SCHEDULE F – PROJECT COMPLETION REPORT TEMPLATE

VERY IMPORTANT:

Timing: You need to email a report, to your GMF project officer (contact info is in Schedule C), on the dates indicated in Schedule C or whenever FCM asks for such a report.

Copyright: Before you submit a report to FCM, make sure you hold the copyright for the report. If you're hiring a consultant to prepare the report, please make sure to get the copyright (see FCM's copyright tips document), or else FCM will not be able to disburse the Grant Amount.

Accessibility for people with disabilities: Please do not change the format, font, layout, etc. of this report. This template has been specially designed, following FCM's Accessibility Guidelines, in order to be accessible to people with disabilities.

Confidentiality: If your report contains any Confidential Information that you would prefer not be made available to the public (e.g. through a case study or other materials produced by FCM that relate to your Project), please submit two versions of the report:

1. **Complete report including Confidential Information:** Please clearly label this report with the word "**Confidential**" or similar wording and FCM will treat it as confidential.

2. **Abridged report excluding Confidential Information:** This report may be posted on the FCM website and otherwise made available to interested third parties, to help FCM meet its knowledge sharing objectives.

Please contact your project officer to receive an electronic copy of the Completion Report Template.

Upon completion of the project, a copy of the Final Deliverable must be submitted along with this Completion Report.

FCM will post your report on the Green Municipal Fund™ (GMF) website. This is because one of FCM's mandates is to help municipal governments share their knowledge and expertise regarding municipal environmental projects, plans and studies.

How to complete the Completion Report

The purpose of the Completion Report is to share the story of your community's experience in undertaking your project with others seeking to address similar issues in their own communities.

Please write the report in plain language that can be understood by people who are not specialists on the subject. A Completion Report is typically in the range of 5–10 pages, but may be longer or shorter, depending on the complexity of the project.

GMF grant recipients must enclose **final** copies of the Completion Report and the Final Deliverable with their final Request for Contribution. The reports, including all attachments and appendices, must be submitted in PDF format with searchable text functionality. Reports that are not clearly identifiable as final reports, such as those displaying headers, footers, titles or watermarks containing terms like "draft" or "for internal use only," will not be accepted by GMF. Additionally, reports must be dated. If you have questions about completing this report, please consult GMF staff.

GMF number	16724
Name of the lead applicant (municipality or other partner)	City of Saskatoon
Name, title, full address, phone, fax, e-mail of lead technical contact for this Pilot Project	Paul Bracken, 57 Valley Road, Saskatoon., Sk, S7M5Y1, paul.bracken@saskatoon.ca, 306-975-2871
Date of the Report	November 18, 2021

1. Introduction

a) 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.

The project consisted of work from Saskatoon Transit and Saskatchewan Research Council.

Saskatoon Transit staff consisted of:

Paul Bracken, Maintenance Manager, paul.bracken@saskatoon.ca, 306-975-2871

Ales Short, Maintenance Supervisor, alex.short@saskaoton.ca, 306-975-3133

Saskatchewan Research Council staff:

Ryan Jansen, Senior Research Engineer, ryan.jansen@src.sk.ca, 306-385-4180

Kyla Clarke, Senior Research Engineer, kyla.clarke@src.sk.ca, 306-221-5549

2. The Pilot Project

a) 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)

The project objective was to trial an electric bus through all 4 seasons in Saskatoon. We partnered with SRC to determine how a proper trial should be conducted. It was determined that a long term lease (one year) would be the best approach. An RFP for a one year lease was advertised and awarded to BYD for the lease of a K9MD bus. The bus was on site June 19, 2020 and was put into service Oct 5th, 2020. The time delay to put into service was due to the bus requiring a safety inspection and repair, delays in insurance due to a lease and ownership issues, and finally the completion of the lease agreement was a tedious process.

SRC secured third party telematics to install on the bus to monitor power usage and where that power was being used. This information was used in the final report from SRC and is presented in the attached report form them.

Upon completion of the trial Sept 30th, 2021, Saskatoon Transit decommissioned our equipment from the bus, had the telematics equipment removed and notified SRC of the completion of the trial. SRC then worked on their final feasibility report and submitted it Paul Bracken, Transit Maintenance Manager, on November 17th, 2021

b) 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

- **Engineering Consultant coupled with a third party telematics supplier**
- Other (please specify) _____

3. Pilot Project Results

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

The recommendations in the final report from SRC were to peruse an appropriate funding source and begin the procurement process to begin the conversion to a battery electric bus fleet. Also to explore other properties that have made the electric fleet conversion to explore alternative cabin heating options to extend the range of the bus, the electric heat in the test bus dramatically reduced the range of the bus.

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

The results of the pilot are completely technically feasible. The results of the pilot demonstrated the electric buses will in fact work in the geography and climate of the city of Saskatoon. The largest barrier to the implementation of this project is going to be the funding. Currently with no funding to even keep up with diesel bus replacement, the conversion to an electric fleet will be even more difficult.

c) 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.

As mentioned above the financial feasibility will be the largest blockade. The report clearly identified a total life cycle cost savings of approximately $400,000 per bus. The initial capital cost is substantially higher than that of a diesel bus, but the life time 'fuel' and maintenance costs show a dramatic savings over the cost of diesel fuel and diesel bus maintenance.

d) 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.

A Parameter measured	B Unit	C Baseline performance before project	D Anticipated performance after project completion	E Actual performance Project Completion
Greenhouse Gas Emissions	tonnes CO2e	83.8	33.5	44.5

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

The power consumption of the electric heater was demonstrated to be less environmentally friendly than a possible bio-diesel heater. The possible reduction is due to the inefficient nature of an electric heater. A bio-diesel heater can lower the total emissions of a BEB by approximately an additional 6 tonne of CO2 to approximately 38.4 tonne annually.

f) 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	By moving to an electric fleet, the air exchangers in storage will not be required to operate as often as there will no longer be the diesel exhaust to evacuate.	This was not discussed in the final report but will still hold true. If funding becomes available and the fleet attrition plan, a part of the asset management plan, is followed, in approximately 14 years significant savings should be realized from the lack of HVAC operation in storage.
Extended lifespan for facility		
Increased municipal revenue streams (e.g. property tax, user fees, etc.)	The projected increase in ridership, correlates to a higher revenue stream for transit.	This was not discussed in the report, however it has been demonstrated that a clean fleet does promote ridership, this would directly impact our revenue stream.
Lower taxes	The move to an electric fleet, while more costly up front, is	The report outlines the life cycle costing comparisons of a diesel bus versus an

A	B	C
	expected to provide substantial savings on the operating side of the department, projected to actually save money after year 10 of ownership. This in turn, may not provide a decrease in property taxes, however will aid in mitigating mill rate increases.	electric bus and the potential total LCC savings of approximately $469,520 over the life of the bus. This can be found on page iv and 13 of the SRC report.
Stimulus for local economy (use of local business, capacity for local business development)	As a part of moving to electrification, solar power production will be explored, providing opportunity for local suppliers.	This was not discussed as a part of the report and would likely need a further in depth study to determine the feasibility of solar panels on the roof of the building
Increased employment options or job retention	Along with heavy duty technicians, electric vehicle technicians will also be required, resulting in internal training opportunities for existing and new staff.	This was not discussed in the report but would be a very real opportunity for staff to expand their skill set beyond diesel machanics. If EV courses are offered in the local trade schools, that could also open up opportunities there also.
Increased transit ridership	By creating 'clean' transit, and promoting it as such, ridership increase is expected. Also with the electrification, an increase in reliability, and reduced bus down time is expected, increasing reliability and again creating an increase in ridership.	This goes along with the increased revenue point above. It has been demonstrated that new/clean buses with more comforts (noise reduction) and amenities, that ridership will increase.
Attraction of new businesses	With the expected increase in ridership and the onset of the BRT (Bus Rapid Transit), an increased business attraction close to BRT terminals is expected.	This was also outside of the scope of the report. However, with an expected ridership increase due to the reasons listed above, and large BRT stations throughout the city, the opportunity for business is huge.
Other (please specify)		

g) 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	Reduction of CO2 emissions and of odour, noise and soot.	Up to 14dB reduction, approximately 40tonne CO2 reduction, and depending on heating method, significant reduction in odor and soot. Pg 16 and 18 SRC report
Improvements to public safety	Reduction of CO2 emissions and soot, and cleaner air.	Up to 14dB reduction, approximately 40tonne CO2 reduction, and depending on

A	B	C
		heating method, significant reduction in odor and soot. Pg 16 and 18 SRC report
Improvements to community quality of life	Reduction of CO2 emissions and of odour, noise and soot.	Up to 14dB reduction, approximately 40tonne CO2 reduction, and depending on heating method, significant reduction in odor and soot. Pg 16 and 18 SRC report
Increased opportunities for community engagement		
Increased public education or awareness	Through promotion of the fleet's electrification, education of the public regarding the substantial reduction in pollution will be available.	Through our own communications team, EV events, and social media we can accomplish this
Community revitalization		
New housing and infrastructure		
New or enhanced public space or public facilities	The BRT will bring with it new terminal structures, and with the continued turnover of the fleet, buses will always be newer and have better amenities.	This is a budget issue. But the BRT will bring newer and more elaborate stations. The buses will need to wait until funding is in place to continue with the asset management plan
Improved access to recreation and physical activities	Increased reliability will increase access to these amenities.	The reduction in down time and maintenance as referenced throughout the report will increase reliability of the fleet and increase access to these other facilities.
Reduced urban sprawl		
Increased civic pride, ownership and participation		
Improved quality and efficiency of service provision to residents	Increased reliability of the fleet will improve the quality of service proved to the people of Saskatoon.	Increased reliability of the fleet mentioned throughout the report will provide for an increased quality of life through a reliable transit service and a significant reduction in cancelled runs due to bus shortages.
Reduced opportunities for crime		
Other (please specify)		

4. Lead Applicant's Next Steps

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

The next steps have already been started. An asset management plan and a business plan have been put forward to council outlining costs and savings by moving to an electric fleet. Budget deliberations are in Nov/Dec of this year. Following the success of those meetings in favor of Transit, the procurement process can begin. The current facility can support approximately 30-40 buses without a major electrical upgrade. That's a 3 to 4 year window to plan for smart charging implementation and the procurement process to follow for that.

Failing the success of budget, its back to more reports to council asking for the appropriate funding to move forward.

Saskatoon transit has applied for ZETF funding and we are eagerly awaiting the results of that.

5. 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.

a) 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?

I think the lease for a full year was the best way to approach this type of project. It gives a full seasonal trial of the equipment in all weather conditions and also gives the operator pool a solid chance at operating the bus and getting use to the way they work and feel. The bus becomes a normal part of the fleet and begins to integrate well.

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

The two biggest barriers were the finalizing of the lease agreement and actually getting insurance on the bus so we could use it. The other was parts availability. The fire suppression system caused almost a month of last service and then at the end of the lease we had to wait three weeks for s windshield because it had failed our internal safety inspections.

There was no overcoming the parts supply, and the lease issue was resolved by calling our solicitors department daily to get it finalized.

6. Knowledge Sharing

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

Sorry, no.

b) 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).

Not yet. It will however lead to further studies as mentioned before about solar generation, smart charging, infrastructure upgrades. When that happens we would be more than happy to share our findings

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