings<sup>3</sup> are therefore required to prove the performance of these technologies in our demanding climate. They will serve to send a strong signal to transit managers and decision makers not only in Canada, but also abroad. The performance of e-buses have been demonstrated in service under the most exacting conditions and have proven to be reliable and cost competitive.

## **Conclusions**

The economics of e-buses make sense in many situations despite the requirement for en-route charging infrastructure because in many cases, this equipment cost can be amortized by a sufficient number of buses and passengers on a route or on a cluster of routes. Generally, the low cost of energy and maintenance over the life of the buses more than offsets the higher capital cost of the bus and of the equipment. When there is such an opportunity, stakeholders, transit operators, transit users, provincial and local governments, taxpayers and communities all benefit. E-buses should be deployed where they will perform well and economically.

## **Recommendations**

In order to encourage the adoption of e-buses by transit systems across the country, EMC requests that the Government of Canada increase its cost-share in public transit projects that adopt e-buses by at least 10% over its standard cost-share for projects that utilize diesel buses. These projects should include:

- Procurement of commercially ready e-buses, and related infrastructure
- In service trials of e-buses, and related infrastructure
- Technical and economic feasibility studies<sup>4</sup> for both e-buses and charging systems and solutions
- Implementation planning for e-buses
- Training / retraining of transit system operators and maintenance personnel
- Benchmarking of e-bus performances against other propulsion technologies and against other transit agencies

The additional incentive will send a strong signal to transit agencies regarding the preference for clean bus technology.

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<sup>3</sup> Some trials have been conducted in Canada and are presented in appendix.

<sup>4</sup> Adequacy of e-buses on their routes, determine the breakeven number of electric buses, with lifecycle cost calculations of GHG emissions reductions.

The use of the Public Transit Infrastructure Fund or the Green Infrastructure Fund should be aimed and restricted to projects led by transit agencies for their specific purposes. Other federal programs are available to fund transit R&D activities and to encourage partnerships between manufacturers and academia.

## Appendix Demonstrations, ongoing projects and projects in development

System	Description of demonstration projects	Project Goal	Duration / date	Bus model tested Charging system used
<b>COMPLETED AND ON-GOING PROJECTS</b>				
STL <b>On-Going Completed</b>	One bus in regular service on a specific driver assignment One bus 2 years experimentation	<ul style="list-style-type: none"> <li>- Challenges for operation</li> <li>- Customers experience and awareness</li> <li>- Cold impact, range, best charging system</li> </ul>	Ongoing since 2015 January 2013 / December 2014	Design Line BEB 254 kWh, 12 m. Slow charging overnight 8 hours Slow charging overnight 8 hours and in the middle of the day Project concluded: 120 km max range, 8 hours charging time, 50% range reduction in winter condition with electric heating, slow charge depot charging more suitable for STL operation mode <b>20% of fleet could be electrified with this bus</b>
Winnipeg Transit <b>On-going</b>	Four (4) buses in shuttle service between downtown and the airport ( 3 hour round trip)	to test in cold weather, with fast charging, in support to the Government and New Flyer	Still on-going in regular service	New Flyer Xcelsior® BEB 200 kWh, 12 m Fast charging (10-20 min) station at airport, and slow charging end day 5 hours autonomy between charges
STL Completed STO/STM	One K9M BYD bus (Gen 2) short 1 month demo/trial	To test on route 42 (26 km) with stop simulation until full range is achieved <ul style="list-style-type: none"> <li>- 328km max range</li> <li>- 4.5 h charging time</li> </ul> <b>~50% of fleet could be replaced with this bus</b>	August/2015	BYD BEB 324 kWh (Gen II), 12 m. Slow charging overnight
Edmonton Transit	Three (3) buses in regular service Winter trial	<ul style="list-style-type: none"> <li>• feasibility of operating a BEB in winter conditions</li> <li>• Compare the lifecycle cost of two battery electric technologies with a standard diesel fleet at ± 20% precision</li> </ul>	January to March 2016	BYD BEB (Gen II) 324 kWh, diesel heater BYD (Gen III) 324 kWh diesel heater Trickle charge New Flyer EXcelsior® – 200 kWh, 12 m Overhead pantograph at garage

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<b>PROJECTS in DEVELOPMENT</b>				
STM / Cité Mobilité (Montréal)	3 buses	Showcase Quebec expertise Customers and drivers experience, operational results, and planning	2017-2020	Nova Bus E-LFS Rapid charge stations with 6 minute fast charge at each end of route, inverted pantograph (charging rails on roof of bus)
BRT Québec-Lévis	Full implementation of e-buses in service being considered and evaluated	Feasibility study	Project design underway 2025	No manufacturer selected Both BEV and PHEV being considered



December 19, 2016

Chantal Guimont  
President-CEO  
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Dear Chantal,

The Canadian Urban Transit Association (CUTA) supports Electric Mobility Canada (EMC) in its efforts to secure a cleaner and more sustainable future for Canada's urban transit systems. On the market today there are a variety of technologies that, if incorporated into Canadian transit systems, would create an immediate and sizable reduction in transportation GHG emissions. The procurement and deployment of these vehicles will be a key factor in reducing urban GHG emissions while also improving the air quality of our urban spaces.

Unfortunately, the high incremental cost of purchasing alternative propulsion buses, instead of standard diesel buses, creates a procurement barrier for transit systems. There is a need for an incentive for transit systems to purchase these vehicles; this will increase not only the adoption of these technologies, but their commercialization, as well. The additional costs to build the appropriate supporting infrastructure, such as charging stations, for these new vehicles can also create a barrier to adaptiveness.

The federal government is poised to make an unprecedented investment in urban transit. By ensuring that alternate propulsion transit infrastructure is a key part of this investment, the government can be confident that they are working towards their goals of reducing GHG, creating green jobs in Canada and improving Canadian communities by providing them with a modern and sustainable way to move around their urban spaces.

Regards,

Patrick Leclerc  
President-CEO