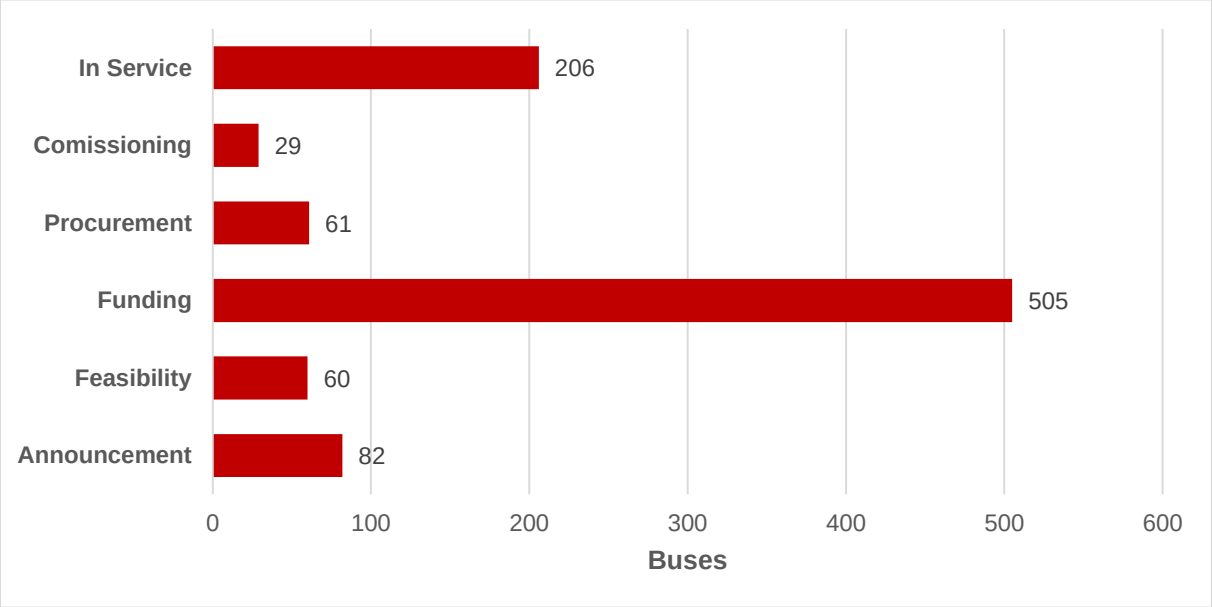
Zero Emission Bus Jurisdictional Scan

The use of zero emission bus (ZEB) fleets is becoming more attractive to cities seeking to reduce greenhouse gas emissions. ZEB fleets provide benefits such as lower fuel and maintenance costs, and reduced greenhouse gas emissions. Adoption of ZEBs varies across Canada; however, with the recent rollout of federal and provincial funding and financing incentives many municipalities have accelerated ZEB projects. The Zero Emission Transit Fund (ZETF) alone aims to support the purchase of 5,000 ZEBs by 2025 (Government of Canada, 2022).

The Canadian Urban Transit Research and Innovation Consortium's (CUTRIC's) "Canadian ZEB Database" provides the most recent survey of ZEB projects in Canada as of April 2022. It is collected by directly soliciting data from transit agencies as well as data from the public domain (CUTRIC, 2022). According to CUTRIC there are currently 206 Battery Electric Buses (BEB) in service in Canada along with many buses in the funding phase to be deployed in the near term, Figure 1.

Figure 1: Zero Emission Bus counts by stage in Canada (CUTRIC, 2022)



Relevant Feasibility Studies

Edmonton Transit Service and Saskatoon Transit have completed demonstration projects and reports that outline the operational and environmental considerations of operating electric buses in cold climates. The outcomes of these reports are listed below.

Edmonton Transit Service (ETS) Feasibility Study (MARCON, 2016)

In 2016, ETS completed a feasibility study and field trialed two models of 40-foot BEBs. Both models had auxiliary diesel heating. An evaluation period of five weeks was completed on test routes and operational data was collected. The test program was designed to determine how well BEBs performed in winter conditions in Edmonton. Here are some of the key highlights of the feasibility study:

- Based on data collected from the trial, the study determined that BEBs perform as reliably as the rest of the diesel fleet,
- BEBs have environmental benefits with an estimated 38-44% reduction in GHG emissions,
- Based on results of the field trial, BEBs can be expected to operate effectively in winter months,
- The field trial demonstrated that operators could adapt quickly to the test vehicles with minimal amount of training, and
- The relatively short range of BEBs means more buses will be required to provide the same level of service and may result in the re-design of service.

Saskatoon Transit Electric Bus Performance Report (Saskatchewan Research Council, 2022)

In 2020, Saskatoon Transit began a one-year demonstration project to test one 40-foot BEB. A key goal of the project was to collect comprehensive operational data in various weather conditions. The results of the project include the following:

- In terms of reliability, the BEB performed as well as the diesel bus fleet in extreme temperatures,
- The effective range of the BEB was between 175 km and 361 km throughout the test period, with the lower range during the colder months,
- The maintenance cost for a BEB with an annual mileage of 50,000 km was $9,000 per year compared to $43,000 for a diesel bus per year,
- The BEB was estimated to have 47% lower GHG emissions than a diesel bus, and
- The use of auxiliary diesel heater in the winter resulted in a higher operating cost but increased the overall range of the BEB in colder months.

The City of Calgary continues to participate in forums and working groups dealing specifically with lessons learned and best practices from other transit agencies in Canada that have deployed zero emission buses. Table 1 below provides a jurisdictional review of zero emission bus projects in other transit agencies across Canada.

Table 1 – Completed and Ongoing Zero Emission Bus Projects

CITY	TRANSIT AGENCY	PROGRAM DESCRIPTION
Banff	Roam Transit	First three Proterra 40-foot BEBs launched in 2021 using plug in charging at the new Roam Transit Operations and Training Centre
Barrie	Barrie Transit	Metrolinx study to support transition to ZEB fleet is underway.
Brampton	Brampton Transit	Part of CUTRIC's Pan Canadian Demonstration, Brampton Transit has committed to eight BEBs in total including on route fast charging. The first bus was delivered and in service since Spring 2021.
Burlington	Burlington Transit	Burlington Transit has started planning work and develop a transition plan.
Edmonton	Edmonton Transit Service	In 2016 completed a winter feasibility study of two 40-foot BEBs. As of 2022, 60 40-foot Proterra buses are currently in service.
Grande Prairie	Grand Prairie Transit	Two 30-foot BEB shuttles were deployed in 2019.
Guelph	Guelph Transit	Announced the purchase of four BEBs in 2021 from with expected delivery in 2022.
Kingston	Kingston Transit	Metrolinx study to support transition to ZEB fleet is underway. Kingston Transit's first two BEBs went into service in the summer of 2021. Their 2022 budget includes the purchase of five more buses for delivery in 2023.
Laval	Société de transport de Laval (STL)	Launched first BEB in 2019. In total, as of 2021 they have 10 BEBs deployed.
London	London Transit	Council approval to purchase 10 40-foot BEBs in 2021 including both depot and on route charging. Buses are anticipated to be deployed in 2023
Longueuil	Réseau de transport de Longueuil (RTL)	Deployed five 30-foot BEBs in the summer of 2021.
Montreal	Société de transport de Montréal (STM)	As of 2022, STM has 42 BEBs including both 40-foot and 30-foot buses.
Ottawa	OC Transpo	First four 40-foot were put into service in 2021.
Saskatoon	Saskatoon Transit	Saskatoon Transit completed a pilot project of one leased 40-foot BEB.
St. Albert	St. Albert Transit	Seven 35-foot BEBs in service and started their electrification program in 2016.
Toronto	Toronto Transit Commission	60 40-foot BEBs are currently in operation.
Vancouver	Translink	Translink deployed four electric buses in 2019 as part of CUTRIC Pan Canadian Demonstration trial. An additional 15 BEBs were announced in 2021, and testing of these buses started in 2022.
Various Ontario Municipalities	Metrolinx	Metrolinx is piloting two battery electric double deck buses this year.
Victoria	BC Transit	Victoria piloted one 40-foot BEB in 2018. Subsequently, they have signed a non-exclusive contract in May 2022 for up to 500 BEBs and charging infrastructure. One BEB to be deployed in Victoria in Fall 2022 with ten more in the summer of 2023.

Waterloo	Grand River Transit	Regional Council approved purchase of six electric buses in 2022 and five in 2023 for pilot project. First six buses are being provided by Nova, with first deployment in 2023.
Winnipeg	Winnipeg Transit	In 2014, Winnipeg Transit started a demonstration project with four leased BEBs deployed for four years with on route charging.
York Region	York Regional Transit	As part of Pan Canadian Demonstration, York Regional Transit currently operates ten BEBs as part of a pilot project.

References

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