

# Briefing: Futureproofing Multifamily Buildings for EV Charging

## What Decision-Makers Need to Know

**This briefing note outlines why Canadian decision-makers must act to support comprehensive futureproofing of multifamily buildings with electric vehicle (EV) charging infrastructure. It outlines how policies, programs and investments can ensure that all residents can access EV charging at home.**

### People in Multifamily Buildings Need Access to Home Charging

- Canada is bringing forward legislation to ensure that **by 2035, all new passenger vehicles sold will be Zero-Emission Vehicles (ZEV)**, the vast majority of which will be Electric Vehicles (EV) that must plug in to charge.
- On a life-cycle basis, **EVs are the most cost-effective vehicle technology today**. EV **purchase and lease costs will continue to decline**, as the cost of producing batteries decreases due to learning effects and economies of scale. As the EV population grows, more **used EVs** will come onto the market, providing **opportunities for low- and middle-income households** who typically do not acquire new cars – It has been estimated that by 2030, low income households who drive could save approximately 7% of their total household budget by driving a used EV.<sup>1</sup>
- **Charging at home is the most affordable and convenient** way to charge. However, unlike most single-family dwellers, most people living in multifamily buildings today cannot readily install charging on their own.
- Charging at home, compared to public charging, also brings other benefits:
  - For **condo and building owners**, it adds an increasingly sought-after amenity;
  - For **cities**, it reduces how much land must be devoted to public EV charging, freeing up valuable public space for other uses;
  - For **all levels of government**, it reduces the total required investment in EV charging infrastructure, as public charging infrastructure tends to be more expensive than properly implemented home charging; and
  - For **utilities**, it improves opportunities to harness the flexibility of home EV charging loads to build a flexible, cost-effective electrical grid.
- To achieve **climate targets** and maximize the **economic opportunity** associated with EVs, we must **futureproof multifamily buildings** to enable all residents with onsite parking to eventually charge at home. Such futureproofing can **avoid sub-optimal approaches** and **stranded assets**.

<sup>1</sup> International Council on Clean Transportation. *When might lower-income drivers benefit from electric vehicles? Quantifying the economic equity implications of electric vehicle adoption*. February 2021.

## A Growing Share of Canadians Live in Multifamily Buildings

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- Multifamily buildings include condos, rental apartments, and co-ops. For the purposes of this brief, multifamily buildings refer to apartment-style housing and most townhomes.
- About **1 in 3 Canadians** lives in a multifamily home. In urban centres, this share is much higher, reaching **60%** in the Montreal and Vancouver metropolitan areas.
- Canadians of all kinds live in multifamily homes. However, **low and middle income people** are more likely to be **renters**,<sup>2</sup> and more likely to live in multifamily buildings (whether rental apartments or condo units).<sup>3</sup> As such, ensuring universal access to charging for residents of multifamily buildings is **important for social equity**.
- **Condos are more common** than purpose-built rental housing in Canada. Unfortunately, it can be especially difficult to futureproof condo parking for EVs, because of complicated decision processes, financial constraints, and the inability to trade parking spaces between residents under most forms of condos' parking tenure. Close to 40% of condo units in Canada are rented out,<sup>4</sup> meaning futureproofing condos is important for renters too.

## Leveraging New Construction and Retrofitting Existing Building Stock

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- For **new** multifamily buildings, the best solution is to **require developers to make all parking spaces EV Ready** for "Level 2" charging – "EV Ready" parking has an adjacent electrical outlet at which an EV charger can be installed in the future, when households acquire EVs (see below).
- For **existing** multifamily buildings, we need **comprehensive futureproofing retrofits**, with policy, funding and financing aligned to make these retrofits a reality.



Figure 1. EV Charging in a condo building in Saanich, BC (on the left wall). Source: District of Saanich

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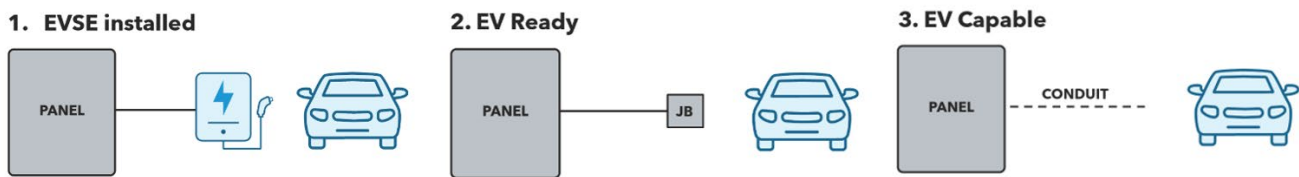
<sup>2</sup> <https://www150.statcan.gc.ca/n1/pub/46-28-0001/2021001/article/00017-eng.htm>

<sup>3</sup> <https://www150.statcan.gc.ca/n1/pub/75f0002m/75f0002m2020003-eng.htm>

<sup>4</sup> <https://www150.statcan.gc.ca/n1/daily-quotidien/220921/dq220921b-eng.pdf>

## How to Futureproof Multifamily Buildings for EV Charging

- To date, only a small proportion of multifamily buildings in Canada have implemented any EV charging infrastructure. Of those that have, most have taken an **incremental approach**, adding a few EV chargers at a time without planning for expansion. Such an incremental approach can serve early adopters. But it often **uses limited electrical capacity inefficiently**, making subsequent expansion much more **expensive** and risking **stranded assets**.
- The alternative to this incremental approach is **comprehensively future-proofing a building with EV charging infrastructure**. A common approach is a retrofit that makes **all parking in the building “EV Ready” or “EV Capable”**.<sup>5</sup>



**Figure 2. Different ways to futureproof a parking space for EV charging. “JB” means a junction box or outlet.**

- The advantages of a comprehensive approach are:
  - It is significantly **more cost-effective** on a per-parking-stall basis. Lower costs are achieved through economies of scale, and most importantly the use of **EV Energy Management Systems (EVEMS)**. EVEMS allows for load-sharing, lowering the costs of electrical systems.
  - It **avoids logistical barriers** (e.g. most condo owners cannot swap parking spaces) and future **stranded assets**.
  - It avoids the **unfair** situation of early adopters using buildings’ limited electrical capacity inefficiently and ensures that **any drivers** choosing an EV can access home charging. This is important for social equity, as it ensures that lower-income people, who will tend to acquire EVs later than higher income people, will be able to cost-effectively charge at home.
- Comprehensively future-proofed buildings can be designed for use of either **Level 1** (120V) charging, or **Level 2** (120V/208V) with load management. Dunsky usually recommends clients implement Level 2 charging. However, ultimately, the decision of whether to implement Level 1 or Level 2 should be left to building owners. Key considerations include:
  - Level 2 charging provides **superior EV charging performance**. Level 1 charging is inadequate for those that drive longer distances and/or have larger vehicles. Load managed Level 2 is much more likely to meet a wide range of drivers’ real and perceived charging needs.
  - Comprehensive “EV Ready” or “EV Capable” Level 2 futureproofing will usually entail **lower “day one” capital costs**, because such Level 2 charging configurations are usually designed for significant load sharing using EVEMS. However, Level 1 can often be implemented with no- or low-cost chargers, which can sometimes result in lower life-cycle costs.

<sup>5</sup> In some circumstances where residents can swap parking spaces (e.g. some rental housing) it is possible to implement a phased retrofit, where systems are designed to ultimately enable all parking to feature EV charging but only a portion of the parking is made EV Ready or EV Capable during the initial retrofit. However, in condos and many rental buildings, it is not possible to swap parking spaces due to the legal structure of the parking tenure. Moreover, in many buildings phased approaches will not result in significant savings.

## Barriers to Futureproofing

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- **Cost, high investment hurdle rates, and lack of access to cash.** EV futureproofing entails capital cost – Usually ~\$1000 to \$1500 per parking space or more to futureproof 100% of parking spaces.<sup>6</sup> Most multifamily buildings do not have access to the significant sums of cash required for EV futureproofing retrofits. Indeed, many multifamily buildings have deferred maintenance on capital renewals. Multifamily building owners and condos often have very high hurdle rates that prevent them from making investments like EV futureproofing, which have long repayment horizons and only realize their value over decades.
- **Perceived limited demand for EV charging.** Many condo associations and building owners may not yet perceive significant demand for EV charging. Surveys conducted in the U.S. suggest that building owners' perception of demand is likely lower than actual demand.<sup>7</sup> Many condo and building owners are unaware of how rapid the transition to EVs is likely to be.
- **Complicated processes.** Condo decision-making involves long, complicated, and uncertain processes. Provincial condo legislation often requires overwhelming majorities of owners to approve capital projects (e.g. 75%). Additionally, few condo owners happen to be knowledgeable about electrical systems or construction project management. The high transaction costs and time associated with educating condo owners about the options for EV futureproofing deters many engineering consultants and contractors from serving the condo sector. These factors also reduce the likelihood that condo members will champion EV futureproofing projects.
- **Information asymmetries.** Most building owners, condo residents, and even electrical contractors and engineers do not have a good understanding of EV charging and futureproofing best practices, nor the risk of stranded assets when pursuing incremental additions.
- **Lack of standard approaches.** Broadly, there is limited understanding and standardization of design approaches for comprehensive futureproofing.
- **Incentive program design.** Most provincial and federal incentive programs offer incentives on a per installed charger basis, not per EV Ready or EV Capable parking space; likewise, programs usually do not require participants to consider nor implement comprehensive futureproofing for all parking. This focuses contractors and building owners on deploying chargers but does not create incentives for careful futureproofing that will be most cost-effective on a life-cycle basis.



**Figure 3. A condo owner in Saanich, BC shows the upgraded electrical infrastructure and panels that were part of the EV ready retrofit in his building. Source: District of Saanich.**

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<sup>6</sup> Costs per parking space are usually much greater to futureproof a smaller proportion of parking spaces, though absolute “day one” capital costs may be less.

<sup>7</sup> Presentation from Apex Analytics and Drive Clean Colorado at PLMA Managed Charging Symposium, August 2023.

## The Business Case

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- Comprehensive futureproofing can realize a range of **benefits**:
  - **Lowest life-cycle costs.** Properly implemented, comprehensive future-proofing is much lower cost than piecemeal approaches, on a life cycle basis.
  - **Avoiding stranded assets.** As noted above, comprehensive futureproofing can avoid the risk of exhausting the limited electrical capacity in buildings associated with incremental EV charging implementation, and the subsequent stranded assets.
  - **Convenience.** It will provide the most convenient form of EV charging for drivers and result in predictable, simple processes to install a charger (once the initial complications of implementing the retrofit are complete).
  - **Enabling savings from EVs.** It allows drivers to benefit from the life cycle cost savings of driving EVs.
  - **Revenues from EV charging.** Multifamily buildings can realize various sources of revenues by providing EV charging. These include Low Carbon Fuel Credits and demand response program revenues. The revenue potential from these sources in the coming decades is hard to predict and depends on policies at the federal and provincial levels. However, they could be substantial. For example, the revenue potential from BC's Low Carbon Fuel Requirement is currently more than \$1000 annually per EV driver.
  - **Alignment with broader electrification efforts.** Decarbonizing buildings requires that we electrify space heat, hot water, ventilation, cooking, and other building energy uses. Comprehensive EV futureproofing is an opportunity to also plan for building electrification.
  - **Alignment with changes in how buildings' parking is used.** Planning comprehensive EV charging infrastructure futureproofing also provides an opportunity to plan how buildings' use of parking can change in the future to create more value. As households increasingly forgo personal vehicle ownership and move to shared mobility services (e.g. car-share, ride-hailing, e-bike-share, etc.), there is an opportunity change the tenure and use of multifamily buildings' assigned parking. For example, this might involve making parkades accessible to outsiders and/or allowing car-share parking. This can increase value for residents and owners, and also encourage more sustainable communities. Electrical infrastructure designs can be optimized for these potential future uses.
- Despite the benefits, comprehensive EV futureproofing requires a **significant capital investment**. **Incentives** and **financing** are necessary to help building owners overcome their high hurdle rates and lack of access to cash. **Clear program structures** supporting comprehensive futureproofing and **standard specifications** are required to overcome the information asymmetries facing condos, building owners and industry.
- **"Charging-as-a-Service"** (CaaS) could be a useful strategy in some buildings. CaaS involves a third party owning and operating the charging infrastructure, while requiring drivers to pay a user fee to access home charging. CaaS can allow EV charging infrastructure to be implemented in multifamily buildings without owners making a capital investment.

However, in some buildings, CaaS operators may realize greater returns on investments by only partially futureproofing buildings; in such circumstances, the financial interests of the CaaS operator may make it more difficult for later EV adopters (who will tend to be lower income) to gain access to home charging. CaaS may be most applicable in rental buildings where parking can be more easily exchanged between residents, enabling phased retrofits.



## Recommended Actions

- We recommend the actions in the table below to enable comprehensive EV futureproofing in multifamily buildings.
- For more details on these recommendations, please see the full Report.

Action	Who?
<b>1.0 Policy &amp; Regulation</b>	
1.1 Update the model <i>National Energy Code for Buildings</i> (NECB) and the <i>National Building Code</i> (NBC) to require EV Ready new construction.	Federal govt., Provinces & Territories (P/Ts)
1.2 Adopt best practice EV Ready requirements for new construction.	P/Ts, municipalities (Munis)
1.3 Adopt “Right to Charge 2.0”, which entails requiring buildings conduct electrical planning reports to guide investments in EV charging and broader building electrification; simplifying approvals processes for feasibility studies; and reducing voting thresholds to 50% to approve capital investments in comprehensive futureproofing; and specifying that comprehensive futureproofing can be funded from condo reserve funds.	P/Ts
1.4 Update utility policy, regulation, rates and programs to support widespread deployment of EV charging and broader beneficial electrification.	P/Ts, Utility regulators, Utilities
1.5 Explore legislation and/or template condo bylaws and associated processes to enable legally exchanging parking spaces in condos and thereby enable phased retrofits, and to lower approval voting thresholds for futureproofing projects.	P/Ts, Federal govt., Development Finance Institutions (DFIs), Non-profits
<b>2.0 Incentive Programs</b>	
2.1 Offer incentives (rebates) for comprehensive EV futureproofing retrofit planning studies and infrastructure upgrades. <b>In aggregate, we recommend incentives total approximately \$3 billion by 2030.</b>	Federal govt., P/Ts, Utilities
2.2 Offer incentives specifically tailored to low- or moderate-income rental buildings and non-market housing. Consider Charging as a Service and utility “make ready” programs specifically tailored to the rental and affordable housing sectors. Include clauses in funding agreements that restrict rent increases, evictions and exorbitant user fees.	Federal govt., P/Ts, Utilities, DFIs
<b>3.0 Financing Programs</b>	
3.1 Introduce loan financing products to support comprehensive EV futureproofing.	DFIs - e.g., Canada Infrastructure Bank, Green Municipal Fund, LC3s, credit

Action	Who?
	unions, and other public interest lenders
3.2 Engage with the Canada Infrastructure Bank and consider aggregating EV futureproofing projects as part of the Building Retrofits Initiative.	DFIs
3.3 Explore financing projects repaid with future Clean Fuel credit revenues.	DFIs, Federal govt., P/Ts
3.4 Pilot Charging-as-a-Service, and quickly scale up if programs are deemed effective.	DFIs, Utilities, Federal govt., P/Ts, Munis, Charging service providers
3.5 Pilot “Make Ready” utility investment in EV charging infrastructure, and quickly scale up programs if deemed cost effective.	Utilities, Utility Regulators
<b>4.0 Capacity building, standards &amp; bulk procurement</b>	
4.1 Provide education and training related to comprehensive EV ready retrofits for condominium boards and rental building owners to understand the value proposition.	Federal govt., P/Ts, Munis., Utilities, Non-profits
4.2 Develop a standard specification for networked EV charging services for multifamily buildings (and potentially other applications – e.g. workplaces), and an impartial means of testing and certifying service providers against the specification.	Federal govt., P/Ts, Utilities, DFIs, Non-profits
4.3 Develop specifications and guidance for wholistic electrification planning studies and futureproofing practices.	Federal govt., P/Ts, Utilities, Non-profits & DFIs
4.4 Explore bulk procurement of EV charging services for multifamily buildings (and potentially other applications – e.g. workplaces).	Federal govt., P/Ts, DFIs

## No Need to “Reinvent the Parking Stall”

- Decision-makers can adopt actions already being taken by global leaders in multifamily futureproofing here in Canada. Some jurisdictions are leading the way:
  - Over a dozen B.C. municipalities, the City of Toronto and the City of Waterloo have adopted **bylaws requiring that all new multifamily buildings be constructed to be 100% EV ready**; several have also regulated new commercial developments (requirements range from 20 to 50%).  
B.C. has established the **EV Ready Rebate Program for apartment and condo buildings**, administered by BC Hydro and FortisBC. This program is designed to **enable 100% EV ready approaches**. Several municipalities in B.C. offer **top-up programs** to further incentivize condo associations (Saanich) and rental owners (Vancouver) to pursue retrofits.