Community Energy Association

How Fleet Electrification and Bidirectional Charging Can Deliver Local Benefits

EMPN/RSPN Deep Dive
December 10, 2025

BC Hydro
Power smart

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How to use this resource

This resource has been co-created by everyone in attendance at the meeting on December 10, 2025. It's complimentary to the meeting summary that can be found at https://www.communityenergy.ca/rspn/ and includes downloadable graphics, links to additional resources, and more.

This resource can be shared with people outside the network.

You will also find useful resources and links, identified by these icons:

Downloadable resource for presentations & reports

External resource link

Exercise or take-away activity

How Fleet Electrification and Bidirectional Charging Can Deliver Local Benefits – **December 10, 2025**

Meeting Objectives:

- Increase sharing of the latest knowledge on the intersection of bidirectional charging, fleet decarbonization, and emergency management.
- Provide an open forum for network members to identify some next steps or opportunities for bidirectional charging in BC.
- Build professional connections and relationships while providing a supportive and positive climate community.

Meeting Highlights:

- V2X Opportunities and Resilience: Bidirectional charging (V2X) can provide backup power during emergencies, reduce peak demand costs, and strengthen community resilience – especially for critical facilities and vulnerable populations
- Pilot insights and outlook: BC Hydro and Fuse showcase Canada's first V2G school bus trial, demonstrating strong potential for grid support and cost savings. Future plans include charging hubs, light-duty V2H pilots, and advancing plug-and-play standards
- Challenges: High upfront costs, limited awareness, infrastructure readiness, and uncertainty are barriers.
- Collaboration Opportunities: Utilities, local governments, OEMs, and community partners must work together to scale V2X, advance standards, and ensure benefits reach underserved communities. IntegratingV2X into affordable housing and partnering on public pilots can help raise awareness and accelerate adoption.

Complete summary can be found at
https://www.communityenergy.ca/rspn

Opportunities to Apply an Adaptation and Resilience Lens to E-Mobility

Integrate Climate Adaptation into Transportation Planning

Electrified transportation systems should be designed to strengthen community resilience in the face of climate change. Planning must account for increasing risks from extreme heat, flooding, wildfires, storms, and power outages. E-mobility infrastructure can play a critical role in maintaining mobility, emergency response, and access to essential services during and after climate events.

Infrastructure location with Climate Risk in Mind

Charging stations should be strategically located to minimize exposure to climate hazards such as floodplains, wildfire-prone areas, storm surge zones, and extreme heat corridors. Climate risk assessments should inform site selection, design standards, elevation requirements, and protective measures to ensure long-term reliability.

Building Outage-Ready Networks

As extreme weather events increase grid disruptions, charging infrastructure must be designed for energy resilience. This includes integrating solar and battery storage at priority locations.

Leverage Vehicle-to-Everything (V2X) Capabilities

Vehicle-to-everything (V2X) technology enables electric vehicles to both draw electricity from and supply power back to the grid, buildings, or critical infrastructure. During emergencies, EVs can function as mobile energy storage units, supporting shelters, critical facilities, or neighborhoods.

What is Vehicle-to-X?

Vehicle-to-everything (V2X)

Refers to the ability of electric vehicles (EVs) to both receive electricity from and send electricity back to the grid, a building, or other infrastructure. This bi-directional capability enables EVs to function as flexible energy resources.

Energy Storage

EV batteries can serve as distributed energy storage, sending power back to the grid during peak demand to reduce strain and avoid costly overbuilding. They can also provide backup power during outages and emergencies, and help shave peak loads to lower energy bills.

Bi-directional charging

Enables EVs to strategically take power from and return power to the grid or a building. This transforms EV users from passive energy consumers into active participants in the energy network.

Value for EV Users

EV users can unlock value from their vehicles by participating in the grid/energy market, earning financial compensation while supporting local grid reliability. EV’s can respond to grid needs such as peak pricing, providing energy to the grid during critical periods.

V2X Overview

V2L - Vehicle to load

Allows a vehicle to power individual devices, such as a heater or cooler, by drawing energy directly from the vehicle battery to the connected load, without requiring complex infrastructure.

V2H - Vehicle to Home

Power flows from the vehicle's charging port through a bidirectional charger into a home's electrical panel, enabling the vehicle to supply electricity to household circuits and provide critical backup power during grid outages.

V2B - Vehicle to Building

Powers a business with higher energy requirements, similar to V2H but designed for commercial or larger buildings, supporting greater power demands than a typical home while helping manage energy costs and maintain operations during disruptions.

V2G - Vehicle to Grid

Enables EVs to send excess energy back to the electric grid, providing grid support services similar to distributed solar generation and supplying energy during peak demand or grid stress events.

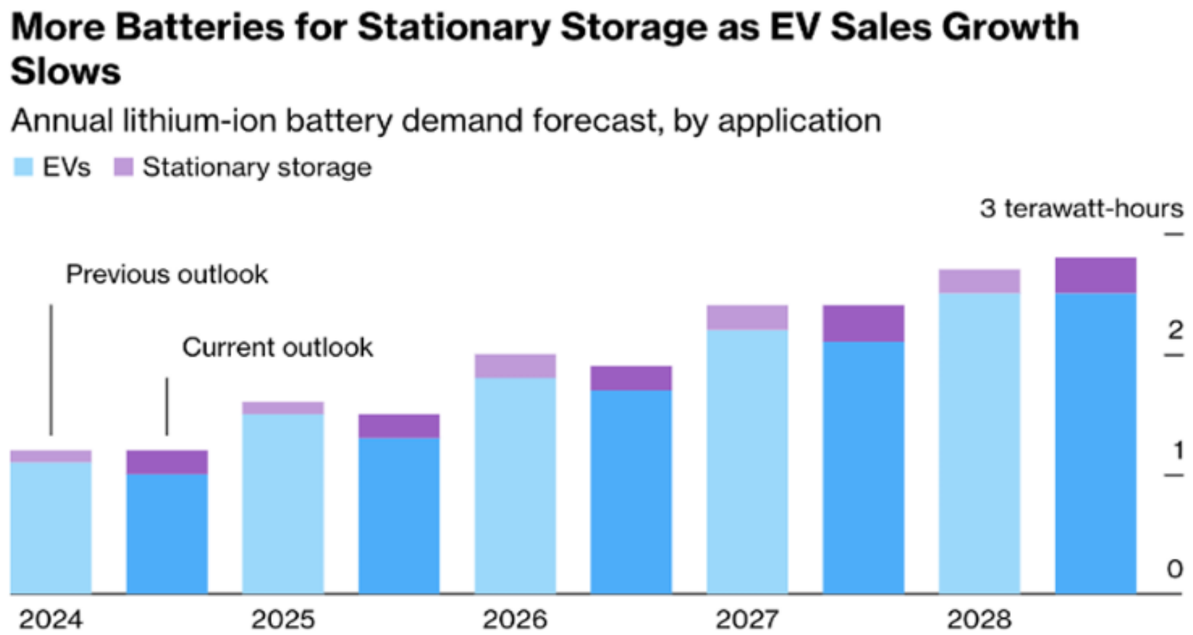
V2X applications can:

- Help shave peak load
- Lower demand charges and electricity costs
- Provide access to financial and grid participation benefits

THE FUTURE POTENTIAL OF V2X

- V2X is still emerging
  - Widespread deployment is still a few years away.
  - Growth will be driven by increasing EV adoption.
- The growing energy opportunity reflects a widening gap between forecasted EV battery storage capacity and installed stationary storage, with EVs representing a much larger and more flexible resource. The number of vehicles capable of bidirectional energy flow will continue to grow, including medium- and heavy-duty vehicles advancing toward bidirectional capability.
- Opportunities for Communities:
  - Backup power during rural outages.
  - Support for emergency response operations.
  - Revenue opportunities for participants.
  - Contribution toward achieving net-zero energy buildings.

Vehicle-to-Grid (V2G) Excitement



To learn more about the Future of V2X at the international level check out Task 53

Source: Task 53

V2X Evolution

Present - Expanding Pilots

Pilots will continue to expand and be integrated into planning efforts from existing V2G projects while increasing the number of bidirectional charging locations. This includes exploring the strategic value of movable assets, such as fleet vehicles that can be deployed to areas where emergency services support or additional grid capacity is needed.

Future - Technology

Technology will focus on telematics systems that communicate directly with vehicles and enable intelligent management of charging and bidirectional flow, with the goal of extending this capability to vehicles before they plug in.

Future - Market Development

Future pilots will look to include deploying light-duty vehicles and chargers beginning in 2026, testing performance under simulated outages and emergency scenarios, collaborating with standards agencies to advance plug-and-play capability and reduce ecosystem lock-in.

Case Study: Fuse Power Management - Electric School Bus Pilot

- Fuse partnered with BCH and Lynch bus lines for Canadas first V2G field trial using electric school buses
  - School buses are an ideal use case for resilience since they have large batteries and predictable schedules that allow them to give back to the grid in a time of need
    - 1 type-d school bus can power five hospital operating rooms for 8+ hours
    - Each bus can provide 2 hours of power to 75 homes.

- Electricity demand in Canada is forecasted to double, and there is already enough energy stored in EVs to meet current demand.
  - The most promising fleet applications are particularly those aligned with downtime versus peak demand periods:
    - Winter capacity and outdoor work fleets (e.g., roofing and landscaping vehicles that are idle in the winter), parts of the marine industry, and fleets that do not operate in the evenings.
    - Fleets traveling less than 100 km per day are ideal, as they can maintain sufficient reserve capacity.

Social and Community Benefits of Bi-directional EV Charging

1. Mobile back up power
    - EV's act as flexible power sources during outages

2. Emergency support
    - powering critical facilities
    - Useful during natural disasters

3. Support for vulnerable and remote communities

4. Energy equity
    - Shared access to mobility and backup power
    - Supports multi-family & lower-income households

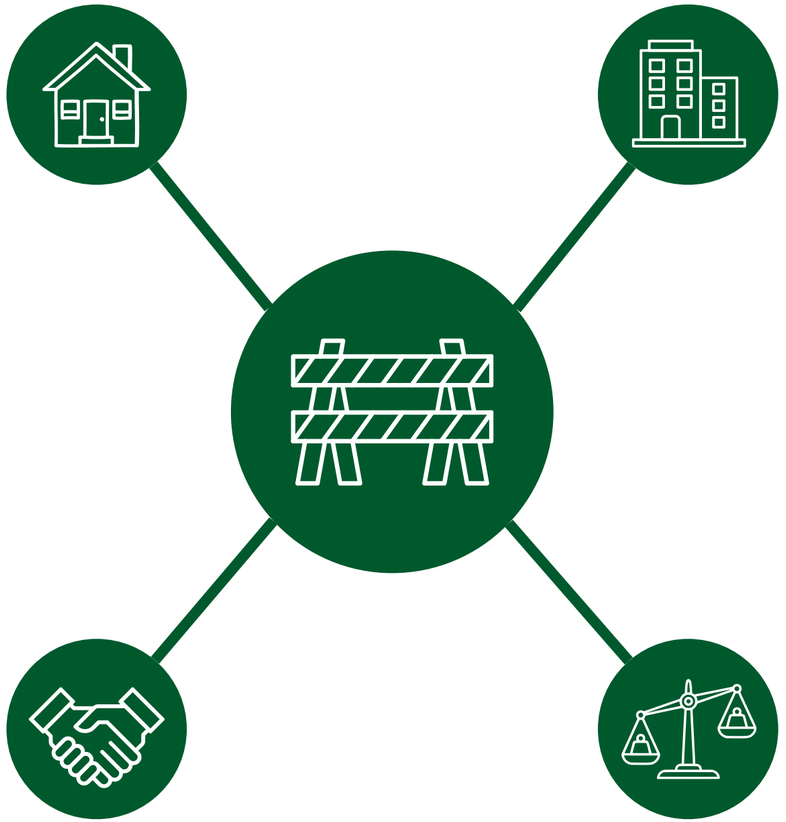
5. Community resilience
    - Local V2X hubs for emergencies

6. Local economic benefits
    - New job creation

Barriers to V2X Adoption

Difficult for Low Income Households

Low-income households face barriers to V2X adoption due to lower EV ownership, high cost sensitivity, and limited access to charging infrastructure, which together make it more difficult to participate in V2X.



Challenges for Multi-Unit Residential Buildings (MURBs)

Residents in MURBs face barriers to V2X adoption due to shared or insufficient parking, inadequate electrical wiring, and limited grid capacity, which restrict the ability to install and use bidirectional charging infrastructure.

Trust and Awareness Issues

Without public pilots and education, users may be uncertain about reliability, safety, or benefits, and without clear information, they are less likely to participate in V2X.

Unequal Distribution of Benefits

Backup power and resilience advantages may not reach all communities equitably.

Opportunities for V2X Adoption

Opportunities

01 Embedding V2X in affordable housing, emergency shelters and community hubs

02 Ensure pilots are publicly visible to build trust

03 Early engagement with multiple interest holders for codeveloping solutions

04 Subsidies and targeted programs for underserviced communities

Recommendations

01 Update BC building Code for shared charging in new multi-unit residential buildings

02 Subsidize V2X infrastructure for affordable housing

03 Design equity-focused tariffs and targeted subsides Design equity-focused tariffs and targeted subsides

04 Reserve v2x capacity for backup power in vulnerable communities

05 Launch tenant engagement and awareness program

Additional Resources

- Your EV is Not a Car. The real revolution starts when we stop thinking of Electric Vehicles (EVs) only as vehicles: https://transformativeenergy.ca/your-ev-is-not-a-car/

- Charging Ahead: Unlocking Vehicle-Grid Integration in Canada: https://www.csagroup.org/article/research/charging-ahead-unlocking-vehicle-grid-integration-in-canada

- Foresight Canada Fleet Survey, BC EV Charging Alliance: https://docs.google.com/forms/d/e/1FAIpQLSf5jPJ7xLI8BI-FnFZaf01NIqjoIwVW6oxw_97UfPRbbzLIHg/viewform

- Vehicle-to-everything technology: https://www.bchydro.com/powersmart/electric-vehicles/owning-buying-ev/vehicle-to-everything.html