

FORESIGHT

BC NET ZERO
INNOVATION NETWORK

Vehicle-to-Grid Field Demonstration in British Columbia

Final Report on Utility-Integrated
Fleet Deployment | **March 2026**



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Disclaimer

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List of Abbreviations

BCIT: British Columbia Institute of Technology	M&V: Measurement & Verification
BCTA: British Columbia Trucking Association	M2M: Machine-to-Machine
BCNZIN: BC Net Zero Innovation Network	MW: Megawatt
CAN/CSA: Canadian Standards Association	OCPP: Open Charge Point Protocol
CEA: Community Energy Association	OEM: Original Equipment Manufacturer
DER: Distributed Energy Resource	PacifiCan: Pacific Economic Development Canada
DERMS: Distributed Energy Resource Management System	PKI: Public Key Infrastructure
EMS: Energy Management System	R&D: Research and Development
ESG: Environmental, Social, and Governance	RFP: Request for Proposal
EV: Electric Vehicle	ROI: Return on Investment
GHG: Greenhouse Gas	RSPN: Resilience Peer Network
GWh: Gigawatt-hour	SAE: Society of Automotive Engineers
ICE Fund: Innovative Clean Energy Fund	TCO: Total Cost of Ownership
IEA: International Energy Agency	UL: Underwriters Laboratories
IEC: International Electrotechnical Commission	VIG: Unidirectional Managed/ Smart Charging
IEEE: Institute of Electrical and Electronics Engineers	V2B: Vehicle-to-Building
INBID: Task 53 Multiparty Interoperability Of Bidirectional Charging	V2G: Vehicle-to-Grid
IoT: Internet of Things	V2H: Vehicle-to-Home
ISO: International Organization for Standardization	V2L: Vehicle-to-Load
kW: Kilowatt	V2X: Vehicle-to-Everything
kWh: Kilowatt-hour	VGI: Vehicle-Grid Integration
LCFS: Low Carbon Fuel Standard	VGIC: Vehicle-Grid Integration Council
LTE: Long-Term Evolution	VPN: Virtual Private Network

Engagement Summary

Working Group

In early 2024, Foresight Canada hosted a V2G Working Group meeting at the GLOBE Forum. Attendees included Fuse Power Management, BC Hydro, Norda Stelo, Lion Electric, BC Trucking Association, BC Emergency Health Services, Community Energy Association (CEA), the BC Ministry of Energy, Mines, and Low Carbon Innovation, and Deloitte. This formed the foundation of the stakeholder engagement for this pilot project.

Stakeholders from the Working Group were engaged during this project by Foresight and Fuse Power Management. The goal of the Working Group was to provide a platform for project stakeholders to provide input on milestones, potential business models, customer needs, and regulatory requirements. Based on project needs, working group members were engaged informally over the duration of the project to provide feedback.

Members include:

Utility (BC Hydro):

- Role: Integrated asset deferral planning, customer-based program operation, interconnection requirements, and governance of export permissions for safety and reliability.
- Interest: validate V2G as an emerging distributed energy resource (DER) pathway for peak management, congestion relief, resilience, and system flexibility.

Program Partner (Foresight Canada):

- Role: Convenor of cross-sector working groups; facilitator of knowledge-sharing and coordination across industry, government, and utility stakeholders.
- Interest: Accelerate commercialization pathways by reducing coordination friction and elevating replicable program design.

Project Implementer (Fuse Power Management):

- Role: Systems integrator responsible for site selection support, engineering coordination, installation/commissioning oversight, operational test planning, and performance reporting.
- Interest: Develop a scalable V2G deployment model and reduce integration barriers (hardware + software + process).

Technical Partners:

- **Asset Market:** Market context, opportunity assessment, business models, and economic framing.
- **Norda Stelo:** Engineering design support and implementation coordination.
- **Tecium:** High-frequency telematics, digital twin modelling, energy analysis, and EV/V2G performance validation.
- **Electrum Charging Solutions and McKinley Electric:** Project electrical contractors responsible for charger delivery, installation, and commissioning, including execution of a major service upgrade, feeder and protection equipment replacement, on-site installation, and synchronized coordination with BC Hydro and municipal inspections.
- **British Columbia Institute of Technology (BCIT):** Applied research partner providing V2G program design and testing through its SMART microgrid team, including structured decision-making site evaluation, technical integration support, smart grid R&D expertise, and collaboration on digital twin and cybersecurity modelling for resilient V2G infrastructure.

Host Fleet Site (Lynch Bus Lines):

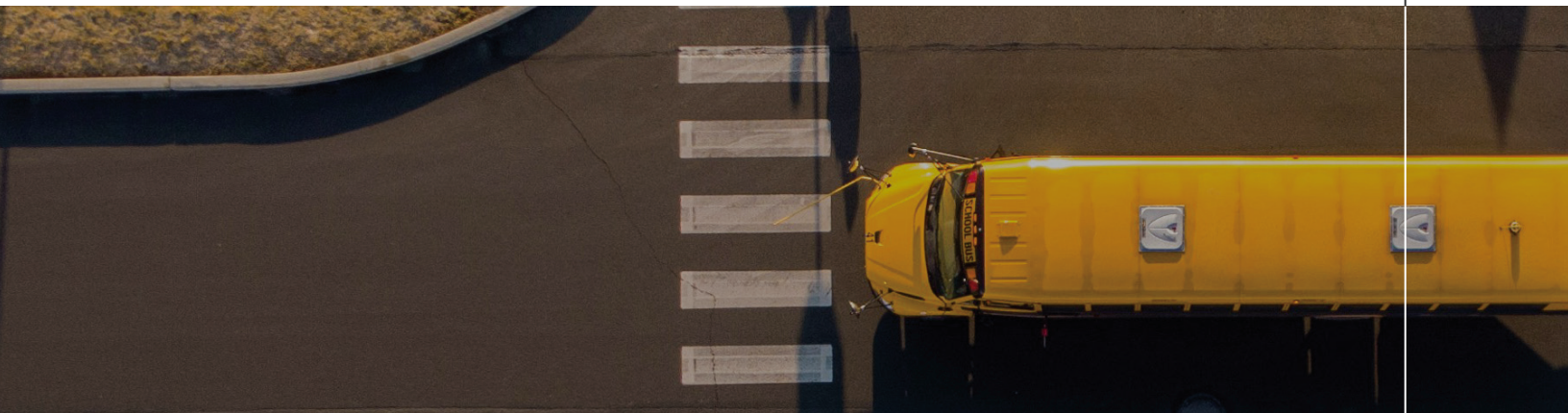
- Role: Family-owned commercial school bus operator providing real operational conditions, fleet duty cycles, and operational feedback.
- Interest: De-risk electrification and understand V2G value, operational constraints, and long-term economics.

Municipal/Permitting Authorities (e.g., City of Burnaby):

- Role: Electrical and construction permitting, safety oversight, and alignment with community climate and resilience goals.

Wider Ecosystem Stakeholders:

- Role: Vehicle OEMs, charger manufacturers, EMS/aggregators, standards bodies, regulators, and other fleet operators exploring electrification.



List of Formal Engagements

In addition to informal engagement, the project included several formal engagement meetings and events:

- **November 6, 2024:** Project Kickoff – Introductions, project overview, goals, roles & expectations Smart Energy Vancouver at the University of British Columbia on the sidelines of the Smart Energy Vancouver Conference.
- **January 30, 2025:** Workshop on technical & policy implications, safety and engineering considerations at Northeastern University.
- **February 27, 2025:** Presentation on V2G to the BC Trucking Association (BCTA) Sustainability Committee.
- **March 5, 2025:** Foresight hosted a session at Zero-Emission Fleets: Reconnect 2025. The panel addressed V2G business models, customer needs, and regulatory frameworks, exploring how fleets and property owners can utilize electric vehicle batteries to lower energy costs and generate revenue. It also examined the support required from regulators and utilities to scale V2G in BC and Canada.
- **March 24, 2025:** Presentation of V2G to BCTA Motor Coach Committee.
- **September 5, 2025:** Launch of field demonstration project with BC Hydro CEO at Everything Electric Vancouver at Vancouver Convention Centre.
- **September 18, 2025:** Presentation at 2025 Fleet Forward Vancouver Island: Showcasing Zero-Emission Fleet Vehicles hosted by Community Energy Association.
- **October 2, 2025:** Workshop with Canadian utilities and stakeholders at EVVE 2025, Vancouver, hosted by Electric Mobility Canada.
- **October 3, 2025:** Presentation on V2G Standards and Innovations in V2G Technology at EVVE 2025, Vancouver, hosted by Electric Mobility Canada.
- **October 6, 2025:** Foresight Fleet Survey with Vehicle-to-Everything (V2X) and the BC EV Charging Alliance.
- **October 29, 2025:** Presentation of demonstration project results at Open House hosted at Lynch Bus Lines in Burnaby, attended by Mayor Mike Hurley, City Councillors, and key stakeholders.
- **December 18, 2025:** Presentation on How Fleet Electrification and Bidirectional Charging Can Deliver Local Benefits, jointly by BC Electric Mobility Peer Network and Resilience Peer Network (RSPN).
- **February 26, 2026:** BC Hydro and Fuse Power Management workshop for utilities, with representatives from the Vehicle-Grid Integration Council (VGIC) and International Energy Agency (IEA) Task 53, about how utilities can support Vehicle-Grid Integration (VGI) adoption as Canada advances its new automotive and electricity strategies to enhance grid capacity, modernize infrastructure, and deliver electricity that is more reliable, efficient, and affordable for Canadians.

Executive Summary

This final report summarizes the outcomes, findings, and lessons learned from an 18-month Vehicle-to-Grid (V2G) Field Demonstration Project delivered by Fuse Power Management (“Fuse”) on behalf of Foresight Canada (“Foresight”). Technical and implementation support was provided by Asset Market, Norda Stelo, Tecium, Electrum Charging Solutions, McKinley Electric, and the British Columbia Institute of Technology (BCIT). The project was designed to advance BC Hydro’s exploration of bidirectional demand response and to measure real-world energy export from fleet electric vehicles to the grid through an operational field deployment.

Vehicle Grid Integration (VGI) is emerging as a foundational component of modern electricity systems. As transportation electrification accelerates, unmanaged charging risks add material peak demand and distribution congestion. Larger vehicles represent a larger load on the power distribution system; however, once charged, they also represent substantial energy storage potential.

Electric vehicle batteries represent a rapidly growing distributed storage resource that sits idle for large portions of the day. V2G transforms that storage into dispatchable flexibility, enabling peak shaving, renewable integration, resilience services, and the deferral of traditional grid infrastructure investments. Rather than functioning solely as electrical loads, EV fleets become mobile distributed energy resources capable of supporting both bulk system operations and local grid reliability.

This project moved beyond concept validation toward a replicable, utility-integrated deployment model. Core milestones included:

- **Defining technical requirements** for safe bidirectional charging at a commercial fleet site
- **Validating end-to-end communications** across the command chain (utility scheduling > energy management platform > chargers > vehicles > grid)
- **Demonstrating coordinated export** from multiple vehicles
- **Generating program recommendations** to inform future V2G frameworks in British Columbia and beyond

The demonstration builds directly on a December 2023 BC pilot conducted at Powertech Labs’ Smart Utility Test Centre by Lion Electric, Powertech Labs, BC Hydro, Coast-to-Coast Experience, Lynch Bus Lines, and WhiskeyJack. That earlier controlled pilot confirmed the technical applicability of V2G and its ability to provide peak shaving, while identifying systems integration—not hardware capability—as the primary barrier to scale. The current project was therefore intentionally structured to address interoperability using two buses, integration pathways, and multi-vehicle coordination in a real operational fleet environment.

The project progressed through a multi-stage implementation phase that included site selection, system engineering, regulatory approvals, major electrical service upgrades, equipment deployment, and full commissioning of the bidirectional charging system. This preparatory work established a technically compliant, utility-integrated platform capable of safely demonstrating real-world V2G operation under operational fleet conditions.

Key outcomes from the field deployment include:

- **Utility-Grade Operational Validation:** Coordinated multi-vehicle export events were executed reliably, with communications uptime exceeding 99.99% between chargers and the energy management platform.
- **Settlement-Grade Energy Measurement:** Cross-verification between charger telemetry and BC Hydro AC metering demonstrated. Although the project was unable to reconcile the kWh spent versus the price point, the project was able to measure net versus draw power output on a certified meter, setting the stage for future settlement frameworks.
- **Meaningful Export Capability:** High-frequency telematics and digital-twin modelling validated that a single electric school bus can reliably export approximately 160 kWh during the 5:00–9:00 PM peak window while maintaining operational readiness.
- **System Efficiency:** Round-trip efficiency approached 90%, consistent with industry benchmarks and supportive of commercial viability.
- **Critical Institutional Constraint:** Integration with the utility distributed energy resources management system (DERMS) platform (Uplight) proved to be a schedule bottleneck driven by onboarding timelines measured in months. A controlled fallback architecture using pre-programmed dispatch schedules preserved project milestones while maintaining a future upgrade path to live utility control. This bottleneck should be addressed through future V2G programs.
- **Site and Technology Selection Completed:** Building upon the first pilot at Powertech Labs, this project removed any remaining concerns with power quality associated with V2G charger infrastructure.
- **Regulation Shaping Design:** BC Hydro has a Self-Generation market offer and provides a streamlined interconnection process when the load is less than 100 kW. The project leveraged this process as a test of what a V2G interconnection process could be like in the future. Limiting the project to less than 100 kW was viewed to be a conservative approach to testing the process.
- **Lifecycle Performance Insight:** Tecium’s modelling shows that sustained mid-day charging access is the primary determinant of long-term V2G export capacity. Access to charging top-up, after morning pick-up and drop-off, governs the ability to have sufficient power to give back to the grid during afternoon peak, even if there is no time to charge after returning to base following the afternoon run. Operational scheduling and charging logistics have a greater lifecycle impact than upgrading to higher-power chargers. Maintaining export performance, therefore, depends on active fleet management—using telematics, digital twin modelling, and integrated fleet software to plan routes, charging windows, and battery health over time.

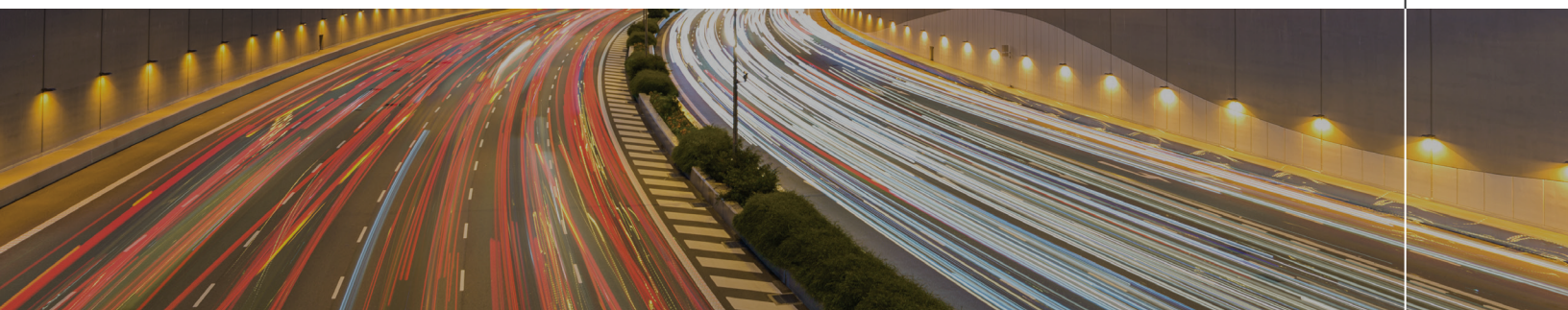
Market analysis reinforces the strategic significance of these findings. By 2040, electric vehicles in British Columbia alone could provide roughly 975 GWh of aggregated battery capacity for grid services (enough to power 800,000 homes for an hour) and 1,888 MW of dispatchable power (70% more than the Site C generation facility). At the national scale, EV fleets represent a storage resource comparable to many large utility-scale generation assets. At this scale, V2G can serve as a cost-effective alternative to major generation and transmission expansion.

From a commercial standpoint, fleets with predictable duty cycles and long dwell times—particularly school buses, municipal fleets, and delivery vehicles—represent the most immediate opportunity. Field results confirm that these fleets can participate in grid services without disrupting core operations. Customer engagement indicates strong interest, but adoption decisions hinge on financial risk, infrastructure availability, and operational certainty. Clear compensation mechanisms, standardized interconnection pathways, and replicable commercial frameworks will be essential to scale deployment.

Overall, the project demonstrates that depot-based electric fleets can function as distributed grid assets when technical, regulatory, and operational conditions are aligned. The V2G ecosystem is transitioning from early pilot experimentation toward structured commercial deployment.

Management / Process Findings

- Scaling V2G requires formal coordination mechanisms between utilities, regulators, fleet operators, and technology providers rather than ad-hoc project-by-project engagement.
- Harmonized regulatory and commercial frameworks are necessary to reduce transaction costs and provide predictable pathways for project approval.
- Standardized DERMS onboarding and interconnection processes are essential to shorten deployment timelines and avoid bespoke utility integrations.
- Clear compensation structures for grid services are needed to create investable revenue certainty for fleet operators.
- Early deployment strategy should prioritize fleet segments with high grid value (predictable idle windows, centralized parking, large batteries) to demonstrate bankable use cases and accelerate market confidence.



Technical Findings

- Interoperable standards across chargers, vehicles, and grid control platforms are critical to enable scalable, multi-vendor V2G ecosystems.
- DERMS integration must support reliable bidirectional dispatch, telemetry validation, and cybersecurity at fleet scale.
- System architectures should be designed for repeatable deployment rather than custom engineering per site.
- High-value fleet segments provide technically optimal operating conditions for early V2G scaling due to predictable duty cycles and controllable charging windows.
- EvGateway’s APIs could only be accessed by a router. As such, Wi-Fi is not a suitable use case to maintain 100% uptime as a grid-edge solution. The project initially attempted to use M2M cards from Telus, but those cards could not connect with the chargers. Tests were initiated by sharing Wi-Fi with Lynch operations, which resulted in some inefficiencies. Fibre and Wi-Fi were later installed at the Lynch Yard, and the Wi-Fi connection was stronger and more reliable with the installation of a new MR42 outdoor Wi-Fi AP. BC Hydro could explore these protocols, including M2M card solutions, with Telus in the future.

Taken together, the findings establish that fleet-based V2G is technically feasible, commercially promising, and strategically aligned with decarbonization and grid modernization goals. With appropriate policy goals, financial incentives, and infrastructure investment, V2G can evolve from demonstration projects into a significant flexible resource within British Columbia’s and Canada’s future electricity system.



1. Introduction

1.1 Project Rationale: Why V2G, Why Now?

Transportation electrification is accelerating rapidly, positioning electric vehicles (EVs) as a central pillar of Canada’s energy transition. While EV adoption delivers significant environmental and economic benefits, it also introduces a new and growing source of electricity demand. If unmanaged, large-scale EV charging could increase peak loads, strain local distribution infrastructure, and raise system costs. At the same time, EV batteries represent a vast distributed energy storage resource that sits idle for much of the day. Vehicle Grid Integration (VGI) seeks to transform this challenge into an opportunity.¹

VGI refers to the technologies, control strategies, and policy frameworks that enable EVs to interact dynamically with the electricity system. Rather than acting solely as passive loads, EVs can function as flexible grid assets that adjust charging schedules and, in bidirectional applications, discharge electricity back to buildings or the grid. When implemented effectively, VGI can support grid reliability, integrate renewable energy, reduce infrastructure investment, and create new revenue opportunities for fleet operators. Increasingly, VGI is recognized as an enabling component of a modern distributed energy system.

VGI encompasses a spectrum of applications. At the simplest level, unidirectional smart charging (V1G) shifts charging to off-peak periods. More advanced applications include vehicle-to-load (V2L), vehicle-to-building or home (V2B/V2H), and V2G.² Among these, V2G is the most technically sophisticated and systemically impactful. It enables EVs to export electricity back to the grid, allowing vehicles to operate as mobile energy storage systems capable of peak shaving, backup support, and renewable balancing.³

Because it involves bidirectional power flow, grid interconnection, and real-time communication with utility control systems, V2G depends on advanced hardware, interoperability standards, and operational frameworks. It therefore remains largely in the pilot and demonstration phase, where field trials are essential to validating performance, safety, interoperability, and economic viability.

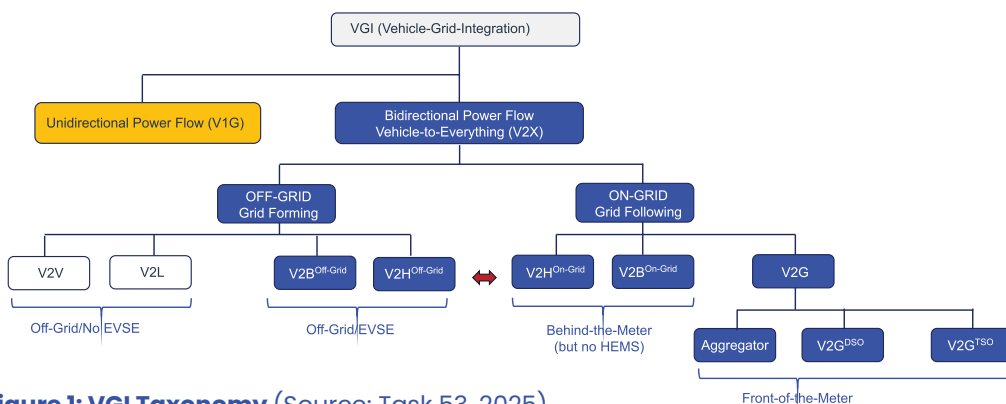


Figure 1: VGI Taxonomy (Source: Task 53, 2025)

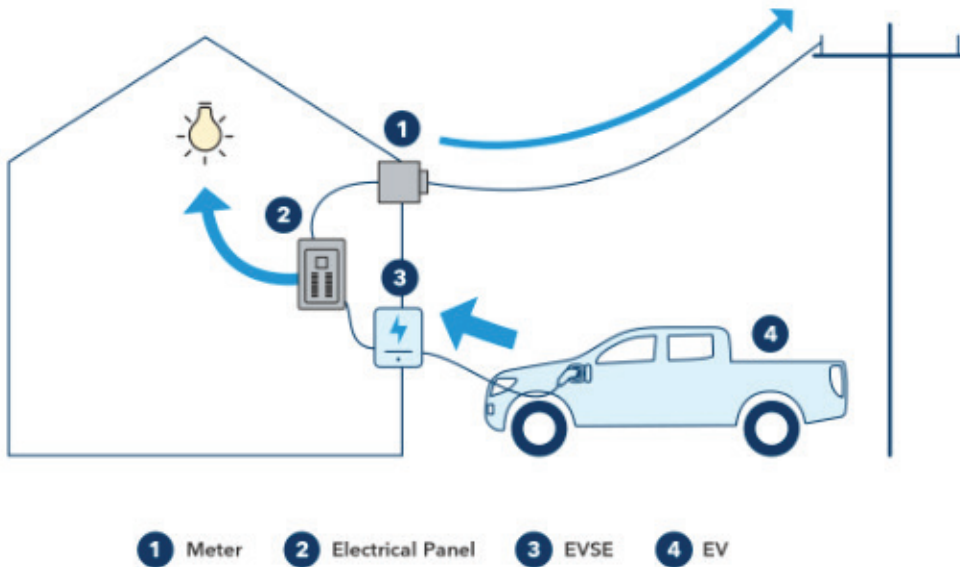


Figure 2: V2G (discharge mode)
 The vehicle provides power to a building to completely offset the building's power demand and deliver a net export of power to the grid.
 (Source: CSA Group)
 (Taylor et al, 2025)

VGI also aligns with Canada's new industrial and electricity strategies, which position electrification, advanced technology, and energy resilience at the centre of the country's economic future. Integrating EVs into the electricity system strengthens domestic EV adoption, enhances grid reliability, and accelerates clean technology investment. In this context, VGI and V2G pilots are foundational infrastructure demonstrations that support Canada's competitiveness in emerging mobility markets. By validating real-world V2G performance and interoperability, this field demonstration project contributes practical evidence that EVs can function as both transportation assets and grid resources within a resilient, homegrown energy ecosystem.

VGI also represents a strategically important next frontier for British Columbia. As the province accelerates electrification of transportation and expands clean electricity supply, EV fleets can evolve from passive loads into actively managed distributed energy resources that improve grid reliability, reduce peak infrastructure costs, and strengthen energy security.⁴ The CleanBC review underscores the need for proactive electricity planning, integrated system optimization, and demand-side flexibility—conditions under which V2G can play a meaningful role by providing dispatchable storage embedded within existing transportation assets. For British Columbia, where electricity is already low-carbon and electrification is central to economic and climate strategy, VGI offers a pathway to align affordability, resilience, and emissions reduction.

Demonstrations such as this project show that fleet-based V2G can support BC Hydro's long-term objectives by smoothing peak demand, enabling higher renewable penetration, and deferring capital investments, while simultaneously creating new value streams for fleet operators and strengthening the province's leadership in clean technology innovation. This positions VGI not as a niche pilot activity, but as a scalable infrastructure tool consistent with the CleanBC vision of an integrated, efficient, and resilient energy system.⁵

1.2 Project Goals and Success Criteria

This project builds on a December 2023 V2G pilot conducted by La Compagnie Électrique Lion, Powertech Labs, BC Hydro, Coast-to-Coast Experience, Lynch Bus Lines, and WhiskeyJack at Powertech Labs' Smart Utility Test Centre. ⁶ The pilot confirmed technical applicability in BC and demonstrated the potential for peak shaving, while identifying integration and control architecture as the primary hurdle to scale.

Key learning carryovers that shaped this project included:

- Hardware feasibility is necessary but not sufficient; integration drives deployability.
- Accurate measurement and reconciliation between estimated and actual power flows requires robust control, scheduling realism, and metering.
- Multi-vehicle scalability and performance in “weaker” * networks should be staged and validated.
- Interoperability, standardized communications, Measurement Canada-compliant metering, and closed-loop control architectures are required for broader deployment.
- The primary goal of this project is to bridge the gap between theory and commercial reality, while incorporating the findings of the previous pilot.

Strategic Goals

- Demonstrate that a commercial fleet can participate in V2G in a manner compatible with utility safety, operational needs, and emerging market structures.
- Produce program recommendations to inform BC's future VGI pathways, including interconnection, DERMS integration, and customer adoption.

Operational Goals

- Establish safe, reliable bidirectional charging at a fleet site.
- Validate multi-vehicle control and export.
- Validate communications and measurement reconciliation suitable for future settlement frameworks.

** The 2023 test was conducted in an area with strong power system connections which may not be usual to other V2G applications. It was recommended that such a test should be done in a weak system area, where harmonic impedances are higher and the impact from such a system is expected to be more significant.*

2. Business Models, Customer Needs, and Regulatory Frameworks

Working Group members engaged in discussions to support understanding of business models and customer needs, as well as a regulatory framework review. Preliminary results were shared for feedback.

2.1 Market Context and Demand Outlook

British Columbia has been a leader in EV adoption in Canada. EV adoption in British Columbia is expected to accelerate rapidly across all vehicle classes over the next 15 years, driven by policy mandates, declining battery costs, and increasing fleet electrification. To understand the breadth of the potential for V2G in British Columbia, Asset Market conducted a V2G opportunity assessment and developed a platform to map the opportunities. The following section discusses the results of that analysis.

Zero-emission vehicles will play a significant role in the province’s electricity system, providing both flexible load and distributed storage resources. By 2040, with conservative assumptions for vehicle and charger V2G compatibility and program participation, EVs in British Columbia alone could represent approximately 975 GWh of aggregated battery capacity and 1,888 MW of dispatchable power available for grid services.

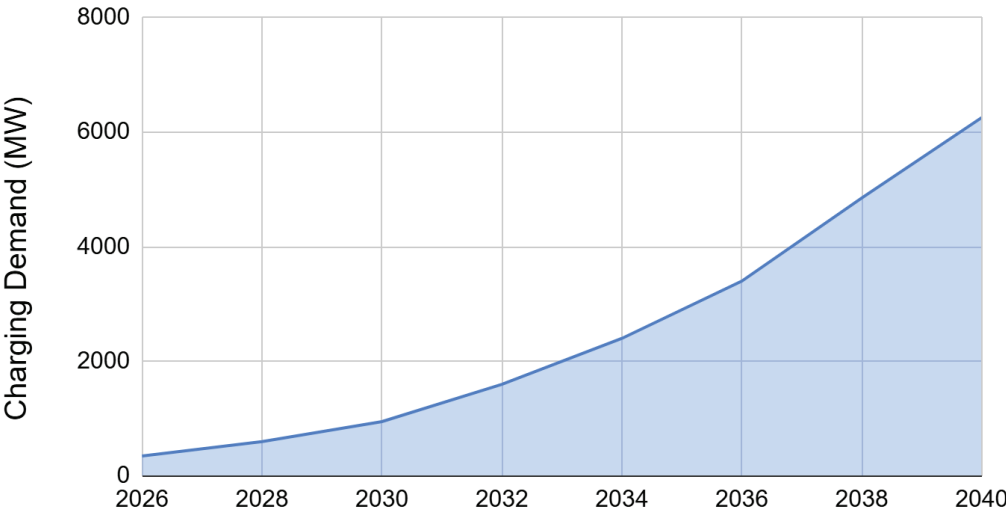


Figure 3: Forecast of EV Charging Demand in Canada (Source: Asset Market, 2025)

At the national level, transport electrification is expected to drive major load growth. Forecasts indicate that EV charging could account for 6,370 MW of electricity demand by 2040, equivalent to roughly 9% of Canada’s current electricity consumption. At the same time, the batteries embedded in those vehicles represent a substantial distributed storage resource. By 2040, V2G-enabled vehicles across Canada could provide—assuming conservative assumptions for V2G compatibility and participation—approximately 10 GWh of battery capacity and up to 19 GW of dispatchable power, equivalent to enough energy to power two million homes for peak hours in a day. To give a sense of scale, this total dispatchable power from V2G would be larger than BC Hydro’s total generation capacity of 13,400 MW.

While there are practical details to how this power can best be harnessed, the scale of the opportunity is clear: V2G has the potential to substitute for large-scale flexible generation such as new dams and peaking plants to handle peak loads. At the same time, V2G can provide power in grid-constrained areas, providing an alternative to investment in distribution and transmission upgrades.

Within British Columbia, V2G opportunity mapping has been developed with support from BC Hydro using vehicle registrations, duty-cycle data, and grid constraints to identify high-value locations. Preliminary analysis shows that fleet electrification and V2G can create both revenue opportunities and dispatchable capacity for utilities, with opportunities aggregated into heat-map analyses at one-square-kilometre resolution.

Taken together, these projections indicate that the aggregate V2X resource available from electrified vehicles could become a material component of system planning. As EV adoption scales, the combination of charging load growth and distributed battery capacity will create both new grid challenges and significant opportunities for flexible capacity, peak shaving, and infrastructure deferral. Since the V2X resources are mobile, they can present some unique advantages that stationary battery systems can not.

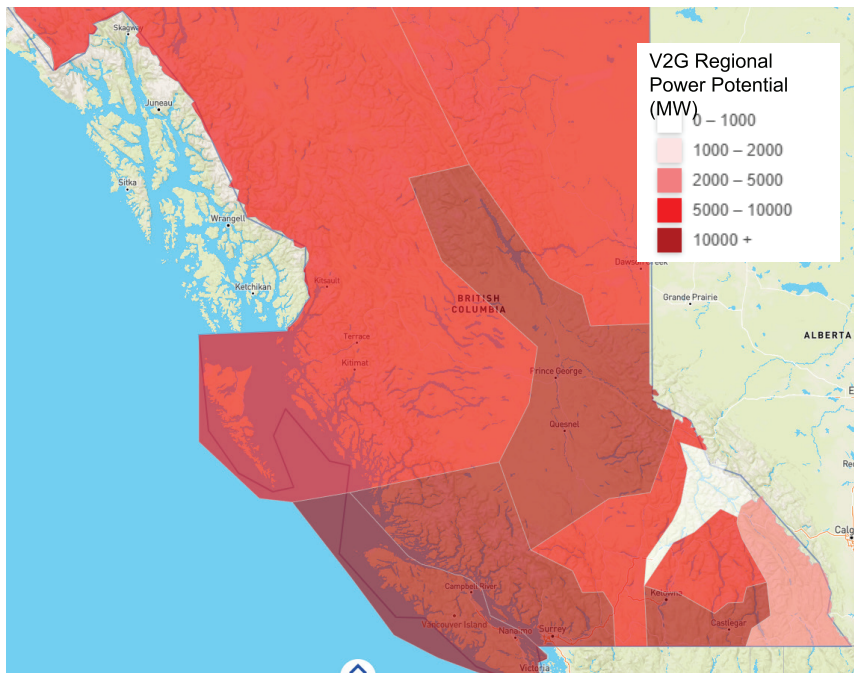


Figure 4:
Asset Market platform:
Heat map of V2G opportunities in BC

2.2 Business Models

One of the most mature and near-term business models is the depot-centric “fleet battery” model, which is best suited to fleets with predictable duty cycles and long dwell times, such as school buses, municipal vehicles, courier fleets, and seasonal tour coaches.

As an example, Asset Market’s commercial analysis shows that an electric school bus fleet can generate significant annual savings from V2G services and additional income from low-carbon fuel credits, while achieving lower overall operating costs than diesel equivalents.

A detailed site-level assessment for a 15-bus fleet in Burnaby illustrates the economics of this model. Under a representative scenario, the electrified fleet generated \$millions in total revenue, including from ancillary service contracts and carbon-related credit programs. Operating costs were also reduced relative to the diesel baseline, primarily due to lower fuel and maintenance expenses.

A second emerging model is the shared charging hub. This structure targets fleets without access to private depots, such as drayage, construction, or trades fleets. In this approach, a third-party hub owner develops bidirectional charging infrastructure and aggregates multiple fleets into a single market participant. The hub operator coordinates charging and dispatch using duty-cycle data and grid signals, unlocking both charging services and V2G revenues while minimizing operational conflicts. This model is supported by the broader V2G opportunities analysis, which evaluates revenue potential, charging needs, and dispatchable energy at specific geographic locations.

A third model focuses on behind-the-meter demand management for industrial and commercial facilities. Asset Market’s business-case tool shows that electrified fleets can stack revenues from ancillary services, low-carbon fuel programs, and operational savings. Additional benefits—such as energy arbitrage and demand-charge reduction—are expected to further improve project economics, although these were not fully included in early site analyses to avoid conflicts with utility storage contracts.

Finally, V2G presents a compelling opportunity in remote or diesel-dependent microgrids. In these systems, EV batteries complement renewable generation and stationary storage by providing fast-ramping power, backup capability, and peak-shaving services. The primary value drivers are avoided diesel fuel costs, reduced logistics risks, and improved energy resilience.

2.3 Additional Business Insights

The technical and economic viability of V2G varies significantly by vehicle type, duty cycle, and operating environment. Fleets with predictable schedules and long dwell times offer the strongest near-term opportunities, as they provide reliable and concentrated battery capacity that can be aggregated for grid services.

School buses and depot-based commercial fleets are widely identified as the most promising initial applications. Their predictable routes, centralized charging infrastructure, and long idle periods make them well suited to providing grid services without disrupting transportation operations. Electric school buses represent a significant storage resource. Studies suggest that electrifying and V2G-enabling the entire U.S. school bus fleet could provide more than 60 GWh of storage capacity, highlighting the scale of the opportunity.⁸

From a business perspective, V2G enables several new value streams. These include revenue from ancillary services, demand response, and capacity markets, as well as avoided infrastructure upgrades for utilities. V2G can also provide resilience services to critical facilities, communities, and emergency response operations.

However, customer engagement remains a key challenge. Interviews with fleet operators indicate that while awareness of V2G is increasing, most customers are not yet planning deployments. Many lack clarity on the financial value, technical requirements, and operational implications of V2G systems.⁹ This suggests that utilities and policymakers will need to provide clear programs, incentives, and technical guidance to drive adoption.



2.4 Customer Needs

Across all business models, successful V2G deployment depends on aligning fleet characteristics with technical, operational, and regulatory conditions.¹⁰ Analysis of fleet duty cycles and site economics indicates that the strongest early candidates share several characteristics. These include daily driving distances below roughly 100 kilometres, predictable routes, and long dwell times at a regular charging location such as a depot. Fleets that meet these conditions can reliably participate in grid services without compromising operational readiness.

In contrast, heavy vehicles with high mileage, variable routes, or continuous utilization are more challenging candidates, as they require higher-power charging and have less available dwell time for grid services. The BC-wide V2G opportunities analysis incorporates duty-cycle data, charging requirements, and grid constraints to identify the locations and fleet types most likely to provide meaningful dispatchable capacity.

Economic outcomes are also strongly influenced by tariff structures, availability of grants, and access to utility storage or ancillary service contracts. Site-level analysis indicates that projects can achieve net profitability when supported by storage contracts, capital grants, and appropriate financing structures. Conversely, fleets with flat volumetric rates, uncertain routing, or restrictive battery warranties face higher barriers to participation.

2.5 Regulatory Framework: Why it Matters

VGI technologies are emerging within a regulatory and standards landscape that is still evolving across most jurisdictions. Traditional electricity systems were designed for one-directional power flows and stationary distributed energy resources, and as a result, many existing interconnection rules, tariffs, and grid planning frameworks are not yet equipped to accommodate mobile, bidirectional assets such as electric vehicles. This misalignment between technology capability and regulatory structure is one of the primary barriers to large-scale V2G adoption.¹¹

In Canada, the standards landscape for VGI is described as fragmented and rapidly evolving. Multiple overlapping standards exist across vehicle systems, charging equipment, grid interconnection, and communications protocols. This fragmentation increases compliance costs, slows product rollout, and creates uncertainty for utilities, manufacturers, and fleet operators seeking to deploy V2G systems. At the utility level, interconnection processes were largely developed for unidirectional loads or stationary distributed generation, and in many jurisdictions—including British Columbia—there is no clear or standardized pathway for interconnecting bidirectional EV charging systems.

Globally, the standards ecosystem for V2G is beginning to take shape. Key standards include SAE J3072 and ISO 15118-20, which govern bidirectional charging and secure communications between vehicles and charging infrastructure. At the grid interface, standards such as IEEE 1547 and UL 1741 define interconnection requirements for distributed energy resources. Meanwhile, communications protocols such as IEEE 2030.5, OpenADR, and Open Charge Point Protocol (OCPP) enable coordination between utilities, aggregators, and charging infrastructure.¹²

Despite these advances, several critical gaps remain, including inconsistent interconnection processes, misaligned communications protocols, and limited certification pathways for emerging AC-based V2G systems. Another major regulatory issue is the absence of mature compensation mechanisms. Currently, it is difficult to accurately monetize the cost / benefit of deferred distribution / transmission infrastructure. Most analyses indicate that grid-connected V2G will be driven by revenue-generating programs, including demand response, capacity markets, or ancillary service payments.

Without transparent, predictable compensation frameworks, most customers are unlikely to adopt V2G systems despite their technical capabilities. Locational marginal pricing is an established methodology outside of BC but has not yet been fully implemented in the province. Consequently, regulatory reforms must address both interconnection rules and market structures in order to unlock the full potential of V2G.

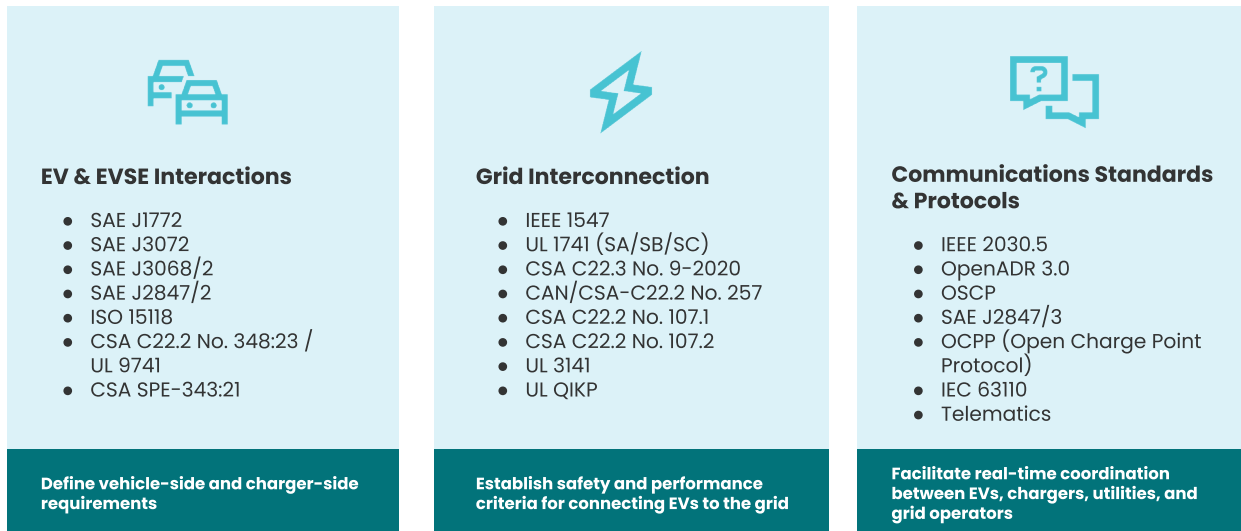


Figure 5: Safety standards, performance criteria, and communication standards and protocols covering all aspects of the VGI delivery chain (Source: CSA Group) (Taylor et al, 2025).

3. Technical/Policy Implications and Safety/Engineering Considerations

The following sections were informed via feedback from Working Group members and broader stakeholder engagements, as outlined in the list of formal engagements.

3.1 Technical and Policy Implications of V2G

V2G fundamentally changes the role of electric vehicles within the electricity system. Instead of functioning solely as electrical loads, EVs become flexible distributed energy resources capable of both consuming and supplying power. When aggregated, EV batteries can provide services at the bulk system, distribution system, and customer levels, offering both technical and economic benefits.

At the bulk power system level, V2G can provide a range of services typically delivered by conventional generators or stationary storage. Although less practical than distribution systems, these can include some level of frequency regulation, operating reserves, load following, energy arbitrage, and peak capacity support. Such services can improve system stability, reduce reliance on fossil-fuel peaking plants (while noting that BC Hydro relies mostly on hydro power), and facilitate the integration of renewable energy.

At the distribution level, V2G can function as a non-wired solution. By discharging energy during periods of high demand, EVs can relieve congestion, support voltage regulation, and defer or avoid costly transmission and distribution infrastructure upgrades. This is particularly valuable in regions experiencing rapid electrification, where load growth may otherwise require major capital investments.¹³

At the customer level, V2G enables a range of services that improve resilience and reduce costs. These include backup power during outages, demand-charge reduction, energy arbitrage, and off-grid or temporary power applications.

From a policy perspective, VGI is increasingly recognized as a critical tool for managing the impacts of transportation electrification. EVs represent a substantial and growing source of electricity demand, and unmanaged charging could strain grid infrastructure and increase system costs. VGI strategies—including V2G—allow EVs to act as flexible assets, shifting load, providing capacity, and improving the overall efficiency of the power system.

Globally, the most commercially viable V2G use cases today are relatively straightforward applications such as backup power, load shifting, and peak shaving. These use cases align well with existing tariffs and customer needs. More advanced applications, such as frequency regulation, remain technically feasible but are constrained by interoperability challenges, regulatory structures, and concerns around battery degradation.

3.2 Safety and Engineering Considerations

Early V2G pilot projects demonstrate that the technology can operate safely, but they also highlight the importance of rigorous engineering design, system integration, and standardized testing. Demonstrations at BC Hydro’s Powertech Labs in 2023 showed that V2G systems could operate safely, though commissioning and integration were complex and some power-quality metrics occasionally fell outside required standards.¹⁴

One of the primary engineering challenges is system integration. V2G systems require coordination between multiple components, including the vehicle, charger, battery management system, communications network, and grid control platform. Past pilot studies identified communication issues between these systems, as well as challenges in integrating control software and ensuring accurate measurement of bidirectional power flows.^{15, 16}

Operational performance is influenced by several factors, including vehicle availability, battery state of health, environmental conditions, and overall system configuration. For example, vehicle schedules and charging patterns can significantly affect the amount of energy available for grid services. Similarly, ambient temperature and power levels can influence system efficiency.

Round-trip efficiency is a key performance metric for V2G systems. Studies indicate that power level and ambient temperature have the greatest impact on efficiency, while state of charge has a comparatively smaller effect.² These findings highlight the need for careful system design, component selection, and operating strategies to ensure efficient and reliable performance.

Overall, early deployments must include interoperability testing, power-quality monitoring, and standardized certification processes to ensure safe and reliable operation at scale.





4. Market Research Findings and Customer Feedback

4.1 Market Readiness and Fleet Electrification Trajectory

Fuse and Foresight conducted a fleet survey with fleet operators, and the results provide early but meaningful evidence that Canadian fleet operators are actively preparing for electrification while navigating infrastructure and cost constraints. Although the response rate was modest (16%), respondents included a representative cross-section of sectors, including municipal services, logistics, film production, public transit, and long-haul transportation, with fleet sizes ranging from fewer than 20 vehicles to over 5,000. Most respondents either own their fleets or are already piloting electric vehicle deployments and intend to electrify portions of their operations within the next one to five years.

Typical daily duty cycles are relatively short (often under 75 km), indicating strong technical compatibility with overnight charging and future V2G participation. These operational patterns suggest that many fleets have the inherent capacity to offset building load and return stored energy to the grid without compromising core transportation functions. At the same time, a significant share of fleets rely on public or shared parking rather than private depots. This creates a clear structural need for accessible third-party charging infrastructure and publicly available overnight charging hubs to support large-scale electrification. The following section discusses trends and findings from the fleet survey and stakeholder engagements.

Targeted Engagements

BC Trucking Association (BCTA) Sustainability Committee

Discussion at the BCTA Sustainability Committee underscored that market readiness for fleet electrification in British Columbia remains uneven and highly sensitive to policy and incentive stability. Members characterized the current environment as one of regulatory and funding “flux,” with significant uncertainty tied to U.S. policy shifts, federal incentives, and provincial budget direction. Several participants emphasized that while innovation is advancing and electrification momentum continues, deployment decisions remain strongly dependent on incentives to close total cost of ownership (TCO) gaps. Larger carriers are continuing to test technologies, often motivated by ESG commitments or procurement requirements, whereas mid-sized and smaller operators are demonstrating caution due to capital risk and unclear near-term returns. Importantly, electrification criteria are increasingly embedded in major RFPs, suggesting that market forces—particularly customer-driven procurement standards—are becoming a structural driver of adoption.

Operational experience shared by fleet operators revealed a nuanced picture. Some operators reported strong performance and measurable operating cost savings from electric units—citing lower fuel, maintenance, and carbon credit impacts—as justification for expanding deployments. However, others noted that customers are generally unwilling to pay a premium for zero-emission freight at scale, limiting revenue-side upside. Infrastructure costs, reliability concerns, and high upfront capital requirements were consistently identified as barriers to broader fleet transition, particularly for larger-scale conversions. At the same time, participants acknowledged that many fleet vehicles travel less than 100 km per day, indicating a substantial segment of operations where electrification could be technically viable today. Overall, the Committee’s feedback suggests that while technical feasibility is advancing and niche use cases are emerging, mass adoption will depend on improved economics, reliable infrastructure scaling, and business models that materially lower total cost of ownership for carriers.

Committee feedback indicates that early V2G opportunities are most likely to emerge in fleet segments characterized by predictable duty cycles and operational proximity to depots. In particular, drayage trucks operating within port and intermodal corridors, vehicles traveling shorter daily distances, fleets hauling lighter goods, and routes with relatively milder grades present the strongest near-term fit. These use cases typically return to base daily, operate within constrained geographic areas, and avoid sustained high-load hill climbs—conditions that align well with current battery range, charging infrastructure limitations, and the economic logic of leveraging parked capacity for grid services.

BC Trucking Association (BCTA) – Motor Coach Committee

Feedback from members of the BCTA Motor Coach Committee indicates that while there is strong conceptual support for V2G and electrification, commercial readiness in the motor coach segment remains constrained by cost, operational risk, and technology maturity. Operators cited recent manufacturer insolvencies—including Proterra and Lion Electric—as materially impacting fleet confidence, particularly where vehicles require significant upfront capital investment and specialized maintenance infrastructure. Participants emphasized that electric motor coaches currently carry a cost premium, require new high-voltage service capabilities, and present parts availability risks, with downtime during peak tourism season posing material revenue exposure. As a result, committee members suggested that broad commercial adoption in the motor coach sector may be at least two years away, pending improved vehicle reliability, clearer program structures, and cost equalization mechanisms.

At the same time, operators acknowledged that targeted use cases represent near-term “low-hanging fruit,” particularly for fleets with predictable duty cycles under 200 km per day, such as school buses, last-mile delivery, and certain urban tour operations.

Members recognized that V2G presents a potentially significant system-level opportunity for utilities, noting that aggregated EV battery capacity already exceeds purpose-built stationary storage in some jurisdictions. However, broad charter and long-distance coach operations remain challenged by range constraints, limited charging infrastructure in remote or mountainous corridors, and the need for larger-capacity batteries to support unrestricted routing.

The Committee expressed openness to pilot participation, particularly where infrastructure costs are covered and revenue contracts are structured to equalize upfront capital costs and provide predictable compensation for grid availability. Overall, the sector is monitoring technology evolution closely and remains interested in early demonstration programs, but adoption will depend on improved economics, supply-chain stability, and operational certainty.



Survey Findings

Full results of the survey are presented in Appendix 1.

Infrastructure Demand and Charging Hub Opportunity

Operational insights reinforce a strong case for publicly accessible charging hubs, particularly at institutional sites capable of supporting overnight parking and long dwell times. Fleet vehicles are generally off the road overnight and parked for extended periods, aligning well with managed charging strategies and future grid services.

Respondents expressed specific interest in off-site charging services in major urban regions like the Lower Mainland/Metro Vancouver and the Greater Toronto Area, as well as along highway corridors. These geographic preferences highlight where early infrastructure investments would have the highest utilization potential. However, adoption barriers remain significant.

Operators cited vehicle reliability concerns, range limitations under heavy payload conditions, and high upfront capital costs as primary constraints. Many indicated that more affordable acquisition models, leasing options, or financing support would materially accelerate electrification. Improved charging availability is therefore viewed not simply as a convenience, but as a prerequisite for scaling electric fleets.

V2G Interest and Commercial Conditions for Adoption

Interest in V2G is strong but conditional. Nearly 90% of survey respondents report at least a basic understanding of V2G and recognize its potential grid and revenue value. However, fleets consistently emphasized that adoption depends on:

- Clear business cases and ROI transparency
- Hardware compatibility guidance
- Practical deployment pathways
- Access to grants or structured financing

Fleet operators expressed willingness to participate in electrification and grid integration, provided that enabling infrastructure, policy alignment, and financial frameworks are in place. These findings directly support the case for expanding publicly accessible overnight charging and developing a scalable V2X ecosystem that delivers both operational fleet benefits and grid services.

Organizational Mobilization and Institutional Capacity Building

These surveys captured early signs of institutional mobilization. Participants representing a mix of companies, including logistics, municipal and public transportation, and specialized mobility services, reported a need for immediate next steps, including:

- Load forecasting and grid planning
- Regulatory review
- IT and cybersecurity assessments
- Fleet management engagement
- Interdepartmental coordination
- Regional collaboration planning

This signals a transition from exploratory interest to operational planning. Organizations are moving from asking whether V2G is relevant to asking how to integrate it. Peer networks and pilot visibility are accelerating this shift from awareness to execution. Survey respondents overwhelmingly agreed that program objectives were met and requested continued updates on pilot progress. This sustained engagement indicates that knowledge-sharing platforms are functioning as force multipliers. Relatively modest investments in pilot visibility and peer learning are catalyzing cross-jurisdictional momentum and building implementation capacity.

Resilience Use Cases and Community Value

Survey findings were reinforced through a live peer session focused on resilience and emergency applications of V2X. Participants emphasized that the same operational characteristics that make fleets compatible with overnight charging also position them as valuable distributed energy assets. Key use cases identified include:

- Backup power for resilience hubs
- Outage coverage in rural communities
- Emergency shelters and critical facilities
- Support for medically vulnerable residents
- Peak demand reduction and grid stabilization
- Localized energy delivery for distribution congestion relief

Participants intuitively recognized that resilience alone cannot sustain market scale. Emergency applications are viewed as essential co-benefits, but commercial value streams including peak shaving, grid services, and ratepayer savings must anchor long-term adoption. This reflects a sophisticated understanding among stakeholders that V2G succeeds when resilience and economics are integrated rather than treated separately.



Pilot Engagement Findings

Pilot Validation and Municipal Role

The BC Hydro electric school bus pilot provides a real-world validation of these market signals. The pilot demonstrated that parked electric buses could discharge significant energy during peak periods while still fulfilling transportation obligations. This confirms that fleets can operate as distributed energy assets without compromising service reliability.

Fleet operator feedback from the pilot underscored that:

- Emergency-only programs are not bankable at scale
- Recurring commercial value is required
- Resilience is a critical secondary benefit
- Municipal engagement and participation is essential

Participants identified a strong municipal role in scaling adoption, including:

- Coordinating fleet, planning, and emergency departments
- Hosting charging hubs
- Partnering with utilities
- Enabling regional fleet collaboration

There was broad consensus that collaborative ecosystem approaches rather than isolated pilots are necessary to transition from demonstration projects to scalable programs.

Intentional interoperability testing between Tellus Power hardware, fleet vehicles, and BC

Hydro Electric provides the technical foundation for successful collaborations.

Strategic Market Implication

Together, the fleet survey, peer session feedback, and pilot validation illustrate a maturing ecosystem:

- Fleets are willing participants
- Utilities are piloting and planning
- Municipalities are mobilizing
- Communities are recognizing V2G as infrastructure

Persistent barriers remain including capital cost, regulatory uncertainty, and standards interoperability, but stakeholder appetite is clear. Demand is shifting from conceptual interest to structured deployment frameworks. These combined insights strengthen the business case for expanding publicly accessible charging hubs and structured V2X programs in British Columbia. V2X is emerging not only as a climate solution, but as a grid resilience strategy capable of delivering economic, health, and emergency preparedness benefits at the community scale.

4.2 Customer Feedback

Engagement with Lynch Bus Lines, a large commercial school bus operator, provided a rare operationally grounded view of the real-world decision framework fleets use when evaluating electric vehicles and V2G integration. Feedback from Lynch, who manage a fleet of over 125 vehicles serving daily school contracts, offers insight into how electrification decisions are made in practice—not from a sustainability lens alone, but through operational risk, flexibility, workforce behaviour, and long-term asset economics.

Operational Sustainability of Electric Buses

From a duty-cycle perspective, the operator confirmed that most routes are well aligned with EV capabilities. Buses typically return to base by late afternoon, creating a consistent overnight charging window. Long-distance or mountainous trips represent a small minority of operations and would likely remain assigned to diesel vehicles even in an electrified fleet. This reinforces that electric buses are not a theoretical fit—they already match the core operating model of school transportation. However, the transition is not only about range.

Lynch emphasized that electric buses fundamentally change fleet logistics because they become infrastructure-anchored assets. Unlike diesel or propane vehicles, which can be redeployed across multiple yards or regions, electric buses are tied to charging infrastructure. This loss of redeployment flexibility is viewed as the single most important structural trade-off. Even if lifetime operating costs were equal, Lynch indicated a preference toward internal combustion vehicles solely because they preserve operational mobility and resale optionality.

This insight is critical: electrification must create a clear economic advantage, not just parity, to compensate for reduced flexibility.

Economic Decision Thresholds

The operator's adoption criteria are strictly financial and risk weighted. Fuel savings alone are not sufficient to justify transition unless they are paired with financing structures that reduce upfront exposure.

Estimated annual fuel savings per electric bus are significant (~\$10,000/year), and over a 10–12-year lifespan this becomes a meaningful cost advantage. Moreover, and often under-acknowledged, a major economic benefit is the reduction in maintenance costs. Electric buses have fewer mechanical components and do not require oil changes, exhaust system repairs, or transmission servicing.

Agencies with early EV deployments report lower routine maintenance needs and fewer wear-related failures. Over a full service life, these reduced maintenance obligations can compound into a substantial operational savings that further strengthens the total cost of ownership.

For operators, predictable and lower maintenance requirements also reduce exposure to unplanned downtime, improving budgeting stability and supporting more reliable fleet availability.

Yet despite these advantages, the purchase price differential remains a psychological barrier. Grants help narrow the gap, but the operator’s decision rule is simple: electric must be economically better, not merely comparable. Equally important is uncertainty around secondary market value. Lynch expressed concern that today there is no established resale market for aging electric buses. The fear is not battery failure—warranties mitigate that—but asset liquidity at end of life. Internal combustion vehicles have predictable salvage pathways. Electric buses do not yet. This highlights a financing and policy opportunity: programs that de-risk residual value could materially accelerate adoption.

Reliability and Service Support

Fleet managers evaluate manufacturers through the lens of service infrastructure, not only technology. Lynch noted that early electric bus trials revealed long parts lead times and service complexity. Even short disruptions create cascading operational risk when vehicles are tied to fixed routes. A technically advanced vehicle that cannot be repaired quickly is unacceptable in a commercial environment.

While lower mechanical maintenance contributes positively to overall lifecycle economics, it does not eliminate the need for strong local service ecosystems. Lynch indicated a preference for brands with strong dealer networks, even if they are not the cheapest or newest option. Reliability and service access are valued above new features. For V2G programs to scale, integration partners must demonstrate that uptime is protected and that manufacturer and supplier support structures are mature.

Workforce Adoption & Training Reality

Driver behavior emerged as a central theme. The operator’s workforce skews older, and older drivers tend to resist unfamiliar systems. Regenerative braking feels dramatically different from diesel compression braking, especially on mountain descents. Drivers described a steep learning curve and an initial lack of confidence. This is not a mechanical limitation—it is a training issue. Lynch recommended structured onboarding that treats EV deployment as a cultural program, not just a vehicle delivery.

Direct suggestions from Lynch include:

- Create internal demo days
- Select early adopters
- Run week-long focused training
- Normalize mistakes
- Build familiarity through repetition

Without intentional training, fear slows adoption. Once drivers gain experience, curiosity replaces resistance. This insight reframes EV rollout as workforce change management.

Infrastructure Disruption & Implementation Friction

The operator praised the installation process but emphasized that infrastructure upgrades temporarily disrupt yard operations. Power shutdowns, construction logistics, and workflow changes create real operational stress. While manageable, these frictions must be anticipated and actively supported.

Future electrification programs should:

- Pre-plan outages
- Provide temporary backup power
- Handle engineering complexity externally
- Minimize operator administrative burden

The more invisible the infrastructure work is to the fleet, the faster adoption occurs.

Market Segmentation Insight

This engagement revealed that school buses are only the entry point. Lynch identified adjacent fleet verticals with similar duty cycles and infrastructure stability, including:

- Restoration service trucks
- Specialty contractor fleets
- Private school transport
- Urban service vehicles
- Seasonal shuttle fleets

These segments share predictable routes and centralized parking—ideal conditions for V2G. Importantly, private operators driven by marketing and brand differentiation may adopt faster than public school boards, which he described as verbally supportive but slow to commit.

This suggests early commercialization should target fleets motivated by competitive positioning, not only policy mandates.

Strategic Use Case Validation

This feedback confirms several key hypotheses:

- Electric school buses are operationally viable today.
- V2G integration aligns with real fleet schedules.
- Adoption barriers are economic and behavioural, not technical.
- Training and financing are as important as hardware.
- Infrastructure support accelerates trust.
- Adjacent commercial fleets represent scalable expansion.

The fleet operator did not reject electrification, but instead demanded a structured pathway that reduces risk and preserves business continuity. That distinction is critical. The market is not resistant—it is pragmatic.

5. V2G Demonstration Trial

This Field Demonstration Project was structured around clearly defined technical deliverables intended to move beyond concept validation toward a replicable, utility-integrated deployment model. Key objectives included establishing safe bidirectional charging requirements at a commercial site, demonstrating real-time communication between BC Hydro’s grid dispatch systems and the V2G platform, validating coordinated export from multiple vehicles, and producing program recommendations to guide future scale-up.

Table 1: Pilot Timelines

Milestone / Activity	Date
Site assessment and selection	February 28, 2025
Design approval	March 27, 2025
Purchase order placed for chargers	April 14, 2025
Supply agreement executed buses signed	April 30, 2025
City permit application submitted	May 16, 2025
Delivery of first bus to site	June 27, 2025
Delivery of second bus to site	July 4, 2025
Charger fabrication, assembly, and site delivery	July 25, 2025
City inspection report	August 26, 2025
Test sessions begin	August 28, 2025
Test sessions end	November 9, 2025

Site Assessment and Selection

The project began with a structured evaluation of eleven candidate sites across Metro Vancouver representing fleet operators, municipal facilities, and research campuses. A structured decision-making framework developed by BCIT guided selection, incorporating criteria such as grid capacity, fleet idle patterns, permitting feasibility, community impact, and scalability.

Lynch Bus Lines was selected as the preferred site. The company operates around 125 school buses and has a strong record of operational innovation. School buses are idle during BC Hydro’s evening peak period, enabling stored battery energy to be exported when grid demand is highest. Lynch’s planned electrification of its fleet created a scalable platform capable of demonstrating measurable grid value and fleet revenue potential.

System Design and Technical Architecture

Fuse, supported by Norda Stelo, engineered an integrated solution spanning electrical upgrades, electric buses, bidirectional chargers, and a data management platform capable of utility coordination. Design priorities included battery safety, depth-of-discharge capacity, climate reliability, serviceability, and lifecycle cost optimization.

The demonstration project originally anticipated deploying Lion Electric buses; however, Lion's entry into creditor protection in late 2024 introduced unacceptable schedule and warranty risks. To preserve project momentum, the team pivoted to RIDE Canada (formerly BYD) Type D electric school buses following a market assessment of alternatives.

Two buses were used in the pilot. Their lithium iron phosphate battery chemistry provides enhanced safety performance and long service life. Each bus delivers approximately 204 kWh of dispatchable energy, using an 80% operating window of a total 255 kWh available, supported by a 12-year warranty permitting up to 800,000 kWh of discharge throughput. This capacity enables meaningful grid services while maintaining battery longevity. Field performance data from Ontario confirmed reliable operation across Canadian temperature extremes, and local service support ensured rapid maintenance response.

Bidirectional charging infrastructure was designed to meet BC Hydro's technical requirements, including grid-following operation and secure LTE/VPN communication using the OCPP. Two 40 kW Tellus Power Green bidirectional chargers were installed, capable of exporting up to 80 kW in aggregate. The chargers interface with EvGateway's Charging Management System—a FedRAMP-compliant platform that hosts Canadian project data domestically while supporting real-time charging, discharging, and greenhouse-gas reporting. EvGateway's prior deployment across BC Hydro's public charging network and major municipal fleets provided operational confidence and interoperability assurance.

Tellus Power's V2G charging system architecture incorporates ISO 15118-20 communication standards, OpenADR demand-response protocols, and mutual certificate authentication to ensure cybersecurity and interoperability. Chargers default to charging-only mode in the absence of a utility dispatch signal, maintaining safety and operational reliability. Tellus Power hardware is software-agnostic and interoperable with several commercially available and industry tested software stacks.

Utility Interconnection and Regulatory Approvals

The project team completed BC Hydro's Distribution Generator interconnection review in early 2025 and filed an Express Connect service upgrade request to support additional load capacity. Engagement with the City of Burnaby resulted in timely permitting support, reflecting strong municipal alignment with climate and electrification goals.

A major service upgrade was required to safely accommodate the new bidirectional chargers. The site's existing 400 A electrical service was upgraded to a 600 A breaker, requiring conductor replacement, protection equipment upgrades, and coordinated shutdown scheduling between contractors, the utility, and municipal inspectors.

Although supplier lead times and outage coordination extended the schedule, the phased approach minimized operational disruption to Lynch Bus Lines.

Equipment Deployment and Commissioning

Site preparation included upgrading underground cabling and transformer infrastructure to right-size charging capacity and preserve long-term scalability. As mentioned, BC Hydro's Express Connect group completed feeder upgrades, while Electrum and McKinley Electric installed the new protection systems, transformers, and charger infrastructure during a planned shutdown.

The installed Tellus Power Green chargers comply with UL 1741 SB, IEEE 1547, and CSA safety standards and operate strictly in grid-following mode, eliminating the risk of energizing a de-energized feeder. BC Hydro retains full authority to disable export during outages to protect line workers.

Testing and commissioning were performed remotely through EvGateway's Charge Management System platform, and real-time vehicle data was captured by Tecium's high-frequency telematics (see Figure 6).

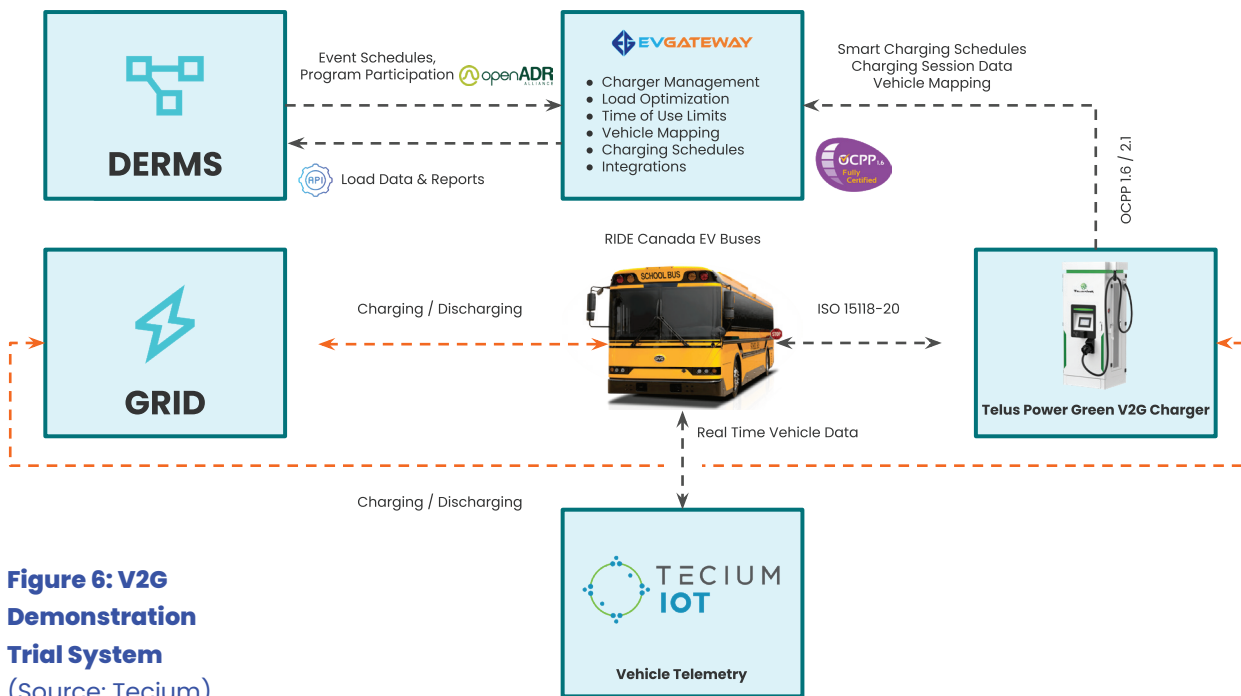


Figure 6: V2G Demonstration Trial System
(Source: Tecium)

5.1 Trial of Communication Between BC Hydro Grid Dispatch System and V2G

A central objective of the Lynch Bus Lines pilot was to demonstrate that electric school buses could operate as coordinated, dispatchable grid resources rather than passive energy loads. The pilot validated a functioning command chain linking BC Hydro scheduling instructions, the EvGateway charge management platform, bidirectional chargers, and vehicle discharge back to the grid. Even without live DERMS dispatch integration during the reporting window, both buses consistently executed programmed discharge events, confirming that multi-vehicle orchestration is technically reliable.

Across the full dataset, total system energy throughput exceeded 14 MWh, with aggregate recorded losses representing a tiny fraction of total energy moved through the system. Discharge events were typically scheduled for the four-hour evening peak window (5:00–9:00 PM), with charging events occurring overnight between 10:00 PM and 2:00 AM; however, multiple operational permutations were tested throughout the trial to assess performance under varying conditions.

In all cases, the bidirectional chargers ramped to their full programmed export setpoint—reaching the full 40 kW capacity almost instantaneously, or 20 kW where a lower output was specified. Even under conservative assumptions that account for charger telemetry uncertainty, the pilot demonstrates that bidirectional fleet charging can operate with efficiency levels compatible with grid-scale distributed energy resources.



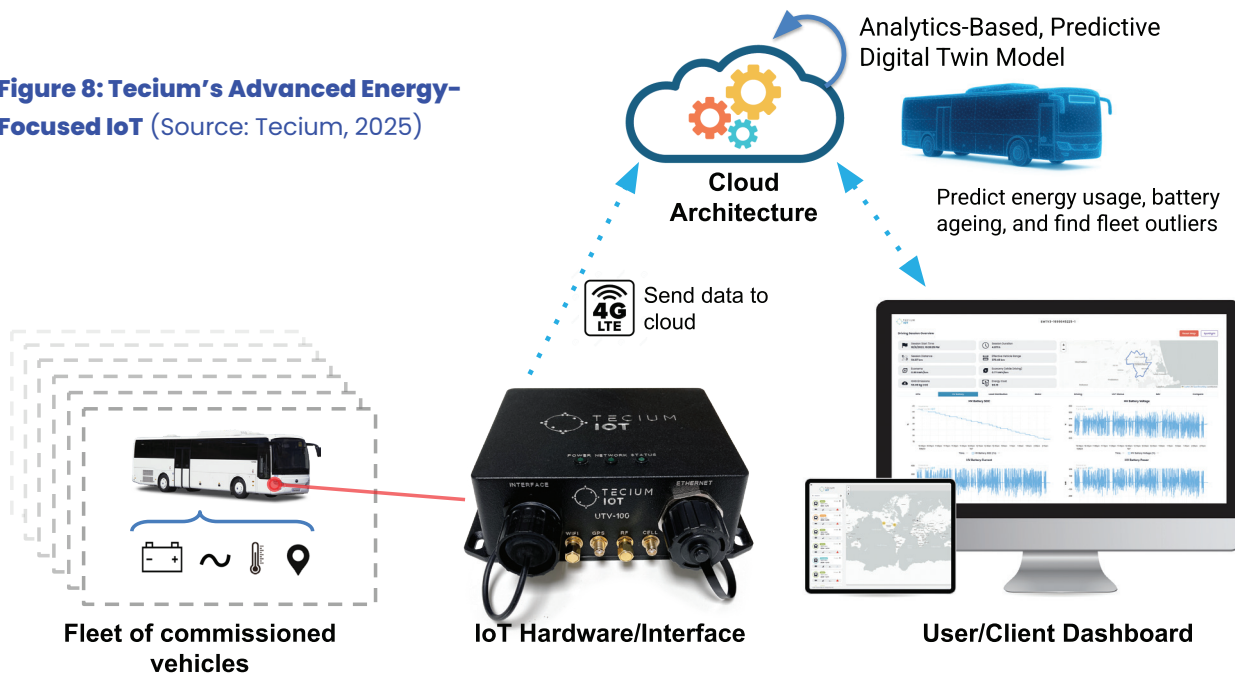
Figure 7: Representative four-hour discharge event at 40 kW for a bidirectional charger deployed at Lynch Bus Lines (Source: EVGateway)

Communications uptime between the chargers and the energy management platform exceeded 99.99%, and cross-verification between charger telemetry and AC sub-metering installed by McKinley Electric and BC Hydro’s Measurement and Verification team confirmed M&V measurements are consistent with the onboard metering system. This alignment is critical—it paves the pathway for the V2G system to support future billing frameworks and participation in grid services markets based on Measurement Canada and BC Hydro revenue grade certification.

Total charging Duration	556.86 hrs
Total Discharging Duration	606.73 hrs
Average Charging Power	38.703 kW
Average Discharging Power	-34.454 kW

Tecium’s energy-focused, cloud-enabled IoT platform added a second layer of validation. High-frequency telematics streamed directly from the vehicle battery systems into a digital twin environment allowed driving, charging, and V2G sessions to be automatically categorized and analyzed. The resulting operational and energy timeline shows deterministic transitions between modes, confirming that the control system responds predictably to scheduling commands rather than exhibiting unstable behavior.

Figure 8: Tecium’s Advanced Energy-Focused IoT (Source: Tecium, 2025)



- High-resolution, continuous data collection for maximum data transparency
 - >1Hz sampling for 100s of parameters
- Utilizes Big Data to generate accurate and nuanced predictive Digital Twin models
- Highly flexible and compatible with any vehicle/application > Quick Installation
- Leverages scalability and security of AWS

5.2. Field Testing Feedback and Challenges

5.2.1 Systems Integration Challenge: DERMS Connectivity

A central architectural goal was full integration with BC Hydro’s DERMS (Uplight). In practice, the project revealed that DERMS onboarding is not simply a technical task but a programmatic bottleneck. Access to the integration queue introduced delays measured in months rather than weeks. Entering that queue would have jeopardized the pilot schedule and funding milestones.

To preserve the demonstration timeline, the project implemented a controlled fallback architecture. Instead of live utility dispatch, the energy management system (EMS) executed pre-programmed schedules derived from a joint test plan with BC Hydro. This simulated dispatch events, validated safety logic, and confirmed charger responsiveness without waiting for full DERMS enrollment. Importantly, the command architecture mirrored the production chain (DERMS > gateway > EMS > inverter), allowing future activation without redesign.

Although live DERMS connectivity was not completed within the reporting period, the workaround still validated core system behaviour. The broader lesson is institutional—DERMS onboarding must be treated as a critical path item equal to hardware procurement and interconnection. Without early integration planning, software timelines—not vehicle readiness—become the dominant deployment risk.

Future scaling will depend as much on institutional readiness as on charger technology. A staged activation model—local EMS validation > DERMS onboarding > live dispatch—provides a practical roadmap for expansion. Notably, BC Hydro’s DERMS platform via Uplight has already been integrated with stationary battery energy storage systems and other distributed residential devices. The communication protocols, telemetry standards, and control architectures established through those integrations are expected to be readily adaptable to V2G applications, reducing incremental implementation risk and accelerating fleet onboarding.





5.2.2 Review of Field/Lab Testing, Initial Feedback, and Challenges with Two Vehicles

The pilot generated a statistically meaningful operational dataset—nearly 9,000 charging sessions, more than 600 discharge events, and over 14 MWh of energy throughput.

When discharge load at the chargers exceeded the building threshold, power was returned to the grid. Tecium’s digital twin modelling confirmed that a single electric bus, with fresh batteries, can reliably export approximately 160 kWh during the 5:00–9:00 PM peak window while maintaining a safe battery reserve. In an optimal day scenario, approximately 200 kWh was delivered to the grid without compromising vehicle readiness.

Harmonics

The 2023 evaluation conducted by Powertech Labs at its Smart Utility Test Centre for BC Hydro identified harmonic distortion and phase-specific discharge efficiency losses in the earlier test, including approximately 1% efficiency reduction on certain phases during export events. Based on those measurements, the prior configuration would not have met the recommended harmonic performance limits under IEEE 1547.

The bidirectional chargers deployed at the Lynch Bus Lines demonstration site exhibited materially different electrical behaviour. Harmonic performance testing was conducted using high-resolution measurements captured via a Fluke power quality data logger and analyzed with Energy Analyze Plus software. Assessment against IEC 61000 harmonic criteria confirmed that harmonic levels remained within prescribed thresholds throughout the demonstration period, and no exceedances were observed under operating conditions.

Seasonal Data Constraint

The validation period occurred during shoulder-season weather, when HVAC loads are minimal, and energy efficiency is near optimal. The dataset therefore represents best-case operating conditions rather than a full annual performance envelope.

Winter operation, including sub-zero temperatures, snow resistance, and sustained heating loads, was not directly observed. While statistical models extrapolate performance under colder conditions, empirical validation remains a future requirement. The absence of year-round monitoring introduces uncertainty around worst-case seasonal performance and highlights the need for winter trials in future phases.

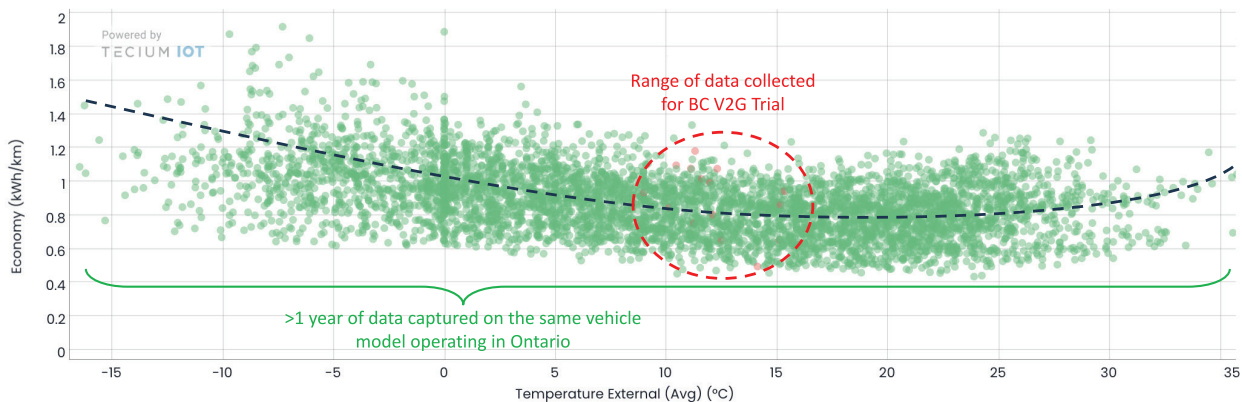


Figure 9: Vehicle efficiency (kWh/km) is greatly dependent on ambient temperature (Source: Tecium, 2025. Raw data)

Charger Efficiency Findings

BC Hydro installed three data loggers at the site to monitor electrical flows during the demonstration period. Two loggers were installed on the primary side of the 480V transformer at the main disconnect serving each bidirectional charger to capture charger-specific load and export data. A third logger was installed on the building load panel, downstream of the main 600 A breaker on the secondary side, to record aggregate building load. In addition, McKinley Electric installed a separate data logger at the building service entrance to measure total incoming power to the facility. Accordingly, building load attributable to non-charger consumption was determined by reconciling these datasets. Specifically, total facility demand measured at the service entrance, less the lower measured at the main breaker attributable to charger operation, was deemed to represent the net building load.

Charger analytics revealed two performance regimes:

- One charger operated at near-lossless efficiency (99.997% round-trip).
- The second charger demonstrated conventional commercial efficiency (~90%).

Some minor discrepancies were noted. On a few occasions, communications at one of the chargers in particular was disconnected from the cloud and data was lost. However, the other remained within acceptable engineering norms, and neither compromised grid compatibility. Harmonic testing confirmed compliance with IEEE and IEC limits. The disparity between the 2023 evaluation conducted by Powertech Labs* and the current demonstration at Lynch Bus Lines using Tellus Power bidirectional chargers underscores a key lesson: procurement decisions materially affect long-term lifecycle efficiency, but even conventional hardware supports viable V2G deployment.

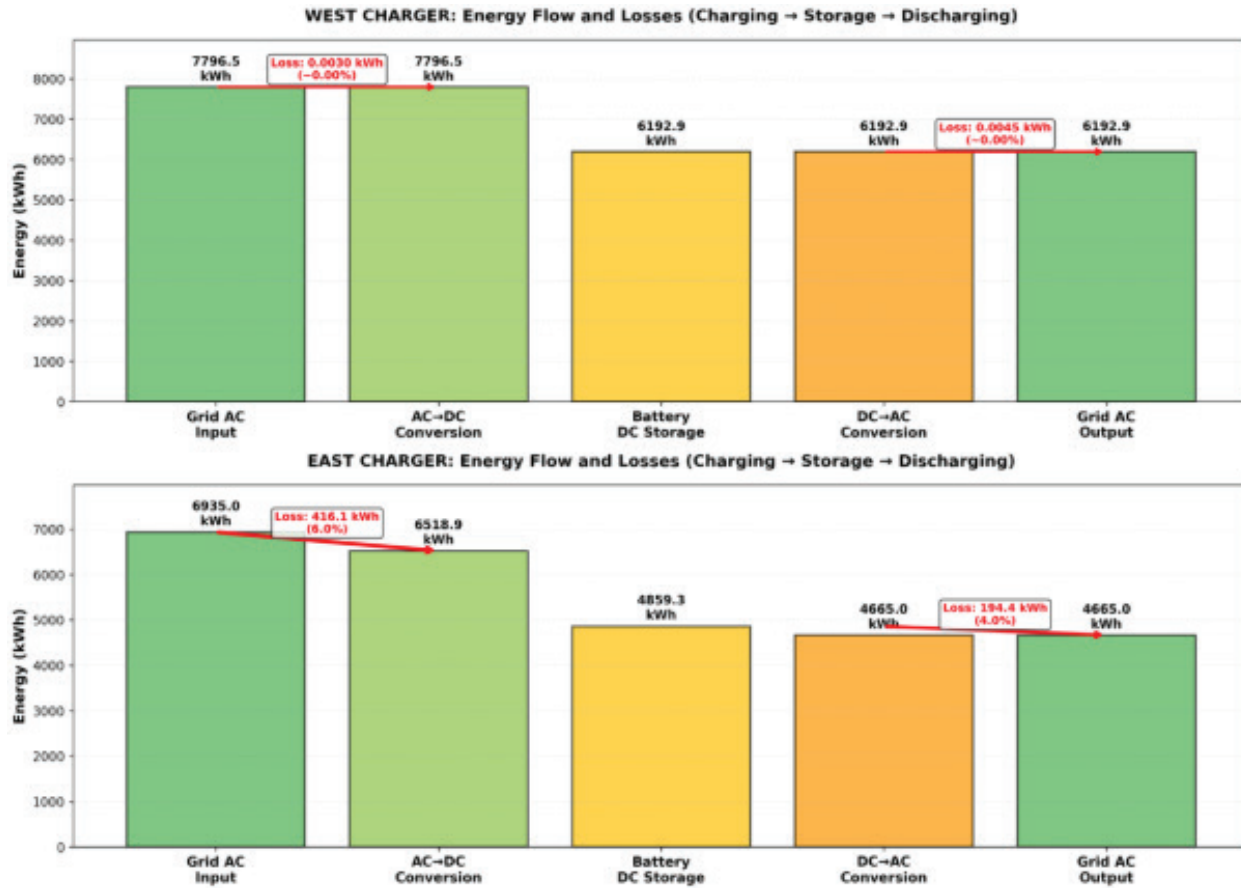


Figure 10: System Energy Flow and Round-Trip Efficiency (Source: EvGateway, 2025. Raw data)

* A 2023 evaluation conducted by Powertech Labs at its Smart Utility Test Centre for BC Hydro identified harmonic distortion and phase-specific discharge efficiency losses in an earlier test installation, including an approximate 1% efficiency reduction on certain phases during export events. Based on those measurements, the prior configuration would not have met the recommended harmonic performance limits under IEEE 1547. The bidirectional chargers deployed at the Lynch Bus Lines demonstration site exhibited materially different electrical behavior. Harmonic performance testing was conducted using high-resolution measurements captured via a Fluke power quality data logger and analyzed with Energy Analyze Plus software. Assessment against IEC 61000 harmonic criteria confirmed that harmonic levels remained within prescribed thresholds throughout the demonstration period, and no exceedances were observed under operating conditions.



6. Comprehensive Review of System Performance, Additional Technical and Business Insights

Tecium's statistical modelling expanded the pilot from a snapshot into a lifecycle forecast. Real Lynch Bus Lines routes were simulated across a ten-year vehicle lifespan, incorporating battery aging, charging opportunity, environmental efficiency, and route variability.

The results show that mid-day charging is the dominant factor sustaining grid export capacity. With both AM and PM charging enabled, an average vehicle can meet the 160 kWh V2G target for approximately three to eight years, depending on battery degradation. Without mid-day charging, export capacity declines rapidly even in early vehicle life. Environmental efficiency also plays a role, as winter HVAC demand reduces the available export energy precisely when grid stress may be highest. Upgrading to 60 kW chargers produced minimal improvement because route timing, not charge rate, limits recharge opportunity. Operational logistics therefore, outweigh hardware upgrades as the primary performance driver.

Battery aging remains the long-term constraint. Maintaining an approximate 85% state-of-health threshold is critical to sustaining export targets. Continuous battery monitoring through high-frequency telematics becomes essential not only for operational optimization but for warranty enforcement and lifecycle planning. Given the demonstrated impact of battery degradation, charging availability, and seasonal efficiency on long-term export performance, careful scenario analysis should be undertaken before nominating firm export capacity over a ten-year offtake period with BC Hydro. Alternatively, this performance risk should be mitigated through appropriate manufacturer warranty provisions tied to minimum State of Health thresholds.

From a business perspective, the pilot confirms that electric school buses function as distributed energy infrastructure. Idle fleet capacity can serve as stationary storage, export volumes are economically meaningful, and performance aligns with international V2G pilots. Fleet electrification therefore becomes both a transportation and grid resilience strategy.

The school bus provides energy back to the grid after daily operation.

V2G target:

- Provide >160 kWh to grid within 4 hours between 5-9PM
- Keep vehicle's state of charge above 20% during V2G
- Single bus would power 25-40 homes



Ride Dreamer Type D
255kWh Capacity

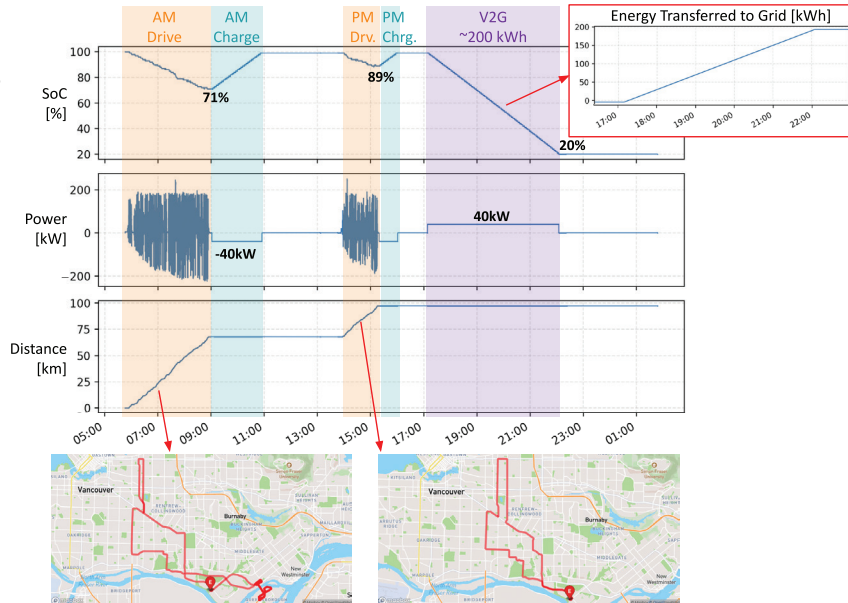
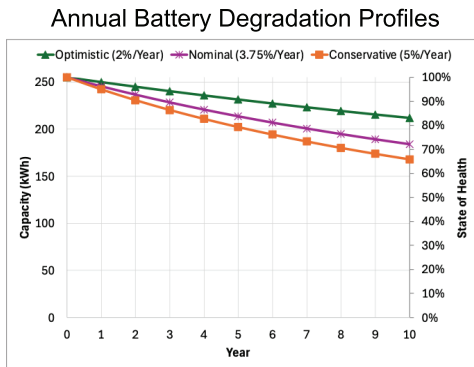


Figure 11: Example of routes and graphed state of charge, battery power, vehicle distance, and energy to grid data collected on Lynch trial bus staging a real day of operation ending with V2G on October 23, 2025. (Source: Lynch Bus Lines)

*Average energy available for V2G during peak hours:



Optimistic Aging			Nominal Aging			Conservative Aging		
Battery Age (Year)	Seasonal Efficiency		Battery Age (Year)	Seasonal Efficiency		Battery Age (Year)	Seasonal Efficiency	
	Optimal	Low		Optimal	Low		Optimal	Low
0	194.4	188.2	0	194.4	188.2	0	194.4	188.2
1	190.3	184.1	1	186.8	180.5	1	184.2	178.0
2	186.3	180.0	2	179.1	172.9	2	174.0	167.8
3	182.2	175.9	3	171.5	165.2	3	163.8	157.6
4	178.1	171.9	4	163.8	157.6	4	153.6	147.4
5	174.0	167.8	5	156.2	149.9	5	143.4	137.2
6	169.9	163.7	6	148.5	142.3	6	133.2	127.0
7	165.9	159.6	7	140.9	134.6	7	123.0	116.8
8	161.8	155.5	8	133.2	127.0	8	112.8	106.6
9	157.7	151.5	9	125.6	119.3	9	102.6	96.4
10	153.6	147.4	10	117.9	111.7	10	92.4	86.7

* Specific to Lynch Bus Lines route permutations and frequency, mid-day charging enabled

Figure 12: Validating for Worst Case Scenario.* (Source: Tecium)

* **DISCLAIMER:** It should be noted that the battery data in this study is based solely on performance during a specific test period of Summer/Fall 2025, using test vehicles from a specific batch of RIDE Type D vehicles with differences in battery chemistry and thermal management logic, and does not constitute a formal guarantee of the buses' universality. The degradation profiles are derived from multiple industry studies, representing generalized V2G aging trends not specific to any single OEM.

7. Final Design Adjustments Based on Testing Outcomes

7.1 Regulatory Interconnection Constraint and Project Resizing

A significant implementation challenge emerged during engineering design related to BC Hydro’s self-generation interconnection framework. The original plan specified two Tellus Power 60 kW bidirectional chargers (120 kW total). However, BC Hydro’s streamlined interconnection pathway is limited to systems ≤ 100 kW. Exceeding that threshold would have triggered a more complex review process and introduced schedule risk.

To preserve the streamlined pathway, the project resized the installation to two Tellus Power 40 kW chargers (80 kW total). This adjustment balanced demonstration capability with regulatory efficiency and allowed the pilot to proceed without delay. The experience underscores a broader lesson: regulatory thresholds can shape system design as strongly as engineering constraints. Future deployments must incorporate phased interconnection strategies and early utility engagement.

7.2 Interoperability Scope

The pilot intentionally used a single vehicle platform, a single charger model, and a single energy management system to reduce integration risk. While this enabled focused validation, it does not yet establish cross-vendor interoperability. Multi-vendor compatibility remains a known industry challenge. Future research should align with international standards initiatives such as IEA Task 53 to ensure scalable, interoperable V2G ecosystems.

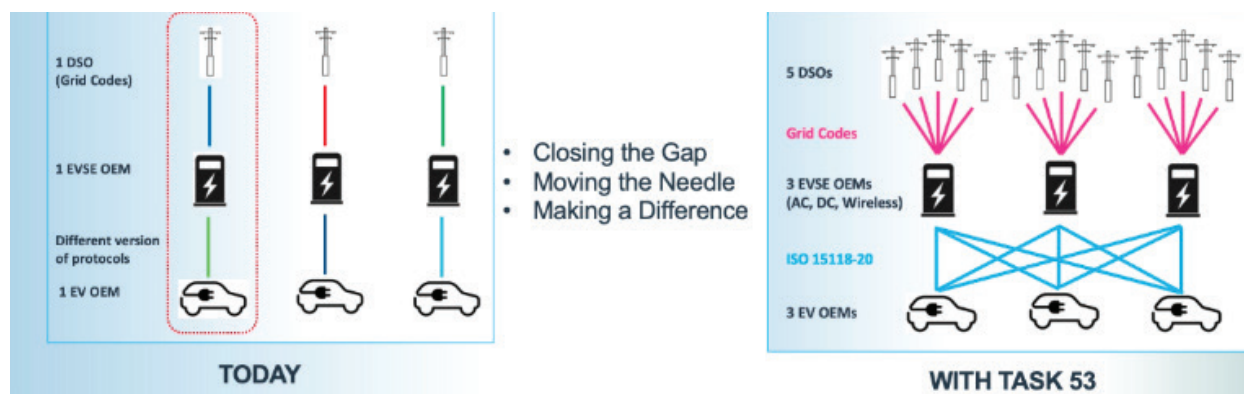


Figure 13: Interoperability of Bidirectional Charging (Source: Task 53, 2025)

7.3 Operational Optimization

Testing outcomes highlight three engineering priorities:

- Continuous battery health monitoring
- Expanded depth-of-discharge flexibility during stationary V2G
- Route optimization to maximize peak-window availability

Digital twin simulation enables dynamic fleet planning that prioritizes EV return-to-depot timing without compromising service.





8. Final Recommendations, Reflections on Findings, and Next Steps

The Lynch Bus Lines pilot marks Canada's transition from V2G experimentation to early commercial readiness. Leveraging a robust Working Group of diverse stakeholders enabled a critical path for gathering insights, feedback, and shared learnings that will advance V2G opportunities in the province faster than working in silos. The combined engineering, operational, and statistical analysis confirms that electric fleets can function as dispatchable grid infrastructure when supported by intelligent planning.

Key findings are clear:

- V2G export capacity is technically achievable.
- With careful selection and integration of the right technology, modern charging and discharging infrastructure has overcome power quality and harmonics concerns and do not represent technical hurdles.
- Lifecycle performance is predictable with modelling.
- Mid-day charging is essential.
- Battery monitoring must be continuous and high frequency to capture transients.
- Regulatory alignment shapes deployment speed.
- Interoperability remains a future frontier.
- Institutional readiness defines scaling pace.

Future phases should prioritize production fleet deployment, live DERMS integration, winter validation, and multi-vendor trials. Establishing battery health thresholds, embedding digital twin planning tools, and aligning interconnection frameworks will ensure that expansion preserves both performance and economic viability. Using digital twins that can leverage the rich operational data from the pilot to predict route-based energy usage battery aging, future phases can develop a model for V2G deployed at scale and measure grid impacts and benefits for utility-scale deployments.

Future phases should also examine a staged approach to DERMS integration. An example approach could include:

- A sandbox version of the DERMS system that is used to fully validate and confirm the technical integration required for the specific DERMS product and the V2G data interfaces.
- Targeted piloting of simulated DERMS interactions with the V2G deployment. Specifically, simulations via digital twins to test various scenarios could be run and pilots could then be selected based on the results of these simulations.

The pilot demonstrates that electric fleets are no longer just transportation assets. They are emerging components of grid infrastructure. With targeted scaling, V2G becomes a resilience platform that stabilizes electricity networks, reduces emissions, and unlocks new revenue streams for fleet operators.

Project Significance

The demonstration confirms that commercially available electric school buses can operate as distributed energy resources within a framework aligned with applicable safety and interconnection standards, including UL 1741-SB, UL 2202, CAN/CSA-C22.2, IEEE 1547.1-2020, OCPP 1.6, and ISO 15118:2022.

While the field demonstration did not include dedicated penetration testing or a full cybersecurity validation protocol, the communications architecture is designed around ISO 15118, which incorporates secure, encrypted vehicle-to-charger communications and public key infrastructure (PKI). In addition, IEEE 2030.5—commonly used for DER communications—rolls up into ISO 15118-based frameworks, providing a pathway for standardized, utility-grade integration. Future testing phases can leverage DERMS platforms, which incorporate established cybersecurity controls, authentication layers, and secure utility back-end environments, to validate end-to-end grid integration under live operational conditions.

The project establishes a scalable and interoperable architecture capable of integrating fleet electrification with utility grid services. Lessons learned from site selection, hardware integration, interconnection requirements, and control system coordination provide a replicable foundation for future V2G deployments in British Columbia and across Canada, with cybersecurity validation positioned as a defined next step in commercial-scale implementation.

As part of the Canadian national energy strategy, VGI has the potential to play a strategic role. Future phase work is being planned to develop a scaled model and projections of VGI when a large number of fleet vehicles (eg. 10,000) are included in a province-wide asset base.

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Thank you to BC Hydro and FUSE Power Management for providing many of the images used throughout this report.



Appendix 1: Electric Vehicle Fleet Survey Results

Executive Summary

An online survey was sent to over 100 diverse fleet operators across Canada to gain insights into their electrification needs, plans and concerns. A total of 18 survey responses were received. Although the response rate was low, the results demonstrate that many fleet operators are actively working towards or planning to electrify at least a portion of their fleets. Operational and financial barriers to fleet electrification remain, and improved access to publicly available charging infrastructure as well as new third party options with extensive parking such as those proposed by BC colleges and universities could help to overcome these challenges. These results will inform a business case aimed at expanding publicly accessible, overnight charging solutions on university and college campuses, and plans for Vehicle-to-Grid (V2G).

Methodology and Objectives

Foresight Canada is leading a joint initiative to help shape fleet electrification in Canada, including facilitating two working groups: the Vehicle-to-Everything (V2X) and the BC Electric Vehicle (EV) Charging Alliance. Members include a network of universities and colleges that are working to use their facilities to expand public charging access. This work and the working groups are supported by BC Hydro. The online survey was conducted to gain insights into the needs of fleet operators in Canada, informing the development of business cases with the aim of:

- Building publicly accessible, overnight charging solutions at university and college campuses for commercial and municipal fleets.
- Building a province-wide V2X network that lets EVs earn revenue.

The survey was open from October 7, 2025 to December 19, 2025 and was sent to 111 organizations representing a range of fleet operators from different sectors. The types of organizations targeted included logistics companies, food and beverage distributors, airport operators, shipping companies, public transit operators, ride-sharing companies, municipalities, public sector entities, trades, and movie production companies.

A total of 18 survey responses were received.

Despite direct follow-up, challenges arose in increasing the survey response rate. However, a representative mix of companies did respond (some selected more than one industry type):

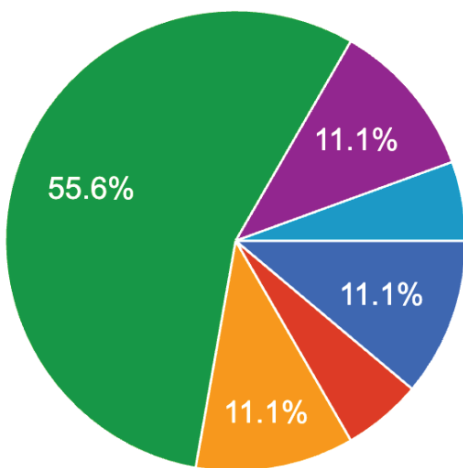
- Bulk Transportation (Forestry, Mining, Environmental Products, and Oil and Gas) (1)
- Film & Television Production (2)
- Long-Haul Transportation (2)
- Municipal Services (4)
- Pharmaceutical (1)
- Public Transportation (2)
- Same-Day Delivery & Logistics (4)
- School bus transportation (1)
- Tourism & Hospitality (2)
- Trades & Construction (1)
- Key Findings and Insights

Responses represented a range of industries and fleet sizes, from 18 to 5,600 vehicles, including a mix of light-duty, medium-duty and heavy-duty vehicles. Operators also use a mix of owned and leased vehicles.

Interest in Fleet Electrification

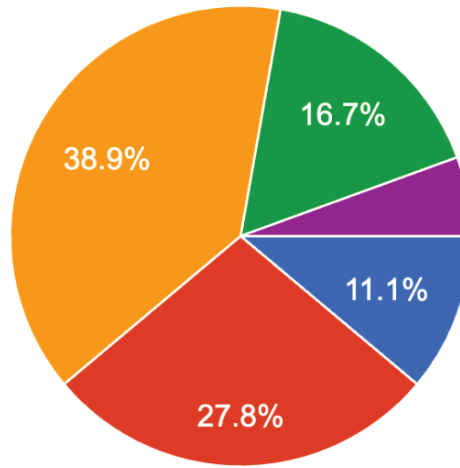
The majority of respondents, at 55.6%, own their fleet, which may allow for more control over fleet electrification. Most respondents are either actively deploying or piloting EVs, as shown in Figure 1 and have plans over the next 1-5 years to electrify fleets, as shown in Figure 2. Only two respondents mentioned that they currently have no plans to electrify their fleet.

Figure 1: What stage is your organization at in its fleet electrification journey? (18 Responses)



- Exploring/researching options
- Actively planning our transition
- Piloting our first few EVs
- Actively deploying EVs into our fleet
- We have no current plans to electrify
- Most of the above

Figure 2: Over the next 3-5 years, what percentage of your fleet do you realistically plan to transition to electric? (18 Responses)



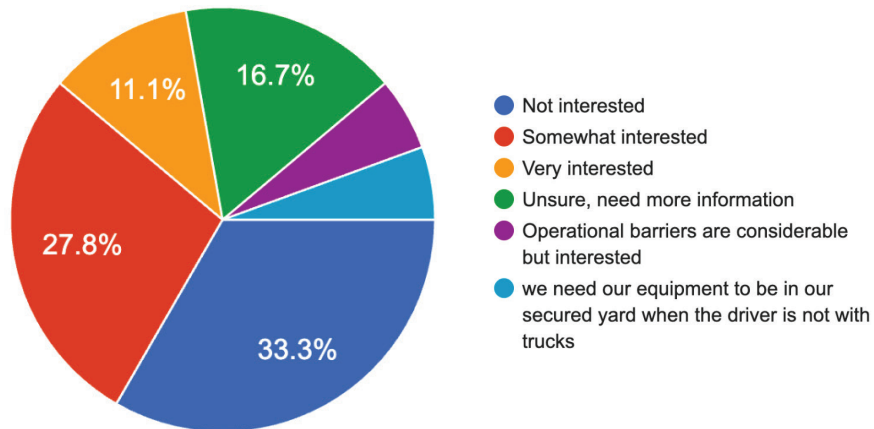
- 0%
- 1-25%
- 26-50%
- 51-75%
- 76-100%

Fleet Operation Insights

Typical duty cycles for fleets are between 0 and 250 km, with 33.3% of vehicles travelling less than 75 km per day. This indicates that fleets are typically within range of charging stations for overnight charging. Eleven respondents highlighted that vehicles are typically on the road during the daytime (7am to 5pm), however, all other responses showed that vehicles will be on the road for multiple shifts to support 24-hour operations. Typically, vehicles are parked at depots or yards owned by the organizations; however, 10 respondents use public depots, parking lots, or public streets. Seven respondents plan to use public, rented or a mix of public and private charging infrastructure. This demonstrates an opportunity for alternative EV parking and charging solutions, such as third-party sites.

In some smaller organizations and for landscaping, maintenance, and property management companies, vehicles may be parked at staff members' homes during the evenings for convenience or if lots are not available. There may be further opportunities to engage with these organizations in the future; however, representation from such organizations was low in the survey responses. Survey responses also indicated that off-site charging services would be valued across Canada, with preferred locations reflecting the operational preferences of respondents. Key locations include the Lower Mainland and Metro Vancouver, as well as the Greater Toronto Area, primarily along major traffic corridors and at truck stops along the highways.

Figure 3: How interested would your organization be in using a third-party site (like a university campus) for overnight fleet charging?
(18 Responses)



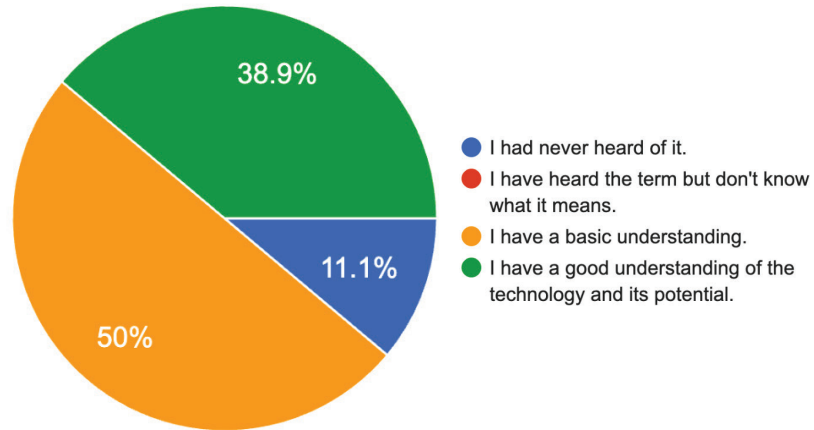
Challenges with Fleet Electrification

Respondents highlighted some challenges with EV performance and meeting specific organizational needs. Key issues include perceived reliability, payload weight, and range, particularly for long-haul trucking and specialized vehicles. A higher payload can result in a shorter range due to additional battery drain. The cost of new EVs is also a barrier, so access to more affordable options or rental options would be welcome. Improved infrastructure and public charging could be an enabler to facilitate fleet electrification.

V2X Interest

The majority of respondents, 88.9%, have a basic or good understanding of V2G technology and its potential. Fleets noted that in order to consider v2G adoption, several elements would need to be addressed. This includes development of a clear business case and a return-on-investment calculation, more detailed information on compatible vehicles and charging hardware, and access to funding or grants.

Figure 4: Vehicle-to-Grid (V2G) technology allows parked and connected EVs to direct power back to the building and grid during peak hours, creating a potential financial stream to benefit the vehicle owner. Before this survey, what was your understanding of V2G? (18 Responses)



Next Steps

These insights will inform business case development and provide further understanding of the opportunities and challenges associated with developing public EV charging infrastructure and V2G capacity in BC.

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