MURB Retrofits:

OPPORTUNITIES FOR ELECTRIFICATION

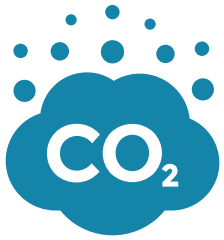
What is building electrification?

Building electrification refers to the replacement of fossil fuel-based building systems with low carbon electric powered systems. This guide focuses on opportunities for **electrifying heating**, **hot water**, and **ventilation systems** as part of retrofits in BC apartment buildings.

Building electrification in BC can help reduce emissions since:

97%

of building emissions
come from
space heating & water heating



Natural gas emits

~16x

more GHG emissions
than electricity

Buildings represent

~30-60%

of community emissions

What is driving electrification?

Climate action policies & regulation are being put in place at Federal, Provincial and local levels. Landlords are increasingly looking for ways to lower emissions and mitigate the impacts of rising carbon taxes & risks from future regulations (e.g., potential limits on emissions, mandatory upgrades, additional taxes). Financial incentives are available to support this work.

Air conditioning and improved indoor air quality is becoming a necessity as heat waves and wildfire smoke are becoming more frequent and intense. Tenants are increasingly installing low efficiency portable A/C units that could overload electrical systems. Heat pumps, a key strategy for electrification, enable the addition of efficient heating and cooling, can add air filtration and be done in conjunction with ventilation improvements.

Shifting to a tenant-pays model for utilities: most utility costs in BC apartment buildings are paid by landlords as most buildings use central mechanical systems. In-suite heat pumps enable a greater portion of utility costs to be paid by tenants, who are also given greater control over their comfort and their energy use.

Attracting investment: many investors are increasingly prioritizing Environmental, Social and Corporate Governance (ESG), of which building emissions reductions is a key pillar. Some landlords are already seeing the impacts and upgrading their portfolios in order to attract capital.

Increasing building value: companies are increasingly reporting that capital investments in cooling, indoor air quality, and electrification can improve building value.

Common building electrification
OPPORTUNITIES

- Improve tenant health and comfort with added cooling and improved air quality.
- Reduce greenhouse gas (GHG) emissions.
- Eliminate maintenance and leaks of central hydronic (hot water) heating systems when moving to in-suite heat pumps.
- Transfer to a “user-pay” model for utilities, further encouraging conservation. The transition will need to respect and account for tenant rights.
- Modernize buildings.
- Obtain government rebates.

Common building electrification
CHALLENGES

- Higher capital costs; though this is partially addressed by BC’s recently announced Additional Rent Increase (ARI) process, which recognizes upgrades that improve efficiency and reduce emissions as eligible capital expenditures.
- May require electrical service upgrades.
- Higher costs of running electric equipment v. fossil-fuel fired equipment, though this is changing as carbon taxes increase.
- Increased complexity for planning, designing and permitting relative to more conventional fossil-fuel fired equipment retrofits. Retrofits are best done with sufficient planning before old equipment fails.
- Site-specific technical challenges (e.g., electrical and structural capacity, finding an appropriate location for the new equipment, asbestos abatement).

Electrifying In-suite Heating

This approach involves shifting from central hydronic heating to in-suite heating using air-source heat pumps. Two different approaches to this are shown below. For deeper reductions and improved health/comfort, these can also be done in conjunction with other improvements, such as enclosure (e.g. window, cladding) or ventilation upgrades.

Main Benefits:

- Added cooling and air filtration
- Better temperature control
- No tenant displacement
- Enables "user pays" model for utility cost

Main Challenges:

- Envelope penetrations are required
- Condensate and defrost drainage need to be accounted for
- Requires periodic access to suites for maintenance

All-in-one air-source heat pump

Photo: Climatech Design

All-in-one air-source heat pumps replacing hydronic

Specific Benefits:

- No outdoor unit required
- Simpler electrical connection (compared to mini-splits) – plugs into regular outlet

Specific Challenges:

- Envelope penetrations are bigger than those required for mini-splits (two 6-8" holes)
- Need to install on an exterior wall

AC Added	**Yes**
Responsibility of energy costs	**Can be transferred to tenant**
$ / suite *estimated*	**$4 –10k**
Emissions reduction *estimated*	**95%** *of heating*

Mini-split air-source heat pump – outdoor unit

Photo: Google Maps

Mini-split air-source heat pumps replacing or augmenting hydronic

Specific Benefits:

- Slightly higher efficiency than all-in-one HPs
- Low noise outdoor units
- Wide range of product availability, including multi-head units
- Indoor unit doesn't need to be on exterior wall

Specific Considerations:

- Finding a suitable location for the outdoor units
- If not fully replacing the hydronic system, heat pumps can provide heating in the shoulder heating season and cooling in summer

AC Added	**Yes**
Responsibility of energy costs	**Can be transferred or split** *(when augmenting hydronic)* **between landlord and tenant**
$ / suite *estimated*	**$4 –10k**
Emissions reduction *estimated*	**95%** *of heating (50% when augmenting)*

Mini-split air-source heat pump – indoor head

**While you can electrify with electric baseboard heaters, they use 2-3 times more electricity than heat pumps and don't offer cooling.*

Electrifying Central Hydronic Heating

This "hybrid" approach involves complementing fossil-fuel fired central hydronic boilers with central air source heat pumps (ASHPs). In most circumstances, central heat pumps are unable to fully meet the needs of hydronic system. This approach enables the building to retain a central system, while still achieving a significant GHG reduction.

For deeper reductions and improved health/comfort, these can also be done in conjunction with other improvements, such as enclosure (e.g. window, cladding) or ventilation upgrades.

Main Benefits:

- Limited disruption to tenants
- Maintains existing structure for utility costs

Main Challenges:

- Requires space for outdoor equipment
- Ongoing hydronic system maintenance still required
- Does not facilitate a "user pay" model for utility costs
- Challenging to add cooling

Central air source heat pump

Photo: AERMEC

Central ASHPs Retaining Original Hydronic Baseboards

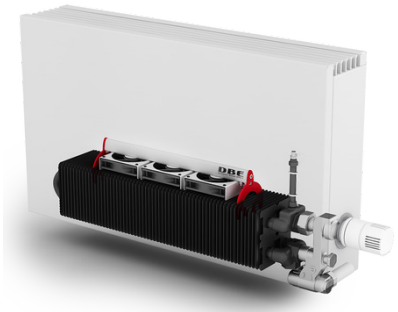
Specific Benefits:

- No work in suites is required

Specific Challenges:

- Since the ASHP can't provide the high temperature required by the existing baseboards, the boiler will need to run for a longer portion of the heating season

AC Added	**No**
Responsibility of energy costs	**Remains on landlord**
$ / suite *estimated*	**$7 – 9k**
Emissions reduction *estimated*	**65%** *of heating*



Newer high efficiency hydronic baseboard heater

Photo: Jaga

Central ASHPs Replacing Hydronic Baseboard Heaters

Specific Benefits:

- Higher reduction of GHGs

Specific Considerations:

- Higher cost than leaving existing baseboards in place
- Requires work in suites and more tenant disruption
- Adding cooling is possible but can add significant complexity and cost

AC Added	**No**
Responsibility of energy costs	**Remains on landlord**
$ / suite *estimated*	**$11 –13k**
Emissions reduction *estimated*	**85%** *of heating*

Electrifying Domestic Hot Water

This approach involves replacing a fossil-fuel fired central domestic water heating with an air source heat pump (ASHP) system.

Prior to upgrading equipment, it is recommended that fixtures (e.g. shower heads) be upgraded to reduce hot water consumption.

Main Benefits:

- Reduces GHGs
- No tenant disruption

Main Challenges:

- Need space for outdoor units and additional storage tanks

Modular Central ASHPs– very quiet operation

Photo: Rod Nadeau

Central ASHPs with CO_2 refrigerant

Specific Benefits:

- CO_2 has a lower global warming potential when released to the atmosphere (from leaks)
- CO_2 can operate in lower outdoor air temperatures (~-25°C)
- Modular and larger systems available

AC Added	**N/A**
Responsibility of energy costs	**Remains on landlord**
$ / suite *estimated*	**$2 – 3k**
Emissions reduction *estimated*	**95%** *of hot water heating*

ASHPs require additional storage tanks, and could require auxiliary heating

Central ASHPs with R410A refrigerant

Specific Benefits:

- Modular systems available

Specific Considerations:

- R410A refrigerant has a much higher global warming potential
- The outdoor air temperature limit is ~-10°C, auxiliary heating is often required

There are also solutions that allow in-suite domestic hot water heat pumps where space and configurations allow.

Electrifying Make-up Air

This approach involves replacing fossil-fuel heated central make-up air (MUA) ventilation with an air source heat pump.

This can often be done in conjunction with other improvements, including better control of ventilation and/or the addition of heat recovery.

Central MUA heat pump

Main Benefits:

- Strong economics as capital costs are relatively low (compared with other electrification approaches) and there are high rebates from CleanBC
- No tenant disruption
- Provides some cooling to the building

Main Challenges:

- Added equipment weight and electrical load
- Auxiliary heating may be needed in some circumstances

AC Added	**Yes** *(partial)*
Responsibility of energy costs	**Remains on landlord**
$ / suite *estimated*	**$500 – 700**
Emissions reduction *estimated*	**95%** *of outdoor air heating*

Interested in more details?

Watch the recorded webinar on LandlordBC's Youtube channel titled **"Climate change policy, regulation, and MURB retrofits – are you ready for what's coming?"** https://www.youtube.com/watch?v=HErYhVEG9D

Read the full report, available to LandlordBC members

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This summary guide was supported by:

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FRESCo Building Efficiency