# Embedding Equity in Canada's Transition to Electric School Buses


Canadian Electric School Bus Alliance

Green Communities CANADA

Équiterre

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# About CESBA

Led by Green Communities Canada, in partnership with Équiterre, the Canadian Electric School Bus Alliance (CESBA) is an initiative that brings together various provincial and national school bus actors, including school boards, environmental organizations, and bus manufacturers. Their goal is to advocate for policies that can accelerate the transition from fossil fuel-powered school buses to electric school buses, aligning with Canada's climate targets. With the support of a steering committee, CESBA gathers insights and best practices to formulate recommendations and implement engagement strategies aimed at mobilizing decision-makers and increasing awareness of the issue. This project spans across Canada and draws upon best practices from North America and beyond, with a focus on specific regions or provinces, including Atlantic Canada, Quebec, Ontario, and British Columbia.

This project aims to:

- Strengthen the network of actors involved in school bus electrification across Canada;
- Increase knowledge transfer and sharing of best practices around school bus electrification;
- Increase awareness of the social and environmental justice issues related to the transition to electric school buses;
- Increase federal policy support for the electrification of school transport.

### About Green Communities Canada

Founded in 1995, Green Communities Canada (GCC) is a national non-profit and charitable organization consisting of 24 community-based environmental organizations working together for a vibrant, equitable, and sustainable future. GCC connects community-based climate action groups through a national network to share resources, inspire innovative programming, and elevate our collective impact.

### About Équiterre

As one of the main environmental organizations in Quebec, Équiterre seeks to make the necessary collective transitions towards an equitable and environmentally sound future more tangible, accessible, and inspiring. Since 1993, Équiterre has worked with citizens, organizations, and governments to develop projects in transportation, agriculture, energy, consumption, and climate change.

# II. Land Acknowledgment

We respectfully acknowledge the longstanding history that has brought us to reside on the land now called Canada—land that has been stewarded since time immemorial by Indigenous Peoples across Turtle Island. We recognize the deep and ongoing relationship that First Nations, Inuit, and Métis communities maintain with these territories, and the reality that many of these lands are unceded and were taken without consent. We also recognize that even when treaties were signed, they were often done so under unfair conditions that were not carried out in good faith.

We encourage all settlers, newcomers, and visitors to learn about the complex histories and present-day realities of colonization, and to reflect on how we each can meaningfully contribute to truth, justice, and reconciliation with Indigenous Peoples.

As we work toward a cleaner, more just future—including the transition to electric school buses—we must recognize that climate justice and reconciliation are deeply connected. This includes responding to the **Truth and Reconciliation Commission's Calls to Action**, such as:

- **Calls to Action 10, 11, and 12**, which call for equitable, culturally appropriate education for Indigenous children—something clean, reliable, and safe transportation can support;
- **Call to Action 17**, which affirms the right of Indigenous Peoples to reclaim traditional names, identities, and languages, often erased through colonial systems like the residential school system;
- **Call to Action 18**, which calls for recognition and respect for Indigenous healing practices and equitable health outcomes—including cleaner air and healthier environments for children and communities; and
- **Call to Action 43**, urging all levels of government to fully adopt and implement the United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP) as a framework for reconciliation.

# III. Anti-Racism Acknowledgment

We acknowledge that racism—whether individual, institutional, or systemic—continues to shape the lived experiences of Black, Indigenous, and communities of colour across Canada, including how people access safe transportation, clean air, and healthy environments.

As we work toward school bus electrification, we must recognize that environmental initiatives do not exist in isolation from social justice. Historically, environmental harms—such as air pollution from diesel buses and traffic congestion—have disproportionately impacted racialized communities, especially those living in under-resourced neighbourhoods. These disparities are not accidental; they are the result of systemic racism embedded in our infrastructure, planning, and policy decisions.

We believe that the shift to electric school buses is not only a climate solution—it is an opportunity to build a more equitable and just future. Anti-racism means asking: *Who benefits from these changes? Who is left out? And how can we ensure that solutions are created by and for the communities most affected by environmental and racial injustice?*

We commit to advancing this work in ways that centre equity, challenge exclusion, and elevate the leadership of communities historically marginalized by systemic racism. We acknowledge that true progress requires listening, learning, and acting with humility and accountability.

We invite everyone involved in school transportation, climate action, and education to reflect on how they can build anti-racist principles into their work—ensuring that the path to a cleaner, healthier future includes justice for all.

# IV. Glossary of Terms[1]

**Accessibility:** The extent to which services, resources, and opportunities are usable by all individuals, regardless of physical abilities, socio-economic status, or location. It includes designing systems to meet diverse needs, ensuring equitable access, and addressing barriers to participation.

**Equity:** The effort to provide different levels of support based on an individual's or group's needs in order to achieve fairness in outcomes. Working to achieve equity acknowledges unequal starting places and the need to correct the imbalance.

**Equity-Deserving Groups:** A group of people who, because of systemic discrimination, face barriers that prevent them from having the same access to the resources and opportunities that are available to other members of society, and that are necessary for them to attain just outcomes (Government of Canada, 2022).

**Environmental Equity:** This concept is broadly understood to mean that no single group or community is at a disadvantage when dealing with hazardous environmental exposures or pollution, regardless of their diversity or social position. It requires the fair treatment and meaningful involvement of those who are or could be affected by environmental decision-making (Government of Canada, 2023).

**Environmental Justice:** The fair treatment and meaningful involvement of all people in environmental laws and policies. It addresses the disproportionate environmental burdens on racialized and low-income communities, seeking to recognize and remediate the adverse human health and environmental effects on these communities (Initiative for Energy Justice, 2019).

**Environmental Racism:** The disproportionate exposure of Indigenous and racialized communities to pollution and hazardous activities, the lack of political power to resist these placements, and the implementation of policies that sanction harmful environmental conditions (Bullard, 2002).

**Inclusion:** A state where individuals from diverse backgrounds are valued, integrated, and welcomed equitably as decision-makers and collaborators. It involves providing opportunities for all to grow and feel they belong, ensuring acceptance without the need to assimilate.

[1] Unless cited otherwise, all definitions are adapted from the Center for the Study of Social Policy (2025).

**Indigenous Decolonization:** The repatriation of Indigenous land and life, and the ongoing efforts to contest and reframe narratives about Indigenous histories and the impacts of colonialism. It involves adopting Indigenous perspectives and practices, and repositioning knowledge within Indigenous cultural contexts to address historical injustices.

**Institutional/Systemic Racism:** Practices and policies that perpetuate racial disparities; for example, upholding White supremacy by disadvantaging people of colour. These laws and practices create different outcomes based on race, often without explicitly mentioning any racial group.

**Justice:** The process of transforming an unfair or inequitable state into one that is fair and equitable. It involves community efforts to address past and present harm and proactively enforce policies and practices that ensure equitable access, opportunities, treatment, and outcomes for all, regardless of identity.

**Just Transition:** A transition away from the fossil-fuel economy to a new economy that provides dignified, productive, and ecologically sustainable livelihoods, along with democratic governance, and ecological resilience (Initiative for Energy Justice, 2019).

**Marginalization:** The process that occurs when members of a dominant group relegate a particular group to the edge of society by not allowing them an active voice, identity, or place for the purpose of maintaining power.

**Race:** A social and political construct, without a genetic or biological basis, used to categorize and divide people based on physical appearance, ancestry, and ethnicity. It has been used to justify domination, exploitation, and violence against non-White individuals.

**Racism:** The systematic subjugation of other racial groups to uphold the societal supremacy of the dominating racial group. Unlike prejudice or discrimination, racism involves one racial group having systematic power over others, supported by institutional structures, policies, cultural norms, and individual behaviours.

**Social Justice:** The principle that all individuals should have equal rights and opportunities, and that the wealth and resources of a country should benefit everyone. It encompasses the fair treatment and equitable status of all individuals and social groups within a society.

**Transportation Equity:** The fair or just distribution of transportation costs and benefits among current (and future) members of society (Litman, 2002).

**White Supremacy:** An institutionally perpetuated and ever-evolving system of exploitation and domination that consolidates and maintains power and resources among White people.

# V. Executive Summary

**Canada's transition to electric school buses promises cleaner air and healthier communities–but who is benefitting and who is being left behind?**

This report examines the equity impacts of the transition across five lifecycle phases: resource extraction, manufacturing, adoption, use, and disposal. Using literature review, desktop research, actor mapping, and interviews, it highlights how equity-deserving groups–such as Indigenous communities, students with disabilities, and bus drivers–are affected, and presents recommendations to embed equity in the transition.

## Key Findings

- **Resource Extraction:** While resource extraction is essential to powering Canada's electric school bus transition, it raises equity concerns—particularly for communities near mining sites and for workers in the mining sector—both in Canada and in the Global South. These impacts include environmental degradation, threats to Indigenous sovereignty, gender-based violence, and unsafe or inequitable labour conditions.
- **Manufacturing:** Electric school bus manufacturing brings jobs, but not always equally. Most manufacturing is based in Quebec and the U.S., limiting access elsewhere. Workers face low wages, job insecurity, and few retraining options—especially as electric buses can require less labour.
- **Adoption:** Electric school bus rollout is uneven across Canada. Students with disabilities, Indigenous and rural communities, small operators, and underfunded school districts face more barriers—like high costs, administrative burden, limited vehicle availability, and lack of charging infrastructure.
- **Use:** Electric school buses improve air quality and reduce noise, but they can bring new challenges. Rural drivers, senior staff, and mechanics face technical and training hurdles, while routing and bus design often overlooks equity-deserving communities and students with disabilities.
- **Disposal:** Canada lacks a clear plan for retiring electric school bus batteries and the thermal buses they replace. Recycling facilities are often near low-income or racialized communities, and old diesel buses are sometimes exported to countries with weaker environmental protections—shifting the burden elsewhere.

## Recommendations

To address these challenges and ensure a just transition, the report offers the following policy recommendations:

1. **Ensure all new electric school buses are accessible** by updating procurement guidelines and safety standards to support a wider range of models with universal design features.
2. **Improve Indigenous access to electric school bus funding** by adapting federal program criteria to community realities, expanding dedicated funding streams, and supporting grant-writing capacity.
3. **Increase school transportation funding for under-resourced communities** by revising provincial and federal budgets to cover higher upfront electric school bus costs and support small fleet operators.
4. **Prioritize electric school bus funding for underserved areas** by targeting "High-Priority Zones" using air quality and census data to help equalize health outcomes.
5. **Improve wages and working conditions** for school transportation staff by increasing operational funding and including Living Wage standards in contracts.
6. **Build a skilled electric school bus maintenance workforce** by expanding EV training programs, modernizing apprenticeships, and ensuring mechanics have repair access through procurement contracts.
7. **Enable the safe use of repowered school buses** by funding pilot projects, updating safety standards, and allowing extended use of certified converted vehicles.
8. **Regulate the export of decommissioned school buses** to countries with weaker protections by updating export controls.
9. **Adopt Extended Producer Responsibility policies** for electric vehicle batteries to ensure safe recycling, hold manufacturers accountable, and protect communities from disproportionate environmental harm.

# VI. Table of Contents

# 1. Introduction

Canada is in the early stages of transitioning from traditional diesel-powered school buses to electric school buses (ESBs). This shift is being led by provinces like Quebec, Prince Edward Island (P.E.I.) and British Columbia (B.C.). Currently, about 4% of the national school bus fleet has been electrified (CESBA, 2025).

The transition to ESBs is associated with numerous benefits in comparison to their thermal equivalent, including improvements in physical and mental health, enhanced academic performance, cost savings, economic opportunities, and increased grid resiliency (Pollution Probe et al., 2023). Despite these advantages, ESB advocates and stakeholders are increasingly concerned that equity has not been sufficiently embedded in the transition to ESBs thus far, which could risk further equity issues, similar to those faced by electric vehicles (EVs) (Moses & Brown, 2023). These concerns arise from factors such as the location of extractive industries required for ESB materials, the design of ESB procurement and funding schemes, and the communities served by ESBs.

This report aims to explore these equity implications related to the ESB transition in Canada. The main contents of the report will investigate equity through the five phases of the ESB lifecycle: resource extraction, manufacturing, adoption, use, and disposal. These phases will describe the context and cover equity implications related to identified equity-deserving groups, including school bus drivers, disabled students, Indigenous communities, and more. The report will conclude with a comprehensive set of recommendations to ensure equity is prioritized in Canada's ESB transition, including recommended areas for further research and an action plan.

This report hopes to demonstrate that without an equity-centred approach from the outset, the shift to ESBs risks exacerbating existing inequalities rather than fostering a more just and sustainable future.

# 2. Methodology

## 2.1. Scope

This report initiates introductory, exploratory research on the topic of equity and justice in Canada's ESB transition, touching on all aspects of the ESB lifecycle. Key equity implications explored include:

- Are all communities experiencing equal benefits and harms through this transition?
- How are equity-deserving communities being meaningfully engaged to ensure their needs are met?
- How can we protect all communities and the environment throughout the ESB transition?

A comparative analysis of equity in the internal combustion engine (ICE)[2] bus industry was beyond the scope of this research, but the existing impacts of fossil fuel are acknowledged.

## 2.2. Objectives

The objectives of this exploratory research are to:

1. Assess the availability of data and research on these topics;
2. Identify important equity implications across the ESB lifecycle; and
3. Make preliminary recommendations and propose areas for further research.

## 2.3. Methods

This report employed a mixed-methods approach combining literature review, desktop research, actor mapping, and interviews. The literature review was built on U.S.-based research relevant to the Canadian context, while desktop research examined ESB adoption trends, environmental justice concerns, air quality, and infrastructure capacity within Canada.

Building on this research, a detailed actor mapping and preliminary impact assessment were conducted to identify and analyze key actors involved in the ESB transition, based on their influence, interest, and involvement (Appendix I). Actor categories included: governments

[2] This includes both diesel and propane school buses. "ICE buses" and "thermal buses" are used interchangeably to refer to both. When referring specifically to diesel buses—the majority of the fleet—we use "diesel" only.

(federal, provincial, and First Nations); student transportation administrators; school bus manufacturers and operators; unions and industry associations; advocacy groups and non-governmental organizations (NGOs); students; and utilities. This analysis revealed that governments, transportation administrators, and manufacturers hold the greatest interest and influence, whereas operators, NGOs, and students are highly involved but have comparatively limited power.

To ensure an inclusive approach, the methodology also incorporated additional equity-deserving groups, whose characteristics are detailed in Appendix II. Key actors, impacted communities, as well as intersecting identities, are highlighted throughout the report to provide additional context on the associated equity implications of the electrification of school buses.

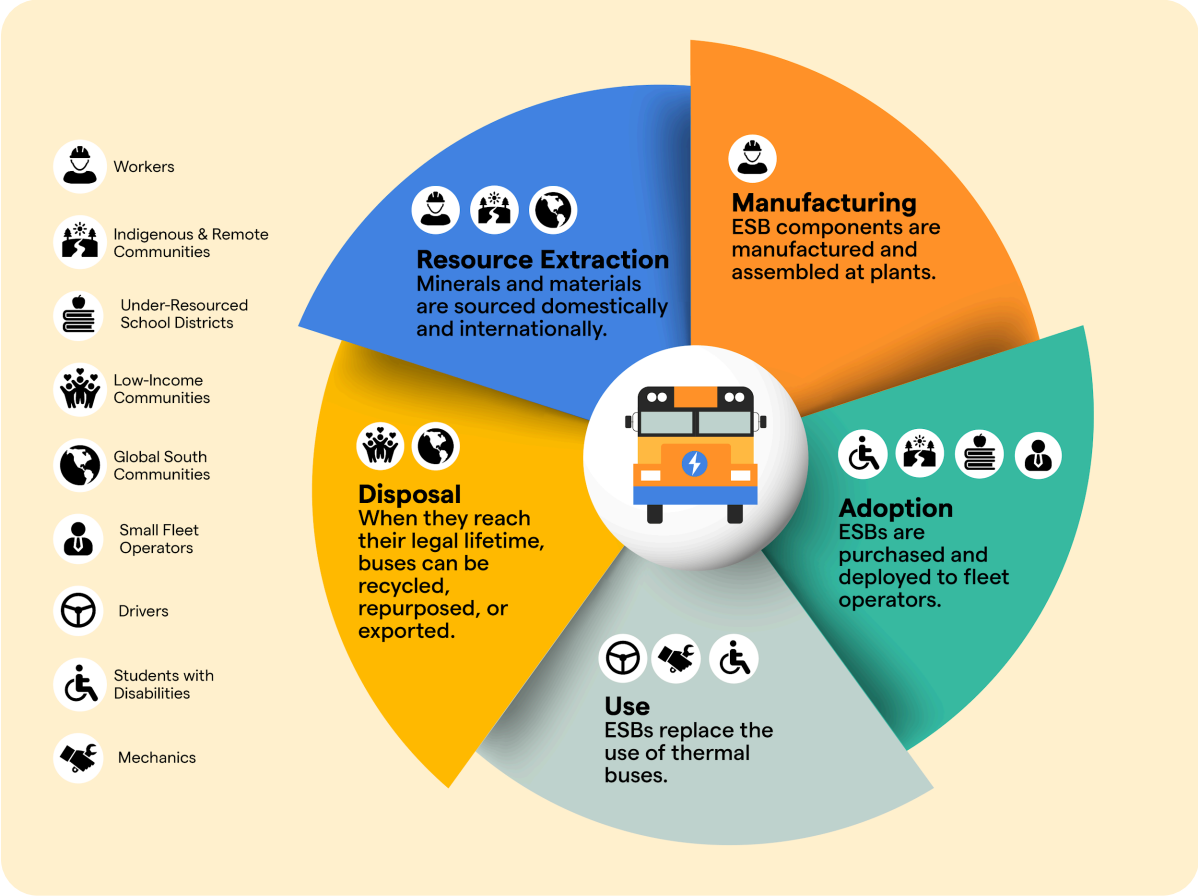
These insights informed the interview phase of the research, which included fifteen interviews with representatives from equity-deserving groups, the school bus sector, and all levels of government. These were complemented by informal conversations and additional meetings. Interviews were conducted across Canada, including in Yukon, P.E.I., Quebec, Ontario, and B.C., to capture a wide range of regional perspectives and lived experiences. A full list of interviewees is provided in Appendix III.

To validate and refine the findings, a draft of the report was circulated to cited interviewees, as well as select CESBA funders and members for feedback. Special thanks to Pollution Probe for their valuable input on this report.

# 3. Lifecycle Assessment

The environment and equity impacts associated with any product must consider the full lifecycle, from raw materials to waste disposal. For ESBs, the lifecycle begins at resource extraction for the variety of materials and minerals needed. Next, the ESBs are manufactured and adopted by the fleet operators who have purchased them. The ESBs are then used in practice, transporting children and others to schools, on field trips, and to other destinations. Finally, an ESB (or the bus it replaces) reaches the end of its life, and the bus will either be repurposed, disposed of, or certain parts will be recycled.

**Figure 1. Overview of the Electric School Bus Lifecycle.**




## 3.1. Resource Extraction

Resource extraction is a pivotal component in the transition towards ESBs, supplying essential materials for their batteries. However, this phase of the ESB lifecycle presents significant equity

concerns, both domestically and internationally, due to the impacts of mining on affected communities. This section will begin by outlining the resource extraction process integral to ESBs, then examine the specific communities most impacted by mining activities, and briefly explore the global implications of Canada's mining industry.

### 3.1.1. Context

ESBs are constructed using a variety of materials and minerals essential for their different components, similar to EVs. The body and chassis of the bus are primarily made from steel. Glass is used for windows, while rubber is essential for tires and various seals. Plastics are utilized in interior fittings and exterior panels. The batteries, which are the heart of ESBs, require specific minerals such as lithium, nickel, manganese, iron, phosphorus, and cobalt to store and deliver energy efficiently. Graphite is used as an anode material in these batteries. Copper is crucial for electrical wiring and components (American Bus Sales, 2023; Kothari, 2022; Barbanell, 2023). Rare earth elements are used in the production of electric motors and other electronic components, with EVs using up to 400% more copper than gas-powered vehicles (Nguyen, 2023). These materials and minerals can be sourced domestically or internationally, as illustrated below.

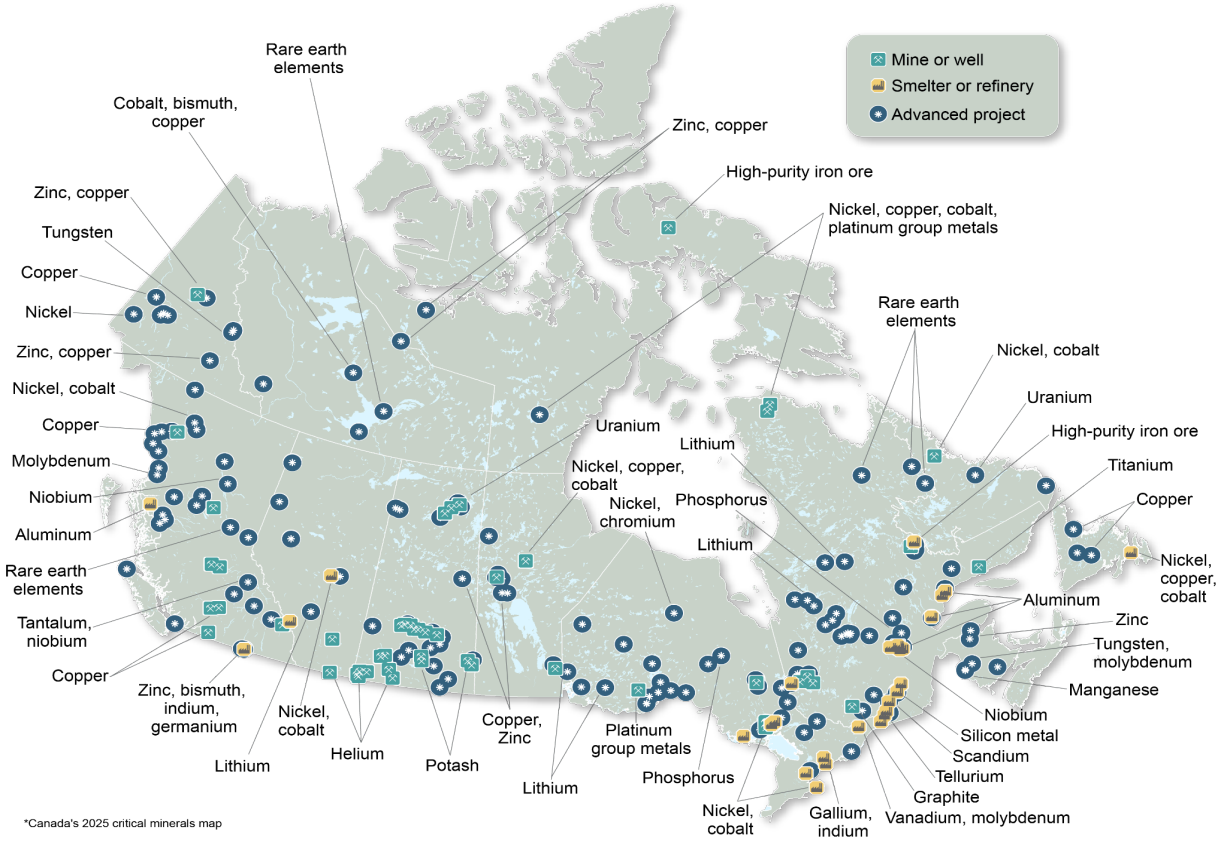
**Table 1. Domestic and International Sources for ESB Components.**

| Material | Domestic Source | International Source |
|---|---|---|
| Steel | Ontario and Quebec | China, Japan, South Korea, U.S. |
| Nickel | Sudbury Basin in Ontario | Indonesia |
| Copper | B.C. and Ontario | Chile, Peru, U.S., China, Australia |
| Lithium | Quebec and Alberta | Chile, Australia, Argentina, China |
| Graphite | Quebec | China |
| Rare Earth Elements | Quebec, Northwest Territories, and B.C. | China, U.S., Australia |
| Rubber | Alberta, Saskatchewan, and Newfoundland and Labrador (synthetic rubber) | Indonesia, Thailand, Côte d'Ivoire, Liberia, Vietnam (natural rubber) |
| Glass (silica/quartz sand) | Quebec, Ontario, Alberta | U.S., Belgium, China, Turkey, Germany |

Sources: Backhaus (2021), Boucher (2013), Natural Resources Canada [NRCan] (2025a, 2025b, 2025c, 2025d, 2025e), Observatory of Economic Complexity [OEC] (2025a), OEC (2025b), Pawar (2022), & The Canadian Press (2022).

As shown in Table 1, Canada is rich in minerals essential for ESB production, with mining predominantly located in resource-rich provinces like Ontario, Quebec, B.C., and Alberta. These deposits are often located in remote areas. With the projected increase in EV production, governments are promoting mineral extraction and supporting companies to ensure a stable supply of critical minerals and foster the growth of the domestic EV industry.

**Figure 2. Map of Canada's Critical Minerals.**




Source: Government of Canada (2025).

This growth can come at the expense of communities near mining sites, and mining workers, here and abroad. Although there is currently no specific research on the resource extraction impacts linked to ESBs—likely due to their relatively small share of overall mineral demand—they still rely on the same critical minerals as other EVs. This makes it important to consider how the broader mining sector can directly and indirectly impact equity-deserving groups.

## 3.1.2. Equity Implications

### *3.1.2.1. Indigenous/Remote Communities*

Indigenous communities are disproportionately impacted by mining activities due to their proximity to mineral-rich lands and the disruption of their traditional territories. For example, roughly 85% of lithium reserves are either on or close to Indigenous land (Shorter et al., 2024a).

The extraction of minerals poses serious environmental, social, and governance challenges for Indigenous communities. Toxic tailings, greenhouse gas emissions, and acid mine drainage contaminate ecosystems and threaten human and ecological health (UNDRR, 2023; Linden-Fraser, 2024). A stark example is the Mount Polley mine disaster, which polluted water sources vital to the Xatśūll First Nation (Wood, 2025).

These harms are compounded by social impacts. The influx of transient workers—often housed in temporary "man camps"—is linked to increased rates of violence, harassment, and substance abuse in nearby communities, particularly affecting Indigenous women, girls, and 2SLGBTQQIA+ people (Stoker, 2023; Union of B.C. Indian Chiefs [UBCIC], 2022). Additionally, the loss of land and disruption of traditional practices contribute to mental health challenges, social fragmentation, and economic instability, deepening the intergenerational effects of colonialism.

Economically, EV mining presents both challenges and opportunities for Indigenous communities. While public investments in mining infrastructure can divert resources from essential services and tax breaks reduce public revenues (NRCan, 2025f), mining also offers direct benefits. For example, Community Benefit Agreements (CBAs) can provide revenue for Indigenous governments and employment opportunities, as Indigenous people make up 12% of the mining workforce despite being only 4% of the national labour force (Mining Industry Human Resources Council [MIHR], 2023).

These economic dynamics are shaped by governance systems that often sideline Indigenous authority. Canada's "free entry" mining regime permits companies to stake claims with minimal consultation, and frequently without full consent. This has led to conflicts like the Coastal GasLink pipeline dispute on Wet'suwet'en territory (Bellrichard & Barrera, 2020), highlighting how current frameworks undermine Indigenous sovereignty and decision-making.

Ontario's Ring of Fire region, rich in critical minerals for EV battery production, highlights the tension between economic development and Indigenous rights. In 2025, the province passed legislation to designate the region a "special economic zone," allowing it to bypass provincial laws to fast-track mining (Gray, 2025). While consultation with First Nations is required, the nine communities in the area remain divided—some see economic opportunity, others fear environmental harm and loss of sovereignty (Casey, 2023; Desai & Thornley, 2024).

#### *3.1.2.2. Resource Extraction Workers*

The growth of EV mining in Canada is expected to drive job creation, with a projected 15% increase in employment across the mining and extraction sector (Convery et al., 2024). However, 54% of businesses anticipate wages will remain flat, raising concerns about the quality and sustainability of these new jobs (Convery et al., 2024). Equity in access to these job opportunities is also uneven. While women and immigrants respectively make up for 45-50% and 30% of Canada's overall workforce, they account for only 16% and 10% of the mining workforce (MIHR, 2023). The male-dominated nature of the industry continues to limit access to stable, well-paying jobs for women and gender-diverse people (Marshall, 2020; Dinye & Erdiaw-Kwasie, 2012).

Working conditions also raise equity concerns. Jobs often involve long hours, extended time away from home, and high risks of fatigue, burnout, and mental health challenges. Canada had the second-highest number of known mining accidents globally between 2007 and 2017 (Tuncak, 2020), reflecting ongoing safety issues. These challenges are compounded by declining collective bargaining power, as union coverage in the private sector–including mining–fell from 21.3% in 1997 to 15.5% in 2023 (Statistics Canada [StatCan], 2024), weakening workers' ability to advocate for better conditions. These challenges are even more pronounced in Canadian mining operations abroad, where labour protections are often weaker and regulatory oversight less stringent.

#### *3.1.2.3. Global South*

With nearly 50% of publicly listed mining companies being Canadian (NRCan, 2022), the Canadian mining industry, particularly in the EV sector, also has significant international impacts, raising serious equity concerns for communities in the Global South, including human rights abuses, environmental degradation, and the inequitable distribution of benefits (Business & Human Rights Resource Centre, n.d.).

The Human Rights Council's UN Special Rapporteur, Baskut Tuncak (2020), highlights a pattern of human rights abuses by Canadian extractive industries operating abroad. These abuses are often well-documented yet insufficiently deterred by the Canadian government, necessitating global standards on business and human rights.

Canadian mining operations in Latin America, for example, divert water resources for lithium and copper extraction, exacerbating local shortages (Fernández et al., 2022). Additionally, mining in fragile ecosystems like the Paramos wetlands threatens climate regulation and drinking water sources (V. Herrera, personal communication, November 19, 2024; MiningWatch Canada, 2022).

Countries with mineral resources for EV production often do not benefit equitably from these resources (M. Gadain, personal communication, December 16, 2024). The Canadian government and embassies are complicit in supporting mining projects that sidestep human rights and environmental protections, furthering these inequities (V. Herrera, personal communication, November 19, 2024).

## 3.2. Manufacturing

School bus manufacturing supports tens of thousands of jobs throughout the supply chain, including materials processing, component production, and vehicle assembly. This section will begin by outlining the manufacturing landscape in Canada and will then examine specific equity implications related to workers.

### 3.2.1. Context

Canada's ESB manufacturing capacity is primarily based in Quebec (Pollution Probe et al., 2023), led by Micro Bird (a joint venture between US-based BlueBird Corporation and Quebec-based Girardin) and Lion Electric Company (Lion). Both manufacturers produce various ESB models, from smaller Type A buses to larger Type D transit-like models. Green Power Motor, headquartered in Vancouver, manufactures Type D ESBs in southern California (Pollution Probe et al., 2023). Ecotune is an EV drivetrain integrator within the Type A school bus market and was acquired by Micro Bird in 2021 (Girardin Blue Bird, 2021). Other non-Canadian manufacturers include IC Bus (Traton/Navistar), Thomas Built Buses (Daimler), and Trans Tech, which specializes in retrofitting Type A ESBs (Lion Electric Company [Lion Electric], 2022). Since 2020, Lion has held 45% of ESB sales in North America, BlueBird 40%, and Green Power Motor 14% (Pollution Probe et al., 2023). Lion has been the major supplier for P.E.I. (Government of Prince

Edward Island [Government of P.E.I.], 2024), Micro Bird and Lion for Quebec, and IC Bus for B.C. (Nasdaq, 2021).

Beyond ESB production, motor vehicle and parts manufacturing remains a cornerstone of Canada's economy, generating $14 billion annually and accounting for 12% of total manufacturing Gross Domestic Product (GDP) (Canadian Vehicle Manufacturers' Association [CVMA], 2023). As of 2024, approximately 1.8 million Canadians were employed in manufacturing (StatCan, 2025), highlighting the sector's significant role in the national labour market. As the clean transportation sector grows, it's expected to support over 1.17 million jobs by 2026, with a share rising from 12% to 37% by 2040 (Ernst & Young LLP, 2025). ESB manufacturing offers strong economic potential through job creation—comparable to or exceeding that of light-duty vehicles—alongside benefits like education investments and healthcare savings (Bhardwaj et al., 2023).

## 3.2.2. Equity Implications

### *3.2.2.1. Manufacturing Workers*

The shift toward ESB requires some equity considerations for workers in manufacturing roles, which are among the most impacted by electrification (Elder, 2022). Unlike ICE systems, electric powertrains require fewer components and less assembly time, reducing the overall labour hours needed to manufacture a school bus. This raises concerns about potential job losses and reduced working hours over time.

Moreover, access to new jobs in the electrification sector is uneven, with most ESB manufacturing concentrated in Quebec and the U.S., limiting opportunities elsewhere in Canada. Geographic barriers, skill gaps, and limited retraining programs pose additional barriers—especially for older workers nearing retirement and those lacking formal training or certifications. Job quality also varies widely, affecting wages, security, and overall satisfaction.

Adding to these challenges is the ESB industry's reliance on government subsidies, which makes it vulnerable to policy changes and funding delays. This instability has already led to layoffs—over 200 workers were let go by Lion Electric in early 2024, which they attributed to delayed federal funding (CTV News, 2024). Even with nearly 300 unionized employees at its Saint-Jérôme plant (Saptel, 2024), workers reported concerns over low pay and job insecurity (Boulay, 2024). Similar challenges affect U.S.-based ESB manufacturers like BlueBird, Thomas

Built, and IC Bus, which also face market and funding uncertainties despite having unionized workforces (CityNews, 2024; Labor Network for Sustainability, 2022).

There is limited data on how ESB manufacturing impacts nearby communities, particularly equity-deserving groups. While production can create environmental burdens through energy use, waste, and transportation (ESB Initiative, 2023a), Canada's main ESB manufacturer, Lion Electric, benefits from Quebec's low-emission hydroelectric grid. Still, its emissions have increased with expanded operations, reaching 3,140 tCO 2023 (Lion Electric, 2023). Other manufacturers have also adopted sustainable practices; for example, MicroBird reduced transport emissions by consolidating facilities (Schlosser, 2021), and international OEMs like Thomas Built Buses and Green Power Motor have committed to carbon-neutral goals and waste reduction (Thomas Built Buses, n.d.; Canadian Manufacturing Online, 2024). Ensuring these efforts benefit all communities—especially those with fewer protections—remains essential.

## 3.3. Adoption

The adoption and distribution of ESBs are closely connected to government targets, policies, and funding programs. These factors may contribute to vast differences in ESB uptake between provinces and territories, as well as between various communities. This section will outline the ESB adoption supports and associated uptake in Canada, and will share barriers to adoption for students with disabilities, Indigenous and remote communities, under-resourced school boards and districts, and small fleet operators.

### 3.3.1. Context

Across Canada, several jurisdictions have introduced a mix of policy targets, regulations, and funding initiatives to encourage ESB uptake (Table 4), aiming to bridge the substantial upfront cost gap compared to diesel models. Currently, ESBs are priced between $400,000 and $600,000, significantly higher than the average cost of a diesel bus, which is around $125,000 (Kerans, 2022). However, as ESB manufacturing capacity expands and battery prices fall in line with projections, the cost of ESBs is expected to also decline, dropping to $310,000 in 2040 (Dunsky Energy + Climate Advisors [Dunsky], 2023a).

It's also important to consider the diversity in procurement models across provinces, which influences how these incentives are applied. For example, in P.E.I., all school buses are provincially owned, allowing for more centralized decision-making. In contrast, Quebec and Ontario primarily rely on private contractors to operate their fleets, while in B.C., school districts

are responsible for bus operations. These structural differences shape how each jurisdiction approaches the adoption and integration of ESBs.

**Table 4. ESB Targets and Funding Programs Across Canada.**

| Jurisdiction | ESB Target | Funding Programs |
|---|---|---|
| **Federal** | 35% of medium- and heavy-duty vehicle (MHDV) sales are zero-emission vehicles (ZEV) by 2030 and 100% by 2040. | Programs include the Zero Emission Transit Fund (ZETF) for capital and planning costs, the Zero Emission Vehicle Infrastructure Program (ZEVIP) for charging infrastructure, and the Canada Infrastructure Bank's (CIB) Zero-Emission Buses Initiative for tax and loan incentives. |
| **B.C.** | Aligning with California's mandate for all new trucks and buses to be electric by 2036. | Programs include the CleanBC Go Electric Rebates Program for ESB purchases, the CleanBC Fleet Charging Program for charging infrastructure, the CleanBC Commercial Vehicle Pilots Program, and the BC Hydro EV Fleet Ready Program for infrastructure upgrade costs. Additional support for Indigenous communities is offered. |
| **P.E.I.** | 100% of school buses electrified by 2030. | No funding program in place. P.E.I. was relying on funding from the Investing in Canada Infrastructure Program, which was exhausted in 2023, and now relies on core provincial education funding. |
| **Quebec** | 65% of school bus fleet electrified by 2030. | Programs include "*Programme d'électrification du transport scolaire*" for ESB purchases and charging infrastructure, and "*Transportez vert*" for charging infrastructure. Core provincial education funding also provides an annual operating allocation over the ESB 12-year lifespan. From 2021 to June 2025, Quebec had a regulation requiring that all new school bus purchases be electric. |

Source: Adapted from CESBA (2025).

Thanks to these policy measures, B.C., P.E.I., and Quebec are the leading provinces in terms of the total number of ESBs. As shown in Figure 3, these provinces have electrified 5%, 33%, and 20% of their school bus fleets, respectively (F. Marasco, personal communication, September 16, 2024; J. Charbonneau & J.-C. Vandenberghe, personal communication, October 8, 2024; Government of P.E.I., 2024).

**Figure 3. ESB Adoption Rates Across Canada.**

| | Number of ESB's | Total Fleet |
|---|---|---|
| **BC** | 158 | 3,166 |
| **AB** | 6 | 7,114 |
| **SK** | 1 | 3,083 |
| **MB** | 0 | 2,546 |
| **ON** | 25 | 20,833 |
| **QC** | 1,606 | 10,650 |
| **NB** | 22 | 1,234 |
| **PEI** | 107 | 323 |
| **NS** | 0 | 1,459 |
| **NL** | 1 | 1,009 |
| **YT** | 0 | 60 |
| **NT** | 0 | 73 |
| **NU** | 0 | 120 |
| **Canada** | **1,926** | **51,670** |

Source: The numbers of ESBs are estimates, as no compiled source of data is available. Total fleet numbers are from Transport Canada (2020).

Despite the absence of ESBs in jurisdictions with large Indigenous populations (see section 4.3.2. for more details), some Indigenous communities in QC and B.C. have been early adopters in the ESB transition. In Quebec, 4 communities participated in the provincial funding program and purchased a total of 20 buses (J. Charbonneau & J.-C. Vandenberghe, personal communication, October 8, 2024). As another example, 12 communities in B.C. completed feasibility assessments to acquire ESBs (First Nations Education Steering Committee [FNESC] & First Nations Schools Association [FNSA], 2024).

Uptake of ESBs in Canada has varied not only by region, but also by bus type, with larger Type C models seeing higher rates of adoption (CESBA, 2023). In contrast, smaller Type A buses—which are commonly used for accessible student transportation—have seen more limited uptake (F. Marasco, personal communication, September 16, 2024).

## 3.3.2. Equity Implications

### *3.3.2.1. Students with Disabilities*

Type A school buses (minibuses) have historically been widely used for transporting students with physical disabilities, but the limited availability and range associated with Type A ESBs have posed significant challenges. Earlier models, such as the Microbird G5 Electric, offered only about 100 km of range–insufficient for longer routes or cold weather conditions–leading some operators to reroute buses or avoid ESB adoption altogether (Ekbatani, 2024). While the latest version now offers a 300 km range (Arsenault, 2025), supply remains constrained, and only a few models are available in North America (Ekbatani, 2024).

In Quebec, where only the Microbird model qualifies for provincial funding, minibus adoption has been slow. Assembly limits cap sales at 200 units per year, with just 113 in operation as of September 2024 (Arsenault, 2025). Earlier range limitations and the continued use of aging diesel buses have contributed to this low uptake. To accommodate delays in ESB availability, the province introduced a temporary measure allowing operators to extend the service life of adapted diesel buses from 12 to 14 years. However, this extension raised safety concerns among parents, particularly regarding older vehicles remaining in service longer than intended (Gagné, 2025). As of June 2025, this measure has been discontinued.

However, accessibility is no longer limited to minibuses. Most Type C buses—the standard full-size school bus—can now be equipped with wheelchair lifts, typically installed at the rear, expanding the range of models that can serve students with disabilities (M. Collins, personal communication, June 17, 2025). This broader compatibility has the potential to ease some of the equity concerns tied to ESB adoption, especially for smaller operators or school districts who only use Type C buses (M. Collins, personal communication, June 17, 2025).

### *3.3.2.2. Indigenous/Remote Communities*

ESB adoption remains significantly lower in Indigenous and remote communities across Canada due to various equity concerns. One of the most pressing challenges is the elevated cost of school transportation. Annual per-bus costs in Indigenous communities range from $95,000 to $115,000–nearly double the $40,000 to $60,000 seen in the provincial system (MNP, 2025). This disparity stems from factors such as remoteness, longer travel distances, and poor road conditions that require frequent and costly repairs. In Alberta, for example, the cost of transporting a student rises from $363 in urban areas to $1,279 in northern or remote communities (MNP, 2025). These high baseline costs leave limited room for the purchase of

ESBs, which are more expensive than thermal buses. While B.C. provincial funding for school districts increased by $9 million to $10 million in 2024 (Government of British Columbia [Government of B.C.], 2024), there was largely no corresponding increase in Indigenous Services Canada's funding for most First Nations school buses.

Beyond cost, First Nations communities face unique challenges that impede ESB adoption. School staff often multitask as principals, bus drivers, and teachers, leading to capacity issues in completing complex funding applications, like the ZETF.

Fleet size and backup capacity also affect eligibility for funding. Many First Nations operate only one school bus, meaning they lack a backup vehicle during repairs or replacement. This can disqualify them from funding programs that require feasibility studies or contingency planning (L. Asher, personal communication, December 16, 2024).

Geographic and infrastructure limitations further complicate adoption. In northern B.C., for instance, a community was deemed ineligible for ESB funding due to long travel distances and insufficient charging infrastructure (Breuer & Chan, 2023).

Road conditions are another major concern. Many Indigenous and remote communities contend with unpaved roads that accelerate wear and tear on vehicles. In Alberta, for example, buses frequently sustain damage from mud and potholes, leading to cracked headlights, loose windows, and increased maintenance costs—issues that worsen in poor weather (MNP, 2025).

Climate-related performance issues also deter adoption, with temperatures below -20 °C reducing vehicle range by up to 50% (Whitestone, 2022). This uncertainty regarding the impact of new technology on unpaved roads and cold weather makes communities hesitant to invest in more expensive electric models. This also illustrates why, in B.C., the adoption of ESB has been minimal in colder climates.

Finally, energy access remains a critical barrier. Over 170 Indigenous communities are off-grid and do not benefit from energy projects on their lands (Sacred Earth Solar & Indigenous Climate Action, 2023). Even where electrical service exists, limited grid capacity and the high cost of upgrades for Level 3 chargers pose significant challenges (Equiterre, 2023). Competing infrastructure priorities and concerns about power outages further discourage investment in ESBs.

#### 3.3.2.3. Under-Resourced School Boards/Districts

Under-resourced school boards can encounter equity concerns with ESB adoption due to the higher upfront costs and the requisite investment in charging infrastructure. However, the core issue is that some school districts lack the financial means to provide basic student transport services due to competing priorities, such as classroom funding and staff salaries (Bennett, 2015; Morgan, 2018; School Bus Ontario, 2024).

For instance, in B.C., despite increased provincial funding since 2017, a Surrey School District trustee noted that these increases have not kept pace with inflation and student population growth, leading to the prioritization of classroom funding and a $4.5 million budget cut for busing (CBC News, 2024). An interview with a maintenance staff member in another B.C. school district highlighted the severe need for repair and upgrading of school buildings. He described the decision to purchase ESBs as politically driven, depriving schools of other necessary maintenance and infrastructure investments. He stated, "I view our recent purchase of two electric buses as purely politically driven. The desire to be seen as being green in a public way when many other decisions in less visible areas are made in the complete opposite direction" (member of the B.C. School District, anonymous upon request, personal communication, September 6, 2024).

Without addressing these financial constraints, it is challenging for under-resourced schools to prioritize ESB adoption, even if government funding is available for their purchase.

#### 3.3.2.4. Small Fleet Operators

Like under-resourced school districts and Indigenous communities, smaller operators often struggle with the high upfront costs of ESBs. Limited financial capacity makes it difficult to invest in necessary electrical infrastructure upgrades and workforce training. The transition can also disrupt operations, particularly for those lacking the administrative capacity to manage complex changes. As capital-intensive technologies become the norm, the market tends to consolidate—many small operators opt to sell their fleets rather than invest in electrification. This trend risks pushing out family-run and rural operators, concentrating fleet ownership among a few large players, which could reduce flexibility and drive up transportation costs for school districts (J. Charbonneau & J.-C. Vandenberghe, personal communication, October 8, 2024; P. Langlois, personal communication, October 9, 2024; G. Klugie, personal communication, December 7, 2024).

## 3.4. Use

The use and ongoing maintenance of ESBs are one of the longest phases of the bus's lifecycle. It relates to the bus routes, bus charging, maintenance, driving, and, of course, the children riding them. This section will outline the context surrounding ESB use in Canada and will present equity implications related to drivers, riders, and mechanics.


### 3.4.1. Context

The use phase of ESBs introduces several operational and financial considerations that distinguish them from thermal models. One of the most significant is the need for dedicated charging infrastructure. Level 2 chargers are more affordable but slower, while Level 3 chargers are faster but more expensive (Table 5).

**Table 5. Cost & Speed of Charging Options**

| Charger Type | Average Installation Cost | Typical Charging Duration |
|---|---|---|
| **Level 2** | $2,000 | 6 to 11 hours |
| **Level 3** | $31,000 | 2.5 to 4 hours |

Source: New York State Energy Research and Development Authority [NYSERDA] (2023); Stewart (2025).

ESB-range varies between 100 and 300 km (Équiterre, 2022), depending on factors such as weather, terrain, battery size and age, and the use of heating and cooling systems. These variables require careful route planning to ensure buses can complete their trips without mid-route charging.

While ESBs have higher upfront costs, they offer significant savings over time. Their simpler electric motors have fewer moving parts compared to ICE bus engines, reducing maintenance costs by at least 50%. Additionally, electricity is approximately 80% cheaper than diesel fuel. These operational savings can help offset the initial investment. Depending on the bus type, funding access, and revenue-generating opportunities—such as vehicle-to-grid (V2G)

technology and Clean Fuel Regulation credits—the average payback period for ESBs is estimated at 9 years (Dunsky, 2023a).

In terms of daily use, ESBs function similarly to thermal buses, though range limitations can affect route design. Unlike diesel buses, ESBs are typically not parked at drivers' homes, a common practice in rural areas, due to the need for overnight charging at bus depots (Propulsion Québec, 2023). Looking ahead, ESBs may have the potential to power buildings through V2G technology (Dunsky, 2023b), and this application is currently being piloted for emergency response in P.E.I. (T. Nguyen, 2023).

Routing decisions for ESBs within school districts are primarily based on factors that affect range, such as terrain, weather, and route length, and on driver preferences. Interviews with decision-makers from B.C., P.E.I., and Quebec revealed that equity was not a primary factor in these decisions (P. Langlois, personal communication, October 9, 2024; F. Marasco, personal communication, September 16, 2024; M. Collins, personal communication, June 17, 2025).

## 3.4.2. Equity Implications

### *3.4.2.1. Drivers*

The transition to ESBs is occurring amidst an already challenging context for school bus drivers, who have faced chronic understaffing for several years. Across Canada, there are only about 40,000 school bus drivers for over 2.2 million children needing transportation daily (Statistics Canada, 2024; Transport Canada, 2020). This situation is partly due to low wages (Elder, 2022; CBC News, 2025), the part-time nature of the work, and its stressful work environment (Scali, 2025), leading to strikes and resignations. Factors contributing to low wages include: rising costs of bus maintenance, insurance and inspections (Dickens, 2024), and insufficient provincial funding (Lajoie, 2025). Given the limited number of ESBs and their recent uptake, it is difficult to say if ESBs have exacerbated these concerns.

However, ESBs have helped reduce some equity concerns related to the health and environmental impacts of ICE buses on drivers. ESB drivers are no longer exposed to diesel fumes and the high vibrations and noise associated with ICE buses, which can adversely affect their health (Elder, 2022; Shorter et al., 2024a). By producing no fumes and fewer vibrations, ESBs are improving working conditions and may lead to greater driver availability (Ekbatani, 2024). Interviews with several operators revealed a mostly positive experience with ESBs from drivers.

Despite these benefits, some aspects of ESBs could lead to potential equity issues, especially for rural drivers and more senior staff. For instance, the range limitations of ESBs can restrict drivers' ability to take on extracurricular activities, field trips, and longer routes, which often provide supplementary income (Poiner, 2015). This has led to dissatisfaction among drivers, particularly in P.E.I., where the inability to get overtime shifts has been an issue (G. Klugie, personal communication, December 7, 2024; M. Collins, personal communication, September 19, 2024). Consequently, drivers operating ESBs may face financial disadvantages compared to those driving traditional buses, creating workforce inequities.

Senior drivers may struggle with the demands and complexity of scheduled charging (G. Klugie, personal communication, December 7, 2024). Many are anxious about charge limitations and less inclined to adjust their driving habits (P. Langlois & R. Stephenson, personal communications, March 19, 2025). Also, the need for extra training to handle new technologies can be particularly difficult for those less familiar with digital systems.

Finally, the requirement for ESBs to be charged overnight at depots can create challenges for rural drivers, who often park their buses at home due to the distance from depots. This shift can increase travel time and costs, potentially limiting job opportunities and deepening existing inequities for rural drivers. To address this, P.E.I. and Quebec have piloted home-based charging solutions, with P.E.I. now expanding the approach to most ESBs following its success

(J. Charbonneau & J.-C. Vandenberghe, personal communication, October 8, 2024; M. Collins, personal communication, September 19, 2024).

#### *3.4.2.2. Mechanics*

It is also important to consider the impacts of the ESB transition on the maintenance workers. Similarly to bus drivers, mechanics also face low wages, contributing to staffing shortages and delays in bus service (Global News, 2025). Unlike diesel buses, ESBs technically have fewer moving parts, which reduces the frequency and complexity of routine maintenance. While this can lower operational costs for school districts, it could mean fewer work hours and potentially less job security for mechanics who have traditionally serviced ICE vehicles.

At the same time, the shift to ESBs introduces new technical demands. Mechanics are now expected to develop specialized skills, particularly in handling high-voltage electrical systems that are central to ESB operation. However, technicians in B.C. have raised concerns about the lack of accessible training opportunities in these areas, which could hinder a smooth and equitable workforce transition (F. Marasco, personal communication, September 16, 2024).
Compounding these challenges is a broader industry trend toward manufacturer-controlled repairs. As ESB manufacturers increasingly require that repairs be handled by their own technicians, local fleet mechanics may find themselves sidelined, with fewer opportunities to apply or expand their expertise (Elder, 2022).

#### *3.4.2.3. Students with Disabilities*

Similar to the benefits for bus drivers, ESBs offer significant health and environmental benefits for students, particularly those with disabilities, who are more vulnerable to air and noise pollution and often face longer commutes to specialized schools (Ross et al., 2020; Shorter et al., 2024a).

Diesel fumes contain carcinogenic particulates, vapours, and gases linked to cancer, heart issues, asthma, and cognitive impairments (Canadian Lung Association, n.d.; Gawryluk et al., 2023). These risks are especially concerning for students with disabilities, who are twice as likely to develop asthma (World Health Organization [WHO], 2024; Canadian Lung Association, n.d.). By eliminating tailpipe emissions, ESBs reduce exposure to these pollutants, improving school attendance and academic performance (Adar et al., 2015; Austin et al., 2019). Students also report fewer headaches and greater comfort on ESBs (Forlini, 2024).

In addition, ESBs produce less noise and vibration, which benefits students with sensory sensitivities. Excessive noise can trigger overstimulation, leading to migraines, dizziness, panic attacks, or disorientation (Shorter et al., 2024a). A U.S. pilot study found that quieter ESBs had a calming effect on students with special needs (Ekbatani, 2024). Overall, parents strongly associate ESBs with improved mental health for children with special needs or sensory sensitivities (Highland Electric Fleets, 2025).

> *"[Decision-makers should prioritize ESBs] because kids are where the they're going to grow up to be the next doctors, government leaders… so [we need] to start off making sure they have the best education and life as a child. It revolves around the buses inhaling diesel and [experiencing] the noise on the way to school, it's a bad start. Research shows that their health deteriorates (from riding diesel buses) […] changing up that system should be a priority. Start at*
> (S. Berry, personal communication, November 5, 2024)

Despite their benefits, ESB deployment can raise equity concerns. As discussed earlier, routing decisions often prioritize logistics over need, meaning lower-income areas–typically more exposed to traffic-related air (Canadian Lung Association, n.d.; Pinault et al, 2017) and noise pollution–may not receive ESBs and thus miss out on their health and environmental advantages. In parallel, students with disabilities face persistent barriers: many buses lack functioning wheelchair lifts, securement systems, or trained staff, and most ESBs offer no improvements in this regard (Curran et al., 2024). Also, specialized transportation–whether diesel or electric–can contribute to social exclusion by segregating students with disabilities from their peers (Ross et al., 2020). Without changes to routing practices or service models, ESBs risk reinforcing these existing inequities rather than addressing them.

## 3.5. Disposal

At the end of an ESB's lifecycle, the bus is either disposed of or its parts are recycled. This section explores the location of disposal sites, battery recycling, and options for repurposing ESBs, and will outline the equity implications associated with the final lifecycle phase.

### 3.5.1. Context

School buses in Canada are typically decommissioned based on their age. Although the national fleet is relatively modern–45% of vehicles are under five years old–22% exceed a decade in service, signalling a significant cohort nearing retirement (Dunsky, 2023a). In most

jurisdictions, both thermal and electric buses are subject to mandatory retirement at 12 years of service.

ESB batteries, however, tend to reach end-of-life earlier than the vehicles themselves, generally between 8 and 10 years of use (Kothari, 2023). At this stage, batteries may be repurposed for secondary applications such as stationary energy storage or recycled to recover critical minerals–including lithium, cobalt, and nickel–for reintegration into the battery supply chain.

Canada hosts several companies engaged in battery recycling, including Lithion Technologies, Electra Battery Materials, Terrapure Environmental, RecycLiCo, and, until June 2025, Li-Cycle (Jones, 2025). Despite this industrial presence, no federal or provincial regulatory framework currently governs EV battery disposal. Proposed extended producer responsibility (EPR) policies in B.C. and Quebec were ultimately withdrawn (Jones, 2025). Nationally, the only coordinated initiative is the EV Battery Recovery Program, a voluntary scheme launched in 2023 by 16 manufacturers, including Lion Electric (Call2Recycle, 2025).

A similar regulatory vacuum exists for the thermal buses being phased out by ESBs. In the absence of a standardized national policy, disposal practices vary and include scrapping, recycling, dealership trade-ins, public auctions, and, in rare instances, conversion to electric drivetrains.

While a growing number of firms in North America and Europe are converting diesel school buses to electric models—an approach that significantly reduces lifecycle environmental and social impacts at roughly half the cost of a new ESB (School Transportation News, 2021)—such conversions remain uncommon in Canada. Current Canadian manufacturing standards (CSA D250) prohibit repowered buses from transporting students, as the conversion voids the original equipment manufacturer guarantee, making the vehicle ineligible for registration or insurance.

Without a clear strategy for managing the lifecycle and secondary use of both thermal and electric models, electrification efforts risk perpetuating existing inequities—particularly in communities already burdened by environmental and infrastructure challenges—rather than resolving them.

## 3.5.2. Equity Implications

### *3.5.2.1. Low-Income/Racialized Communities*

When ESB batteries can no longer be reused or repurposed, they are typically sent to recycling facilities. However, a review of battery recycling facilities in North America (Appendix IV) shows a pattern: many operate near low-income and racialized communities, already burdened by poor air quality, traffic, and noise. Without strong oversight, battery processing could worsen these conditions.

If batteries aren't recycled—due to regulatory gaps—they may be improperly stored or dumped, posing fire, chemical, and pollution risks (Winslow et al., 2017). These risks often fall hardest on low-income and Indigenous communities in Canada, where enforcement is weaker compared to more affluent areas. For example, illegal dumping fines on First Nations reserves are drastically lower than on provincial lands (Tuncak, 2020). While there are regulatory gaps and unequal burdens within our own borders, the discrepancies are even more pronounced on a global scale.

### *3.5.2.2. Global South*

The globalized lifecycle of buses has critical equity implications, particularly for communities in the Global South. As wealthier countries—like Canada—retire thermal buses in favour of ESBs, these outdated vehicles are often exported to countries with weaker air quality and vehicle safety standards (Pskowski, 2019). This practice shifts environmental burdens onto already disadvantaged populations, where continued use of high-emission buses contributes to poor air quality and related health issues. Moreover, recipient countries may become reliant on obsolete, more polluting technologies without the resources to transition to zero-emission alternatives, reinforcing global disparities in environmental health and technological access.

# 4. Policy Recommendations

The following high-level recommendations outline actions that influential actors–primarily governments–can take to embed equity in Canada's ESB transition. Organized by lifecycle phase, each recommendation identifies the responsible actor and relevant mechanisms for implementation. A detailed breakdown is available in Appendix IV.

## 4.1. Resource Extraction

### 4.1.1. Strengthen Environmental and Social Protections through Regulatory Reform

Environment and Climate Change Canada (ECCC), in collaboration with Natural Resources Canada (NRCan) and Justice Canada (JC), should lead efforts to enhance environmental and social safeguards in mining by:

- Amending the *Canadian Environmental Protection Act* (CEPA) to require Environmental Justice Impact Assessments for all mining and resource extraction projects, ensuring that environmental risks and social harms are not disproportionately borne by Indigenous, low-income, or racialized communities;
- Embedding meaningful consent and rights to refusal for Indigenous Nations into federal environmental review processes (Desai and Thornley, 2024), in alignment with the United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP);
- Requiring mining companies to obtain Initiative for Responsible Mining Assurance (IRMA) certification—or an equivalent standard—as a condition for receiving federal funding, permits, or export licenses;
- Coordinating with provincial and territorial governments to harmonize enforcement and monitoring mechanisms, ensuring that impacted communities are meaningfully involved in both the design and oversight of mining regulations.

### 4.1.2. Advance Indigenous Rights and Community Protections in Resource Development

Crown-Indigenous Relations and Northern Affairs Canada (CIRNAC) and NRCan, in collaboration with Indigenous governments, should implement CBAs that secure equitable benefits throughout all stages of resource development projects (CIRNAC, 2024). These CBAs could be embedded in the *Impact Assessment Act* and supported by a certain percentage mining revenue trust to fund local infrastructure and training.

Simultaneously, Employment and Social Development Canada (ESDC), in coordination with CIRNAC, should amend the *Canada Labour Code* to require comprehensive gender-based violence prevention plans at federally regulated resource extraction sites. These plans must be co-developed with Indigenous communities, include culturally appropriate safety protocols, prohibit the use of "man camps" (UBCIC, 2022), and align with the Missing and Murdered Indigenous Women and Girls Calls for Justice (13.1–13.5) to protect Indigenous women, girls, and 2SLGBTQQIA+ people from violence linked to industrial development (CIRNAC, 2024).

### 4.1.3. Enhance Labour Protections and Corporate Accountability

ESDC and Global Affairs Canada (GAC) should work together to ensure that Canadian resource companies uphold high labour and human rights standards both domestically and abroad. This includes:

- Supporting unionization and collective bargaining to improve wages, safety, and job security for resource workers—particularly those from Indigenous, Northern, and rural communities;
- Enacting mandatory human rights and environmental due diligence legislation to hold Canadian companies accountable for harms in their global supply chains;
- Strengthening the Canadian Ombudsperson for Responsible Enterprise by granting it full investigatory powers, including the ability to compel documents and testimony.

## 4.2. Manufacturing

### 4.2.1. Advance Equity and Regional Growth Under Sustainable Jobs Plan

ESDC, with support from the Sustainable Jobs Secretariat, Innovation, Science and Economic Development (ISED) and NRCan, should designate ESB manufacturing as a priority sector in Canada's upcoming Sustainable Jobs Plan, with targeted measures to ensure an equitable and regionally inclusive transition. This should include:

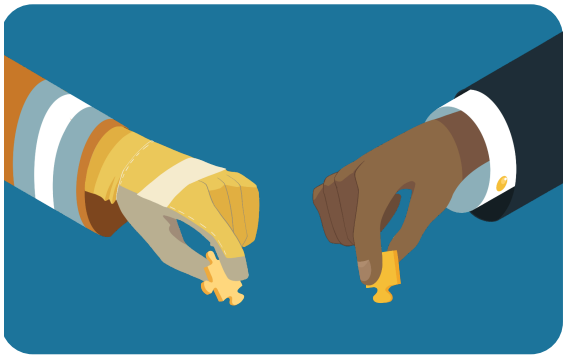
- Expand the Sustainable Jobs Training Fund to include training for EV manufacturing roles, complementing its current focus on EV repair and charging infrastructure.
- Inclusive training partnerships with unions, colleges, and community organizations.

- Collaboration with Regional Energy and Resource Tables to identify industrial sites, labour pools, and infrastructure needs for ESB manufacturing expansion outside of Quebec.

# 4.3. Adoption

## 4.3.1. Expand the Availability of Accessible ESB Models

To ensure students with disabilities are included in the transition to ESBs, provincial ministries of education should update procurement guidelines and expand eligibility criteria in ESB funding programs (where available) to support a broader range of accessible models. This should include both Type A and Type C buses equipped with universal design features.



At the federal level, Transport Canada (TC) should revise School Bus Safety Standards to mandate accessibility features, such as wheelchair lifts, securement systems, and sensory-friendly design, in all new ESBs.

## 4.3.2. Enhance Indigenous Access to Federal Funding

To ensure Indigenous and remote communities can equitably access federal ESB funding, Housing, Infrastructure and Communities Canada (HICC) should revise ZETF's feasibility criteria to reflect the realities of Indigenous communities—such as smaller fleets, longer travel distances, and limited infrastructure—and consider creating a dedicated Indigenous stream, modeled after ZEVIP. In partnership with NRCan, HICC should also fund application workshops and grant-writing support through ZEVAI.

Meanwhile, NRCan should expand ZEVIP's fully subscribed Indigenous Organizations Stream and collaborate with Indigenous advocacy groups to raise awareness and build capacity to access available funding.

### 4.3.3. Enhance School Transportation Funding for Under-Resourced Administrators

To bridge the cost gap with urban areas, ensure sufficient student transportation funding, and offset the higher operational cost of ESB, provincial ministries of education and ISC—for federally funded First Nations schools—should revise school-year budget frameworks to increase annual funding for student transportation. This should include dedicated operational funding to support the use of ESB in under-resourced and remote school boards/districts and consortia, as well as for small fleet operators. Quebec's model of providing an additional $5,000 annually per ESB over its 12-year lifespan offers a valuable reference point.

### 4.3.4. Prioritize ESB Funding for High-Exposure and Underserved Communities

HICC and provincial governments with ESB funding programs should prioritize funding for school districts and operators serving pollution-burdened and underserved areas. Using Health Canada's data on air quality and the most recent census data, funding should target "High-Priority Zones", an approach modelled on California's Zero-Emissions School Bus and Infrastructure. This ensures public investment delivers the greatest health and environmental benefits where they're needed most, and helps address equity gaps in routing decisions.

## 4.4. Use

### 4.4.1. Improve Work Conditions for School Transportation Staff

To prevent the transition to ESBs from worsening existing staffing challenges, provincial ministries of education should increase annual school transportation funding specifically to improve wages and working conditions for drivers and mechanics. This would also help offset income loss from reduced extra shifts due to ESB range limitations. The funding could be integrated into operational support for ESB deployment (see Recommendation 4.3.3).

In collaboration with provincial ministries of labour, they should also encourage school boards/districts and private operators to become certified Living Wage Employers, and include Living Wage clauses in procurement contracts. For example, until April 2025, the Vancouver School Board was a certified Living Wage Employer, topping up school bus drivers' pay to meet local living wage standards (CBC News, 2025).

### 4.4.2. Build the ESB Maintenance Workforce

School transportation consortia should look at applying to the Sustainable Jobs Training Fund to deliver large-scale EV maintenance training across fleets. Individual operators can access the Canada Job Grant through their province to train new or existing mechanics.

Meanwhile, provincial ministries of education should modernize automotive apprenticeship programs to include EV and ESB maintenance–covering high-voltage safety, battery diagnostics, and charging systems, aligned with national EV standards.

To ensure trained mechanics can apply their skills, operators should include repair access clauses in procurement contracts to reduce manufacturer lock-in.

## 4.5. Disposal

### 4.5.1. Enable the Use of Repowered School Buses

To limit the environmental impact of scrapping thermal buses and extracting new materials, while also lowering costs for operators (Lefebvre, 2025), TC should enable the safe and legal use of repowered school buses by:

- Funding pilot projects to assess the safety, performance, and operational feasibility of repowered ESBs;
- Amending the CSA D250 manufacturing standard to allow repowered buses to be certified, registered and insured for student transportation;
- Extending or revising the 12-year limit for buses that have been repowered.

### 4.5.2. Regulate the Export of Decommissioned Buses

To improve the export conditions of retired, polluting thermal school buses to countries in the Global South with weaker environmental and safety standards, TC could collaborate with GAC to amend the Export Control List, adding decommissioned diesel school buses. This would require exporters to obtain permits and meet environmental criteria before shipping buses abroad.

### 4.5.3. Adopt EPR Policies for EV Batteries

Provincial ministries of environment–particularly in Ontario, BC and Quebec where EV adoption is high–should implement EPR (Extended Producer Responsibility) policies for EV batteries (Jones, 2025). This would hold manufacturers accountable for battery collection and recycling,

reducing risks from improper disposal. It would also help protect vulnerable communities by requiring impact assessments for recycling sites and enforcing standards for air quality, noise, and traffic.

Meanwhile, ECCC should uphold the *National Strategy Respecting Environmental Racism and Environmental Justice Act* by ensuring that historically disadvantaged communities are not disproportionately burdened by EV battery or school-bus related waste and recycling facilities, which could lead to unjust health or environmental outcomes.

# 5. Recommended Areas for Further Research

This report initiated exploratory research into the equity and justice of Canada's ESB transition. Several key areas emerged that warrant deeper investigation to strengthen the evidence base and guide more equitable policy and implementation.

## Analysis of Equity in Thermal School Bus Industry

While this report focused equity within the ESB industry, a comparative analysis of thermal buses and ESBs is needed. Such research could clarify how electrification may mitigate existing inequities, and provide stronger justification for a just transition in student transportation.

## Demographics and Impacts Cross-Referencing

Efforts to map equity impacts were limited by data availability. Future research should cross-reference demographic data with ESB adoption rates and environmental indicators to visualize how harms and benefits are distributed across the lifecycle. Mapping school bus depots and routes alongside pollution and population data could reveal disparities in access to clean transportation and exposure to emissions.

## Equity Implications in the Second-Hand Diesel Bus Market

This report examined the disposal and recycling of ESBs, but only uncovered anecdotal information regarding the end-of-life pathways for retired diesel school buses. Further research is needed to map where used buses are going, how they're being used, and whether current policies support a just end-of-life process. A comprehensive understanding of the second-hand market for both diesel and electric buses is important to ensure this transition continues to meet the needs of the communities that currently rely on second-hand diesel school buses for transportation.

## Just Transition for the ESB Workforce

This report identified several points where workers were impacted by the ESB transition, from resource extraction to vehicle operation. While preliminary insights were gathered, further research is required to fully understand how this shift affects employment, labour rights, and training standards across the entire workforce. CESBA co-coordinator Équiterre is currently pursuing this area of research in its upcoming report

## Additional Research Priorities

Other important areas for future investigation include:

- Lifecycle GHG emissions of ESBs
- Equity impacts of extracting non-battery materials (e.g., glass, rubber)
- Environmental practices of Canadian mining operating abroad
- Trade-offs between job creation and local environmental concerns
- Intersectional barriers to ESB adoption (e.g., rural students with disabilities, urban Black communities)

# 6. Conclusion

The report examined equity implications of Canada's transition to ESBs, with attention to the full lifecycle of these vehicles and the diverse actors involved. It found that equity-deserving groups–both within Canada and globally–are affected at every stage, from mineral extraction and manufacturing to adoption, use, and disposal. These impacts span a wide range of issues, including fair labour practices, accessibility, and ethical waste disposal.

The findings make clear that equity cannot be treated as an afterthought in the ESB transition. Instead, it must be embedded into every decision—from procurement and infrastructure planning to workforce development and international trade policy. Without this intentionality, the transition risks reinforcing the very inequities it seeks to address.

This research arrives at a pivotal moment. As Canada accelerates its shift toward low-carbon transportation, there remains a critical window of opportunity to shape this transition in a way that is not only sustainable, but also just. By centering equity now, policymakers, school boards/districts, and industry leaders can ensure that the benefits of electrification are shared fairly—and that no community is left behind.

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# 8. Appendices

## Appendix I. Actor Mapping Matrix

## Appendix II. Equity-Deserving Groups

**Global South:** Communities beyond Canada's borders, primarily those in the Global South, are impacted by the transition to ESBs due to resource extraction of rare minerals, the disproportionate impacts of climate change, and end-of-life school bus disposal.

**Indigenous Communities:** Indigenous peoples are impacted by the site selection of resource extraction projects, face unique barriers to the adoption of ESBs, are more likely to experience adverse effects of climate change, and can be impacted through the disposal and re-purposing of retired school buses.

**Low-Income Communities:** People living in low-income communities often face systemic underinvestment in infrastructure, public services, and environmental protections. These communities are more likely to be located near sources of pollution, such as highways or industrial zones, and may lack access to clean transportation options. In the context of the ESB transition, they are disproportionately affected by transportation-related air pollution and may be excluded from early access to electric school buses due to funding or logistical barriers.

**Rural and Remote Communities:** These communities, especially those living in Northern Canada, may be impacted by the site selection of resource extraction projects, may be the last to experience the benefits of ESBs due to unique barriers to adoption, and can be impacted by climate change and industry instability.

**Students with Disabilities:** Children with disabilities who rely on school buses for transportation to and from school face additional barriers to access and can be more vulnerable to air pollution than children without disabilities.

**Racialized Communities:** Racialized communities—particularly Black, Indigenous, and other people of colour—often experience intersecting forms of discrimination, including environmental racism, over-policing, and inequitable access to public services. These communities may be impacted by the ESB transition through proximity to resource extraction sites, exposure to poor air quality, and the siting of waste disposal or vehicle repurposing facilities.

**Under-Resourced Administrators and Operators:** Small school boards/districts and fleet operators are key actors in adopting and successfully implementing ESBs. However, they can face considerable barriers in navigating funding applications, requests for proposals, charging logistics, and more.

**Workers:** Employees within the ESB transition may include those working in resource extraction, manufacturing, maintenance, driving, and more. Workers in these industries may be impacted by product demand, training/reskilling opportunities, wages and working conditions, job security, and more.

## Appendix III. Interview List

| Theme | Interviewee | Title and Organization | Interview Date |
|---|---|---|---|
| Environmental Equity | Muzamil Gadain | Project Lead, Black Environmental Initiative | December 16, 2024 |
| Resource Extraction | Viviana Herrera | Latin America Program Coordinator, MiningWatch Canada | November 19, 2024 |
| | Jamie Kneen | National Program Co-Lead, MiningWatch Canada | December 13, 2024 |
| Government | Jarick Charbonneau | Interim Director of Coordination and Business Strategies, Ministry of Transportation and Sustainable Mobility, Government of Quebec | October 8, 2024 |
| | Jean-Charles Vandenberghe | Transportation Electrification Advisor, Ministry of Transportation and Sustainable Mobility, Government of Quebec | October 8, 2024 |
| | Naomi Hirshberg | Acting Manager, Active Transportation and Zero Emission Buses, Housing, Infrastructure and Communities Canada | September 25, 2024; February 19, 2025 |
| | Keegan Muldoon | Manager of Transit Policy, Housing, Infrastructure and Communities Canada | September 25, 2024; February 19, 2025 |
| | Heather Semotiuk | Acting Manager of Low Carbon Transition Unit, Energy Mines and Resources, Government of Yukon | November 2, 2024 |
| | Cathy Cottrell | Senior Energy Planner, Energy Mines and Resources, Government of Yukon | November 2, 2024 |
| Student Transportation | Leah Asher | Director of Education, Prophet River First Nation | December 16, 2024 |
| | Renee Boucher | Executive Director, Sudbury Student Services Consortium | September 23, 2024 |
| | Matt Collins | Manager of Engineering Services, Transportation and Infrastructure, Government of Prince Edward Island | September 19, 2024 |

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| | Garry Klugie | School Principal, Lake Babine Nations' Schools | December 7, 2024 |
| | Philippe Langlois | Operations Director, Autobus Chambly | October 9, 2024 |
| | Frank Marasco | Association Manager, Association of School Transportation Services of B.C. | September 16, 2024 |
| Youth Activists | Selena Berry | - | November 5, 2024 |
| | Audrey He | - | November 2, 2024 |

## Appendix IV. Socioeconomic and Environmental Context of EV Battery Recycling Facilities in North America

| Company | Facility Location | Key Socioeconomic Indicators |
|---|---|---|
| Lithion Recycling | Saint-Bruno, Quebec | Lower share of visible minority population, immigrant population and higher median income than provincial average; no data on exposure to air pollution |
| Terrapure Environmental | Mississauga, Ontario | Higher proportion of racialized residents than the Ontario average, a slightly lower median income, and experiences greater exposure to environmental burdens due to its urban density and proximity to industrial and transportation corridors. |
| Terrapure Environmental | Sainte-Catherine, Quebec | Lower proportion of racialized residents than the Quebec provincial average, a slightly higher median income, no data on exposure to air pollution |
| Electra Battery Materials | St. Thomas, Ontario | Lower proportion of racialized residents than the Ontario average, a median income slightly above the provincial average, and lower exposure to environmental burdens due to its smaller urban footprint and limited industrial activity compared to larger cities |
| Electra Battery Materials | Windsor, Ontario | Higher proportion of racialized residents than the Ontario average, a median income slightly below the provincial average, and elevated exposure to environmental burdens due to its proximity to heavy industry, major transportation corridors, and cross-border traffic with Detroit |
| RecycLiCo | Surrey, B.C. | Higher proportion of racialized residents than the British Columbia average, a slightly lower median income than the provincial average, and experiences elevated environmental burdens due to its rapid urban growth, proximity to major transportation corridors, and industrial zones |
| Li-Cycle | Rochester, New York | Higher proportion of racialized populations (notably Black and Hispanic communities) than the national average, a lower median household income, and faces moderate to high environmental burdens due to industrial legacy pollution and air quality concerns |
| Li-Cycle | Gilbert, Arizona | Lower proportion of racialized populations than the |

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| | | national average, a higher median household income, and relatively low environmental burden |
| Li-Cycle | Tuscaloosa, Alabama | Higher proportion of Black residents than the national average, a lower median income, and is moderately exposed to environmental burdens, particularly from industrial emissions and air quality issues in surrounding areas |

Sources: StatCan (2023), Government of Ontario (2024), Public Environmental Data Partners [PEDP] (2025).

## Appendix V. Action Plan

| Issue | Recommendation | Actor(s) | Mechanism(s) |
|---|---|---|---|
| **Resource Extraction** | | | |
| Indigenous communities bear the brunt of mining for EV minerals, facing environmental harm and loss of sovereignty under policies that sideline their rights. | 4.1.1. Strengthen Environmental and Social Protections through Regulatory Reform | ECCC; NRCan; JC | • CEPA<br>• IRMA certification |
| Indigenous communities experience social harms and colonial inequities from EV mining, including cultural disruption, and gender-based violence. | 4.1.2. Advance Indigenous Rights and Community Protections in Resource Development | CIRNAC; NRCan; ESDC | • Impact Assessment Act<br>• Canada Labour Code |
| Resource extraction workers face unsafe, inequitable conditions, while communities abroad bear the global costs of Canadian mining. | 4.1.3. Enhance Labour Protections and Corporate Accountability | ESDC; GAC | • Canadian Ombudsperson for Responsible Enterprise |
| **Manufacturing** | | | |
| Workers in ESB manufacturing face equity challenges due to job losses from automation, uneven access to new opportunities across regions, and limited retraining options. | 4.2.1. Advance Equity and Regional Growth under Sustainable Jobs Plan | ESDC; ISED; NRCan; Sustainable Jobs Secretariat | • Sustainable Jobs Plan<br>• Sustainable Jobs Training Fund<br>• Regional Energy and Resource Tables |
| **Adoption** | | | |
| Students with disabilities face barriers to ESB access due to limited availability of electric minibuses. | 4.3.1. Expand Availability of Accessible ESB Models | Ministry of Education; TC | • School Transportation Procurement Guidelines<br>• ESB Funding Programs<br>• School Bus Safety Standards |
| Indigenous and remote communities face major barriers to ESB adoption due to high transportation costs, limited infrastructure, harsh climates, and funding gaps that overlook their unique needs. | 4.3.2. Enhance Indigenous Access to ESB Funding | HICC; NRCan | • ZETF<br>• ZEVIP<br>• ZEVAI |

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| Certain school districts, especially in remote areas, lack financial means to cover basic student transportation needs, let alone ESB higher operational costs. | 4.3.3. Enhance School Transportation Funding for Under-Resourced Schools | ISC; Ministry of Education | • Annual school funding |
| Deployment decisions focus on efficiency over equity, lower-income communities—often most affected by pollution—risk being excluded from the benefits of ESBs. | 4.3.4. Prioritize ESB Funding for High-Exposure and Underserved Communities | HICC; Provinces | • ZETF<br>• ESB Funding Programs |
| **Use** | | | |
| Drivers and mechanics face low wages, understaffing, and job insecurity. | 4.4.1. Improve Work Conditions for School Transportation Staff | Ministry of Education; Ministry of Labour | • Annual school funding<br>• Bus procurement contract |
| School bus mechanics face a lack of training opportunities and manufacturer-controlled repairs. | 4.4.2. Build the ESB Maintenance Workforce | School transportation consortia; Ministry of Education; Operators | • Sustainable Jobs Training Fund<br>• Canada Job Grant<br>• Apprenticeship programs<br>• Bus procurement contract |
| **Disposal** | | | |
| The conversion of thermal school buses into electric models, which would reduce environmental impacts, is prohibited by manufacturing standards. | 4.5.1. Enable the Use of Repowered School Buses | TC | • CSA D250 Manufacturing Standard |
| Thermal school buses replaced by ESBs can be exported to countries with weaker environmental and safety standards. | 4.5.2. Regulate the Export of Decommissioned Buses | TC; GAC | • Export Control List |
| There's no regulatory framework on EV battery recycling, leading to improper disposal and environmental justice concerns around facilities siting. | 4.5.3. Adopt EPR Policies for EV Batteries | Ministry of Environment; ECCC | • Bill C-226 |