

Staff Memorandum



To	Mayor A. Nuttall and Members of Council
Subject	Battery Electric Bus (BEB) Pilot and Testing
Date	October 22, 2025
Ward	All
From	B. Forsyth, Director of Transit and Parking Strategy
Executive Member Approval	R. James-Reid, General Manager of Access Barrie
CAO Approval	M. Prowse, Chief Administrative Officer

The purpose of this memorandum is to provide members of Council with an update concerning the pilot of two (2) Battery Electric Bus (BEB). During this pilot program City staff will be gathering metrics and KPI's for a 12-month period and provide regular updates to Council. This memo is for the testing completed thus far for the Summer (June – August) of 2025.

City staff have collaborated with the Operating Contractor to complete the summer phase of testing the BEB's. In June, City Staff established a baseline measurement, where the BEB operated in the Transit Network with no passengers and stops made on 50% of the designated bus stop.

In July and August, the BEB's went into standard full service in the Transit Network. In this phase of the testing, BEB's were operating in normal passenger load and weather conditions for the summer season.

Performance data from June through August:

	June (Baseline)	July	August
Mileage (km/kWh)	1.08	0.97	0.99
Regenerative Braking Ratio*	0.41	0.37	0.40
Estimate Range (km)	320	287	293
Average Passenger Load	0	17	15
* Regenerative Braking Ratio = Regenerative Energy /BEB Energy Consumption			

Table 1. BEB operational performance

It is important to note that while the manufacturer advertises the battery capacity as 520 kWh and estimated range of 408km, only 87% (452.4 kWh) of capacity is usable due to a built-in manufacturer buffer designed to protect and extend battery life. Furthermore, to avoid fully depleting the battery and disrupting service, the current procedure is to return to the garage when the battery reaches 30% (156 kWh) remaining capacity as a safety margin. This leaves a net usable energy of 296.4 kWh for service.

By fine-tuning operator's behaviour of maximizing energy recuperation through regenerative braking, the BEB's mileage and range could be further extended. The increase in the Regenerative Braking Ratio (i.e. proportion of energy provided by regenerative braking relative to total energy consumed) between July and August demonstrates this trend thus far.

Moreover, decreasing the safety margin before the operator needs to return to the garage (i.e. from 30% to 20%) could also extend the range, but to avoid unnecessary disruptions to service, additional testing and data collection would be needed prior to making that recommendation.

Passengers on the BEB's and weather conditions, also have an impact on performance. It was expected that with a higher passenger load (i.e. more weight), would negatively impact the BEB's performance. From the data collected this Summer, this appears to be the case. In June (Baseline, no passengers) the average estimated range was 320km, but this was reduced as passengers were introduced; 287km and 293km in July and August respectively. For comparison, the City's diesel buses may travel up to 400km for a full day of service. As the City continues to collect data through the coming months, City staff will be able to better compare the temperature impacts to BEB performance.

City Staff also compared the fuel and energy dollar cost per kilometre of a conventional 40' diesel bus versus the 40' BEB's. For this phase of testing, on average, diesel buses cost \$0.42/km while BEB's cost \$0.35/km. Additional data collected in the coming months will help provide a more accurate estimation.

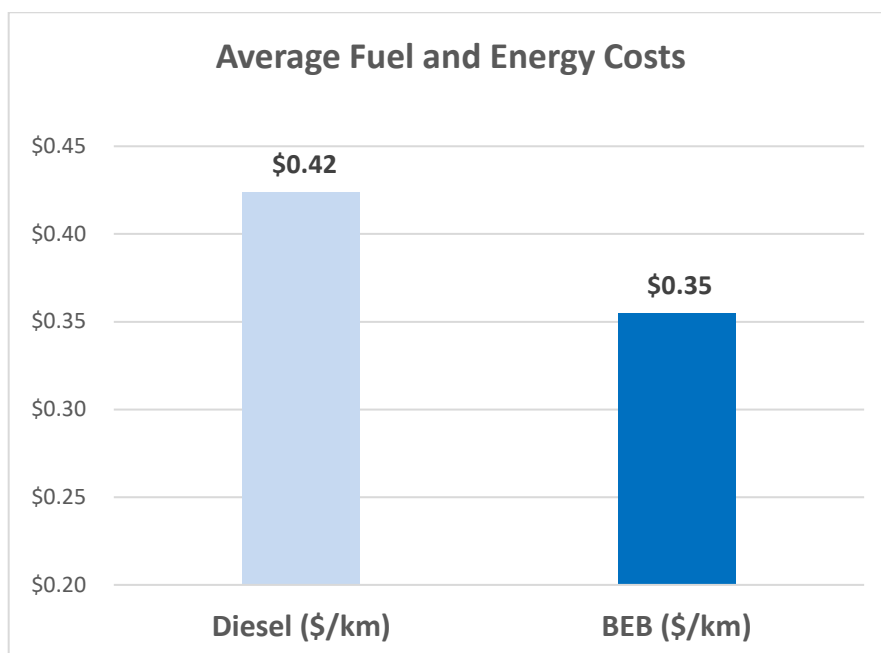


Figure 2 – Average Fuel and Energy dollars per kilometre comparison.

In addition, Barrie Transit is a member of a collaborative industry group Canadian Urban Transit Research & Innovation Consortium (CUTRIC). CUTRIC supports Transit Agencies across Canada, and specifically in Ontario: York Region Transit, Toronto Transit Commission (TTC), Brampton Transit, Kingston Transit and Grand River Transit (GRT) are all members of CUTRIC.

CUTRIC connects members and consolidates data from member Transit Agencies to provide technical expertise and support in planning the transition to zero-emission vehicles. And as a member, City staff will be sharing the Pilot program data with CUTRIC and will be required to sign a Non-Disclosure Agreement (NDA) with CUTRIC that protects their proprietary methodologies as well as the City's data shared amongst the members. The City's own data and any analysis completed by the City will remain the City's property and will not bound by this NDA.

City staff will continue with testing and refinement of policies and procedures throughout the next phase of testing and will report back again in the next quarter.

Appendix:

Not Applicable

Memo Author:

E. Chen, Manager of Transit Fleet, Barrie Transit

File #:

Pending #:

Not Applicable