



Working towards a fully electric fleet

Report for The Atmospheric Fund (TAF)

Durham Region Transit (DRT)

E-Mission Zero Fleet Electrification Program



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Executive summary

This report summarizes Durham Region Transit's (DRT) Scaling up to Zero Emission Transit project, supported by The Atmospheric Fund (TAF). The project was focused on delivering DRT's pilot project, which included DRT's first six battery-electric buses, and charging infrastructure; and captured practical lessons that can help other transit agencies derisk and accelerate electrification.

This project is part of DRT's E-Mission Zero program, which aims to eliminate emissions from transit operations. The pilot demonstrates the feasibility of electrification and provides valuable insights for scaling up. By installing

charging infrastructure and deploying six battery-electric buses, DRT is laying the foundation for a fully electric fleet by 2037.

The project faced a number of challenges, including supplier bankruptcy; delays in getting key electrical equipment; and a [major depot fire](#), which required changes to the project's scope and design. Despite this, infrastructure was successfully commissioned, and operations continued through the use of temporary charging solutions until permanent equipment was installed.

Quick notes

- TAF Grant project: Scaling up to Zero E-Mission Transit in the Region of Durham (Grant #G MAY 202001).
- Charging infrastructure: commissioned; substantial performance achieved December 2024.
- Buses supported: six battery-electric buses delivered September 2024.
- Temporary operational measures during commissioning gap: secondary 20-kilowatt (kW) level three fast chargers and diesel generator were used while waiting for the necessary electrical equipment.
- Ongoing work: performance monitoring and planning for future expansion will continue as part of DRT's electrification program.

1.

Project overview

TAF funding supported early work to scale up zero emission transit in Durham Region, specifically, planning and delivering facility charging infrastructure to enable DRT's first battery-electric buses and to capture lessons for broader fleet transition.



Scope delivered (summary)

- Executed an Engineering, Purchase, Construction, Operations and Maintenance (EPCOM) agreement (in quarter one of 2023) with Oshawa Public Utilities Company (PUC) Energy Services (OPUCES) to deliver charging infrastructure; Ramco served as design/build subcontractor.
- Advanced detailed design and construction, including design adjustments in response to site constraints and disruptions.
- Commissioned infrastructure to support six battery-electric buses, with design allowances for future expansion (additional charging ports).

Timeline of events

Milestone	Outcome
EPCOM executed	Quarter one of 2023.
Design / procurement	2023 to 2024 (iterative design, longlead procurement).
Construction	Administered across 2024; substantial performance achieved December 2024.
Buses delivered	September 2024
Commissioning and handover	Commissioned; closeout and handover progressed into early 2025.



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What worked

- Contracting structure: an EPCOM delivery model, a single-delivery approach, was used to align design, construction and ongoing operations and maintenance.
- Early ordering of long-lead items (where feasible) helped reduce further schedule slippage in a volatile supply environment.
- Temporary solutions were used to keep operations on track while permanent electrical components were delayed. Design for scalability: infrastructure design considered future expansion capacity.

From idea to impact: Maintaining operations during transformer delay



A step-down transformer converts high-voltage electricity from the grid into a lower voltage suitable for operating equipment and charging infrastructure. When the step-down transformer delivery was delayed, DRT used temporary measures, including a secondary 20-kilowatt (kW) charger at a nearby site and a diesel generator, to support vehicle testing, training and ongoing charging until permanent equipment was installed.

3.

Roadblocks

- Supplier concentration risk: the bankruptcy of a key distributor required renegotiation and finding a new supplier, which impacted the project schedule and delivery sequencing timelines.
- Long-lead electrical components: delays in transformer delivery created a gap between bus delivery and permanent infrastructure readiness.
- Facility disruption: a depot fire required design rework and relocation of charging equipment outdoors. Note: The depot fire was not related to battery electric vehicles nor charging equipment.
- Market volatility: increased costs and site constraints led to changes in scope, including switching from overhead chargers to plug-in chargers and reducing the number of buses ordered.



From idea to impact: Adapting after a depot fire



Following the depot fire, DRT reassessed remaining structures and updated the design to relocate charging equipment outdoors. This meant finding new solutions through option generation exercises, design change management and co-ordinating of works, while keeping safety and constructability at top of mind.

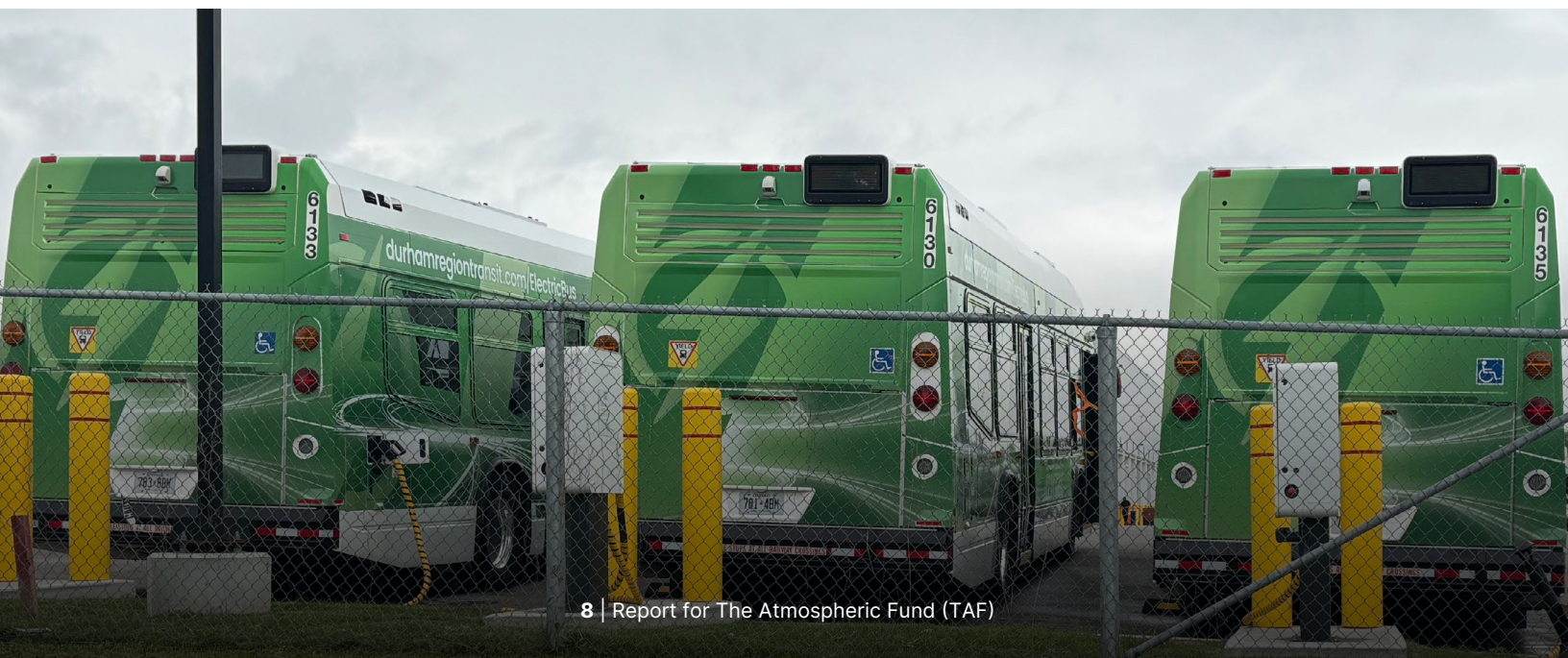


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Recommendations for scaling

These recommendations are intended to be practical, repeatable, and appropriate for transit agencies at early stages of electrification:

1. Diversify critical suppliers and validate financial stability for key components (avoid single points of failure).
2. Budget and plan for volatility: include contingency allowances and flexible contracting to manage scope changes.
3. Treat key electrical equipment, such as transformers (which adjust voltage to safe levels) and switchgear (which controls and protects the flow of electricity) as critical by securing it early and maintaining backup operational plans.
4. Design for expandability and interoperability: plan for power needs through load capacity studies, standards and space requirements early to avoid making changes and rework as project progresses.
5. Integrate commissioning, training, and handover into the baseline schedule (not endloaded).
6. Co-ordinate adjacent projects explicitly (duct banks, vaults, and site works) to reduce future disruption and doublehandling.



From idea to impact: Implementation checklist



- Procurement: define interoperability/standards; include contingency/cash allowance; require supplier risk disclosures.
- Electrical: confirm utility service approach; validate transformer availability and delivery windows; plan for temporary charging.
- Operations: define charging roles (driver vs. dedicated staff); develop standard operating procedures (SOPs); include safety/ergonomics (e.g., cable retractors, bump stops).
- Data: define baseline and methodology early; validate dashboard filters and definitions before publication.

5.

Next steps and acknowledgement

Next steps – Phased electrification rollout and supporting initiatives

Phase one: Expansion of charging infrastructure

Building upon the success of the pilot project, which saw the installation of six charge points and associated distribution equipment, with deliberate provisions for future expansion. DRT is leveraging the lessons learned to drive a wider, phased deployment of electrification across its entire depot network. The upcoming stage, referred to as Phase 1, will deliver an additional 24 plug-in charge points, new distribution equipment, and a dedicated utility service. These enhancements are designed to accommodate the next cohort of battery-electric buses, including the scheduled delivery of 25 electric buses in 2026, 7 delivered in quarter one, and 18 in quarter four, further advancing DRT's commitment to sustainable transit solutions.

Phase two: Facility rebuild and integrated charging

Concurrently, plans for phase two involve the reconstruction of the storage area affected by fire. Electrification will be fully integrated into the new facility concept, resulting in additional charging capacity. This redevelopment aims to create a cohesive, purpose-built environment that supports both charging and fleet storage, thereby providing a scalable solution to accommodate ongoing fleet expansion.

Supporting system performance and scalability

Alongside these infrastructure upgrades, DRT is pursuing several complementary initiatives to enhance overall system performance and scalability. A pilot project pairing battery energy storage with depot charging is underway. It is intended to evaluate operational applications and gather key insights for future electrification deployments. Additionally, a distributed energy resources (DER) study is in progress to assess grid constraints, inform load management strategies, explore opportunities for solar integration, and provide guidance on optimal storage sizing to support Phase 2 and subsequent phases.

Implementation of charge management system

To further strengthen operational oversight, DRT has initiated the deployment of a charge management system. This system will centralize the monitoring and control of charging activities, enhancing performance reporting in conjunction with existing telemetry and operational data collection. The result will be improved quality and reliability of metrics for both internal decision-making and external reporting, ensuring that performance keeps pace with the growing electric bus fleet.

Acknowledgements

DRT acknowledges The Atmospheric Fund (TAF) for its funding and partnership. TAF's support helped accelerate early electrification planning and implementation, driving and enabling significant progress at a critical stage.

While most federal and provincial contributions are directed toward capital investments, TAF stands out as one of the rare organizations dedicated to addressing operational needs. This focus is vital for organizations seeking to move the sector forward, particularly considering staffing and operational constraints.

Through this program, TAF has been an essential catalyst in overcoming these barriers and accelerating the transition to electrification.

The achievements outlined in this report reflect the collective efforts of our team, our partners, and our supporters. The progress made is only the beginning; with continued collaboration and commitment, we are confident that the future of sustainable transit in our region is bright. Thank you to everyone who contributed to making this success possible.



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