Power Efficient Design in All-Electric New Construction: Lessons from the Vancouver Multiplex Guide

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ABSTRACT

All-electric new construction practices, electric vehicle (EV) charging infrastructure, and denser infill development can all increase electrical load calculations, which are prescribed in applicable electrical codes, for new buildings' utility service connections. In turn, larger calculated loads for consumers' services may cross thresholds and require higher capacity utility infrastructure. These higher capacity utility services often necessitate more expensive electrical works (e.g. undergrounding services), higher utility connection fees and increased space requirements.

Fortunately, power efficient design (PED) can reduce calculated loads and avoid costly service upsizing. Power efficient design (PED) refers to strategies that optimize buildings' instantaneous electricity use to stay within the capacity limits of buildings' electrical services. This approach helps avoid costly electrical upgrades while enabling widespread electrification, including the adoption of electric space and water heating, cooking and EV charging.

This paper briefly notes the trend toward all (or predominantly) electric construction, EV charging infrastructure for onsite parking, and denser infill development. It then summarizes the range of PED strategies, using a rubric developed under the auspices of the Consortium for Power Efficiency, a collaborative effort by Canadian utilities, government and industry partners. Finally, it summarizes results from the City of Vancouver's Multiplex Power Efficient Design Guide, documenting how all-electric multiplexes (4-8 unit new housing recently enabled on previously single-family properties) can achieve utility service capacities typical of gas heated developments when using PED.

Introduction

Electrification Drivers and Trends

North American jurisdictions are increasingly switching from fossil fuel systems to electric alternatives in homes, buildings, and vehicles. In the United States, 130 bills were introduced advancing building decarbonization in 2025, with 41 passing (Building Decarbonization Coalition, 2025). In Canada, the federal Energy Efficiency Act was modernized in 2025 to strengthen energy performance requirements to help lower building emissions (Natural Resources Canada, 2025). Building codes and municipal regulations are also increasing electrical demand in new construction. Many jurisdictions now require new buildings to be EV-ready, mandating electrical infrastructure capable of supporting future electric vehicle charging (U.S. Department of Energy, 2025; McEwen, 2022). Furthermore, building electrification is driven not only by climate policy and regulation, but also by consumer demand for electrified end uses including electric vehicle (EV) charging, in-suite cooling, and fully electric appliances.

At the same time, many neighborhoods are densifying. Notably, communities that were once mostly single-family homes are seeing more "missing middle" housing like multiplexes, townhomes, row houses, and small apartment buildings, enabled by modernized zoning to address housing supply gaps (Whitzman, Ashtari, & Perwani, 2024).

These energy transition and densification trends will reduce emissions and air pollution, make housing and transportation more affordable, drive economic development, and improve quality of life. However, electrification and densification are increasingly leading to larger electrical service requirements in new construction settings to handle the increased demand.

Higher capacity electrical services translate directly into greater costs for developers and utilities. For example, an undergrounded 400A electrical service for a 3-unit multiplex can cost homebuilders $30,000-$100,000+ (CAD) more than the overhead 200A service typical for new single-family homes (Consortium for Power Efficiency, 2025). On a multi-unit residential building (MURB) apartment scale, increases in electrical service equipment costs can range in the hundreds of thousands to millions of dollars and can deter developers from pursuing fully electrified new construction (StopWaste & AEA, 2021).

Electrical Load Calculations and Electrical Service Capacities

Electrical load calculations determine the required capacity of a building's electrical service, feeders, and branch circuits. In North America, these calculations are governed primarily by model electrical codes, most notably the National Electrical Code (NEC, NFPA 70) in the United States and the Canadian Electrical Code, Part I (CE Code, CSA C22.1) in Canada. These model codes are adopted by states, provinces, and municipalities (sometimes with local amendments) and provide standardized methodologies for estimating the maximum electrical demand that a building may impose on its electrical system. The scope of the NEC and CE Code are limited to customers' services; utility standards dictate the capacity of utility infrastructure upstream of the customer's utility service connection point.

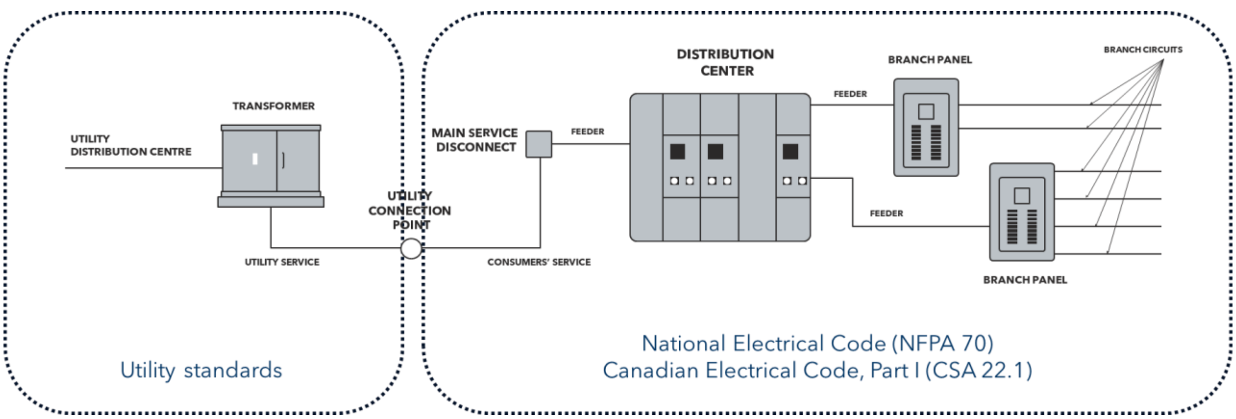


Figure 1: Example building electrical systems. Electrical codes pertain to systems downstream of utility connection point.

Customer (building) service connections are available only in discrete increments of increasing capacity, for example 200A, 400A, or 600A services at 120/240V for many residential applications. Crossing these stepped thresholds often results in significantly higher project costs because, when a larger electrical service is required, utilities may require different types of service infrastructure or additional site work. There are several different categories of costs:

- Utility extension fees: utilities commonly charge extension fees to recover the cost of providing distribution infrastructure to a site, offset by a credit reflecting the utility's expected future revenue from that building's electricity consumption. Because these costs depend on local distribution conditions, they can be highly variable and difficult for developers to predict in advance.

- Customer-side electrical and civil works: developers are typically responsible for site-level infrastructure on the customer side of the meter. This may include trenching, conduit installation, larger service conductors, electrical rooms, and associated civil work such as pavement restoration, landscaping, and arborist requirements.
- Opportunity costs associated with electrical equipment siting: larger electrical services may require space for pad-mounted transformers or additional clearances and setbacks. In urban settings, these requirements can reduce buildable area or parking availability, creating additional indirect project costs.

No two building sites are perfectly alike. Notably, there isn't necessarily a discrete point at which a consumer's load calculation will *always* result in a larger service. Service sizing decisions depend on site-specific factors including the distance from the building to the distribution transformer, allowable voltage drop limits, conductor sizing requirements, and the characteristics of the local distribution network. For example, utilities may require thicker conductors for longer service runs, which can increase costs even if the nominal service capacity remains unchanged.

Experience from electrified residential projects in British Columbia, Canada suggests that if a calculated load remains well below the nominal service threshold (e.g., below roughly 80% of service capacity), the project will typically remain within the lower service category. When calculated loads approach the threshold range (approximately 80–100% of nominal capacity), the likelihood of requiring a larger service increases. Once calculated loads exceed the nominal capacity of the service category, an upgrade to the next service size is unavoidable.

Because electrical load calculations directly influence service sizing decisions, strategies that reduce calculated electrical demand, even by relatively small amounts, can determine whether a project remains within a lower service category. This dynamic creates a strong incentive for designers to incorporate Power Efficient Design (PED) strategies that reduce peak electrical demand and avoid crossing service thresholds.

Power Efficient Design

Power efficient design (PED) refers to a range of strategies that limit instantaneous electrical power demand that dictate sizing of consumers' services, feeders and branch circuits under electrical codes. There are four broad categories of PED strategies, outlined below and expanded upon in the following sections.

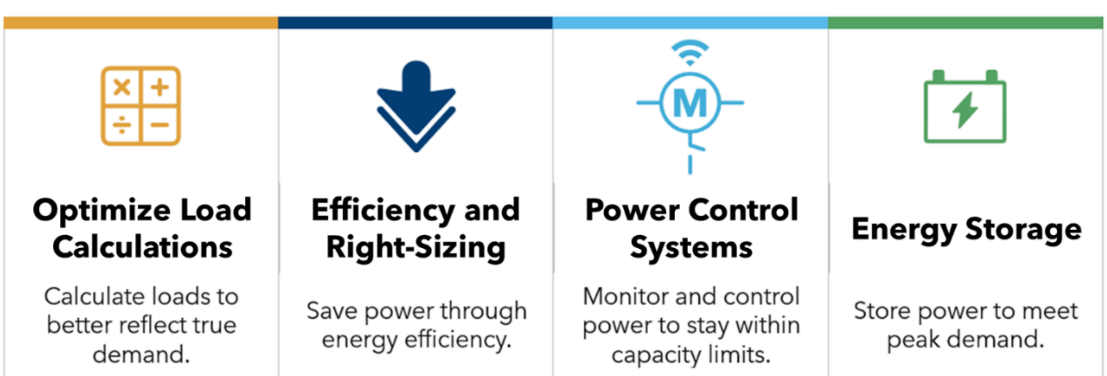


Figure 2: PED categories.

Optimize Load Calculations

Electrical code load calculation methodologies for services and feeders tend to be conservative, often exceeding real-world peak loading by 50% or more (Dunsky Energy + Climate Advisors (a), 2025). While it is critical that electrical load calculation methodologies be conservative to ensure adequate capacity to meet the peak demand at facilities, baseline loads (prescribed Watts per unit area based on occupancy type) could warrant revisions to reflect the lower power demand in new buildings.

The U.S. National Energy Code (NEC) allows for use of lighting and plug load power densities based on relevant energy codes; a code amendment proposal for similar provisions in the Canadian Electrical Code, Part I (CE Code) has been put forth by the Consortium for Power Efficiency. Such provisions could help align calculated loads more closely with actual building demand in new construction, potentially avoiding unnecessarily large electrical services.

For existing buildings adding electrical loads, energy codes typically allow for the use of historical measured loads as a replacement for prescribed baseline loads to determine unused electrical capacity. This approach more accurately reflects real building operation and identifies unused capacity that may support additional electrified loads without requiring service upgrades.

Efficiency and Right-Sizing

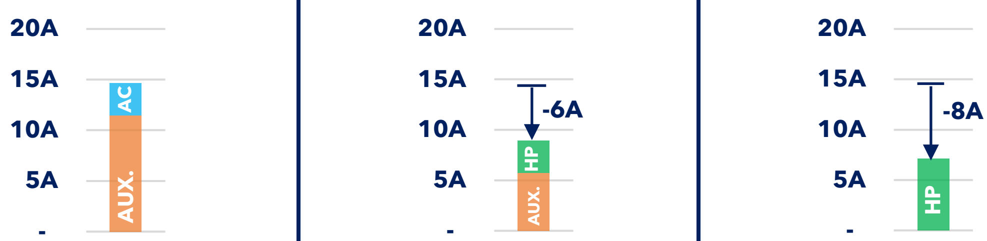
In a PED context, efficiency measures matter not only because they reduce annual energy consumption, but also because they reduce loads that electrical and mechanical systems must be designed to serve, lowering connected load and peak electrical demand. Right-sizing ensures equipment capacities are matched to their intended purposes. In natural gas fired systems, equipment is often oversized to provide heating quickly; if that capacity is used to size electrical heating systems, the resulting peak electrical demand can be significantly higher than the building’s actual operational needs. For new buildings, efficiency and right-sizing PED strategies can include:

- Opting for more power-efficient equipment models that meet the same needs (e.g., heat pump space heating, water heating, clothes drying);
- Selecting equipment with lower capacity that can still meet building energy service needs (e.g., lower power 20A Level 2 EV chargers);
- Reducing the load at the source through design improvements (building envelope improvements).

The example below shows the effect of selecting more power-efficient right-sized equipment for space heating and cooling in a single dwelling within a multiplex building.

Let’s compare three (3) design approaches to heating and cooling a 100 m² (~1,075 ft²) single dwelling in a six-plex building with a design heating load 2,750 W.

Electric Baseboards	Single Head Mini-Split	Multi Head Mini-Split
In this design, a **1 ton mini-split AC** in combination with **electric resistance baseboards** covering the full heating load are installed.	In this design, a **1 ton single-head mini-split ccASHP** in combination with electric resistance baseboards covering 50% of the heating load are installed.	In this design, a **2 ton multi-head mini-split ccASHP** with no auxiliary heat is installed.



* AC = air conditioner; ccASHP = cold climate air source heat pump.
** Calculations follow Canadian Electrical Code methodologies.

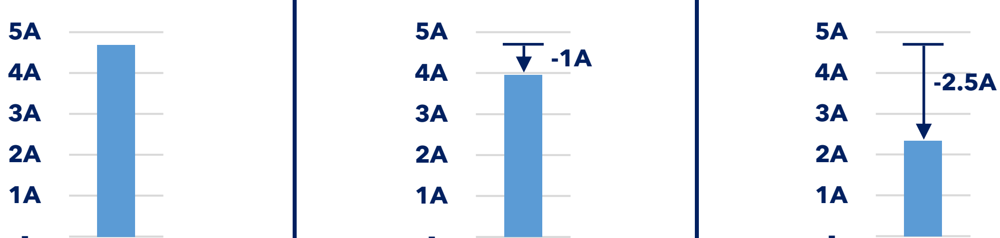
Figure 3: Impacts of power efficient heating equipment selection on electrical load calculations.

In this example, higher efficiency equipment (ccASHP compared to electric baseboards) reduces the required electrical capacity by 6 A at the dwelling level. A multi-head mini-split configuration with no auxiliary heat reduces the required electrical capacity by 8 A at the dwelling level. While this conclusion may vary with different dwelling sizes and layouts, it underscores the importance of accurately assessing the load and selecting the appropriate equipment for optimal performance.

The next example shows the impact of efficient water heating for a similar dwelling.

Let’s compare three (3) design approaches to water heating for 100 m² (~1,075 ft²) single dwelling in a six-plex building.

Electric Resistance Water Heater	Power Efficient Electric Resistance Water Heater	Hybrid Heat Pump Water Heater
Giant 172STE 60-gal tank **4,500 W** nameplate rating	Giant 172EPS 60-gal tank **3,800 W** nameplate rating	Rheem XE65T10H22U1 65-gal tank **2,250 W** nameplate rating



** Calculations follow Canadian Electrical Code methodologies.

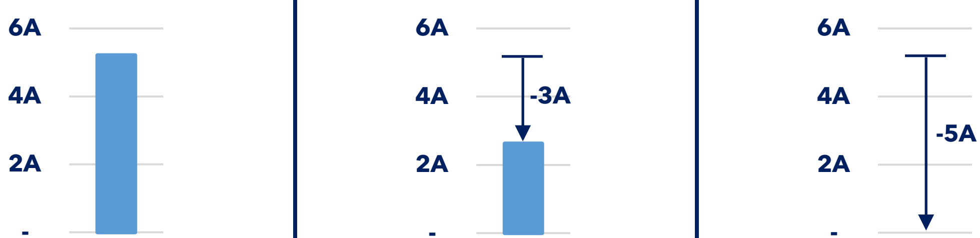
Figure 4: Impacts of power efficient water heating equipment selection on electrical load calculations.

In this example, improving domestic water heating efficiency reduces the required electrical capacity by 2.5 A at the dwelling level, which, in a six-plex, represents approximately an 8.4 A reduction at the building service level. The impact is limited because only 25% of the water heater's nameplate rating is used in the load calculation, which reduces the potential savings from power-efficient models.

The next example shows the impact of efficient appliances on electrical loads.

Let's compare the three (3) clothes dryer types in a 100 m² (~1,075 ft²) single dwelling in a six-plex building.

Traditional Electric Dryer	**Condensing Dryer**	**Heat Pump Dryer**
Regular appliance with a **5,000 W** nameplate rating	Bosch WTG86403UC with a **2,520 W** nameplate rating	Bosch WQB245AXUC with a **900 W** nameplate rating



** Calculations follow Canadian Electrical Code methodologies.

Figure 5: Impacts of power efficient clothes dryer equipment selection on electrical load calculations.

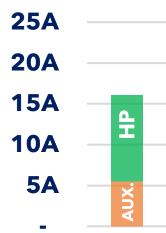
Selection of condensing dryers in this case reduces the required electrical capacity by 3 A at the dwelling level, which, in a six-plex, represents approximately a 10 A reduction. Crucially, since the HP dryer has a nameplate rating under 1,500W, it does not have to be included in the electrical load calculation according to CE Code rules, which reduces the required electrical capacity by 5 A at the dwelling level, which, in a six-plex, represents a 16.8 A reduction.

The next example shows the impact of reducing loads at the source through building envelope improvements.

Let's compare two (2) envelope design approaches to heating and cooling in a 100 m² (~1,075 ft²) single dwelling in a six-plex building with a design heating load of 2,750 W for the code minimum envelope case.

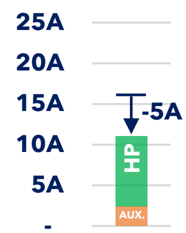
Code Minimum Envelope

In this design, a **1 ton single-head mini-split ccASHP** in combination with electric resistance baseboards covering 50% of the heating load are installed to cover the heating load.



Passive House Envelope

In this design, the same overall design is used, but the lower heating and cooling loads allows for a smaller **0.75 ton single-head mini-split heat pump** with a smaller auxiliary.



* Code Minimum = Vancouver Building By-Law.
** Calculations follow Canadian Electrical Code methodologies.

Figure 6: Impacts of improved envelope performance on electrical load calculations.

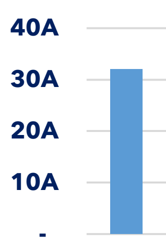
In this example, envelope improvement reduces the required electrical capacity by 5 A at the dwelling level, which, in a six-plex, represents a 24 A reduction at the building service level.

The next example shows how EV charging equipment selection and right-sizing impact electrical load requirements.

Let's compare two electric vehicle supply equipment (EVSE) capacities in terms in the electrical load assessment calculation.

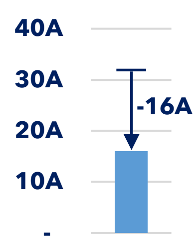
Level 2 EVSE on 40A Circuit

A Level 2 EVSE on a 40A circuit can draw a **maximum power of 32A**.



Level 2 EVSE on 20A Circuit

A Level 2 EVSE on a 20A circuit can draw a **maximum power of 16A**.



** Calculations follow Canadian Electrical Code methodologies.

Figure 7: Impacts of EVSE equipment selection on electrical load calculations.

Using lower capacity EVSE reduces electrical demand at the dwelling level by about 16 A. In a six-plex where each dwelling has a dedicated parking space, this equates to a 96 A reduction in required electrical capacity. Among common efficiency and right-sizing strategies, EV charging typically represents the largest incremental electrical load, meaning equipment selection can significantly influence whether a project is feasible within available service capacity.

For new construction, supporting lower-amperage EV charging (e.g., 20 A charging capability) can help enable EV-ready buildings without triggering costly service upgrades. While some electrical regulations or design standards assume 40 A EV charging, many urban and inner-ring suburban driving patterns can be adequately served by lower-amperage charging, particularly when vehicles charge overnight (AES Engineering, 2021).

At the same time, prescribing dedicated 20 A circuits for EV charging as in the 2025 CALGreen Code for multifamily buildings may not be the most efficient approach, as this can still require more installed capacity than necessary (California Building Standards Commission, 2025). Power control systems (PCS), discussed in the next section, can enable much less power intensive solutions by delivering comparable charging performance while dynamically managing loads and reducing infrastructure requirements.

Power Control Systems

Power Control Systems (PCS) can monitor and control electrical loads to ensure that power demand does not exceed defined capacity limits. By actively managing loads, PCS can enable deeper electrification while avoiding electrical system upsizing. Moreover, PCS can be used to control loads for other purposes, such as avoiding utility demand charges; responding to time varying electrical pricing, and participating in utility demand response programs, among others. Common PCS control approaches include:

- Circuit switching: deactivating secondary loads on a branch circuit when a priority load is turned on;
- Dynamic energy management: equipment that can incrementally adjust power consumption up or down to stay within the electrical capacity of a circuit;
- Service and feeder monitoring: devices such as current transformers monitor real-time capacity on services or feeders and control electrical loads depending on whether sufficient capacity is available.

PCS are commonly used to manage EV charging loads. EVs are often among the highest power electrical loads in new buildings and can therefore significantly affect overall building electrical capacity requirements. At the same time, EV charging is a highly flexible and controllable load, as most vehicles remain parked for many hours and do not require continuous charging at full power. As a result, PCS have been used to manage EV charging in hundreds of thousands of buildings, enabling multiple vehicles to share available electrical capacity through load sharing and dynamic control. PCS can enable "managed charging", reducing charging speed during peak hours while still delivering full charge overnight.

Despite these advantages, PCS are still not consistently deployed, even in jurisdictions where EV adoption is advanced. In some cases, building codes or standards, such as provisions in CALGreen, can unintentionally limit the use of load management to share branch circuits (reducing wiring costs) and/or to monitor upstream services and adjust EVSE loads accordingly. These strategies can be used while maintaining good user experience and charging performance (AES Engineering, 2021).

Moreover, PCS can be used to reduce upstream utility infrastructure impacts, in addition to minimizing building-scale electrical circuit capacity. For example, Pacific Gas and Electric is testing systems that combine EV chargers or smart panels (dynamic loads) with next-generation advanced metering infrastructure (AMI 2.0) (Pacific Gas and Electric Company, 2025). These meters run grid-edge applications that communicate with EV chargers and dynamically limit charging based on real-time capacity at the home's panel as well as the local distribution system equipment.

While most current applications focus on EV charging, PCS for non-EV loads are becoming increasingly viable. Load management strategies can coordinate other high-power equipment to limit coincident peak demand. In new construction, this can reduce overall required electrical capacity. Retrofit projects have also demonstrated these benefits. For example, the Chestnut Street six-plex electrification retrofit project by BC Hydro utilized smart panel PCS to dynamically manage non-EV suite-level loads (thermostat setpoints, water heating, clothes dryers and cooking ranges) and thereby eliminate the need to upgrade from a 200A service to a 400A (Government of British Columbia, 2025). Some new multiplexes in the Vancouver area are likewise being developed with PCS managing space heating, DHW and dryer loads; for example, a 4-unit multiplex was able to be served by a 200A overhead service, avoiding an approximate $200,000CDN underground service by implementing smart panels at a cost approximately 10% of service cost (McLeod, 2026) (Futuri, 2026).

Electrical codes often pose barriers to realizing the full potential of PCS. The 2026 National Electrical Code (NFPA 70) includes provisions that enable a wide range of PCS applications; it will need to be referenced in state and local codes to have legal effect. The CE Code does not yet include provisions to reduce calculated loads via PCS managing non-EV loads; code amendment proposals have been submitted to rectify this situation and some provinces have amended the model code to allow load management of other end loads (1Click, 2025).

Energy Storage

Energy storage, including both battery storage and thermal storage, can shift loads at a building's electrical service level, drawing and storing energy during lower demand periods for discharge during peak demand periods. Theoretically, in a new construction setting, buildings could be designed to integrate energy storage to serve some portion of peak loads, thereby reducing the maximum coincident load that determines electrical service sizing. When integrated with PCS, energy storage can operate as part of a broader load management strategy to reduce coincident demand and provide additional short-term capacity when demand peaks occur.

At present, energy storage remains relatively uncommon but presents a promising PED strategy. Two multiplex projects have been proposed within the City of Vancouver that use battery energy storage to serve peak loads, and thereby avoid service upsizing and associated costs (Higgins, 2026). Interest in energy storage is growing as electrification increases building peak loads and utilities recognize the value of distributed storage. Simultaneously, energy storage technologies are evolving rapidly and costs of technologies like batteries continue to fall (Galik, Widiss, & Lowe, 2021).

Co-Benefits

In addition to lowering construction costs and grid extension fees, PED strategies can:

- passively reduce net demand peaks at the building and grid level;
- involve active control technology and distributed energy resources (DERs) that can enable buildings to participate in demand response programs or act as virtual power plants (VPPs), allowing loads to be adjusted in response to grid conditions or electricity pricing signals;
- improve building resilience by providing backup power during outages (energy storage) and maintaining critical loads during constrained conditions (PCS).

Examples – City of Vancouver Multiplexes

The City of Vancouver commissioned a Multiplex Electrical Process Guide, under the broader auspices of the Consortium for Power Efficiency (powerefficiency.ca), providing practical guidance and illustrative case studies of PED strategies to limit load calculations in triplex, quadplex, and six-plex buildings (Dunsky Energy + Climate Advisors (b), 2025). Results are presented below. Calculations follow CE Code methodologies.

The triplex archetype has a gross floor area of 2,700ft^2 (250m^2), with three identical units of 900ft^2 (84m^2) each and two EV parking spaces. Converting from natural gas-based space heating, water heating, and cooking to an all-electric configuration fits within the same 400A capacity. Applying PED measures including high-efficiency water heating, heat pump clothes drying, and EVEMS for all EVSEs reduces the required electrical capacity by 71A, enabling a reduction in service capacity from a 400A incoming service to a 200A incoming service. For this example, no envelope improvements are implemented (VBBL refers to minimum Vancouver Building By-Law minimum envelope performance).

	Electrification (baseline)	**Electrification** (with all PED)	**Gas equivalent** (no PED)
Service Capacity (Actual Capacity)	400 A (238 A)	**200 A (167 A)**	400 A (217 A)
Panel Size	2x 125 A + 1x 100 A	**3x 100 A**	3x 100 A
Space Heating & Cooling	**1 ton mini-split cold climate ASHP + baseboards**	**1 ton mini-split cold climate ASHP + baseboards**	1 ton mini-split AC + gas heating
Building Envelope	VBBL/Step 3	VBBL/Step 3	VBBL/Step 3
Water Heating	40-gallon storage electric	**heat pump water heater**	gas instantaneous
Other Appliances	electric range and dryer	electric range and **heat pump dryer**	gas range and electric dryer
EVSE	L2 on 40A circuit	L2 on 40A circuit	L2 on 40A circuit
Circuit Sharing/EVEMS	none	**EVEMS on all EVSEs**	none

Figure 8: Triplex PED example load calculations.

The fourplex archetype has a gross floor area of 4300ft^2 (400m^2), with four identical units of 1075ft^2 (100m^2) each and three EV parking spaces. The analysis shows that electrification is possible within the existing 400A service. Applying PED measures including high-efficiency water heating, heat pump clothes drying, EVEMS for all EVSEs, and improved building envelope performance reduces the required electrical capacity by 137A, enabling a reduction in service capacity from a 400A incoming service to a 200A incoming service. For this example, the 200A service would not have been achievable without envelope performance improvement.

	Electrification (baseline)	**Electrification** (with all PED)	**Gas equivalent** (no PED)
Service Capacity (Actual Load)	400A (327A)	**200A (190A)**	400A (291A)
Panel Size	3x 125A + 1x 100A	**4x 100A**	4x 100A
Space Heating & Cooling	**1 ton mini-split cold climate ASHP + baseboards**	**1 ton mini-split cold climate ASHP + baseboards**	1 ton mini-split AC + gas heating
Building Envelope	VBBL/Step 3	**Passive House/Step 5**	VBBL/Step 3
Water Heating	60-gallon storage electric	**heat pump water heater**	gas instantaneous
Other Appliances	electric range and dryer	electric range and **heat pump dryer**	gas range and elect. dryer
EVSE	L2 on 40A circuit	L2 on 40A circuit	L2 on 40A circuit
Circuit Sharing/EVEMS	none	**EVEMS on all EVSEs**	none

Figure 9: Fourplex PED example load calculations.

The six-plex archetype has a gross floor area of 6,300ft^2 (585 m^2), with six identical units of 1050ft^2 (98m^2) each and a total of three EV parking spaces. This archetype can achieve baseline electrification with a 400A service without PED strategies for up to three EV parking spaces. Beyond that, a 600A service becomes necessary. Applying PED measures including high-efficiency water heating, heat pump clothes drying, and EVEMS for all EVSEs reduces peak power demand enough to remain under the 400A threshold while providing an EVSE per dwelling unit.

	Electrification (baseline)	**Electrification** (with all PED)	**Gas equivalent** (no PED)
Service Capacity (Actual Load)	400A (397A)	**400A (276A)**	400A (348A)
Panel Size	3x 125A + 3x 100A	6x 100A	6x 100A
Space Heating & Cooling	**1 ton mini-split cold climate ASHP + baseboards**	**1 ton mini-split cold climate ASHP + baseboards**	1 ton mini-split AC + gas heating
Building Envelope	VBBL/Step 3	VBBL/Step 3	VBBL/Step 3
Water Heating	60-gallon storage electric	**heat pump water heater**	gas instantaneous
Other Appliances	electric range and dryer	electric range and **heat pump dryer**	gas range and elect. dryer
EVSE	L2 on 40A circuit	L2 on 40A circuit	L2 on 40A circuit
Circuit sharing/EVEMS	none	**EVEMS on all EVSEs**	none

Figure 10: Six-plex PED example load calculations.

Cost Considerations

Power Efficient Design (PED) measures can reduce total project costs by avoiding electrical service upgrades and associated utility infrastructure expenditures. While some PED strategies involve additional capital investments in higher-efficiency equipment, load management systems, or improved building envelopes, these costs are more often than not offset by the avoided costs associated with upsizing electrical services.

For the BC triplex example presented in the previous section, the PED package (including heat pump water heaters, heat pump dryers, and EV energy management systems (EVEMS) for all EVSEs) is estimated to add approximately $20,000–$25,000 CAD in project costs (Dunsky Energy + Climate Advisors (c), 2026). These measures reduce the required electrical service capacity from 400 A to 200 A. As discussed earlier, avoiding a transition from a typical 200 A overhead service to a 400 A underground service can avoid approximately $30,000–$100,000+ CAD in utility connection and electrical infrastructure costs (Consortium for Power Efficiency, 2025). As a result, the PED measures yield immediate net project savings while also supporting full building electrification and EV ready parking.

Conclusions & Scaling Implications

From a market transformation perspective, several enabling conditions will be necessary to scale PED in new construction:

- **Modernization and adoption of electrical codes and standards.** Continued updates to model codes such as the NEC and the CE Code can better align load calculation methodologies with modern building technologies and real-world demand patterns. Emerging standards for power control systems, such as UL 3141, will also help expand the deployment of load management technologies.
- **Industry education and capacity building.** Designers, builders, electrical contractors, and code officials must become familiar with PED strategies and their implications for electrical load calculations. Training and guidance documents can help practitioners identify opportunities to reduce calculated loads through equipment selection, right-sizing, and load management.
- **Improved transparency in utility connection processes.** Greater clarity from utilities regarding service sizing thresholds, extension fees, and conditions that trigger more expensive infrastructure (such as undergrounded services or transformer upgrades) would allow project teams to better evaluate the value of PED strategies during early design.

These efforts will support both new construction electrification and housing densification, while also complementing broader efforts to electrify existing buildings.

The Consortium for Power Efficiency represents a national-scale collaboration working to advance these objectives by aligning utilities, governments, and industry around practical PED strategies. Initiatives of this kind can help accelerate market transformation at the scale and speed required to address the dual challenges of climate change mitigation and housing affordability.

Power Efficient Design reframes electrification from a nameplate power addition problem to a peak load management opportunity. As electrification accelerates across the building sector, managing peak demand will increasingly determine whether decarbonization can occur at scale. By reducing calculated peak demand, PED enables fully electrified buildings to remain within lower electrical service capacities, avoiding costly infrastructure upgrades while supporting widespread electrification.

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