

*EVS27 Symposium
Barcelona, Spain, November 17-20, 2013*

Electric Vehicle Technology & Education Centre

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Short Abstract

The Electric Vehicle Technology & Education Centre (EVTEC) at Red River College, with the support of the Province of Manitoba, serves to test and demonstrate electric vehicle technologies, while allowing the College to enhance applied research and training programs. EVTEC was catalysed by a three-year, \$3,000,000 (Canadian) collaboration to develop an all-electric transit bus and charging system.

EVTEC directly complements and supports Province of Manitoba policy concerning sustainable transportation, with a mission to support electric vehicle innovation amongst Manitoba's transportation sector; enhance electric vehicle education at the College and in the region; and increase public awareness of electric vehicle technology.

1 Introduction

The Province of Manitoba has supported a number of applied research projects at Red River College, located in Winnipeg, Manitoba Canada over the years. These projects include the Red River Raycer (solar car); Hybrid Hydrogen Internal Combustion Engine and Hydrogen Fuel Cell bus demonstrations; and the Plug-in Hybrid Electric Vehicle fleet conversion, demonstration and evaluation. These projects [1] complement the \$2,400,000 (Canadian) investment by the Government of Canada's Western Diversification for research equipment and related infrastructure for the Advanced Transportation & Energy Centre (ATEC) within the Heavy Equipment Transportation Centre (HETC).

In 2011, the Province of Manitoba provided \$645,000 (Canadian) to establish and start up the Electric Vehicle Technology & Energy Centre, which is functioning as a "virtual" centre operating within ATEC.

EVTEC directly complements and supports Province of Manitoba policy [2] concerning sustainable transportation. The mission of EVTEC is to:

- support electric vehicle innovation amongst Manitoba's transportation sector;
- enhance electric vehicle education at the College and in the region; and
- increase public awareness of electric vehicle technology.

Innovation & Applied Research: to support innovation amongst Manitoba's transport sector, Applied Research & Commercialization (AR&C) and the School of Transportation Aviation & Manufacturing (TAM) is leading EVTEC project development and management. With a strong industry network and a history of partnering with business to conduct practical applied research projects, the College is applying its successful model of supporting innovation to enhance and improve electric vehicle technology.

Education & Training: to support education enhancement in the area of electric vehicles, TAM is providing full-time instructor support. Through this support, RRC will further develop curriculum and training to include an enhanced focus on electric vehicles. An online electric vehicle resource centre will host the latest resources, including both publicly available and internally developed documents, whitepapers, reports and case studies. EVTEC will not provide recommendations to consumers concerning commercially available electric vehicles.

Awareness & Outreach: to support public awareness and network building, EVTEC will not only use traditional and digital media tools, but will offer a series of events – such as "lunch & learns", open houses, "drive-n-rides" and technical forums – for the public and/or industry professionals.

Specific EVTEC activities and results are presented to enhance knowledge about EVTEC and its impact.

2 Discussion

2.1 Innovation & Applied Research

EVTEC is responsible for applied research and innovation projects concerning ground transportation electric and hybrid vehicles that utilize renewable fuels, including bio-diesel (used for auxiliary systems, such as on-board heating, ventilation and air conditioning). A particular focus is improving fuel efficiency and extreme-weather operation, especially cold.

The flagship project is the aforementioned consortia project to develop an all-electric battery transit bus involving the Province of Manitoba, Manitoba Hydro, Mitsubishi Heavy Industries (Japan), New Flyer Industries and Red River College. This three-year, \$3,000,000 (Canadian) project has developed a prototype “zero emissions” bus (Figure 1) and related charging infrastructure. The bus prototype and associated charging technologies will be tested and evaluated over a two-year period in Winnipeg. The batteries provide direct current power to a nominal 650-volt system, using a 120 kWh battery that is the same weight as the engine and fuel on a diesel bus. The prototype bus has a range of 80 kms/four hours in typical stop-and-go transit operation, and is the first of its kind in Canada.



Figure1: Battery Electric Transit Bus Prototype (June 2012) [3]

New Flyer has led a new consortium application to Sustainable Development Technology Canada and secured another \$3,400,000 (Canadian) to develop a small fleet of four additional electric buses to undertake a four-season, four-year demonstration with Winnipeg Transit under regular transit operating conditions. The total investment in these two projects will be \$10,000,000 (Canadian) and will serve to enhance EV-related research, development, testing and manufacturing capabilities in Manitoba.

With respect to passenger EVs, EVTEC is managing demonstrations and testing of commercially available vehicles. These vehicles are the Chevrolet Volt, Mitsubishi iMiEV, and Nissan Leaf; obtained by the Province of Manitoba under the umbrella of the Manitoba EV Roadmap and the recommendations of the Manitoba EV Advisory Committee. EVTEC will not be providing recommendations to consumers concerning commercially available electric vehicles.

EVTEC has also complemented resources from the National Research Council of Canada's Industrial Research Assistance Program, which have supported development of a publication concerning the application of lithium ion batteries for ground transportation vehicles as well as a cluster map of sustainable transportation technologies in Manitoba.

2.2 Education & Training

The School of Transportation and Manufacturing has dedicated a full-time instructor to support EVTEC. RRC has already developed a curriculum module for apprentices in automotive mechanics. Discussions are underway concerning First Responder training, in partnership with industry. In addition, RRC has developed a licensed bio-diesel refinery – which produces bio-diesel from used cooking oil – and will be invaluable to support applied research and training.

2.3 Awareness & Outreach

EVTEC is utilizing traditional and digital media tools to raise awareness of EV and hybrid technology. Events have included “lunch & learns”, a car and truck show with “drive-n-rides” and public exhibits of EVs. Technical publications are also being produced to share knowledge [4]. Public presentations are made at professional and trade events. And, upon request, media are provided with technical information to help increase their knowledge of EVs and hybrid technologies.

3 Results & Impacts

Although still in the early stages, EVTEC is complementing and supporting Province of Manitoba’s policy and direction concerning sustainable transportation.

EVTEC is serving to support electric vehicle applied research and innovation amongst Manitoba’s transportation sector; enhance electric vehicle education at the College and in the region; and increase public awareness of electric vehicle technology. Issues are also being identified for future study. For example, these include the repurposing of ground vehicle batteries for stationary applications, the availability of commercial-grade, high-capacity, fast-charging infrastructure, appropriate business models, and passenger EV end-of-life.

The impacts will be found not only in the highly qualified personnel (i.e. students, faculty and staff) who have broadened their knowledge and applied learning experience while engaged in EVTEC; but also the industry partners who will commercialize EVTEC research results and the Province of Manitoba whose economy will benefit as a result.

The decision, driven by policy and direction concerning sustainable infrastructure, by the Province of Manitoba to invest in EVTEC is an investment in the future that will have long-term economic development benefits on intellectual capital, sustainability and the manufacturing sector.

Acknowledgments

The generous support of the Province of Manitoba – Innovation Energy and Mines and the Council on Post-Secondary Education – to establish the Electric Vehicle Technology & Education Centre is greatly appreciated.

References

- [1] Ray Hoemsen and Ken Webb, Advanced Transportation & Energy, Presentation to the Standing Senate Committee (of Canada) on Energy, the Environment and Natural Resources, Winnipeg Manitoba, 2012.
- [2] Province of Manitoba (EV Road Map etc.), <http://www.manitoba.ca/iem/energy/transportation/index.html>, accessed January 2013.
- [3] Ray Hoemsen and Dale Friesen, Moving Forward with a Green Economy Through the Development & Integration of Electric Vehicles, Second Annual Electric Vehicle Infrastructure Summit, Toronto Ontario, 2013.
- [4] Robert V. Parson and Ray Hoemsen, Advancing Electric Vehicle Adoption: Insights from Manitoba Experience, EV2012VÉ, Montreal Quebec, 2012.

Author

Ray Hoemsen (M.Sc. Agricultural Engineering, University of Manitoba, 1983) has held numerous leadership positions in the public and private sectors, and as a volunteer in this community and profession. Since 1986, he has specialized in “The Business of Science™”. Appointed as Director of Applied Research & Commercialization at Red River College in June 2004, Ray has led the development and growth of the College’s applied research enterprise – including the demonstration, evaluation and cold weather performance of ground vehicles utilizing renewable fuels and hybrid technologies. Ray’s leadership was recognized by the 2011 Association of Canadian Community College’s Leadership Excellence Gold Award (<http://blogs.rrc.ca/redblog/2011/06/rrc-director-wins-national-award/>).

