Report
Staff Report
The Corporation of the City of Brampton
2020-09-23

Date: 2020-09-03

Subject: **Electric Bus Status Update**

Secondary Title: Provides an update on the status of the CUTRIC Pan-Canadian Battery Electric Bus Demonstration & Integration Trial (Phase I), proposed scope of Phase II, and requests an amendment to the 2020 budget to complete required electrification studies.

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Report Number: Brampton Transit-2020-095

Recommendations:

1. That the report from Alex Milojevic, General Manager, Transit, dated September 3, 2020, to the Committee of Council Meeting of September 23, 2020, re: **Electric Bus Status Update (Report Number: Brampton Transit-2020-095, IB.c)**, be received; and,

2. That the General Manager, Transit will report back in 2022 on the status of battery-electric bus trial (eBus) Phase I following a period of one year after the official start of service with the new electric buses; and,

3. That Council consider the approval of a project to implement Phase II of the eBus trial in support of the transition to an electric bus fleet, as described in this report, to be considered as part of the 2021 budget discussions, contingent on external funding; and,

4. That Council approve an amendment to the 2020 capital budget to establish two new capital projects required to undertake the following key electrification studies: 1. Brampton Transit Network Electrification Feasibility Analysis and Rollout Plan ($250,000), and 2. Brampton Transit Sustainable Fleet Transition Strategy ($150,000), and that the combined total of these studies ($400,000) be funded from Reserve 121 – Municipal Transit Capital Expenditures; and,

5. That the General Manager, Transit or designate be delegated the authority to execute on behalf of the City an agreement with CUTRIC[1] for the completion of

[1] CUTRIC – Refers to the Canadian Urban Transit Research and Innovation Consortium

the Brampton Transit Network Electrification Feasibility Analysis and Rollout Plan on the terms described in this report and otherwise satisfactory to the General Manager, Transit or designate and in a form acceptable to the City Solicitor or designate; and,

6. That the Director, Purchasing and General Manager, Transit, be authorized to begin procurement of the Brampton Transit Sustainable Fleet Transition Strategy as described in this report; and,

7. That the General Manager, Transit or designate, be delegated authority to act as the Authorized Representative of the City and to execute on behalf of the City any necessary documents, proposals, agreements including any amending agreement(s) or other documentation as may be required to complete the two studies noted in recommendations five (5) and six (6) of this report, under key business terms and conditions acceptable to the General Manager, Transit or designate and in a form acceptable to the City Solicitor or designate.

Overview:

- **The implementation of Phase I of Pan-Canadian Battery-Electric Demonstration and Integration Trial, including 8 battery-electric buses and 4 overhead chargers is progressing towards launch in early Q2 2021.**
    - **Phase I is a $16M project, of which $11M is being funded by the Government of Canada.**
    - **Phase I is being administered by the Canadian Urban Transit Research and Innovation Consortium (CUTRIC) and involves Brampton Transit, York Region Transit, and TransLink (BC).**
    - **Phase I trial will last 30 months after start of service, and the official launch date will be planned for Q2/2021.**
- **Scope and funding ($32M) for the expansion of Phase I into Phase II eBus trial with launch in late 2022 or early 2023, as proposed in this report, and subject to consideration as part of the 2021 budget discussions.**
- **Council authority requested to amend the 2020 budget, with funding in the amount of $400K, be provided from Reserve 121 – Municipal Transit Capital Expenditures; and**
- **With the $400K in funding to establish two new capital projects to undertake consulting assignments required to progress the planning and transition towards a full electric bus fleet as follows:**
    1. **Brampton Transit Network Feasibility Electrification Analysis and Rollout Plan ($250K) through a direct consultancy assignment with CUTRIC.**
    2. **Brampton Transit Sustainable Fleet Transition Strategy ($150K) through a competitive public procurement for consulting services.**

Background:

This report provides an update on the status of the CUTRIC Pan-Canadian Battery-Electric Bus Demonstration and Integration Trial ("eBus" Phase I), the proposed scope and timing of eBus Phase II, the need to complete two priority transit electrification studies, and the opportunity to include support for full zero emission bus fleet operating from the new Third Transit Facility as part of Phase I construction (2022-2024).

Current Situation:

To keep pace with population and employment growth and deliver on the public's expectations of transit service, the City of Brampton needs to invest further in its transit infrastructure. The City has defined the need for a larger vehicle fleet and a new operations, maintenance and storage facility through the Future Transit Provisions Technical Report as part of the 2015 Transportation Master Plan (TMP).

<u>eBus Phase I</u>

CUTRIC Pan-Canadian Battery Electric Bus Demonstration & Integration Trial:

- Led by CUTRIC, with Brampton Transit, York Region Transit, TransLink (BC)
- Brampton's portion = $15.96M project; with $11.15M (or 70%) being funding by the Government of Canada (through Natural Resource Canada's Electric Vehicle Infrastructure Demonstration Program (EVID) and the Energy Innovation (EIP) Programs.
- Eight (8) battery-electric eBuses: Nova Bus (2) and New Flyer (6)
- Four (4) on-street Chargers: ABB (3) and Siemens (1)
- Largest single global deployment of fully interoperable eBuses and opportunity (overhead pantograph) eChargers from multiple manufacturers.
- Following the launch, currently targeted for early Q2/2021, this trial will operate for 30 months (2021-2023). Staff will report back to Council with the results of Year 1 in 2022.

<u>eBus Phase II</u>

Proposed scope and timing of eBus Phase II will be presented for Council's consideration during the 2021 budget process, and will expand the Phase I trial as follows:

- High level estimate of $32M includes:
    - Additional ten (10) battery-electric zero tailpipe emission buses to be procured through a competitive procurement process.
    - One (1) high-powered (600kWh) on-street charger
    - One (1) energy storage device; for peak-shaving and energy management
    - Project management, data collection, installation site feasibility, charger performance, and energy analysis (site and buses) using on-board telemetry devices consistent with Phase I for comparison purposes.
    - Up to four (4) overhead chargers and required power upgrades (substation, etc.) for Sandalwood Transit Facility.

- Timing: 2021 budget consideration. Order equipment in early 2021 for late 2022 /early 2023 implementation pending further detailed engineering design.
- Upon Council approval of the project as part of the 2021 budget, contingent on external funding, staff will commence a review of external funding opportunities to provide potential support of this project and will report back to Council as required.

Electrification Studies

There are a number of key environmental initiatives being brought forward to Council in the fall of 2020 for consideration. These include the Community Energy & Emissions Reductions Plan (CEERP), the Brampton Grow Green Environmental Master Plan Refresh, and the Corporate Sustainable Fleet Plan (which includes Transit's non-revenue support fleet vehicles).

Transportation Planning staff have also initiated the Transportation Master Plan (TMP) review process. The TMP is a long-range strategic document that identifies multi-modal policies and infrastructure needs. The TMP will be updated again in 2021, with formal project kick-off before the end of the year.

The transition from the current diesel/diesel-hybrid bus fleet to battery-electric buses in eBus Phase I and proposed Phase II, and beyond to a full zero tailpipe emission bus fleet, will be complex and challenging from a capital funding perspective (both on the fleet and facility side). This process will require significant investment by the City and financial support from senior levels of government. This is required due to the higher capital costs for electric buses versus standard diesel buses and the high capital costs associated with the supporting electric infrastructure (eChargers, facility retrofits, power upgrades including substations, etc.).

Based on the initial modelling completed by CUTRIC for Phase I (routes 23 and 26), these higher capital costs are expected to be offset by operational savings, in diesel and maintenance costs, in the range of approximately $40K per year per bus and $13K per year per bus, respectively, for a combined net savings of approximately $53K per year per bus. These studies will further quantify these estimates based on total cost of ownership, factoring in additional costs for increased service hours and eBuses (to account for additional charging time).

In order to quantify and prioritize the transition to fully electric (which routes first, which type of electric buses, etc.) and ensure the maximum returns on the City's investment, two key studies must first be completed as described below:

1. **Brampton Transit Network Feasibility Electrification Analysis and Rollout Plan**:
    - Estimated value: $250,000
    - Procurement: Direct contract with CUTRIC, with possible co-funding opportunity of up to 50% provided by the Federation of Canadian Municipalities (currently being explored).

- Brampton Transit is a paying member of CUTRIC, and CUTRIC has offered Brampton Transit a 40% discount to complete this assignment.
- CUTRIC has previously completed similar modelling for Brampton Transit, under eBus Phase I, in conjunction with the National Research Council (NRC) OF Canada. CUTRIC has the industry leading expertise in this very specialized field and is already a strong partner in our electrification effort.
- CUTRIC is a not-for-profit organization and is therefore exempt from the City of Brampton's Purchasing By-law.
- Purchasing has been consulted and is in agreement with and support of this approach given the significant benefits to the City.
- CUTRIC was contracted directly in the same manner in 2019 by eBus Phase I participants to provide Program Management and Data Analytics; which is being funded 100% by the Government of Canada through the approved eBus Phase I project with NRCan.
- Models diesel/diesel-electric hybrid buses versus both on-route opportunity (overhead/pantograph style) and depot (plug-in style) charging battery electric buses (BEB), and hydrogen fuel cell electric buses (FCEB).
- Highly technical, block-by-block / route-by-route techno-economic feasibility analysis and simulation including: energy (kW), economic ($), and environmental (GHG).
- Over the past 36 months, CUTRIC has completed simulation work for more than 25 transit agencies, including full and partial fleets deployments assuming BEB and FCEB and their varying charging and fueling solutions.
    - This includes the Toronto Transit Commission and TransLink (larger transit agencies in Canada).
    - CUTRIC has also recently completed modelling work in California (USA) for Riverside Transit, Orange County Transit, and Santa Monica Big Blue Bus.

2. Brampton Transit Sustainable Fleet Transition Strategy:

- Estimated value: $150,000
- Procurement: Competitive Public Procurement.
- Transition pathway from current diesel/diesel-hybrid bus fleet to full zero tailpipe emission transit, procurement plan.
- Review operating complexities for Züm bus rapid transit.
- Deep costing analysis and short, medium, and longer term budget forecasting.
- Includes total cost of ownership life cycle costing analysis.

The above studies will help to determine opportunities for electrification rollout within Brampton Transit.

<u>New Third Transit Facility</u>

The project was originally proposed to be delivered as a diesel/diesel-electric hybrid bus storage and maintenance facility, with space provisions for the future installation of electric charging infrastructure. The project has been split into two phases, and with

Phase I (of 250 buses) construction anticipated between 2022-2024 it is highly desirable to construct bus electrification infrastructure during Phase I.

Phase I of the project is already at the pre-design stage and gearing up towards the design-build stage. The design-build stage is pending funding confirmation through the Public Transit Stream of the Investing in Canada Infrastructure Program. Phase II (an additional 188 buses) is to be constructed at a later date, expanding the facility to full build out capacity as growth in the City of Brampton continues and service is increased beyond the end of this decade

Through CW128-2020, approved by City Council on June 10, 2020, Council passed a resolution which included the following:

> *"Brampton City Council request to the Government of Canada, an incremental funding grant of approximately $150M (to be confirmed), to provide the required investment to consider full electrification of the third transit facility in the City of Brampton".*

The City of Brampton has an immediate opportunity to build and commission one of Canada's first maintenance and storage facilities built to support a fully electric zero tailpipe emission bus fleet from this new location. Refer to the City's website for a copy of the City's Media Release regarding future possible electrification of the New Third Transit Facility. Being in the pre-design stage of facility development, there is a unique opportunity to establish electric bus infrastructure in a purpose built facility in the most cost effective manner.

Corporate Implications:

Financial Implications:

Subject to Council approval, a new capital project will need to be established in the total amount of $250,000 for a Brampton Transit Network Electrification Feasibility and Rollout Plan and a new capital project in the total amount of $150,000 for a Brampton Transit Sustainable Fleet Transition Strategy. Funding for these initiatives, in the overall amount of $400,000, is available from Reserve 121 – Municipal Transit Capital Expenditures.

Other Implications:

Staff are investigating a possible opportunity with CUTRIC regarding collaborating with FCM on a possible co-funding arrangement to complete the Network Feasibility Electrification Analysis and Rollout Plan. This may include possible funding of 50% project costs up to a maximum of $350,000.

Purchasing:

1. Network Feasibility Electrification Analysis and Rollout Plan:

- Under Schedule D, paragraph 9(e) of the City's Purchasing By-law, procurement of goods or services from non-profit organizations are exempt from the procurement processes set out in the Purchasing By-law.

2. Sustainable Fleet Transition Strategy:
   - A public Procurement Process will be conducted and proposals shall be evaluated in accordance with the published evaluation process within the bid document. Purchase approval will be obtained in accordance with the Purchasing By-law.
   - All communication with Bidders involved in the procurement must occur formally, through the contact person identified in the bid document.

Term of Council Priorities:

Transitioning the current diesel/diesel-electric hybrid bus fleet to full zero tailpipe emission buses supports the Brampton 2040 Vision and the 2019-2022 Term of Council Priorities established to improve transit, implement a green framework, sustainable growth, and lead in environmental innovation.

Transitioning to a fully electric zero emission bus fleet in the future builds on Council's commitment to reducing our carbon footprint and building a Green City, and helps to achieve the goals established by the Government of Canada to become net zero emissions by 2050.

Conclusion:

Transit electrification projects such as: eBus Phase I, eBus Phase II, the Brampton Transit Network Feasibility Electrification Analysis and Rollout Plan, the Brampton Transit Sustainable Fleet Transition Strategy, and electrification of the new Third Transit Facility are all critical milestones in the City's journey to reducing greenhouse gas emissions generated in Brampton by 80% by 2050. The new Third Transit Facility serves an important role in supporting Brampton's future fully electric zero tailpipe emission bus fleet.

A well-connected environmentally sustainable transit network is critical to building Brampton's position on Canada's Innovation Corridor, and these electric bus initiatives will bring more Brampton innovation to the Corridor, while continuing to position Brampton Transit as a leader in sustainable transportation.

The studies identified in this report need to begin in 2020 with completion in 2021 to further inform the preparation of the 2022 budget discussions for the 2022-2031 forecast, and provide the necessary information required to plan a wider transition to electric buses during the short (2022-2031), medium (to 2040), and longer term (2050).

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