

SCHEDULE E

GMF Reporting Submissions

Pilot Project Completion Report

GMF number	<i>15074</i>
Name of the lead applicant (municipality or other partner)	<i>Greater Victoria Harbour Authority</i>
Name, title, full address, phone, fax, e-mail of lead technical contact for this Pilot Project	<i>Courtney Crisp, Assistant General Manager at Pacific Northwest Transportation Services, 189 Dallas Rd Victoria BC V8V 1A1, p.778.405.0300, courtney@pnwts.com</i>
Date of the Report	<i>February 28th, 2020</i>

Introduction

1. Who was involved in doing the Pilot Project, and what are their affiliations? Please include name, title and contact information. Those involved could include municipal staff, engineering and other consultants, a representative from a nongovernmental organization, and others.

<i>Fraser Atkinson</i>	<i>Chairman, Green Power Motor Co. Inc.</i>	<i>604-563-4144</i>
<i>Phillip Oldridge</i>	<i>CEO, Green Power Motor Co. Inc.</i>	<i>604-563-4144</i>
<i>Matthew Jewell</i>	<i>Controller, Green Power Motor Co. Inc.</i>	<i>604-563-4144</i>
<i>David Roberts</i>	<i>GM, Pacific Northwest Transportation Services</i>	<i>david@pnwts.com</i>
<i>Courtney Crisp</i>	<i>Assistant GM, Pacific Northwest Transportation Services</i>	<i>courtney@pnwts.com</i>
<i>Doug Petch</i>	<i>Fleet Maintenance, Pacific Northwest Transportation Services</i>	<i>1.844.504.1394</i>
<i>Scot Vaillant</i>	<i>Fleet Trainer, Pacific Northwest Transportation Services</i>	<i>1.844.504.1394</i>
<i>Judith Either</i>	<i>CAO, Greater Victoria Harbour Authority</i>	<i>jethier@gvha.ca</i>

The Pilot Project

2. Please describe the project objectives and the approach used to meet these objectives. Include details on what technology or solution was tested during the Pilot Project. (Indicate relevant sections/pages of the Final Pilot Project Report)

As part of the Greater Victoria Harbour Authority's (GVHA) upcoming Ground Transportation Strategy, GVHA and CVS Tours entered into a lease agreement with Green Power Motor Company Inc. to lease an EV550 all-electric double decker bus for two year commencing in April 2016 with the option to purchase the vehicle at the completion of the project.

This Pilot Project was the first of its kind in Canada and was intended to evaluate the feasibility for fully electric bus transportation for the cruise tourism industry.

The focus was on:

- a) *Cost of operations compared to conventional diesel buses*
- b) *Reduction of GHG emissions*
- c) *Reduction of noise, and*
- d) *Determining charging station requirements*

The EV550 is a double decker bus measuring 45' in length, 8.5' in width and 13.5' in height accommodating 90 seated and 35 standing passengers. The vehicle is fully accessible with a low floor design, kneeling capabilities, a wheelchair lift and varied wheelchair configurations. The EV550 has over 400kWh of batteries with a range of up to 385 kms and has the versatility to fulfil the requirements of transit agencies, shuttle operations, tour operations and special situations.

The bus was planned to be in operation from April to September each year to provide shuttle service for cruise ship passengers. The use of an EV was of particular benefit given research completed by Dr. Brian L. Scarfe whose study titled "The Costs and Benefits of Cruise Ship Tourism in Victoria" demonstrated that cruise ship tourism in Victoria has a zero or negative net socio-economic impact. The main contributors being:

- a) *Traffic congestion*
- b) *Traffic noise*
- c) *Atmospheric emissions, and*
- d) *Public subsidies*

During a 15-year period, the cruise ship industry in Victoria increased 1,600% from 40,000 to over 639,758 in 2018. The Scarfe report states that the "growth of the cruise ship industry has not been accompanied by social and environmental programs to mitigate the negative impacts of the industry on the neighbourhood...where the impacts are felt. As a consequence, the residents' tolerance for further growth, and the activity itself, has been consumed. The limits of acceptable change have been exceeded."

3. Did the pilot project include a methodology or approach for verifying or testing the performance of the technology or solution? Please respond Yes or No.

Yes [x]

No []

If you answered yes to Question #3, which methodology did you use in this pilot project for testing the performance of the technology or solution?

- Environmental Technology Verification Program n/a
 - Engineering Consultant n/a
-

- Other (please specify):

During the pilot project the bus operator, Pacific Northwest Transportation Services, used the technology on various duties throughout the season. Running a shuttle and providing tours to Butchart Gardens. We were to measure Electricity usage and repair and maintenance costs as opposed to a conventional ICE Double Decker

Pilot Project Results:

4. What are the Pilot Project's recommendations? (You may point to the relevant sections/pages of the Final Pilot Project Report if relevant.)

- *Although the potential benefits of electric bus transportation are significant, this Pilot Project proved that the technology is not yet viable for implementation. The continued failure of the Green Power buses resulted in only 31 days of use over the period of the project.*
- *The EV550's cost is more than double that of a new diesel bus. In addition, batteries have a useful life of about 10 years while a new diesel engine has a lifespan of double that.*
- *Servicing capabilities were not available locally which required technicians to travel from California whenever a failure occurred. Future projects should ensure local servicing is available.*
- *Currently, we are not recommending further investment in this technology*

5. Is the Pilot Project *technically feasible* for full-scale implementation? Please comment on why or why not.

This pilot project is not technically feasible for full scale implementation. The technology has not yet been proven and the buses failed repeatedly during the project. For every electric bus we purchase we would need a charger and 6-8 hours to charge each bus and that is not easily scalable. Maximum distance is also an issue and the bus was not capable of doing the full days work without requiring recharge.

6. What were the financial results of the Pilot Project and is the Pilot Project *financially feasible* for full-scale implementation? Please comment on why or why not.

The cost of the EV550 is prohibitive and creates a barrier to market entry. A diesel double-decker is approximately \$850,000USD, and the GreenPower electric double decker \$1.3USD. This in addition to the continued failure of the technology, added costs to providing shuttle services to cruise passengers because back-up diesel buses were required in order to ensure service. The repeated failure of the EV550 also created additional labour costs and general upheaval to the operations of the bus service.

7. Please complete the following table that was part of your pilot project application with the actual results from your pilot project. Please also provide the page numbers where the environmental results of the pilot project can be found in the final report.

Anticipated Environmental Benefits*

Project Parameter	Units	Baseline Performance	Actual Results
Greenhouse gas emissions	Tonnes CO ₂ e	131	n/a
Vehicle Fuel consumed	Liters	51,325	n/a
NO _x emissions	g/bhp-hr	458	n/a

*Greenhouse gas emissions and vehicle fuel consumed in the baseline performance calculations have been modified to reflect a current fuel mix of 20% biodiesel, 80% diesel fuel.

8. Please describe all of the environmental results including any potential negative results or trade-offs that need to be considered.

a) *Environmental Results*

The EV550 has the potential to provide zero emissions locally. However, the technology still creates potential negative impacts in other parts of the world from the mining of battery components and the eventual disposal of batteries.

b) *Trade-offs*

- *Extended down time due to lack of local or readily available maintenance facility and knowledgeable service technicians to fix issues*
- *Parts delivery times were extensive due to being supplied from China and this translated to long periods of down time*
- *Range is decreased from traditional transportation methods*
- *Cost of the bus*

9. Based on the experience gained in the pilot, please update the anticipated social and economic outcomes (community benefits) of full scale implementation of the pilot project. Column B of the following tables shows the anticipated economic and social benefits you noted in your application.

Please complete the table below by describing in Column C the anticipated economic benefits of the pilot project at full scale implementation. Please complete for all that apply in the list below. If there are additional economic benefits, please describe these in the last row of the table.

Figure 1 – Economic benefits

A	B	C
Economic benefit	As described in your GMF application	Anticipated economic benefits of the pilot project at full scale based on pilot experience. If the result is different than what was expected in the application form, please indicate why
Increased return on investment		
Deferred or avoided capital expenditures		
Decrease in facility operating or maintenance costs	Elimination of operating costs related to fuel or diesel purchases. See "Feasibility Study" spreadsheet for estimate of reduction in expected fuel purchased. Based on an expected 12 year life and the price of fuel, it can be reasonably assumed that the operating fuel savings could be between \$400,000 - \$600,000 / bus.	<i>Fuel savings were not realized as bus was not operational.</i>
Extended lifespan for facility		
Increased municipal revenue streams (e.g. property tax, user fees, etc.)	No description provided	
Lower taxes		
Stimulus for local economy (use of local business, capacity for local business development)		
Increased employment options or job retention		
Increased transit ridership	No description provided	<i>EV550 accommodates 99 passengers while the current diesel buses accommodate only 87. This would have increased the per trip revenues.</i>
Attraction of new businesses	No description provided	
Other (please specify)		



10. Please complete the table below by describing in Column C the anticipated social benefits of the pilot project at full scale implementation. Please complete for all that apply in the list below. If there are additional social benefits, please describe these in the last row of the table.

Figure 2- Social benefits

A	B	C
Social benefits	As described in your GMF application	Anticipated social benefits of the pilot project at full scale implementation based on pilot experience If the result is different than what was expected in the application form, please indicate why
Improvements to public health	Elimination of emission remitting transit vehicles will improve surrounding air quality for all residents and tourists. See attached feasibility study to see impact of reduction in emissions for the project.	<i>The project won't be fully implemented at this time.</i>
Improvements to public safety		
Improvements to community quality of life	No description provided	
Increased opportunities for community engagement	No description provided	
Increased public education or awareness	No description provided	<i>The initial media was great; however due to the maintenance issues that the bus kept experiencing, it was hard to have the bus still shown in the media as a positive, but then when asked, have to explain that it was inoperative which is why no one was seeing it on the road</i>
Community revitalization	No description provided	
New housing and infrastructure		
New or enhanced public space or public facilities		
Improved access to recreation and physical activities		
Reduced urban sprawl		

Increased civic pride, ownership and participation	No description provided	
Improved quality and efficiency of service provision to residents	No description provided	
Reduced opportunities for crime		
Other (please specify)		

Lead Applicant's Next Steps

11. What next steps does your municipality plan to take based on the findings and recommendations of the Pilot Project?

The main recommendation would be to look at other solutions and monitor the development of electric buses. Pacific Northwest Transportation Services indicated that they would look at Hydrogen powered buses as an alternative.

Lessons Learned

In answering the questions in this section, please consider all aspects of the Pilot Project—from the initial planning through each of the essential task until the Final Report of the Pilot Project was prepared.

12. What would you recommend to other municipalities interested in doing a similar Pilot Project? What would you do differently if you were to do this again?

Ensure that the vehicle supplier can provide an efficient maintenance and service level that meets the needs of the intended use.

If a similar project was to be taken, more research on the technology should be considered and uptime assurances from the vehicle supplier should be negotiated.

13. What barriers/challenges (if any) did you encounter in doing this Pilot Project? How did you overcome them?

The biggest barrier was downtime and not being able to use this vehicle as required.

To overcome this challenge Pacific Northwest Transportation Services had to purchase other Diesel vehicles to pick up the non-service hours of this BEV vehicle



100-1019 Wharf Street, Victoria, BC V8W 2Y9

p: 250.383.8300 | tf: 1-800-883-7079

e: gvha@gvha.ca | w: gvha.ca

Knowledge Sharing

14. Is there a website where more information about the Pilot Project can be found? If so, please provide the URL.

n/a.

In addition to the Pilot Project results, has your Pilot Project led to other activities that could be of interest to another municipality (for example, another pilot project, sharing of the results of this pilot project with other municipalities formally or informally, changes to existing policies and/or practices etc.)? If so, please list these outcomes and include copies of the relevant documents (or website links).

n/a

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