



FEBRUARY 2022



Community Efficiency Financing

CITY OF POWELL RIVER
FEASIBILITY STUDY

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Executive Summary

This Community Efficiency Financing study was prepared by Ecotrust Canada for the City of Powell River. It presents an outline of the housing stock, demographics and potential for a municipal home energy retrofit program in Powell River, located on British Columbia's Sunshine Coast and with a population of around 13,000. This study considered the design, uptake and effectiveness of other retrofit programs, including municipal, provincial and federal programs in developing recommendations. Seven housing archetypes were selected as representative of the Powell River housing stock, and the energy and emission impact of a number of home energy upgrades was modelled for these homes. The potential overall impact and uptake of a retrofit program for the City was estimated, informed by these models.

In general, the housing stock in Powell River and surrounding communities is older, with two-thirds of the housing stock having been built prior to 1980. There is a high prevalence of less efficient building envelopes and heating systems. The region demonstrates a high potential for significant energy cost savings, GHG reductions, and improvements in home health and comfort resulting from increased uptake of home energy retrofits. The City, and in particular the surrounding qathet Regional District also experiences a relatively high incidence of energy poverty, the result of a combination of lower incomes and poor energy efficiency in homes.

Stakeholder outreach performed as part of this study included interviews with local contractors, energy advisors, ratepayer and neighborhood associations, and City staff. A homeowner and resident survey was conducted in October 2021, with 136 unique respondents. Powell River residents indicated a strong desire to improve the energy efficiency, health and comfort of their homes. While the largest barriers to retrofits for these residents were related to the capital cost of upgrades and a lack of local capacity for energy advisor and contractor services, some participants indicated that a targeted retrofit financing offer might help them to complete a home energy upgrade.

A number of retrofit financing options were considered as part of a holistic municipal retrofit program design, including existing and emergent models including Property Assessed Clean Energy (PACE) financing, on-bill financing, traditional loan products, and contractor driven financing. The most desirable option identified through this study was the creation of new home retrofit specific financing products that are administered by a third-party financial institution and serve to reduce some of the traditional barriers to financing access.

These options could include relaxed eligibility, favourable terms, and personalized support for homeowners, enabled by the FCM's Credit Enhancement offer for municipal lending partners. An in-person workshop was conducted in October 2021 with a local financial institution, First Credit Union, and City staff. Initial alignment around program goals and values was very strong. A retrofit program could incorporate a financing offer as part of a larger supporting ecosystem, including a single point of access for participants and personalized support through the energy assessment, contractor selection and rebate application process.

Overall, there is very strong potential for further development of a municipal home energy retrofit program in the City of Powell River. Home retrofit activity in line with BC's climate targets could result in 200 participating homes per year, representing \$277,000 in energy cost savings and 640 tonnes of GHG reductions for Powell River residents annually, in addition to supporting around 46 jobs.

In summary, we believe that a further Program Design study is warranted, and should be inclusive of the neighboring qathet Regional District and Tla'amin Nation, respecting the tight integration and interdependence of these three jurisdictions, and their geographical isolation relative to the rest of the Province.



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This project was carried out with assistance from the Green Municipal Fund, a Fund financed by the Government of Canada and administered by the Federation of Canadian Municipalities. Notwithstanding this support, the views expressed are the personal views of the authors, and the Federation of Canadian Municipalities and the Government of Canada accept no responsibility for them.

Section 1: Background and Context

About this Study

This Community Efficiency Financing Feasibility Study was completed by Ecotrust Canada for the City of Powell River. Funding for this study was provided by the Federation of Canadian Municipalities (FCM), with the intention of exploring how Powell River residents can make home energy upgrades, such as installing heat pumps or improving building insulation, with support from home retrofit financing.

Ecotrust Canada is a Canadian charity with over 25 years of experience working with rural, remote, and Indigenous communities. Our Community Energy initiative focuses on projects, policies and programs that have the potential to alleviate high energy cost burdens for BC households.

This partnership with the City of Powell River is intended to explore the potential for a community energy efficiency financing program, with core funding provided by FCM. The City of Powell River is a good candidate for a municipal energy efficiency financing program, with a high prevalence of less efficient, single family detached homes occupied by the owners, a significant energy cost burden and a large number of fixed-income households, and an engaged local credit union as a possible program partner.

This work supports the City's 2020-2022 Strategic Plan, Sustainability Charter for the Powell River Region, Integrated Community Sustainability Plan (ICSP), and Community Energy and Emissions Plan (CEEP).

The project involved engagement with people, organizations, and local governments in the City and region to explore barriers and possible solutions to increasing home retrofit activity and reducing energy consumption and carbon emissions within the City of Powell River.

The project's objectives, broadly, were to:

1. Establish baseline information on the region's housing stock and identify energy upgrade opportunities.
2. Based on available research and data, individual home energy audits in the city, and outreach to specific stakeholders, estimate the anticipated number and impact of energy upgrade projects resulting from a municipal retrofit program.
3. Explore and address issues related to home energy and barriers to upgrades that Powell River households face.
4. Assess approaches and products for financing energy efficiency upgrades, including exploring a loan program partnership with a local credit union.
5. Summarize and share findings, and explore possible next steps with stakeholders.

Powell River City Profile

The City of Powell River, located 172 kilometers north of Vancouver on BC's Upper Sunshine Coast, is a municipality of 13,865 residents. The City lies within the qathet Regional District (20,435 residents), which is also located on ʔəʔəmen (Tla'amin) Nation Territories.¹ The Tla'amin Nation is self-governed, with a Final Agreement that came into effect in 2016. The region's main exports include paper, lumber, and green energy. The region is supplied with electricity by BC Hydro and natural gas by FortisBC.

The 2021 qathet Regional Housing Needs Report highlights that over one quarter of the City of Powell River's residents are seniors, and the median age has continued to increase. Another significant trend appears to be an influx of new residents from outside the region.² Provincial population estimates released in July 2021 show a 2% increase of the city's population.³ A Housing Needs Survey was conducted among residents to inform the report. Respondents anecdotally reported a number of energy-related issues, including high heating costs, and discomfort due to lack of heating and/or insulation.



The City of Powell River, qathet Regional District, and Tla'amin Nation form a highly integrated and discrete region of BC that is only connected to the rest of the Province by two BC Ferries routes, one connecting southward to the Lower Sunshine Coast and onward to Vancouver, and one connecting to the Comox Valley on Vancouver Island. As a result, the region experiences unique challenges to its supply chain, including availability of contractors, materials and essential goods. Although the entire region is impacted by many of the same circumstances and barriers surrounding home retrofits, this feasibility-level study focuses primarily on the City of Powell River.

Figure 1: Location of Powell River, BC⁴

¹ Estimate for the year 2020. Statistics Canada. (2021). *Table 17-10-0142-01 Population estimates, July 1, by census subdivision, 2016 boundaries*. Retrieved from <https://doi.org/10.25318/1710014201-eng>

² qathet Regional District; City of Powell River; Tla'amin Nation. (2021). *qathet Regional Housing Needs Report*, p.47-50. Retrieved from https://www.qathet.ca/wp-content/uploads/2021/05/Housing-Needs-Report-Final_April-26-2021.pdf

³ Province of British Columbia. (2021). *Population Estimates: Municipal and sub-provincial areas population, 2011 to 2020*. Retrieved from <https://www2.gov.bc.ca/gov/content/data/statistics/people-population-community/population/population-estimates>

⁴ Image reproduce from: City of Powell River. (2018). *Community Profile: Powell River*, p. 3. Retrieved from <https://powellriver.civicweb.net/document/71016>

Benefits of Home Energy Retrofits

There are numerous environmental, economic, and social benefits at the individual household and community level to be gained from home energy efficiency upgrades. At the household level, successful upgrades will result in multiple benefits, such as:

- More comfortable, healthier homes and improved individual health due to factors such as:
 - Improved ventilation, reducing moisture build-up and mold issues
 - Eliminating drafts
 - Improved air quality due to filtration or removal of particulate emitting heating⁵
 - Reduced cold/hot spots from improved insulation/fenestration
- Utility cost savings and resilience to rising utility prices
- Resilience to extreme weather, incl. heat, cold, power outages
- Increased property value & building lifespan
- Household emissions reductions from lower energy use and/or electrification

As progress on home energy retrofits accelerates in a municipality or region, there can be a number of potential benefits at the community level as well.⁶ These include:

- Cleaner air
- Better public health as a result of healthier homes
- Better housing affordability due to lower utility costs
- Increased employment/business from retrofit activity
- Reduced GHGs, progress on climate goals
- Improved building stock and property tax base

Additionally, energy conservation is generally far less costly than generating additional electricity for rising demand. Given the context of the City of Powell River's housing stock and energy cost burdens, as well as its climate and community development goals, home energy retrofits present a relevant and potentially highly impactful opportunity for improvement.

⁵ For further details on health impacts, see:

Fisk, W., Lei-Gomez, Q., & Mendell, M. (2007). Meta-Analyses of the Associations of Respiratory Health Effects with Dampness and Mold in Homes. *Indoor Air*, 17(4), 284–96. <https://doi.org/10.1111/j.1600-0668.2007.00475.x>

Woodhouse, P., Khaw, K., & Plummer, M. (1993). Seasonal Variation of Blood Pressure and Its Relationship to Ambient Temperature in an Elderly Population. *Journal of Hypertension* 11(11), 1267–74. www.ncbi.nlm.nih.gov/pubmed/8301109.

Rudge, J. & Gilchrist, R. (2005). Excess Winter Morbidity among Older People at Risk of Cold Homes: A Population-Based Study in a London Borough. *Journal of Public Health* 27(4), 353–8. <https://doi.org/10.1093/pubmed/fdi051>

Regarding impacts of financial stress related to high energy burdens, see:

Kearns, A., Petticrew, M., Mason, P., & Whitley, E. (2008). *SHARP Survey Findings: Physical Health and Health Behaviour Outcomes*. Scottish Government Social Research.

<https://www.webarchive.org.uk/wayback/archive/20150220092657/http://www.gov.scot/Publications/2008/11/2010593/9/16>

⁶ The list of benefits is adapted from: Clean Air Partnership. (2020). *Accelerating home energy efficiency retrofits through local improvement charge programs: A toolkit for municipalities*, p. 33. Retrieved from

<https://www.cleanairpartnership.org/wp-content/uploads/2020/05/FINAL-LIC-TOOLKIT-Accelerating-Home-Energy-Efficiency-Retrofits-Through-LIC-Programs-2020-1.pdf>

Section 2: Policy and Program Landscape

Powell River Municipal Policy

Between 2007 and 2010, a Sustainability Charter was created in the Powell River Region by citizens, community leaders and agencies to guide action towards sustainability by the City of Powell River, the Tla'amin Nation, qathet Regional District and others. It sets out a vision, a set of principles, and a number of goals pertaining to three pillars: Society, environment, and economy. One of the goals of the environment pillar states the region's aspiration to have highly energy efficient buildings.⁷

The City of Powell River's Sustainable Official Community Plan establishes policy to "develop education and awareness programs to reduce GHG emissions and energy usage in new and existing" buildings and to "encourage on-site energy generation and efficiency systems."⁸ Its Integrated Community Sustainability Plan (ICSP) combines goals from the Sustainability Charter and Official Community Plan, and includes action items to "establish a residential solar incentive/financing program," to "provide green-building support for homeowners wishing to build/renovate," and to "initiate an efficient wood stove program."⁹

Additionally, the City also has a Community Energy and Emissions Plan, which preceded and informed parts of the ICSP, and set out home energy efficiency related actions as well. These include promoting the demand-side management programs offered by the utilities, the Province of BC and federal government, as well as identifying green economy opportunities. A 2018 report summarizes Powell River's Consumption-Based Emission Inventory and Ecological footprint in the year 2016. Buildings made up 18% or 30,000 tCO₂e GHG emissions, of which 35% was residential operating energy.¹⁰ Based on these results, improving the efficiency of buildings was highlighted as a near-term priority, and one instrument identified was to "provide incentives for smaller and more energy efficient homes, and renewable technology incentives for homes and business."¹¹

The City has declared a climate emergency and established a Climate Change Mitigation and Adaptation Committee tasked with reviewing climate-related policy and planning documents and recommending relevant actions. It has been offering municipal incentive top-ups for fuel switching to air source heat pumps, heat pump water heaters, and electric service upgrades since April 2019 to complement the provincially available rebates.

These plans and policies are evidence of building energy efficiency as an ongoing and important area of action for the City of Powell River. Related priorities and goals include supporting adequate and affordable housing, especially for seniors and others on low and/or

⁷ City of Powell River. (2009). *A sustainability charter for the Powell River region*. Retrieved from <https://powellriver.civicweb.net/document/2720>

⁸ City of Powell River. (2014). *Sustainable Official Community Plan*, p. 50. Retrieved from <https://powellriver.civicweb.net/filepro/documents/15308>

⁹ City of Powell River. (2015). *Powell River Integrated Community Sustainability Plan*, pp. 15-16. Retrieved from <https://powellriver.civicweb.net/document/32785>

¹⁰ Climate Action Powell River. (2018). *City of Powell River: EcoCity footprint summary report*, pp. 17-18. Retrieved from <https://powellriver.civicweb.net/document/75517>

¹¹ *City of Powell River: EcoCity footprint summary report*, p. 23.

fixed incomes, as well as fostering meaningful and sustainable employment opportunities. Climate change adaptation and mitigation, community health, and economic resiliency are all priorities of the City's 2021-2022 Strategic Plan. This report explores some options for integrating these environmental, social, and economic goals by pursuing retrofits, and examines strategies for advancing and scaling up the City's ongoing efforts to pursue building energy efficiency.

Historical Federal and Provincial Retrofit Programs

A number of federal and provincial programs, regulations and standards have influenced the home energy retrofit industry and provide a historical context for current offers.

BC Building Code (BCBC)

The British Columbia Building Code (BCBC) is largely based on the model codes developed by the federal government in the form of the National Building Code (NBC) and National Energy Code for Buildings (NECB). The BC Government develops, administers and enforces the BCBC in most of the province as the Authority Having Jurisdiction (AHJ), other than in on-reserve Indigenous communities and within the City of Vancouver, which has its own building code.

Major milestones in the development of the BC Building Code that are relevant to home energy efficiency include:

1994: Residential insulation requirements added.

2008: Revisions for greening the BC Building Code, including minimum water & energy efficiency requirements for Part 3 & 9 buildings. Part 10 added. Part 9 buildings: Minimum insulation or demonstrate performance at EnerGuide rating 77+ (under the older 0-100 EnerGuide scale).

2014: Revisions for energy efficiency for housing and small buildings.

2015: The Building Act comes into force, harmonizing code requirements across the province and removing municipal authority to set building codes and standards through bylaws.

2017: The BC Energy Step Code is introduced in order to provide municipalities with a tool to require or incentivize better-than-code performance for new construction. It allows for 5 "steps" of performance based on energy efficiency, and each step is in line with planned revisions of the BCBC on a 3-year cycle. The BC Energy Step Code has been adopted by approximately 50 municipalities as of 2021, including the City of Powell River.¹²

2021: The BC Government's Roadmap to 2030 climate plan signals an intention to introduce greenhouse gas (GHG) intensity metrics into future revisions of the building code in addition to

¹² Government of British Columbia Building and Safety Standards Branch. (2021, November 22). *Implementation updates*. Retrieved from Energy Step Code: https://energystepcode.ca/implementation_updates/

the energy efficiency requirements defined outlined in the Step Code, culminating in all new construction being zero emissions by 2030.¹³

ecoEnergy (2007-2012)

The previous federal home ecoEnergy retrofit program was administered by NRCan’s Office of Energy Efficiency from April 2007 to March 2012. It was similar to the current Canada Greener Homes Grant program in the types of retrofits it covered, as well as in process, requiring homeowner registration, EnerGuide evaluations of the home pre-and post-retrofit, and reimbursement after completion. According to a 2011 report to parliament, ecoEnergy program “participants reduced their annual energy consumption by about 20 percent and greenhouse gas (GHG) emissions by approximately three tonnes per house per year.”¹⁴ The below chart confirms the expectation that generally, the older the home, the higher the energy savings that were achieved by participating households. In its first four years of the five-year existence of this program, it received 510,000 applications and provided over \$700 million in grants to 500,000 recipients, which equals about \$1,400 per recipient.¹⁵

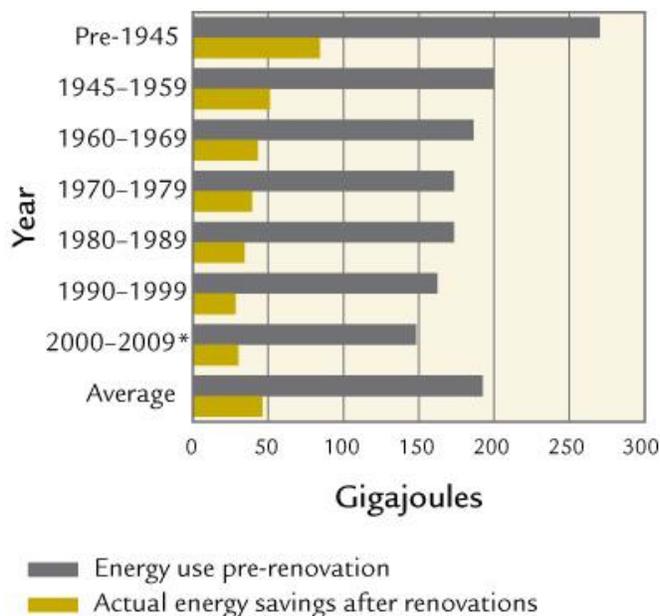


Figure 2: Energy savings by home vintage for the ecoEnergy program ¹⁶

Recent provincial retrofit program history in BC includes the LiveSmart BC Efficiency Incentive Program (2008-2014), the Energy Conservation Assistance Program (2009-present), and utility on-bill financing pilots (initiated in 2012). The Home Energy Rebate Offer (HERO) replaced

¹³ Province of British Columbia. (n.d.). *CleanBC: Roadmap to 2030*. Retrieved October 26, 2021, from <https://cleanbc.gov.bc.ca/>

¹⁴ Natural Resources Canada. (2012). *Improving energy performance in Canada: Report to parliament under the Energy Efficiency Act for the fiscal year 2010-2011*, p.36. Retrieved from Office of Energy Efficiency: <https://oee.nrcan.gc.ca/publications/statistics/parliament10-11/pdf/parliament10-11.pdf>

¹⁵ *Improving energy performance in Canada*, p. 36.

¹⁶ Figure reproduced from: *Improving energy performance in Canada*, p. 36.

LiveSmart in 2014, and Efficiency BC (from 2018) evolved into the current Clean BC Better Homes programs.

LiveSmart BC (2008-2014)

The LiveSmart BC Efficiency Incentive Program, active from 2008 to 2014, was a provincial rebate program wherein BC Hydro and Fortis BC provided up to \$3,500 in rebates, limited to air sealing, bathroom fans, and insulation retrofits. Homes heated by wood or oil were not eligible. The required certified pre-and post-retrofit home energy assessments were subsidized by BC's Ministry of Energy, Mines and Natural Gas. In its first five years, 100,000 homeowners participated.¹⁷ Significantly, rebate applications were handled by energy advisors, removing that burden from households. Participating single family homes achieved, on average, energy savings ranging from 15-28%.¹⁸

On-bill Financing Pilots (2012)

On-bill financing (OBF) pilots were launched in the City of Colwood with BC Hydro and the Regional District of Okanagan-Similkameen with Fortis BC in November of 2012. They offered \$2,000-\$10,000 loans at below market interest rates for upgrades such as insulation, air source heat pumps, solar hot water heaters, weatherization improvements, and windows and/or door replacements.¹⁹ There was no bill-neutrality requirement, meaning loan payment amounts were not prevented from exceeding energy cost savings. Only two households participated in each region and this negligible uptake has informed an avoidance of any further use of this mechanism by those utilities.

A 2015 report by the Pacific Institute for Climate Solutions identifies a number of key shortcomings that may have contributed to this lack of uptake. The OBF pilots required pre-and post-retrofit home energy assessments and the loans had unnecessarily tight underwriting criteria, both of which presented major barriers to participation. They also failed to use retrofit contractors for program promotion, or for completion of applications. Additionally, the utilities who were the public face of the program may not have been seen as trustworthy loan providers. This is unfortunate, as on-bill financing has the most flexible eligibility criteria (utility bill payment history), a strong enforcement mechanism (service disconnection), and a simplified process for the customer (on-bill repayment, bill neutrality) compared to other financing models.²⁰

Home Energy Retrofit Offer (HERO)

LiveSmart BC was replaced by the Home Energy Rebate Offer (HERO) in 2014, led by BC Hydro and FortisBC. It differed from LiveSmart BC in a few ways. In addition to draft proofing, bathroom fans, and insulation; air source heat pumps (for those heating with electricity only) and high-efficiency natural gas water heaters were added as eligible upgrades. Pre-and post-retrofit

¹⁷ Province of British Columbia. (2013, April 11). *LiveSmart BC program extended for one year*. Retrieved from BC Gov News: <https://news.gov.bc.ca/releases/2013EMNG0069-000810>

¹⁸ City of Colwood. (n.d.). *The Solar Colwood Story*, p. 15. Retrieved May 31, 2021, from

<https://www.colwood.ca/sites/default/files/solarcolwood/Solar%20Colwood%20EN%20Outreach%20Report.pdf>

¹⁹ Pacific Institute for Climate Solutions. (2015). *Cheaper power bills, more jobs, less CO2: How on-bill financing done right can be a quick win for British Columbia*, p. 11. Retrieved from

<https://pics.uvic.ca/sites/default/files/uploads/publications/On-Bill%20Financing%20FINAL.pdf>

²⁰ Ecotrust Canada. (2020). *Moving toward energy security in British Columbia's rural, remote and Indigenous communities: Policy options and research areas*, p. 32. Retrieved from <https://ecotrust.ca/latest/research/moving-toward-energy-security-in-bcs-rural-remote-and-indigenous-communities-2020/>

evaluations were no longer required, except to receive the draft proofing rebate or the bonus amount for completing a specific combination of three upgrades. The responsibility for rebate applications was moved back to the household. The program provided application forms for both utility customers and building owners in an effort to reach both homeowners and renters, though it is unclear whether uptake from rental units increased as a result.

While those using heating oil or wood heating (and also propane in the case of HERO) were excluded from LiveSmart and HERO, FortisBC offered the Switch 'n Shrink program for oil/propane to natural gas conversion, and the Province of BC offered an oil to heat pump conversion program.

Efficiency BC (2018-2019)

Efficiency BC established the first central website for all rebates available in BC, and was quickly succeeded by the current CleanBC Better Homes/Better Buildings websites, with an expanded focus on shifting from fossil fuels to electricity. Energy coaches, resources, and contractor and energy advisor directories became available on this site.

Current Federal and Provincial Retrofit Programs

The current landscape of incentive, rebate and financing programs for home energy efficiency likely represents a high-water mark to date in terms of the diversity and amount of funding that is available. There are currently active energy efficiency programs being administered by both the federal and provincial governments, as well as by a large number of BC municipalities.

CleanBC / Better Homes BC / HERO (2018-present)

CleanBC is the Province's plan for accomplishing its legislated GHG reduction goals and building a green economy. The buildings-related part of the plan includes aims to make all new building construction net-zero energy ready by 2032 and zero emissions by 2030, and to support home energy retrofits to make buildings more energy-efficient. It aims to do so by providing rebates via the Better Homes BC program for residential projects, and the Better Buildings BC program for commercial projects as summarized in the figure below.

| | | |
|--|--------------|---|
| Better Homes - Residential Varying offers from: <ul style="list-style-type: none"> • Province of BC • BC Hydro • Fortis BC | Renovating | <ul style="list-style-type: none"> • Retrofit & energy assessment rebates • Heat pump group purchase rebates • Income-qualified programs • Programs for Indigenous communities • Heat pump loans |
| | Building New | <ul style="list-style-type: none"> • Energy Step Code & heat pump rebates |
| | Both | <ul style="list-style-type: none"> • Municipal rebates & programs • Mortgage insurance & tax refunds |
| Better Buildings - Commercial Varying offers from: <ul style="list-style-type: none"> • Province of BC • BC Hydro • Fortis BC • BC Housing | Renovating | <ul style="list-style-type: none"> • Retrofit rebates |
| | Building New | <ul style="list-style-type: none"> • Efficiency measure rebates |
| | Both | <ul style="list-style-type: none"> • Custom Programs • Whole Building Efficiency • Energy Efficiency Guidance • Social / Non-Profit and Rental Housing programs |

The Better Homes BC and Better Buildings BC websites provide information on accessing these rebates, guides, online events, retrofit contractor and energy advisor directories, and access to Energy Coaches (available in eight additional languages) to help navigate the program.²¹ It also offers resources for contractors, community organizations, and Indigenous communities, and coaches specifically for the latter two groups. The current Better Homes programs streamlines access to utility incentives as well, which sometimes retain the “Home Energy Rebate Offer” (HERO) branding.

The Better Homes program’s combination of Clean BC (BC Ministry of Energy, Mines and Low Carbon Innovation), Fortis BC, and BC Hydro-sponsored incentives provides the broadest array of rebates in recent history. It includes heating (heat pumps, furnaces, fireplaces, and wood stoves), hot water (air-to-water heat pumps, heat pump and natural gas water heaters), window and door replacements, draft proofing, insulation, appliances, and home energy evaluations eligible.

It also offers heat pump group purchase rebates and bonuses for improving overall home energy efficiency or installing two or more upgrades. Specific offers are also available to

²¹ See: <https://betterhomesbc.ca/> and <https://betterbuildingsbc.ca/>

Indigenous Communities: The CleanBC Indigenous Community Heat Pump Incentive covers 80% of heat pump costs up to a maximum of \$12,000, and the Indigenous Communities Conservation Program provides trades training and efficiency upgrade support for Bands.

The following chart from Better Homes BC lists the rebates currently available.²² This gives a sense of the variety of options depending on which utility a customer is serviced by and the complexity that poses significant barrier to participation as will be further discussed below.

²² Figure reproduced from: CleanBC Better Homes. (2021, October). *Home Heating Rebates*. Retrieved from CleanBC Better Homes: <https://betterhomesbc.ca/better-homes-bc-rebate-chart/>



HOME HEATING REBATES

HAVE QUESTIONS? Get in touch with an Energy Coach at 1 844 881-9790

| UPGRADE CATEGORY | UPGRADE TYPE | TECHNICAL DETAILS | SPONSOR | REBATE |
|--|--|--|---|---|
| SWITCH FROM NATURAL GAS, PROPANE OR OIL TO ELECTRICITY | MINI-SPLIT HEAT PUMP | HIGHEST EFFICIENCY VARIABLE SPEED HSPF≥10.00, SEER≥16 | cleanBC BC Hydro Power smart | \$6,000 & up to \$2,000* BC Hydro electric territory |
| | | | cleanBC | \$3,000 & up to \$2,000* FortisBC electric territory |
| | MULTI-SPLIT HEAT PUMP | HIGHEST EFFICIENCY VARIABLE SPEED HSPF≥9.30, SEER≥16 | cleanBC BC Hydro Power smart | \$6,000 & up to \$2,000* BC Hydro electric territory |
| | | | cleanBC | \$3,000 & up to \$2,000* FortisBC electric territory |
| | CENTRAL DUCTED "TIER 2" HEAT PUMP | HIGHEST EFFICIENCY VARIABLE SPEED HSPF≥9.30, SEER≥16 | cleanBC BC Hydro Power smart | \$6,000 & up to \$2,000* BC Hydro electric territory |
| | | | cleanBC | \$3,000 & up to \$2,000* FortisBC electric territory |
| | DUAL FUEL DUCTED HEAT PUMP | HIGH EFFICIENCY HSPF≥9.30, SEER≥16 | cleanBC | \$3,000 & up to \$2,000* |
| | AIR-TO-WATER HYDRONICS HEAT PUMP SYSTEM | MUST BE ON THE QUALIFIED PRODUCT LIST | cleanBC | \$3,000 & up to \$2,000* |
| COMBINED SPACE AND HOT WATER HEAT PUMP | MUST BE ON THE QUALIFIED PRODUCT LIST | cleanBC | \$1,000 - \$4,300 & up to \$2,000* | |
| ELECTRICAL SERVICE UPGRADE WHEN FUEL SWITCHING | UPGRADE TO 100, 200, OR 400 AMP SERVICE | cleanBC | \$500 & up to \$500* | |
| UPGRADE YOUR ELECTRIC OR WOOD HEATING | MINI-SPLIT HEAT PUMP | HIGHEST EFFICIENCY VARIABLE SPEED HSPF≥10.00, SEER≥16 | BC Hydro Power smart | \$1,000 |
| | MULTI-SPLIT HEAT PUMP | HIGHEST EFFICIENCY VARIABLE SPEED HSPF≥9.30, SEER≥16 | BC Hydro Power smart | \$1,000 |
| | CENTRAL DUCTED "TIER 2" HEAT PUMP | HIGHEST EFFICIENCY VARIABLE SPEED HSPF≥9.30, SEER≥16 | BC Hydro Power smart | \$2,000 |
| | MINI-SPLIT HEAT PUMP | HIGHEST EFFICIENCY VARIABLE SPEED HSPF≥10.00, SEER≥16 | FORTISBC Energy at work ELECTRIC SERVICE AREA | \$1,200 |
| | MULTI-SPLIT HEAT PUMP | HIGHEST EFFICIENCY VARIABLE SPEED HSPF≥9.30, SEER≥16 | FORTISBC Energy at work ELECTRIC SERVICE AREA | \$2,000 |
| | CENTRAL DUCTED "TIER 2" HEAT PUMP | HIGHEST EFFICIENCY VARIABLE SPEED HSPF≥9.30, SEER≥16 | FORTISBC Energy at work ELECTRIC SERVICE AREA | \$2,000 |
| | CENTRAL DUCTED "TIER 1" HEAT PUMP | HIGHEST EFFICIENCY HSPF≥8.50, SEER≥15 | FORTISBC Energy at work ELECTRIC SERVICE AREA | \$1,200 |
| UPGRADE YOUR NATURAL GAS HEATING | NATURAL GAS FURNACE | HIGH EFFICIENCY ≥97% AFUE | | \$1,000 |
| | NATURAL GAS FURNACE | HIGH EFFICIENCY 95-96.9% AFUE | FORTISBC Energy at work | \$800 |
| | NATURAL GAS BOILER | HIGH EFFICIENCY ≥94% AFUE | | \$1,000 |
| | NATURAL GAS COMBINATION HEATING AND HOT WATER SYSTEM | ENERGY STAR OR P9 CERTIFIED | | \$1,500 |



HOME UPGRADE REBATES

HAVE QUESTIONS? Get in touch with an Energy Coach at 1 844 881-9790

| UPGRADE CATEGORY | UPGRADE TYPE | TECHNICAL DETAILS | SPONSOR | REBATE |
|-------------------------|---|---|---|--|
| WATER HEATING | NATURAL GAS STORAGE TANK WATER HEATER | EFFICIENT (0.67 EF) | FORTIS BC Energy of west | \$200 |
| | NATURAL GAS TANKLESS (ON-DEMAND) WATER HEATER | HIGH EFFICIENCY CONDENSING | FORTIS BC Energy of west | \$1,000 |
| | NATURAL GAS STORAGE TANK WATER HEATER | HIGHEST EFFICIENCY | cleanBC | \$1,000 |
| | ELECTRIC HEAT PUMP WATER HEATER | | BC Hydro Power smart | \$1,000 |
| WINDOWS AND DOORS | TIER 2 PRODUCT | U-FACTOR OF ≤ 1.22 W/M ² -K | cleanBC BC Hydro Power smart FORTIS BC Energy of west | \$100 each Maximum 20 (\$2,000) |
| | TIER 1 PRODUCT (Doors not eligible) | U-FACTOR OF 1.23 – 1.40 W/M ² -K | FORTIS BC Energy of west | \$50 Each** Maximum 20 (\$1,000) |
| INSULATION | ATTIC | \$0.02 X R-VALUE X SQUARE FEET (MINIMUM R12) | cleanBC BC Hydro Power smart FORTIS BC Energy of west | Max \$900 |
| | BASEMENT/CRAWL SPACE | \$0.09 X R-VALUE X SQUARE FEET (MINIMUM R10) | cleanBC BC Hydro Power smart FORTIS BC Energy of west | Max \$1,200 |
| | EXTERIOR WALL CAVITY | \$0.09 X R-VALUE X SQUARE FEET (MINIMUM R12) | cleanBC BC Hydro Power smart FORTIS BC Energy of west | Max \$1,200 |
| | EXTERIOR WALL SHEATHING | \$0.09 X R-VALUE X SQUARE FEET (MINIMUM R3.8) | cleanBC BC Hydro Power smart FORTIS BC Energy of west | Max \$1,200 |
| | OTHER | \$0.07 X R-VALUE X SQUARE FEET (MINIMUM R20) | cleanBC BC Hydro Power smart FORTIS BC Energy of west | Max \$1,000 |
| SECONDARY SPACE HEATING | NATURAL GAS FIREPLACE REPLACEMENT | ENERCHOICE® FIREPLACE | FORTIS BC Energy of west | \$300 |
| APPLIANCES | REFRIGERATOR, WASHER OR DRYER | ENERGYSTAR® | BC Hydro Power smart FORTIS BC Energy of west | up to \$100 Each*** |
| BONUS OFFERS | TWO UPGRADE BONUS: <i>Install any two eligible upgrades within 18 months</i> | | cleanBC BC Hydro Power smart FORTIS BC Energy of west | \$300 |
| | HOME ENERGY IMPROVEMENT BONUS: <i>Complete a pre- and post-upgrade EnerGuide home evaluation and install any three eligible upgrades, both within 18 months</i> | | FORTIS BC Energy of west | Max \$2,000 |
| ENERGUIDE | PRE-UPGRADE ENERGUIDE HOME EVALUATION REBATE <i>Complete a pre-upgrade EnerGuide home evaluation</i> | | cleanBC | \$200 |
| | POST-UPGRADE ENERGUIDE HOME EVALUATION REBATE <i>Complete a post-upgrade EnerGuide home evaluation within 18 months of the pre-upgrade</i> | | cleanBC | \$100 |

* Many local governments in BC are offering limited time municipal top-up rebates. See if your municipality is participating online at BetterHomesBC.ca
 ** City of Vancouver residences are only eligible for tier 2 rebates.
 *** Appliance rebates are seasonal – Please check your utility's website for current offers.
 Maximum one home heating rebate per home.

Figure 3: CleanBC Funded Incentives

All told, the CleanBC Better Homes and Better Buildings program delivered 11,578 rebates in FY 2020-2021²³, an increase of 74% from the previous fiscal year but still far below the estimated 30,000 home retrofits needed per year province-wide in order to meet BC's 2050 climate targets.²⁴

CleanBC's partnership with lender Financeit offers homeowners up to \$40,000 in 0% interest five-year loans for heat pumps. However, accessing households must choose between accessing this financing or the above rebates. Having to forego the rebates may make this financing offer unattractive. Additionally, the requirement that participants have 12 months' continuous utility billing, and the requirement to submit a paid upgrade invoice as part of the loan application introduces two significant accessibility barriers. The latter stipulation relies on the household having the means to finance the upgrade until they receive the loan, or possibly indefinitely if for any reason the application is rejected.²⁵

The Province of BC is now also offering a direct incentive program for low- and moderate-income households, with rebates offered on a midstream basis (to contractors) in order to minimize the cost that is taken on by residents. This program, currently being piloted outside of the qathet region, aims to offer coverage of up to 95% low-income households (up to 60% for moderate-income households) for retrofit actions like heat pumps and insulation upgrades. It should be available province-wide sometime in 2022.

Other income-qualified programs available include BC Hydro's Energy Savings Kits, the Energy Conservation Assistance Program (ECAP), and additional FortisBC furnace, boiler and natural gas water heater rebates.²⁶ Energy Savings Kits are distributed free of charge to income-qualified households by the utilities (BC Hydro, Fortis BC, Pacific Northern Gas and municipal utilities), and items such as water-efficient showerheads, faucet aerators, weather-stripping, window film, and LED light bulbs.

Energy Conservation Assistance Program (2008-present)

The Energy Conservation Assistance Program was introduced by BC Hydro in 2008 and has been offering free home energy evaluations and a number of free energy-saving products and retrofits for low-income households, with some participants receiving more comprehensive home insulation or high-efficiency refrigerators or gas furnaces as well. Renters are able to participate with their landlord's consent. Ecotrust Canada's 2020 assessment of the program found low uptake, with the estimated 17,000 participants equaling only 6% of BC households experiencing energy poverty.²⁷ Further, the largely low-impact retrofit measures have led to only modest efficiency improvements and cost savings, which "have not meaningfully offset increases in the cost of electricity overall."²⁸

²³ Province of British Columbia. (2021). *Climate change accountability report: Supporting material*, p. 12. Retrieved from CleanBC: https://www2.gov.bc.ca/assets/gov/environment/climate-change/action/cleanbc/2021_accountability_report_supporting_materials.pdf

²⁴ Pembina Institute. (2018). *B.C. needs a low-carbon buildings strategy*. Retrieved from <https://www.pembina.org/pub/retrofitbc-infographic>

²⁵ See: <https://www.financeit.io/cleanbc/>

²⁶ Income qualification is based on pre-tax household income amount and number of adults in the household: <https://www.bchydro.com/powersmart/residential/savings-and-rebates/savings-based-on-income.html>

²⁷ Moving toward energy security in British Columbia's rural, remote and Indigenous communities, p. 18.

²⁸ Moving toward energy security in British Columbia's rural, remote and Indigenous communities, p. 19.

Canada Greener Homes Grant (2021-present)

The federal Canada Greener Homes Grant offered by Natural Resources Canada offers up to \$5,000 total for the implementation of eligible retrofits, as well as up to \$600 for the cost of pre- and post-retrofit EnerGuide evaluations that are required to receive the retrofit rebates.

Homeowners, Indigenous governments and organizations, as well as housing management bodies are eligible to apply. Eligible retrofits include insulation, air-sealing, windows and doors, thermostats, space and water heating, solar panels, and resiliency measures if combined with energy efficiency measures.

Currently available rebates (used for payback period/financial analysis) as of February 2022:

- Fossil fuel to heat pump: \$3000 (CleanBC) + \$3000 (BC Hydro) + \$2500-\$4000 (Greener Homes)
- Electric to heat pump: \$2000 (BC Hydro) + \$2500-\$4000 (Greener Homes)
- Insulation: ~\$2000 maximum for attic and basement insulation + \$1200 for exterior walls (CleanBC), \$600-1800 for attics, \$700-\$5000 for exterior walls, \$1050-\$1500 for basements (Greener Homes)
- Windows and doors: \$50-\$100 per unit to a \$2000 maximum (CleanBC), \$125-250 per unit to a maximum of \$5000 (Greener Homes)
- Air sealing: variable amount from Greener Homes (\$550-1000 if modelling target met)

Note that Greener Homes has a combined maximum rebate of \$5000 for the entire home. The federal Greener Homes rebates can be used in combination with BC's Better Homes rebates, as well various available municipal rebate top-ups.

Greener Homes Retrofit Loans

As part of the Government of Canada's announcement of the Greener Homes Grant, the Canadian Mortgage and Housing Corporation (CMHC) plans to offer zero interest loans to homeowners of up to \$40,000 for energy efficiency improvements, in concert with rebates offered through the program. Further details have not yet been announced.

Depending on the terms, accessibility and timeline for the federal zero-interest loan program, this could present a significantly more attractive lending proposition for homeowners, compared to any realistic third-party or municipal financing avenue offer. Therefore, it is important that program design for a municipal retrofit financing offer in Powell River consider the broader ecosystem of homeowner support – from EnerGuide evaluations, to contractor and rebate support, to homeowner education and outreach. A program designed as a standalone financing offer may find itself at a significant disadvantage when competing with a zero-interest loan.

CMHC's Green Home Program currently also provides a 10% refund on Mortgage Loan Insurance premiums for those who buy an energy-efficient home or make energy-saving renovations.

Municipal Retrofit Programs – Historical & Current

While the federal and provincial programs have offered varying levels of retrofit support in the past, and currently provide significant rebates, uptake may nevertheless be hampered by a variety of locally-specific barriers. For this reason, municipal home energy efficiency programs have played an important role in advancing retrofits in a locally relevant manner, filling gaps left by larger scale programs, and in some cases also offering financing to help households cover the difference between available rebates and total upgrade costs. A combination of literature review and informal interviews was employed to study these programs and glean relevant learnings. Full program descriptions for the BC programs mentioned below, as well as examples from other provinces and the United States can be found in [Appendix A](#).

BC has seen a number of municipal and regional district-led home energy efficiency programs over the past decade. Often, these local programs aimed to facilitate uptake of provincial or federal rebate programs, and in some cases also added or expanded supports for specific local priority measures. Past local campaigns that collected data on the number of post-retrofit energy evaluations completed saw an increase of 2-16 times over the rest of the province.²⁹

Solar Colwood's program (2011-2015) is noteworthy as one of the most comprehensive past programs in BC, involving numerous cross-sectoral partnerships and training Indigenous solar installers. 500 participants accomplished over 1,000 actions over four years and achieved an average 37% reduction in energy consumption and a 43% average reduction in GHGs. An estimated economic benefit of \$4.4 million accrued to the city and residents. Notably, Solar Colwood's rebate model was based on a midstream approach, wherein the incentives were provided to installers directly once installations were complete.

Also starting in 2011, several programs called Energy Diets were launched in the southern interior of BC. These offered free or reduced cost energy assessments, free utility-supplied efficiency products, substantial public awareness and promotion campaigns including outreach events, and in some communities on-bill or credit union financing as well. The first of these, the Rossland Energy Diet, achieved an impressive uptake of 22% of the single-family homes and 100% of small businesses in Rossland.³⁰ Support provided by Fortis BC, BC Hydro, or local utilities in the form of funding, marketing, or provision of free products and services has been a feature of a number of local programs, including the Energy Diets.

Two of the municipal programs that have been operating for a decade - Nelson EcoSave and Penticton HELP - have their own local utility and have used this to offer on-bill financing. In the case of Nelson, credit unions are also offering third-party financing on equivalent terms outside of Nelson Hydro service boundaries. Nelson's one-stop-shop support program has had over 1000 participants, with 140 accessing on-bill financing. Nelson partnered with an EnerGuide Service Organization to make EnerGuide evaluations more accessible, and households receive

²⁹ Community Energy Association. (2014). *Home energy retrofit incentive campaigns analysis report*, p. 53. Retrieved from https://www.communityenergy.ca/wp-content/uploads/2020/10/14_11_03_HomeEnergyEfficiencyRetrofitIncentiveCampaignAnalysisReport-FINAL-CEA.pdf

³⁰ Kassirer, J. (2014). *Rossland Energy Diet*. Retrieved from Tools of Change: <https://toolsofchange.com/en/case-studies/detail/683/>

individual guidance through the retrofit process, which can range from 30 minutes to five or more hours in total.

Other ongoing notable programs include the Capital Regional District's "Bring it Home for the Climate" program (offering many resources as well as virtual home energy checkups), Renovate Smart Kamloops (using workshops as a tool to educate participants and reduce 1:1 guidance needed), and the Thompson-Nicola Regional Library's "See the Heat" program (lending thermal imaging cameras to help households inspect their home's insulation). Two more programs to watch include the EnergySave program in New Westminster and Central Saanich's recently launched PACE pilot. The former stands out for targeting harder-to-reach groups including MURB households (incl. renters & stratas) and those facing language and related equity barriers, while the latter is trialing municipal financing for oil-to-heat pump retrofits.

Nearly all programs, past and present, offer informational resources for residents, usually on a website, with links to provincial rebates, and descriptions of types of retrofits or technologies. In some cases, there are also online registration forms, local success stories, or even pre-vetted local contractor lists.

Many programs put effort into marketing and raising awareness, though in some cases this drops off after launch. Other programs chose not to engage in promotion, often to avoid oversubscription of a very limited number of incentives or available services. Awareness and learning events for interested participants are a common feature, though in some cases these are more geared towards initial program promotion, while other programs use them on a more ongoing basis to disseminate specific information, such as how heat pumps work.

With regards to financial incentives and financing, there is a wide range of offers. In the past, some programs have offered financial incentives for EnerGuide evaluations, while many currently offer municipal top-ups of CleanBC Better Homes rebates. Many programs do not include a financing component, but those that do vary significantly. Some partner with credit unions to provide loans, while others offer on-bill financing via a utility. Apart from the Central Saanich PACE pilot, municipal PACE-type financing is only found among programs outside of BC. Generally, programs that focus only on financing to the exclusion of other supports and activities have not been very successful.

Some programs, especially the more comprehensive ones, also aim to fulfill other objectives, such as local skill development and job creation, supports and capacity development for contractors, creation of networks or new relationships, or targeting of specific measures or segments of the population. What generally holds true is that some level of individual guidance seems to increase the rate of completion of retrofits. Further, the best program is one that effectively responds to local barriers, priorities, and context.

The table below provides a variety of examples of local programs, highlighting relevant features and learnings. Some of the example programs outlined are still ongoing, others are not, and some only started recently. Programs are grouped by geographic scale (municipal vs. regional) and whether or not they offer financing.

Municipal Program Summary

| Program | EnerGuide incentive | Financing | Education/Awareness | Notable features | Learnings |
|--------------------------------------|-------------------------------------|-----------|---|---|---|
| Municipal programs without financing | | | | | |
| Power Down Campbell River | Yes, initially free, now discounted | None | Reality TV-style competition in initial phase Social media, print ads, short videos, and news releases | Currently mainly offers rebate top-ups | Use & pay single EA for audits instead of issuing individual rebates Plan for multi-year campaign |
| EnergySave New Westminster | Yes | None | Website w/ resources Pre-approved contractor list 1:1 guidance Events & Workshops | Online registration Two designated EA orgs. complete audits Multilingual support via Empower Me Rental MURB program in partnership with FortisBC Strata pilot in design stage | 1:1 support ranges 30mins to 3+ hrs |
| Renovate Smart Kamloops | No, but free energy coaching | None | 1:1 guidance Workshops "Community-based social marketing" ³⁹ See the Heat thermal camera loan program | Free renovation consultation Carbon accounting workshops Connection to thermal imaging camera borrowing program | Focused language on "renovations" rather than retrofits for increased accessibility Greater logistical support likely would encourage more retrofits Having people participate in workshops first reduces 1:1 time needed |

| Program | EnerGuide incentive | Financing | Education/Awareness | Notable features | Learnings |
|-----------------------------------|---------------------|-----------|---|--|--|
| Invermere | No | None | | Visitable residential accessibility rebates | |
| City of Terrace | Yes, discounted | None | Low cost, via local online and print channels; radio ads subsidized by BC Hydro | Designated EA org. completed audits | Increased real estate sales are ideal timing for retrofit campaign |
| Vancouver Heritage Foundation | Yes, discounted | None | | Heritage home specific incentives | |
| Municipal programs with financing | | | | | |
| City of Penticton | Yes, discounted | On-bill | Initially part of Okanagan Energy Diet which involved extensive promotion; now effectively none | Municipal OBF program Designated EA org. completes audits Includes any measures that reduce energy use | \$63,000 interest revenue, \$29,000 admin cost excl. wages Promotion would likely increase uptake |
| Central Saanich PACE Pilot | No | PACE | Webinars | Oil to heat pump switches only PACE pilot despite lack of provincial legislation 3 rd party admin; Contractors engaged pre-launch | (Only launched in Fall 2021) |

| Program | EnerGuide incentive | Financing | Education/Awareness | Notable features | Learnings |
|---|------------------------------|---------------------|--|---|---|
| Rossland Energy Diet | Yes, free | Credit union | Comprehensive campaign Social marketing EA connection Info sessions 1:1 guidance | Very high uptake | Very high uptake Strong local buy-in was key Part-time ambassador |
| Solar Colwood | Yes | Formerly (CU loans) | Comprehensive community campaign | Extensive partnerships; Skill & job development; Mid-stream rebates to installers Contracted out program operation | Financing not sufficient on its own, and midstream incentives reduced need |
| City of Vancouver HELP | No | Yes, CU loans | Workplace presentations Brochures | Marketed by Vancity – loan aspect emphasized over energy efficiency | Local marketing significantly increased uptake, also supported by provincial rebate marketing |
| Regional programs without financing | | | | | |
| Capital Regional District Bring it Home 4 the Climate | No, but free virtual checkup | None | Website & Facebook page Extensive resources Workshops (carbon accounting, energy performance) Success stories | One-stop shop: Online registration Free virtual home energy check-ups Group rebate support | (Launched Aug. 2020) |
| Comox Valley Regional District | No | None | | Rebate top-ups Extensive contractor engagement and network building | |

| Program | EnerGuide incentive | Financing | Education/Awareness | Notable features | Learnings |
|----------------------------------|---------------------|----------------------|---|--|---|
| Regional District of Nanaimo | No | None | Variety of learning events Connecting to prov./fed. rebates | Rebate top-ups Funded by building inspection permit fees | \$350 local top-ups not financially significant but helpful engagement tool |
| Cool North Shore | No | None | Neighbourhood leaders Free thermal imaging Free caulking & outlet insulation Promotion of LiveSmartBC incentives | Grassroots, citizen-led campaign coordinated by Cool North Shore Society | |
| Jump on a new heat pump | No | None | | Group rebate support for heat pump installations | |
| Regional programs with financing | | | | | |
| Kootenay Energy Diet | Yes, discounted | Yes, 5 credit unions | Substantial promotional campaign | Partnerships: 13 municipalities, 2 RDs, 1 nonprofit, 5 local CUs | Campaign ideally 6-mo min. Test messaging Deadlines help move people to action Involve contractors early |

| Program | EnerGuide incentive | Financing | Education/Awareness | Notable features | Learnings |
|-------------------------|---------------------|---------------------------------------|--|--|--|
| Okanagan Energy Diet | Yes, discounted | Penticton utility OBF, Fortis OBF | Substantial promotional campaign | Partnerships: 11 municipalities, 1 RD, FortisBC | Local paper articles and ads generated high registrations Word-of-mouth & face-to-face marketing effective but labour-intensive |
| Nelson EcoSave | Formerly | OBF by Nelson Hydro; CUs outside city | Website w/ resources 1:1 guidance See the Heat thermal camera loan program | Online registration Designated EA org. completes audits | 1 in 5 participants complete upgrades 1:1 support ranges 30mins to 5+hours |
| Clean Energy Works PAYS | No | On-bill tariff | Depends on local utility. This framework has been adopted by many utilities across the United States | Inclusive of renters No credit or income qualification required Net savings guaranteed Tied to location (meter), not person | Addressing major barriers (home ownership, debt eligibility) with tariff model results in large uptake increases |
| OPALCO Switch It Up | No | OBF | Website with savings & impact calculator | Option to combine with upgrade to high-speed fiber internet | Streamlined, paperless process allows for <1 hour admin time per household |

Acronyms:

CU = Credit Union

EA = Energy Advisor

OBF = On-bill (Utility) Financing

PACE = Property Assessed Clean Energy (Municipal Financing)

PT = Part-time

RD = Regional District

Section 3: Demographics and Housing Stock

Resident Profile

Household Income and Energy Costs

With regards to the City of Powell River’s demographics, the median age of 52 is 9 years above the provincial average. 5% of City residents identify as Indigenous. The median after-tax household income in the city is \$56,525 (compared to the BC-wide average of \$69,995), with a 17% prevalence of low-income households based on the low-income measure (LIM).³¹

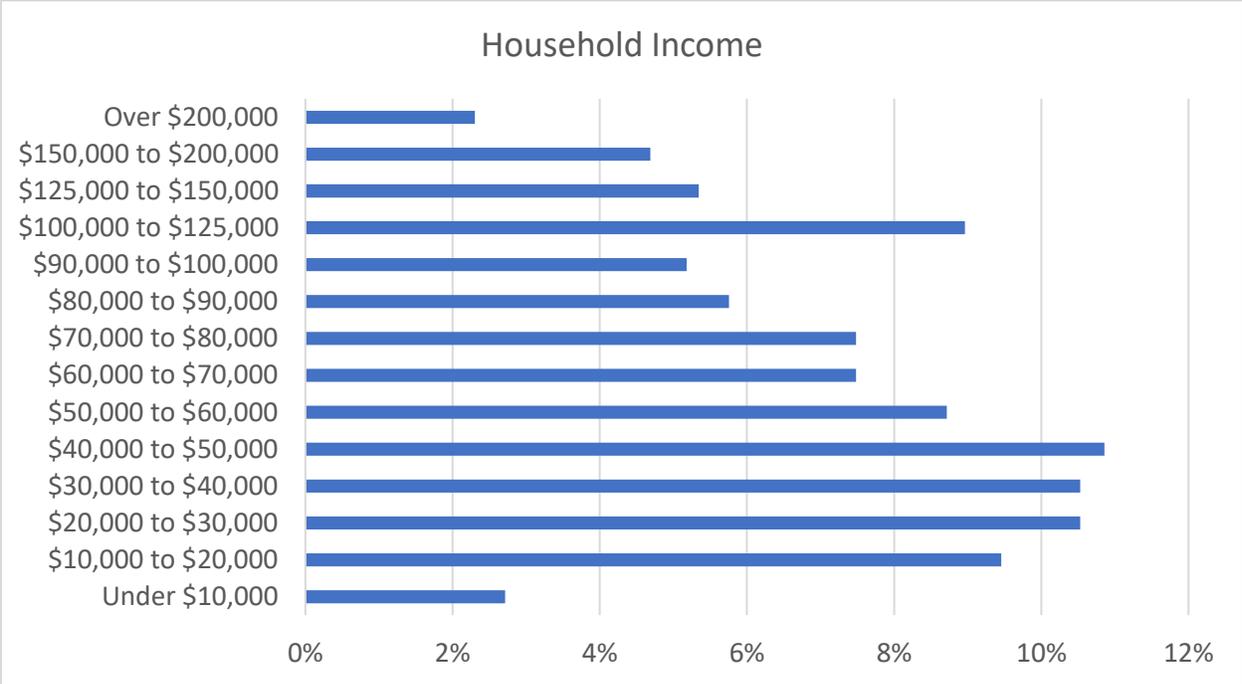


Figure 4: Combined household income in Powell River

Specific to energy costs, Statistics Canada data indicates that the median home energy expenditure in Powell River is approximately **\$1800/year**, which is comparable to the BC average and slightly below the Canadian average of \$2139/year.³²

The energy expenditures experienced by Powell River residents are driven upwards by the prevalence of larger detached homes in the region, but are largely offset by the mild coastal

³¹ Statistics Canada. (2017, November 29). [Powell River, CY, British Columbia: Census profile, 2016 census](#). Retrieved from Statistics Canada catalogue no. 98-316-X2016001.

³² Natural Resources Canada. (2019). *Energy fact book 2019-2020*. Retrieved from https://www.nrcan.gc.ca/sites/www.nrcan.gc.ca/files/energy/pdf/Energy%20Fact%20Book_2019_2020_web-resolution.pdf

climate experienced in the region, with the historical average of 3750 heating degree-days representing some of the lowest heating energy requirements in Canada.³³

Energy poverty in the City of Powell River and qathet Regional District

Energy poverty is the experience of households that struggle to meet their home energy needs including thermal comfort, lighting, water heating, and cooking.³⁴ Canadian households in energy poverty are considered to be those households spending more than 6% of their after-tax income on home energy bills; this energy cost burden threshold represents twice the national median, a commonly used threshold for defining quantitative measures of energy poverty.

Specific to BC, approximately 15%, or 272,000 households experience energy poverty. BC households in energy poverty have income levels 56% below the provincial average, but also have home energy costs that are 50% higher, spending on average \$830 more per year. One quarter of households in energy poverty earn more than \$40,000 per year after-tax and would not fall within the usual definitions of low-income or qualify for any income-qualified energy efficiency program support. Energy poverty rates are also higher among those traditionally marginalized – Indigenous, racialized, recent immigrant, and lone parent households.³⁵ Nearly 18,000, or 6.6% of households in energy poverty in BC are Indigenous households.

Some BC households face disproportionately high energy bills due to remoteness, housing quality, high energy costs, and lack of funds or ability to improve home energy performance.³⁶ Many of these are exacerbated by underlying societal inequities such as race, ethnicity, citizenship, age, ability, and fluency with the dominant language and social norms.³⁷ Energy poverty may be experienced by renters and homeowners alike as both may experience challenges in paying their home energy bills.

Mould, inadequate heating and cooling, and poor air quality in homes experiencing energy poverty can have serious health impacts including increased incidence of asthma,³⁸ mental illness³⁹ and cardiovascular disease.⁴⁰ Factors such as dwelling size, age, efficiency, and proximity to the electrical and natural gas networks can cause a moderate-income household to

³³ Prairie Climate Centre. (2019, July 10). *Climate atlas of Canada*. Retrieved from

https://climateatlas.ca/map/canada/hdd_baseline#lat=49.81&lng=-125.39&z=9&grid=956

³⁴ Ecotrust Canada. (2020). *Rethinking energy bill protections in British Columbia: Jurisdictional scan and best practices*. Retrieved from <https://ecotrust.ca/latest/research/rethinking-energy-bill-protections-in-british-columbia-2020/>

³⁵ CUSP. (2019). *Equity Implications of Energy Poverty in Canada*, p.2. Retrieved from https://cuspnetwork.ca/wp-content/uploads/2020/05/Equity_Energy_Poverty_EN_Nov19.pdf

³⁶ *Equity Implications of Energy Poverty in Canada*.

³⁷ The Cadmus Group. (2018). *A guidebook on equitable clean energy program design for local governments and partners*. Retrieved from <https://cadmusgroup.com/wp-content/uploads/2018/09/Cadmus-USDN-Equitable-Clean-Energy-Guidebook.pdf>

³⁸ Caillaud, D., Leynaert, B., Keirsbulck, M., & Nadif, R. (2018). Indoor mould exposure, asthma and rhinitis: Findings from systematic reviews and recent longitudinal studies. *European Respiratory Review*, 27(148), 170137. doi:10.1183/16000617.0137-2017

³⁹ Lin, B., & Okyere, M. A. (2020). Multidimensional energy poverty and mental health: Micro-Level evidence from Ghana. *International Journal of Environmental Research and Public Health*, 17(18), 6726. doi:10.3390/ijerph17186726

⁴⁰ World Health Organization. (2018). Low indoor temperatures and insulation. In *WHO Housing and Health Guidelines*. Geneva. Retrieved from <https://www.ncbi.nlm.nih.gov/books/NBK535294/>

experience energy poverty. The age, design and efficiency of a house will impact its energy needs and comfort.⁴¹ For example, an individual living in a home built before 1960 or a mobile home has the highest likelihood of experiencing energy poverty.⁴²

Specific to the region, **24% of households in Powell River** (1380 homes) are considered to be in energy poverty by the above-noted definition. This number, already well above the provincial average, is further exacerbated in the qathet Regional District, in which **36% of households** are experiencing energy poverty. The below graphic illustrates the rates of energy poverty in the qathet region compared to some neighbouring regions including the Comox Valley and Campbell River.

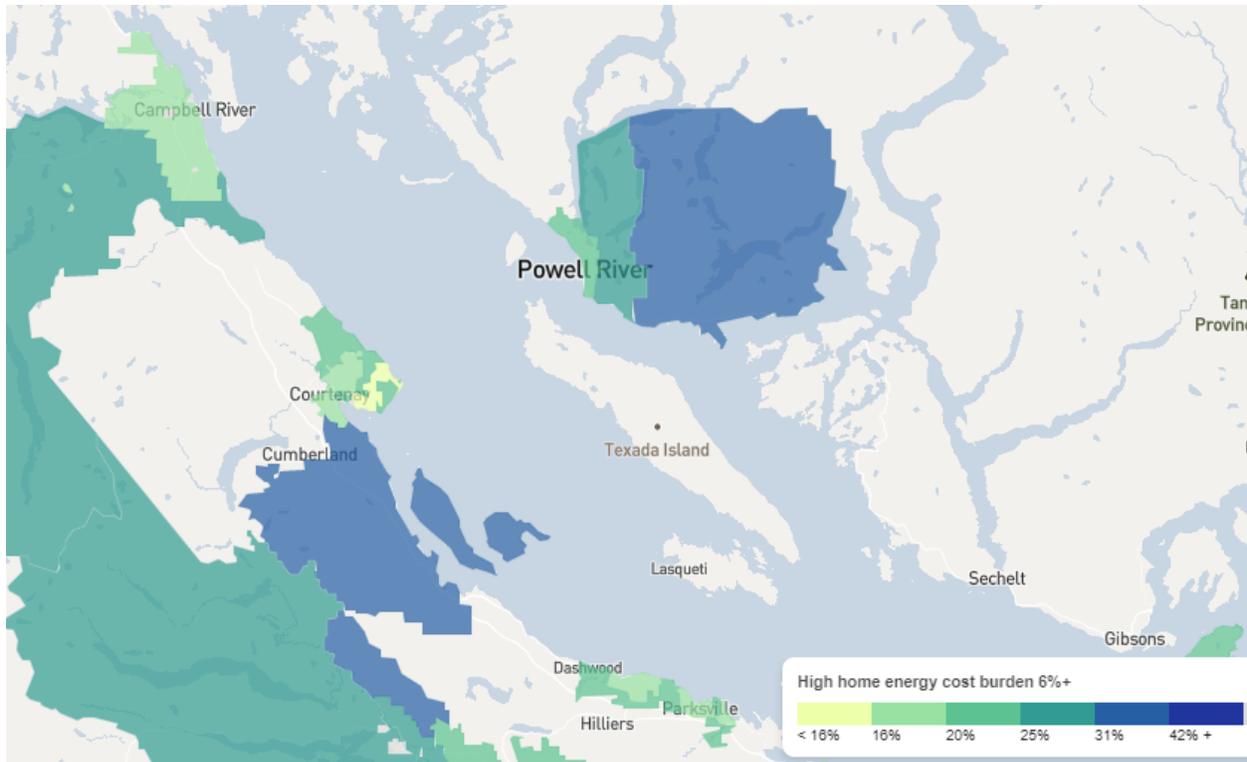


Figure 5: Prevalence of energy poverty in Powell River, qathet, and surrounding regions⁴³

In terms of the overall home energy cost burden experienced by Powell River residents, the majority (76%) of households experience a low or moderate cost burden. The remaining 24%, considered to experience energy poverty, are further broken down into high, very high, and extreme cost burdened categories. 9% of Powell River households experience “very high” or “extreme” energy cost burdens, many of which likely face difficult choices like whether to heat their homes or buy food and other essentials.

⁴¹ CUSP. (2019). *Energy poverty in Canada: a CUSP backgrounder*. Retrieved from <https://energypoverty.ca/backgrounder.pdf>

⁴² *Energy poverty in Canada: a CUSP backgrounder*, p. 8.

⁴³ Image reproduced from: <https://energypoverty.ca/mappingtool/>

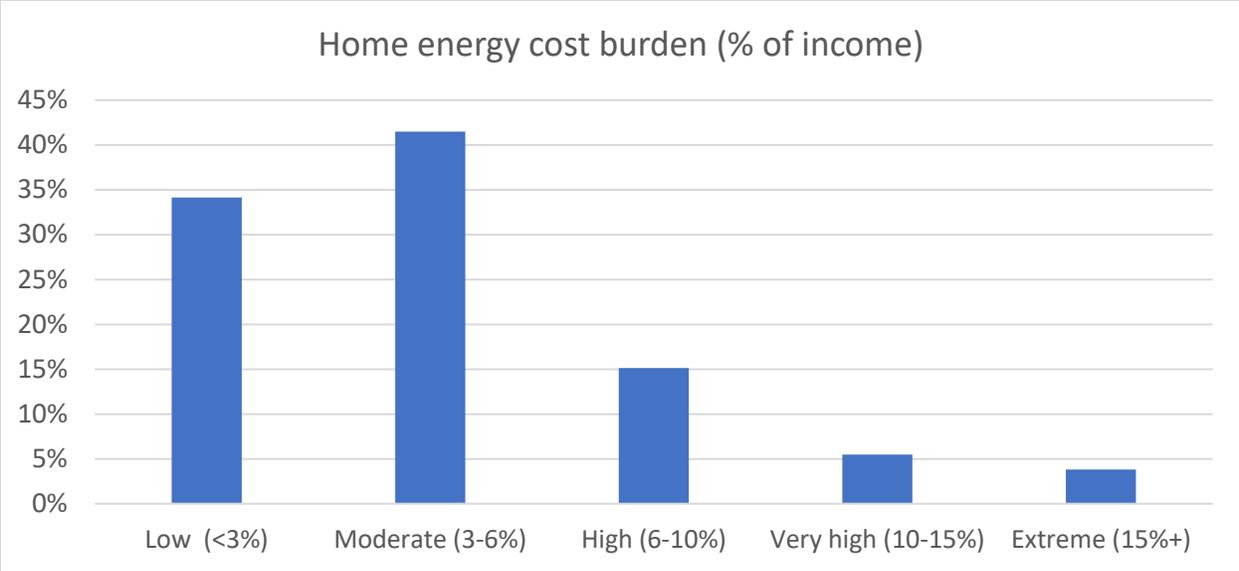


Figure 6: Home energy cost burden as a percent of income

Further breaking these demographics down, Statistics Canada data cross-tabulated through the Energy Poverty and Equity Explorer tool demonstrates the prevalence of a number of metrics compared across the general population in Powell River, and the population that experiences energy poverty.⁴⁴

| Metric | General population | Households in energy poverty |
|--|--------------------|------------------------------|
| Income less than Low Income Measure | 19% | 52% |
| Renter households | 21% | 22% |
| Owner households | 79% | 78% |
| Households in subsidized housing | 2% | 4% |
| Rental housing affordability - Spending 30%+ | 9% | 17% |
| Homeowner affordability - Spending 30%+ | 12% | 34% |
| Households in core housing need | 12% | 30% |
| Housing condition - Major repairs | 9% | 14% |
| Age of housing - Dwellings built before 1991 | 78% | 84% |
| Households in single detached dwellings | 76% | 79% |
| Recent immigrant households | 1% | 0% |
| Visible minority households | 5% | 5% |
| Indigenous households | 7% | 6% |
| Senior households | 40% | 46% |
| Lone parent households | 7% | 12% |

Most risk factors for higher household energy expenditures, from low incomes, to senior households, to housing in need of major repairs, are reflected here in a higher overall incidence of energy poverty.

⁴⁴ CUSP. (n.d.). *Energy poverty and equity explorer tool*. Retrieved October 15, 2021, from <https://energypoverty.ca/mappingtool/>

Homeowner and Ratepayer Perspectives

Ratepayers Associations exist for all four of Powell River's neighborhoods: Westview, Cranberry, Townsite and Wildwood. Some have been well-established for many years, while some are more recent. Representatives from all of Powell River's ratepayers associations were interviewed as part of the stakeholder engagement process, with the exception of the Wildwood Ratepayers.

Cranberry recently reinvigorated its ratepayers association in 2020 with new organizers. Issues of focus include parking and bicycle lanes, property taxes, and upkeep of Cranberry Lake. The Westview Ratepayers Association, representing the largest population base, is relatively new and has existed for just over a year. Issues of focus include bus shelters, infrastructure for residents with disabilities, seniors' programs, speeding and property taxes.

Townsite has in recent years had two active ratepayers groups, whose focus has been directly largely on major projects impacting the community including the consolidated wastewater treatment plant and proposed composting facility. In addition, the Townsite Ratepayers Association works closely with the Townsite Heritage Society to preserve the historic character of Townsite's original homes and to ensure that the community continues to evolve with this historic context in mind.

None of the active ratepayers associations indicated that high energy bills or home energy efficiency were of critical concern among members, despite the City having a higher than average rate of energy poverty and a high number of senior and fixed income households. All of the ratepayers associations identified property taxes and the cost of gasoline as more significant issues to their membership than utility bills.

Nevertheless, there was strong interest and engagement on the design of a potential municipal retrofit program, particularly among Townsite residents, who are interested in improving the energy efficiency of their original homes without altering their historic character. In general, the number of listed heritage buildings in Townsite is not particularly high, but there are many homes with historic character and architectural features that the City and residents wish to preserve.

Most of the historic features of Townsite homes do not preclude improving energy efficiency, with heating system retrofits, insulation improvements and weather sealing all being viable pathways to improving energy efficiency without altering the appearance of the home significantly. However, there are some challenges around windows, with the historic element being single-paned, wood-framed windows that are extremely energy inefficient. These windows can either be replaced with custom double or triple-paned windows that retain the historic appearance of the original windows (often a very expensive option), or storm windows can be added to the original single-paned frames, improving the overall energy efficiency of the window assembly.

Townsite residents also indicated the importance of addressing structural and safety issues with a number of original homes in the neighborhood, which are often a priority item for homeowners and require addressing before energy efficiency improvements can be considered. These include water and moisture management issues in original earthen foundations, which should be addressed before any insulation is added to original crawlspaces to prevent further mould and moisture issues. There are also a number of homes in Townsite that retain original knob

and tube wiring, which from a fire safety and insurance standpoint should be replaced at the same time as, for example, adding or replacing wall insulation.

Additional incentives to help cover the cost of these structural and safety issues should be considered as part of a retrofit program that encourages Townsite homeowners to improve their home's energy and emissions performance.

Townsite ratepayers also expressed interest in modified bylaws that made it easier to install rooftop solar PV on homes, or for the creation of a community-owned solar garden, either on brownfield land or on the rooftop of a community building such as the Patricia Theatre.

Housing Stock Assessment

The City of Powell River (and the qathet Regional District in general) has an older housing stock – with 67% of homes having been built before 1980. A further 22% of homes were built between 1980 and 2000, leaving just 11% of homes built in the last two decades under modern building codes and standards.⁴⁵

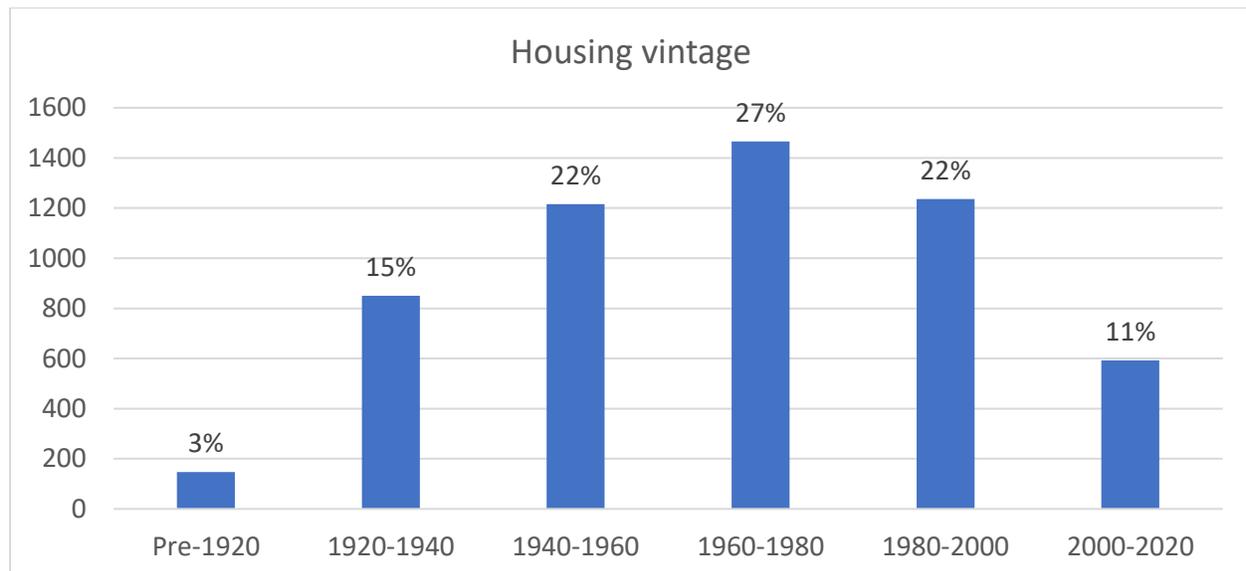


Figure 7: Powell River housing stock vintage, based on 2016 Census

Virtually all of the pre-1920 housing stock, and most of the pre-WW2 housing stock is found in Townsite, where the original mill company construction is reflected in craftsman-style detached homes with relatively poor energy efficiency. The mid-century housing stock is largely reflected in Westview, with a mix of homes built with relatively good energy efficiency for the time period, those that perform more poorly, and newer homes constructed to modern energy efficiency standards.

In terms of housing type, the vast majority of the housing stock in Powell River is in single detached homes, representing three-quarters of total housing units according to Statistics Canada. Most of the rest of the housing stock is in low-rise apartment units, representing 13%

⁴⁵ Powell River, CY, British Columbia: Census profile, 2016 census.

of the housing stock, and a handful of semi-detached dwelling and mobile homes (though there are a relatively large number of mobile home dwellings in the qathet Regional District).

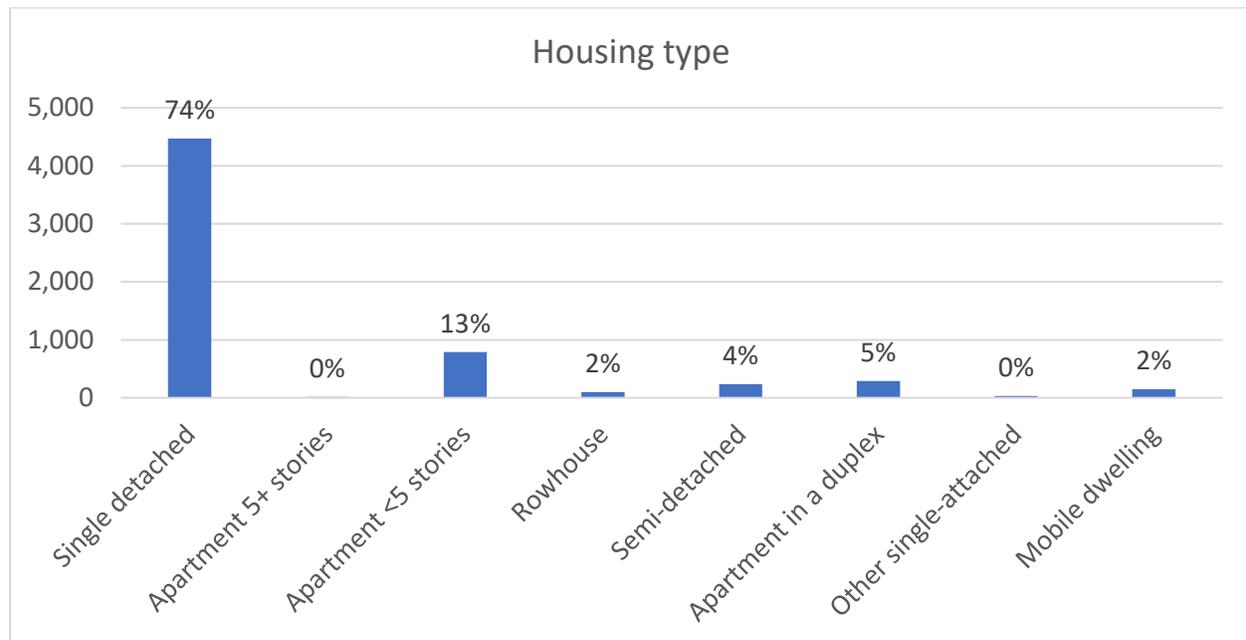


Figure 8: Powell River housing stock type, based on 2016 Census

Home Energy Profile

Generally speaking, Powell River homes use a mix of electricity and natural gas as a primary heating fuel, with other fuels including wood, propane and heating oil making up a relatively small portion of total heating energy.

Natural gas access came to the Powell River region in the early 1990s – leading to a gradual replacement of the previously dominant heating oil and wood-fired heating. Many of the original natural gas furnaces installed across Powell River in the 1990s have recently come to end of life (or are still installed and operating past this point). When these systems have come due for replacement, either due to age, failure, or change of home ownership, a number of homeowners have opted to switch to air source heat pumps, while others have installed higher efficiency natural gas furnaces.

There is no completely accurate data source available which describes the breakdown of heating fuels and heating systems used by Powell River residents. The most accurate (but now dated) historical picture of heating energy breakdown is found in the former provincial Community Energy and Emissions Inventory (CEEI) database⁴⁶, which estimated heating fuel consumption by total energy usage and was last updated in 2016 based on 2012 data:

⁴⁶ Province of British Columbia. (2012). *Community energy and emissions inventory*. Retrieved from <https://www2.gov.bc.ca/gov/content/environment/climate-change/data/ceei>

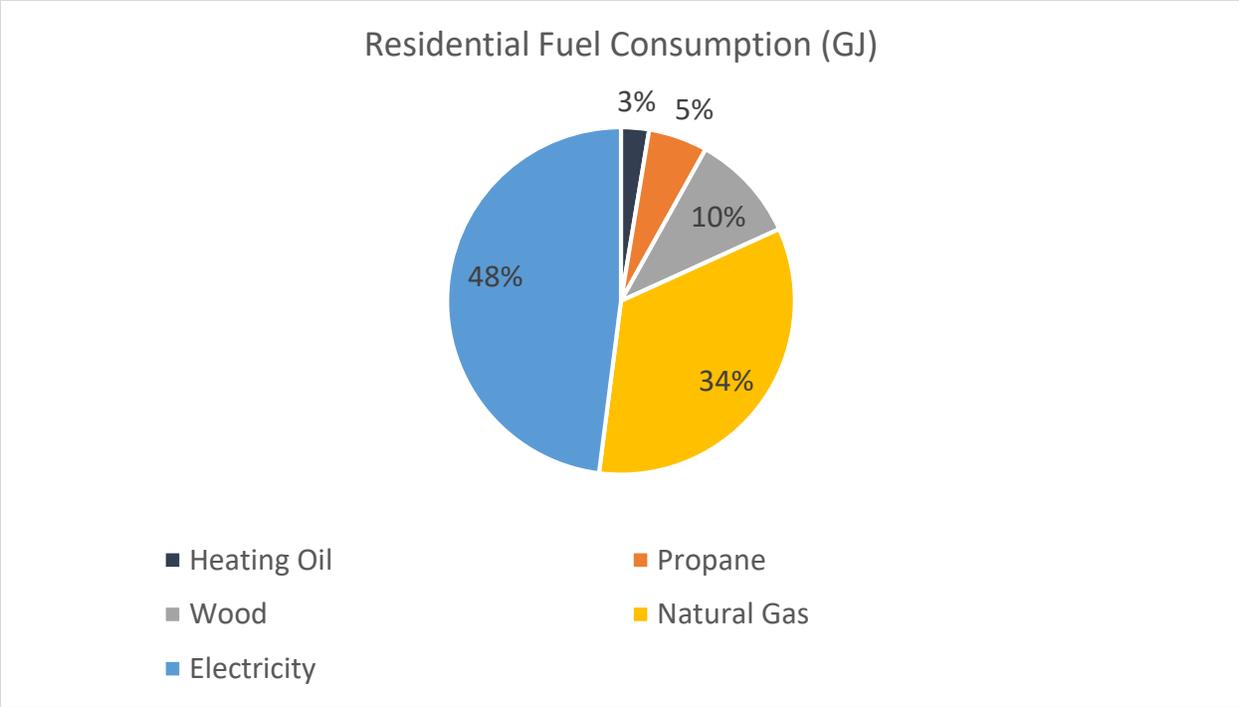


Figure 9: Residential energy consumption by fuel type, based on CEEI data from 2012

The above breakdown, however, does not distinguish between energy used for space heating and that used for water heating, lighting and other end-uses. An alternative estimate of the space heating breakdown considers the number of FortisBC natural gas accounts compared to the number of BC Hydro accounts. This data is based on the 2019 provincial GHG emissions inventory, which replaced the former CEEI database.⁴⁷ This breakdown assumes that most homes with a FortisBC account use natural gas as a heating fuel, due to its lower cost, and that all homes in the City have BC Hydro accounts for electricity, whether or not they have FortisBC accounts. Based on this assumption, up to 56% of homes in the City are heating using natural gas, while the remainder use another heating fuel.

⁴⁷ Province of British Columbia. (2019). *Provincial greenhouse gas emissions inventory*. Retrieved from <https://www2.gov.bc.ca/gov/content/environment/climate-change/data/provincial-inventory>

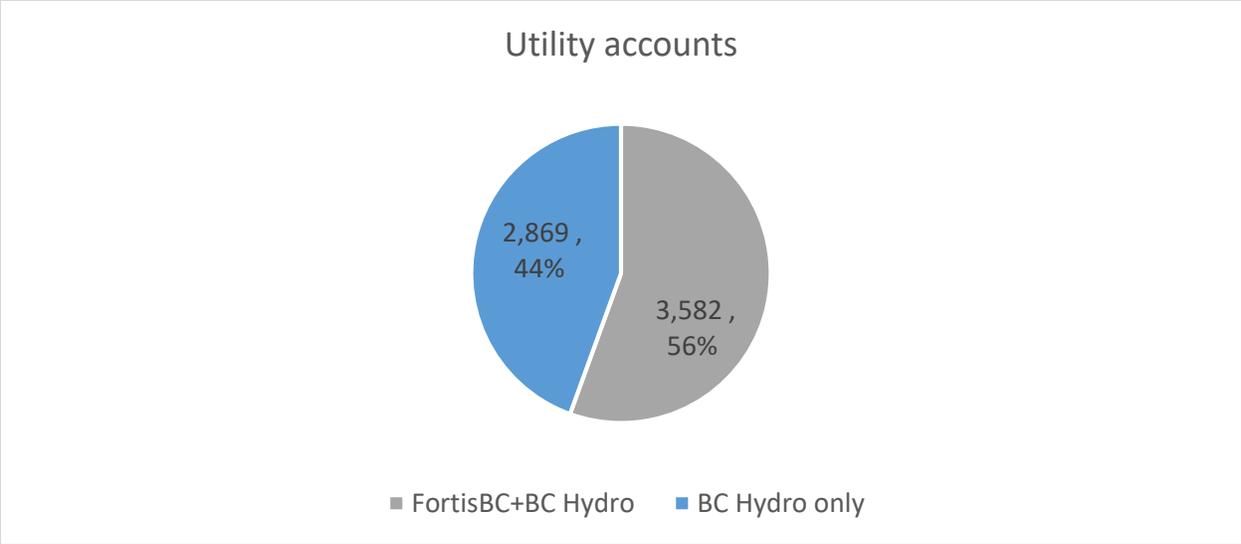


Figure 10: Residential utility accounts, based on 2019 provincial emissions inventory

The most currently accurate estimate of heating fuel use in the City likely comes from the homeowner survey administered in October 2021. Though this survey likely represents some bias toward homeowners that have recently completed, or plan to complete retrofits, this data is the only source that includes a further breakdown of electric heating between less efficient electric baseboards and furnaces, and more efficient heat pumps.

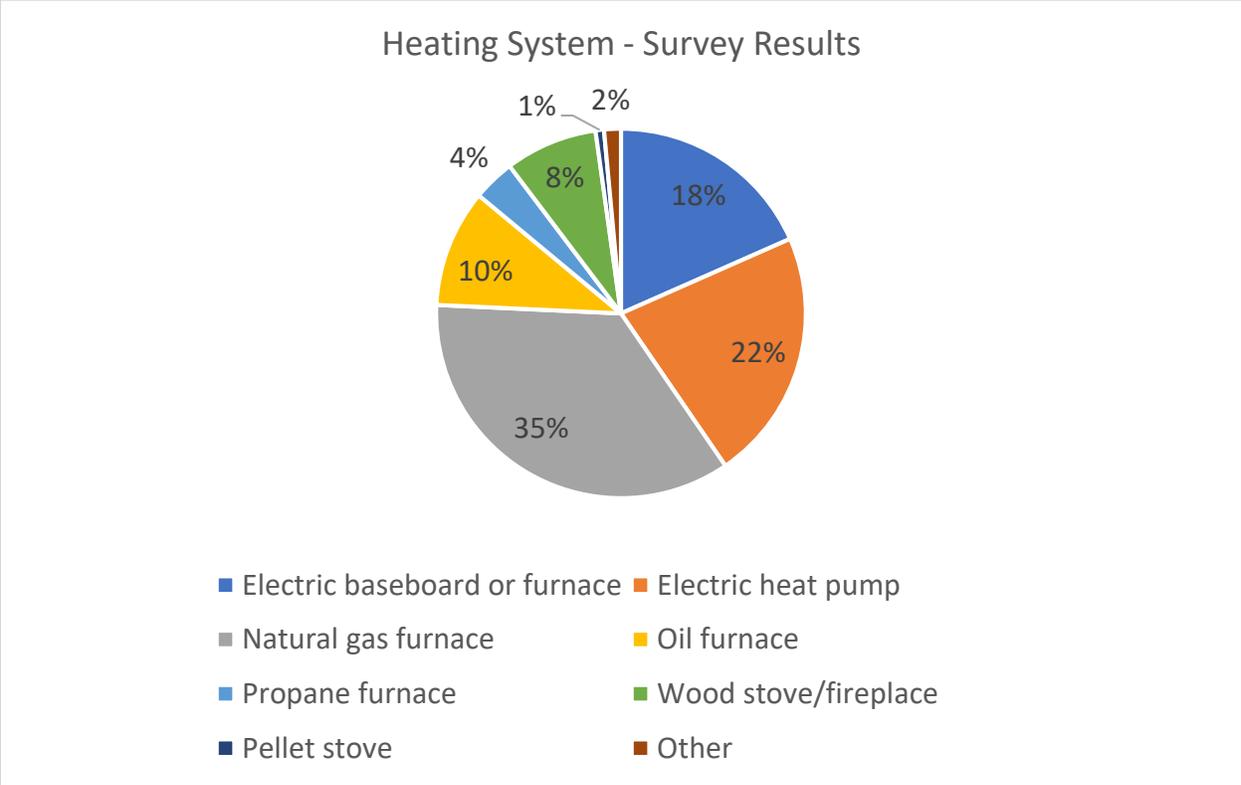


Figure 11: Home heating system breakdown, from 2021 resident survey

The available data sources are not in complete agreement in terms of heating system distribution, but in general it can be inferred that natural gas furnaces are used in anywhere from 35-55% of Powell River homes. Electric heating is also common, with a total of 40-50% of households heating with electricity. Further breaking this figure down, approximately 18% of households utilize inefficient (baseboard and furnace) electric heating systems, while a relatively large proportion (22%) utilize heat pumps. These figures may be influenced by the sample of survey participants, but if accurate this penetration level of heat pumps is very high compared to many other regions of the province. The remainder of households utilize either oil or propane furnaces, wood stoves, or pellet stoves.

Some high-level energy consumptions trends were also analyzed using available aggregate BC Hydro and FortisBC consumption data. In terms of overall energy consumption, the use of electricity has remained relatively stable over the period from 2014-2018, but natural gas consumption trended upward, likely the result of homeowners switching to natural gas from oil or baseboard heating.

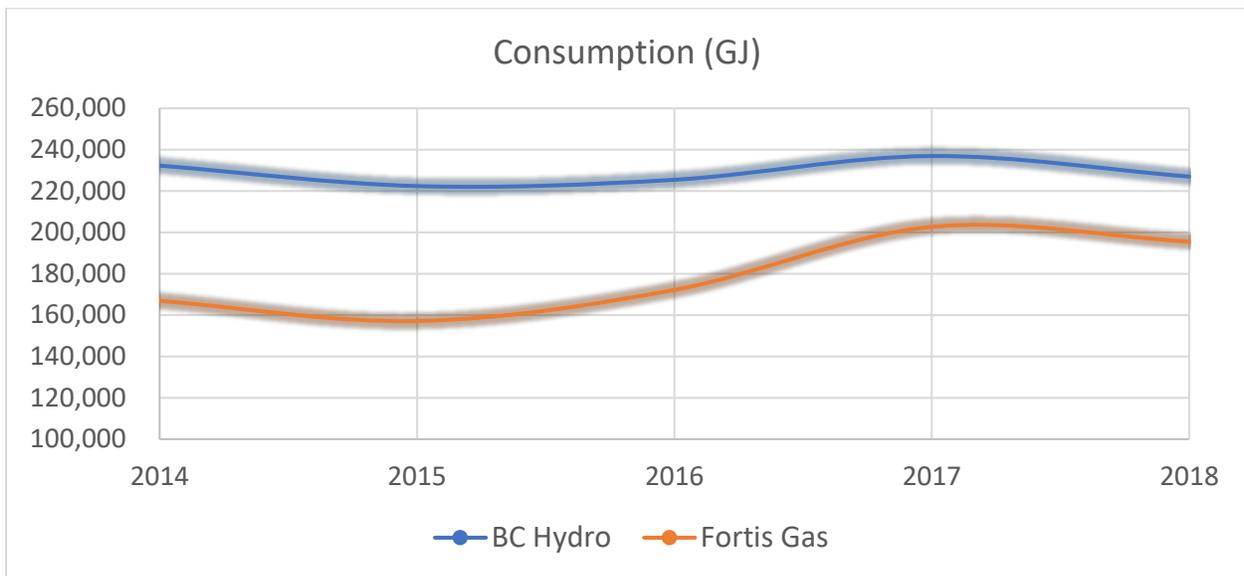


Figure 12: Energy consumption by utility, based on 2019 provincial emissions inventory

In terms of the total number of BC Hydro and FortisBC accounts in the City, both are increasing at a relatively slow rate in step with overall population growth and housing starts in the City, but there is faster growth in natural gas connections than electric connections. This may represent a scenario in which a relatively higher number of households are switching from electric heat to natural gas than those switching from gas to electric. This is a challenging situation from an

emissions reduction perspective, as these (likely cost-driven) decisions by homeowners contribute to the locking-in of fossil fuel burning equipment that will last for 15-20 years or more.

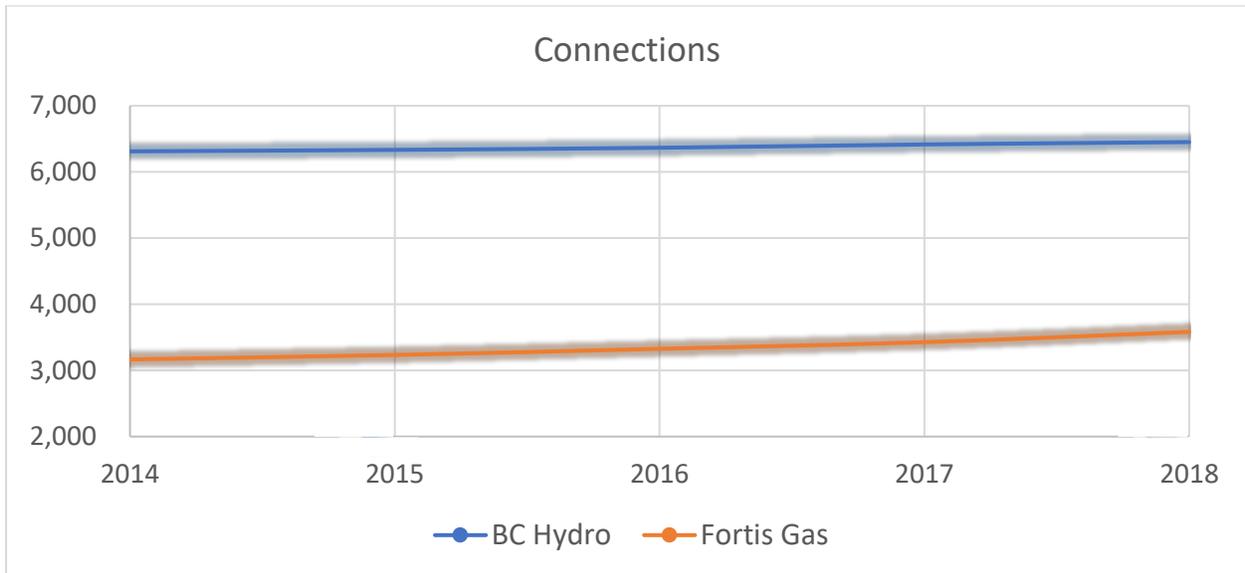


Figure 13: Utility connections over time, based on 2019 provincial emissions inventory

In terms of the GHG emissions resulting from home energy use, the 2019 provincial emissions database unsurprisingly shows that the vast majority of residential emissions (94%) in the City are the result of burning natural gas, compared to emissions from BC Hydro's relatively clean electricity. This figure suggests that a clear emissions reduction priority for the City should be to encourage fuel switching from natural gas to high-efficiency electric heating, coupled with aggressive action to reduce the use of gas in new buildings.

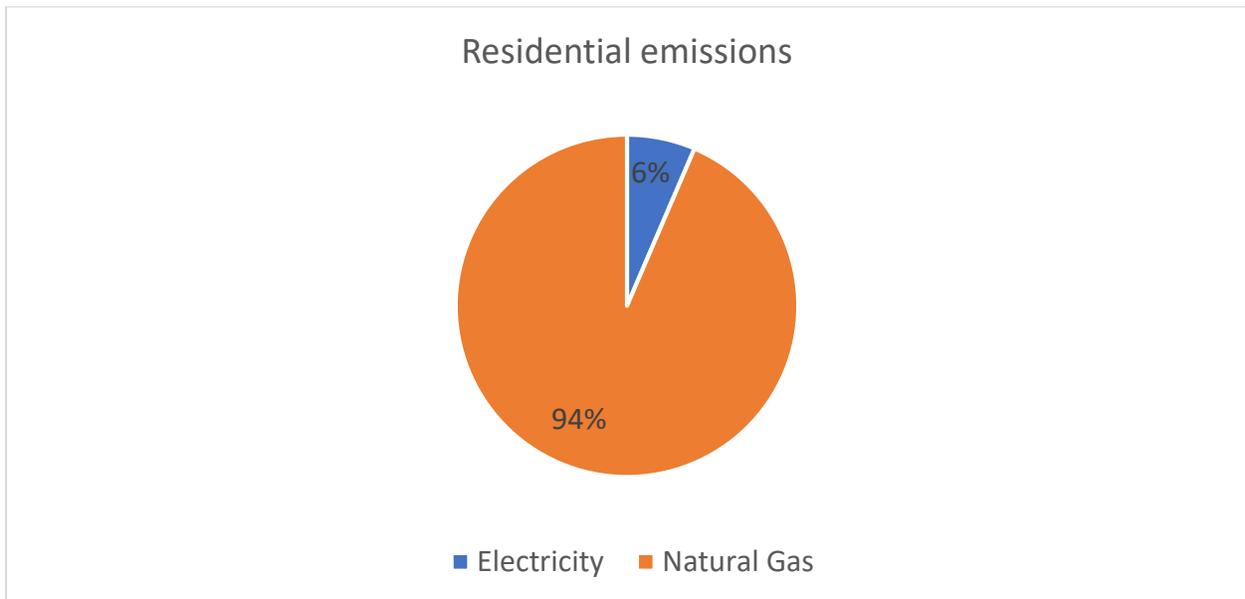


Figure 14: Residential GHG emissions by fuel type, based on 2019 provincial emissions inventory

Section 4: Barriers and Opportunities

Key Barriers and Opportunities

Cost and GHG Intensity of Heating Fuels

Currently, most homeowners in Powell River are not switching from fossil fuel appliances to low-carbon options like electric heat pumps unless they are personally motivated to reduce their home's carbon emissions, or by the summer air conditioning that heat pumps also provide. The most important reason for this is cost: Heat pumps typically have a significantly higher upfront cost compared to natural gas furnaces, and at current fuel prices and carbon tax levels, operating cost savings are not guaranteed either.

Electricity in BC is currently approximately three times the price of natural gas on a per unit of energy basis, which makes heating with electricity much more expensive unless a homeowner utilizes an electric heat pump. These can be 3-4 times more efficient than electric resistance heaters, so the overall monthly cost of heating with a high-efficiency gas furnace vs. a heat pump are often comparable.⁴⁸ However, in some cases gas still results in lower bills, making it difficult to motivate a switch based on either initial or ongoing costs. Contractors therefore find it difficult to justify recommending a heat pump to a customer that could simply upgrade their existing gas furnace. Anecdotally, upon hearing the cost to install a heat pump system, half of customers proceed and half consider other options.

However, planned increases to BC's carbon tax may dramatically change the affordability of natural gas in the future, giving electric heating a much larger advantage in terms of operating costs. The impact of carbon tax escalation on natural gas prices is illustrated in the below figure:

| Year | Carbon Tax \$/Tonne | Carbon Tax \$/GJ | Net Gas Cost \$/GJ |
|------|---------------------|------------------|--------------------|
| 2021 | \$ 40.00 | \$ 1.99 | \$ 9.20 |
| 2022 | \$ 50.00 | \$ 2.49 | \$ 9.70 |
| 2023 | \$ 65.00 | \$ 3.24 | \$ 10.45 |
| 2024 | \$ 80.00 | \$ 3.99 | \$ 11.19 |
| 2025 | \$ 95.00 | \$ 4.74 | \$ 11.94 |
| 2026 | \$ 110.00 | \$ 5.49 | \$ 12.69 |
| 2027 | \$ 125.00 | \$ 6.23 | \$ 13.44 |
| 2028 | \$ 140.00 | \$ 6.98 | \$ 14.19 |
| 2029 | \$ 155.00 | \$ 7.73 | \$ 14.94 |
| 2030 | \$ 170.00 | \$ 8.48 | \$ 15.68 |

One contractor indicated that they do attempt to explain the environmental benefits of electric heat pumps, and additionally explain to their clients that the cost of natural gas could increase in the future either as a result of rising commodity prices or due to planned increases in the carbon

⁴⁸ Pembina Institute. (2017). *What's the true cost of home heating in B.C.?* Retrieved from <https://www.pembina.org/pub/bc-heating-costs>

tax. Another contractor indicated that they do not typically discuss these issues with their clients. Both HVAC contractors observed that, in general, homeowners tend to go ahead with a life-for-like replacement in 75-80% of cases, unless they had been specifically motivated to switch to a low-carbon fuel in order to reduce emissions.

However, contractors felt that overall awareness of and interest in heat pump technology is increasing in Powell River, partly as a result of rebate offers that promote switching to these appliances. Contractors have noticed a surge in new homeowners in particular who are motivated to switch to a low-carbon heating system and have the means to install a heat pump at a higher cost than replacing the incumbent gas or oil system. These clients are motivated by several factors including increased comfort, summer cooling, and reduced emissions, and are less motivated by cost.

Despite this progress, switching from a low-carbon fuel to a high-carbon fuel remains a common choice among Powell River homeowners, according to contractors. Many low- and mid-income households that had previously used electric baseboards or electric furnaces have over the years switched to natural gas due to the significantly lower monthly heating cost. For many of these homeowners, switching to a heat pump was not a realistic option due to the high initial cost, even when factoring in rebates.

Compounding the problem from an emissions perspective, the natural gas utility serving Powell River, FortisBC, currently maintains an active campaign that promotes switching to natural gas and discourages the use of emissions-reducing technologies like heat pumps.⁴⁹ These efforts make it more challenging for contractors and homeowners to have an unbiased discussion of the costs and benefits of different home heating technologies.

Equipment Replacement Cycles

Our interviews with HVAC contractors suggested that current heating system retrofit activity in the City is being driven by three factors. Approximately one-fourth of customers are motivated by new rebate offers – in particular the Double the Rebate promotion that was offered by the Province through Better Homes BC during the COVID-19 pandemic. Another one-fourth of replacements are the result of service calls for older furnaces, air conditioners or heat pumps, where the technician deems that the equipment is impossible to repair or at the end of its lifespan – leading to a recommendation that new equipment be installed.

The remaining half of HVAC installations in the City are driven largely by Powell River's active real estate market. These retrofits are being performed by new owners of older homes, where the existing equipment is aging or deemed inadequate. Our interviews did not suggest that there is a significant amount of retrofit activity initiated as a result of high energy bills, but rather that the primary driver is the replacement of equipment that is aging out.

One contractor suggested that this is partially the result of a large number of gas furnaces aging out at once. Powell River was connected to FortisBC's natural gas network in the early 1990s, and many homeowners switched to gas at that time. As a result, the first generation of natural gas furnaces in homes has been reaching end of life over the past 5-10 years. The contractor suggested that this "boom" cycle of replacements is now approaching its end and is expected to

⁴⁹ FortisBC. (n.d.). *Natural gas facts*. Retrieved May 31, 2021, from <https://www.fortisbc.com/about-us/corporate-information/facilities-operations-and-energy-information/natural-gas-facts>

taper off. Unfortunately, it appears that most of these first generation of natural gas furnaces have been replaced by new, higher efficiency gas furnaces rather than electric heat pumps – effectively locking in GHG emissions from these homes.

Another contractor agreed with this picture, but added that there were still a number of homes in the City relying on older and inefficient electric heating, either baseboard or furnace, and that this segment of the market could represent an important opportunity for switching to heat pumps instead of switching to gas – a potential target group for a municipal retrofit offer.

Homeowners who face pressing maintenance issues in their homes (for example, a roof needing replacement) are often deterred from making energy efficiency investments as they are a lower priority item for maintaining the integrity and safety of the home. However, HVAC contractors indicated that homeowners typically call when they have prioritized a heating system job – either because it is a priority upgrade or because the existing system is failing/has failed.

Education

Energy Advisors cited homeowner education, information availability and a complex incentive process as the biggest barriers for homeowners, as well as representing significant barriers among contractors and tradespeople. New construction in the City is seeing many homes constructed with all gas mechanical systems, average energy efficiency, and poor attention to details e.g. in window construction that impact energy efficiency. This lack of awareness among many designers, builders and trades in new construction makes the energy efficiency retrofit market more challenging as well. Local contractors were so busy and overbooked in 2021 that it was difficult to raise their awareness of energy efficiency and carbon emissions, in one local Energy Advisor's opinion.

Scale/targeting of program

Some programs, including BC Hydro's ECAP and the Province of BC's income-qualified rebate stream attempt to target services toward a particular group or housing type. This targeted approach is contrasted with a universal program model, which can provide the same level of service to all applicants, or can scale the types and amounts of program components in accordance with participant needs and preferences.

In terms of a targeted approach for a City of Powell River retrofit program, there are a few needs unique to the region that could be explored as part of program design, including:

- The prevalence of older, detached homes in the City that exhibit relatively poor energy efficiency and are good candidates for combination insulation and heating system retrofits
- The prevalence of natural gas heating in the City, which could be targeted with specific fuel switching incentives to move more of these homes away from fossil fuels and toward high efficiency electric heating
- A high percentage of households that are experiencing energy poverty and/or are on a fixed income (e.g. senior households). These residents could benefit from targeted

supports that specifically address energy bill affordability though either retrofit supports or direct energy bill assistance.⁵⁰

In addition to program targeting in terms of demographics, the geographic reach of a program should be carefully considered at the design phase. Because the qathet Regional District, together with the City of Powell River and Tla'amin Nation forms such a unique and geographically distinct population centre, a program that serves the entire region should be strongly considered.

There is, however, some evidence that the smaller the community, the higher the participation rate in retrofit programs.⁵¹ Focusing marketing on one municipality or one neighbourhood at a time (even if the program is regional) may be a more successful approach than designing a blanket regional campaign. These strategies for program design could include community-based social marketing, which creates local social norms and visibility that inspires action.

Contractor and Energy Advisor Capacity

Two local HVAC contractors, Tempco and PR Heating & Air Conditioning, were interviewed.

There are currently two main HVAC contractors operating in the City, with a few smaller companies offering HVAC installation and repair services as well. The larger contractors have more experience and training with regards to more complex installations e.g. central heat pump retrofits. Contractors experienced some supply chain issues during 2020 as a result of increased demand for products worldwide, however, these issues appear to have been largely resolved.

Contractors indicated that they were able to continue to receive training from manufacturers during the COVID-19 pandemic as online webinars and workshops were offered. A more significant issue affecting contractor capacity in the City is long wait times for customers due to high demand and limited availability of apprenticeship programs due to long waitlists.

One local window and insulation contractor, Modern Windows, was interviewed. This contractor is also Powell River's only local window manufacturer, and has supplied the majority of glazing products to the town for over 35 years. The majority of window products offered by this manufacturer are of the double-glazed, argon filled type that meet current building code requirements. However, they do not currently offer a higher performance triple-glazed option.

One local Energy Advisor, representing Flex Home Energy was interviewed.

There is currently only one registered Energy Advisor operating within the City, and serving both the Upper and Lower Sunshine Coast. Several Service Organizations based on Vancouver Island are also available to perform energy assessments in Powell River, albeit at a higher cost due to the travel time and ferry crossing required. At present, the local Energy Advisor has worked primarily on new building EnerGuide assessments, largely as a result of airtightness testing requirements that are part of the BC Energy Step Code. There is currently demand for 1-

⁵⁰ Clean Air Partnership. (2020). *Accelerating home energy efficiency retrofits through local improvement charge programs: A toolkit for municipalities*, pp. 72-77. Retrieved from <https://www.cleanairpartnership.org/wp-content/uploads/2020/05/FINAL-LIC-TOOLKIT-Accelerating-Home-Energy-Efficiency-Retrofits-Through-LIC-Programs-2020-1.pdf>

⁵¹ *Home energy retrofit incentive campaigns analysis report*, p. 23

2 assessments per month (and rising) in new home construction. Demand for existing home assessments was slow prior to the introduction of the federal Greener Homes program, which requires a pre- and post-retrofit EnerGuide assessment, but has since picked up rapidly.

At current levels of program uptake and demand, Flex Home Energy does not have sufficient capacity to take on more existing home EnerGuide evaluations in Powell River. They estimated that at ~1% uptake of incentive programs, only 50-60 homes in Powell River would need to be evaluated, which is within the current capacity of one full-time EA operating in the City. However, the current EA is considering leaving the region and no replacement has yet been identified, leading to a significant capacity gap for EnerGuide services in the City of Powell River and qathet region more broadly.

Technical Barriers

In some cases, there are technical barriers that prevent the installation of high efficiency appliances. In a number of older homes, existing ductwork is not adequately sized to accommodate the replacement of an oil or gas-fired furnace with a central heat pump, which requires higher airflow rates in order to provide adequate cooling. Some older heat pumps in the City may not be performing as well as initially expected due to this issue. In homes with small duct diameters, ductless heat pumps or a duct replacement retrofit may be warranted.

Similarly, the replacement of a natural gas furnace with a high-efficiency condensing model requires the installation of direct combustion air ducting, which can present a challenge depending on the layout of the home's mechanical room.

Electrical panel capacity is also sometimes an issue when considering a switch from a fossil fuel fired heating system to an electric system – many homes in Powell River remain on 100-amp service and a service upgrade may be required in some cases in order to accommodate a high-draw appliance like a heat pump. However, our project experience has demonstrated that few homes require panel upgrades in order to accommodate a heat pump, unless there are other atypical loads in the home (e.g., a hot tub or electric vehicle charger).

Equity

Equity is a critical consideration in retrofit program design, particularly in a region that experiences high levels of energy poverty (including the City of Powell River and qathet Regional District). In addition, there are a relatively high number of senior households and fixed income households in the region, a demographic that frequently struggles to pay utility bills. Compounding the problem, these residents often face higher barriers to accessing traditional financing products, particularly if they do not have home equity to offer as loan collateral. A new, targeted financing offer that lowered the barriers to entry through relaxed credit requirements and favourable terms could serve to improve access to home retrofits for these residents.

Apartments & Renters

These are two categories that likely have significant overlap, are difficult to separate based on the available statistics, and are faced with specific barriers.

One barrier concerns rebate eligibility: Existing retrofit programs are heavily geared toward single detached homes, reducing the financial supports that are available for multi-unit residential buildings (MURBs). In addition, retrofits of MURBS tend to be more technically and

logistically complex, with multiple levels of permissions and permitting required, and generally higher complexity of retrofit measures (particularly with respect to whole-building envelope upgrades and heating systems that serve multiple units).

Neither apartments nor condos are eligible for regular CleanBC rebates (though CleanBC-funded custom programs are a possibility), and only small multi-unit residential buildings (MURBs), defined as having three or fewer storeys and less than 6,458 square feet, are eligible for some federal rebates up to a maximum of \$20,000 (however heat pumps are not covered). As part of the federal rebate stipulations, if the small MURB is a rental building, the owner must also live in the building.

Another well-known barrier concerns rental households. Though there are a relatively small percentage of renter households in the region, these households are often the most underserved by existing energy efficiency programs, incentives and financing offers. Many rental units are heated by electric baseboards, which have the lowest installation cost but among the highest operating costs of all heating system types. This situation benefits landlords, who experience lower capital costs, but disadvantages renters who pay the utility bills for their units.

Eligibility for the federal rebates require home ownership, thereby excluding renters. Provincial rebates do not have this stipulation, but do require that the applicant be the utility account holder. If a renter were the holder of their own utility account and the landlord agreed to renovations, it is theoretically possible for them to access the rebates. However, this is not explicitly stated and no clear pathways for renters are described by BC Better Homes.

The lack of financial incentive for landlords to improve the energy performance of their buildings, and the lack of access to upgrades for renters is a pervasive and complex problem, often referred to as the split incentive problem. An equity-focused retrofit program design would aim to improve rental households' participation, though dedicated outreach to renters and landlords, targeted incentives for landlords, and increased understanding of the benefits of energy retrofits (e.g., longer building lifespan).⁵² Once PACE-enabling legislation is available in BC, offering commercial PACE loans to larger apartment building owners may be an option.

Eligibility and Qualification

Initial and ongoing eligibility requirements are an important consideration for a home retrofit program. Most, if not all municipal energy efficiency programs incorporate some mandatory requirements for participation, which could include any of the following:

- An EnerGuide pre and/or post-retrofit assessment to verify the appropriateness of upgrades and to unlock additional incentives
- A list of approved upgrades and minimum standards, for example a minimum added insulation requirement for walls, ceilings or foundations

⁵² For an overview of options to address the split incentive barrier, see: Australian Government Department of Agriculture, Water and the Environment. (2013). *HVAC high efficiency systems strategy factsheet: Overcoming split incentives*. Retrieved from <https://www.environment.gov.au/system/files/energy/files/hvac-factsheet-split-incentives.pdf>

- Minimum standards for fenestration products, including window U-value, specific heat gain coefficient (SHGC), double or triple pane construction, and ENERGY STAR certification
- A retrofit cost effectiveness analysis to determine if financing repayments will be partially or fully offset by utility bill savings
- Eligibility requirements for participating contractors, including program registration, membership in a contractor network, and training requirements (e.g., the Home Performance Stakeholder Council's training courses for quality heat pump installation.⁵³)
- Ensuring that retrofit products are aligned with eligibility for provincial or federal rebates

Single Point of Access

As homeowner incentive programs have been introduced and enhanced by all levels of government over the past few years, the level of complexity that needs to be managed in order to take full advantage of these offers has increased dramatically. Powell River residents can now access federal government rebates, requiring a pre- and post-upgrade EnerGuide audit, as well as multiple provincial programs. Some of these programs are mutually exclusive – for example, taking advantage of provincial heat pump financing or participating in income-qualified incentives requires foregoing other rebate streams. In addition, utilities and municipalities all offer their own rebate programs.

Adding energy efficiency financing and contractor selection to this mix can present an overwhelming situation for applicants. “Complex programs delivered by multiple organizations, often requiring significant time and paperwork” is identified again and again as a major barrier to pursuing retrofits and accessing financing.⁵⁴ A retrofit program that streamlines access to available incentives and financing offers, as well as helping a homeowner to coordinate energy audit and contractor services, can be hugely beneficial for increasing uptake of retrofits.

Rebates/incentives

Current incentives available through the provincial and federal programs are relatively high and present a strong opportunity for a local program to raise residents' awareness of the available rebates and supports, and find ways to make it easier for locals hoping to access them. While in some cases the available incentives are high enough for households to be able to afford an upgrade and pay the remaining costs, in other cases financing may be needed to overcome the gap between the total upgrade cost and what the rebates cover. Additionally, rebates are only provided after project completion, requiring household to pay the full cost up front. This too may be a prohibitive barrier unless financing is available. In short, the capacity of residents to access the available incentives can be significantly increased with local program support and financing.

Regulations

A local home retrofit program could help homeowners to prepare for future regulatory requirements, particularly as the timelines for GHG reducing regulatory measures accelerate in concert with provincial and national emissions targets. By incentivizing and making it easier for

⁵³ For more information, see: <http://homeperformance.ca/>

⁵⁴ Energy and Mines Ministers' Conference. (2016). *Financing energy efficiency retrofits in the built environment*, p. 7. Winnipeg, Manitoba. Retrieved from https://www.nrcan.gc.ca/sites/www.nrcan.gc.ca/files/emmc/pdf/Financing%20Report-acc_en.pdf

homeowners to complete low-carbon retrofits in their homes, the transition from a voluntary to a regulatory approach can be eased. In BC, several regulatory actions are planned for the coming years that will profoundly impact the residential sector, including:

- A commitment to making all new construction zero emissions by 2030
- Regulations on new and replacement space heating equipment that will require $\geq 100\%$ efficiency (heat pump or electric resistance heating) by 2030
- The introduction of a retrofit code for existing buildings, applying to major alterations and covering energy efficiency and carbon emissions⁵⁵
- A commitment to meet or exceed the Federal Government's benchmark carbon price, which is expected to rise to \$170 per tonne by 2030, leading to a significant increase in the relative cost of heating with fossil fuels (see Figure 14 above).⁵⁶

Administrative burden & cost considerations

Any local program will have administrative costs that need to be considered, and can be managed by adjusting the level of service, the program scale, the partners involved, etc. To provide a sense of potential program activities as a starting point from which costs can be estimated, here is a list of common tasks involved in delivering a municipal retrofit program (some are likely essential, others are optional):⁵⁷

- Putting in place administrative staff resources for program coordination/oversight
- Legal/regulatory review of and preparation for chosen activities/financing
- Putting in place funds or partnerships for financing
- Marketing/promotion and community engagement
- Maintaining a list of qualified EnerGuide auditors and retrofit contractors (option to rely on provincial/federal lists instead)
- Supporting group purchasing and group rebate codes
- Contracting some services like audits to offer to households free of charge
- Screening households for eligibility
- Assisting households in process navigation (e.g., applications, retrofit planning, access to government rebates and/or financing)
- Monitoring and reporting on the program.

Considerations and opportunities for managing administrative costs include:

- Option to add admin fees, such as a one-time fixed or percentage charge, or rate rider fee
- Availability and extent of service provided to participants by program staff to navigate processes
- In-house vs third-party administration
- Contractors:

⁵⁵ Government of British Columbia. (n.d.). *Buildings and communities*. Retrieved December 21, 2021, from <https://www2.gov.bc.ca/gov/content/environment/climate-change/clean-buildings>

⁵⁶ Government of Canada. (2021, August 5). *Update to the pan-Canadian approach to carbon pollution pricing 2023-2030*. Retrieved from <https://www.canada.ca/en/environment-climate-change/services/climate-change/pricing-pollution-how-it-will-work/carbon-pollution-pricing-federal-benchmark-information/federal-benchmark-2023-2030.html>

⁵⁷ Adapted from: *Accelerating home energy efficiency retrofits through local improvement charge programs*, p. 86.

- Local availability and capacity of contractors, and whether program intervention is required to address capacity concerns, labour shortages, etc.
- Contractors may be able to amplify outreach efforts and support household education if they have the capacity and are involved by program coordinators.
- If a free or reduced-cost service is offered as part of a program, issuing an RFP to one energy auditor or contractor to complete the service may be less time-intensive than reimbursing each individual household.
- Simplicity of process: Key to reduce administrative burden but also to increase accessibility and participation. For instance, having electronic rather than paper-based processes as much as possible.
- Promotion support/alignment: Willingness of utilities to support local promotion, aligning local promotions with provincial/federal promotion of rebates, collaborating with other local programs on education content/materials, or involving local resident champions to spread the word are some options to amplify efforts with little to no additional cost.
- Scope: Targeting only certain measures, households, or areas can reduce scope and cost.

At the design stage, decisions can be made on around these considerations to balance program costs and benefits.⁵⁸

Program Evaluation and Iteration

Evaluation is an important component of any energy efficiency program lifecycle, and is best implemented in a responsive manner that allows for continuous improvement and iteration. To achieve this, evaluation processes should take place early and often.

Within the paradigm most commonly utilized by utilities that deliver energy efficiency programs, there are three major categories of program evaluation: impact evaluation, process evaluation and market effects evaluation.⁵⁹

- Impact evaluation is designed to measure a program's effectiveness against established quantitative goals, most commonly energy savings, GHG savings and utility bill savings, as well as a host of indirect impact effects including job creation, health benefits and reduction of energy poverty. Impact evaluation can be utilized to course-correct a program's offerings if it is not achieving the breadth, depth or type of results desired.
- Process evaluation looks at the effectiveness of a program's design, delivery and implementation. This could include the process of customer "journey mapping," and seeking participant and staff feedback to determine where inefficiencies, bottlenecks and participant attrition are occurring. Our research into utility energy efficiency programs indicates that process evaluation is a critical and often lacking component of program design, and results in frustration and lack of participation for many customers.⁶⁰ Process evaluation should also be considered through a lens of equity, ensuring that certain residents are not being excluded or discouraged from participating as a result of

⁵⁸ For cost reference, see breakdown in: *Home energy retrofit incentive campaigns analysis report*, p. 16-19.

⁵⁹ EPRI. (2008). *Guidebook for Energy Efficiency Program Evaluation Measurement & Verification*. Retrieved from <https://www.epri.com/research/products/1016083>

⁶⁰ Ecotrust Canada. (2020). *Transforming income-qualified home energy retrofit programs in BC*. Retrieved from <https://ecotrust.ca/priorities/energy/transforming-income-qualified-home-energy-retrofit-programs-in-bc/>

process issues, and that measures are targeted appropriately to encourage participation (for example, through no-cost retrofit pathways for lower income households).

- Finally, market effects evaluation seeks to track the systems change and market transformation effects that are the result of a program's activities. For example, a program that causes acceleration of local capacity and training for retrofit contractors, or one that increases the availability of energy efficiency products in the region could be said to have market effects.

Homeowner Survey

A survey was developed to help understand the barriers that Powell River residents have faced in renovating their homes, as well as to learn about their future renovation plans and preferences for future supporting programs. The survey was available throughout October 2021 on the Participate PR platform, and was advertised through the City's social media channels as well as through sharing with local contractors, building professionals, and homeowner associations.

The results of the homeowner survey are significant indicators of the current needs and intentions of homeowners and renters in Powell River. Some highlights of the survey follow; the full results can be found in [Appendix B](#).

There were 136 unique responses to the survey. The vast majority of respondents – 88% - identified as owners, with 12% identifying as renters. Just over 50% of respondents live in single detached homes, with a relatively even split of around 15% of residents living in semi-detached, townhouses and condos, respectively. The remaining 5% of respondents live in apartments. Nearly 65% of survey participants have lived in their homes for at least 5 years, and a large majority (88%) consider their home to be in 'very good' or 'good' structural condition.

The most prevalent home heating fuel identified in the survey was natural gas, with 35% of respondents using gas furnaces to heat their homes. The next most common heating system was electric heat pumps, used by 22% of participating households. This is a significant figure and is likely much higher than estimated uptake in other parts of the province. Exactly why so many homes in Powell River use heat pumps is unknown, but is likely due to a combination of the mild climate, engaged and knowledgeable local HVAC contractors, and word of mouth. Survey participation was also likely biased towards residents who had recently completed upgrades including heat pump installation, and who were interested in sharing their recent experience.

Most participants (88%) identified that it was important that their home primarily use energy from renewable sources, a number that is relatively out of step with the high prevalence of natural gas heating. This could indicate misconceptions about the environmental impact of burning natural gas, or represent a desire for many homeowners to switch away from fossil fuel heating systems.

The next most common heating system type was electric baseboards and furnaces, representing 18% of households. A smaller proportion of households heated with oil (10%), wood (8%), propane or pellet stoves. 56% of respondents were "happy" or "very happy" with their current home heating situation, whereas 16% were "unhappy" or "very unhappy", and 28% were "neutral". Most participants (77%) thought that their home energy bills were affordable,

while 23% thought they were unaffordable (a number that roughly corresponds with the prevalence of energy poverty in the City).

Most survey participants have made some upgrades to their homes in the past 10 years, with a new heating system, new windows and/or doors and insulation upgrades being the most common completed upgrades. Just 22% of participants had not made any investments in their homes in the past 10 years. Despite this previous work, most participants also had plans to invest in further upgrades over the next 5 years, with new heating systems, insulation upgrades, air conditioning and air sealing being the most popular desired upgrades.

In identifying barriers to energy upgrades, the most important issues identified by respondents were the high upfront costs involved, and the lack of local access to EnerGuide energy advisors. The difficulties of navigating the contractor selection and rebate process ranked in the middle of importance, and the least important barriers identified were a lack of access to financing or a lack of favourable financing terms. Likewise, the most important enabling factors for participants in improving the energy efficiency of their homes were larger rebates, upfront rebates, and access to assistance in all stages of the process. The least important enabling factors were related to financing.

Despite the relatively low demand for financing as a way to address barriers to retrofits, nearly 70% of survey participants indicated that a new home financing offer would make them at least **somewhat more likely** to upgrade their home. When considering other offers that would help them upgrade their homes, respondents indicated free EnerGuide assessments, new offers for heat pumps, and personalized support through the process as important.

In addition, participants shared their feedback and comments, with some themes emerging. Participants clearly saw value in having personalized support, advice, and a neutral point of contact through their retrofit journey to help them navigate the process of getting an energy audit, choosing upgrades, selecting a contractor and applying for rebates. Participants also clearly indicated that the lack of local EnerGuide capacity is an issue, leading to long wait times, higher costs, and foregoing rebates that otherwise would have been accessible due to the difficulties in getting an energy assessment. Participants also indicated that the persistently lower cost of natural gas compared to electricity remains a substantial barrier in moving away from fossil fuel heating.

Existing Program Uptake

Rebate and Incentive Program Uptake

Unfortunately, both BC Hydro and FortisBC declined to provide the City of Powell River with data regarding the uptake of their insulation and heating system rebate programs over the years they have been available, perhaps suggesting low levels of participation. Despite a lack of data transparency around historical uptake of insulation and furnace upgrade programs, there is relatively good data available from the Province on the uptake of CleanBC incentive programs – which focus on fuel switching measures including fossil fuel to heat pump conversions.

Without the cooperation of utilities in promoting data transparency, it is very difficult to quantitatively evaluate the success of previous and existing retrofit programs in the City. Anecdotally, HVAC contractors interviewed for this study indicated that there is a robust and

active retrofit market in the City, with a large number of heating system upgrades and retrofits occurring (many of which are still natural gas furnace installations or upgrades).

The number of households switching from oil or natural gas to an electric heat pump increased dramatically in 2021 – likely due to the Province’s Double the Rebate offer, which enabled a rebate of up to \$6000 for a central heat pump, and the permanent extension of these rebate amounts as part of the Roadmap to 2030 climate plan update. The penetration rate of heat pumps in the City is already remarkably high – up to 25% as indicated by our October 2021 survey – and shows no sign of slowing down as these incentives continue to present an attractive business case for heat pump retrofits.

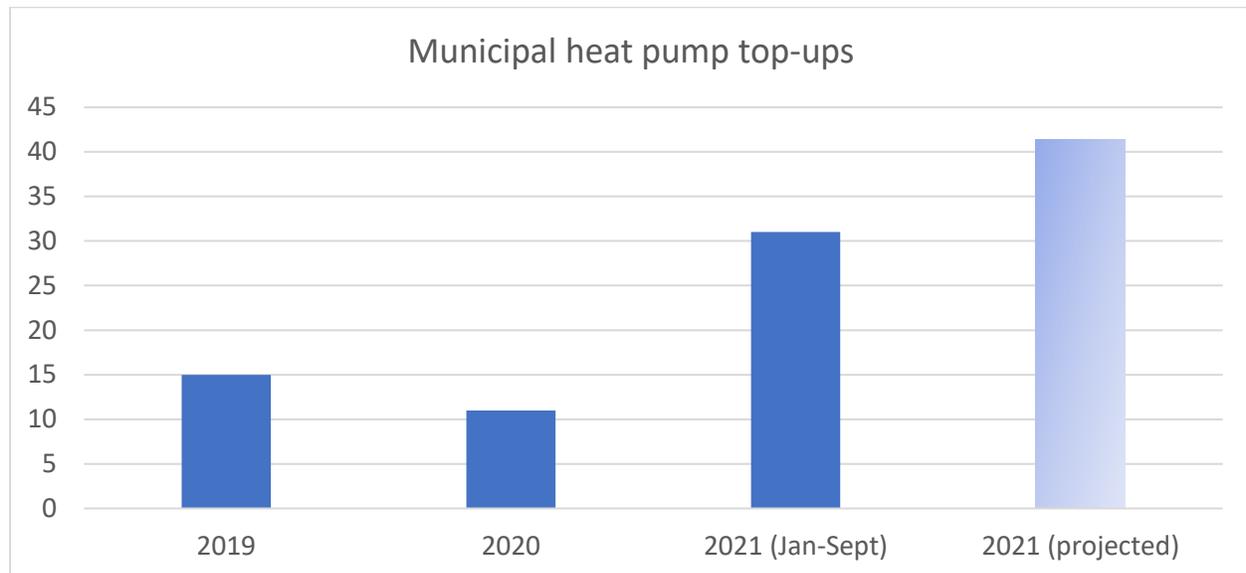


Figure 15: Historical and projected municipal heat pump top-ups

Financing Uptake

Contractor Financing

Both major HVAC contractors in the City offer third-party financing products for customers. However, these financing offers have seen very little uptake, with typically only a single customer per month being interested, according to contractors. This is at least partially the result of the financial terms of this third-party financing, which are generally not as attractive as the homeowner could obtain through a home equity line of credit with their financial institution.

Contractors also indicated that much retrofit activity is being driven by homeowners with substantial equity for a planned retrofit, either because they have been saving for it or because it was budgeted into the cost of a newly purchased home. Demand for financing in HVAC installations has never been high, but is especially weak compared to previous years given these current circumstances in the Powell River housing market.

One contractor indicated that financing could play a bigger role in expanding the accessibility of retrofits if the terms were supportive of lower-income homeowners, either through relaxed credit requirements or low interest rates. In general contractors felt that most of their current clients did not require financing, but that most of their clients were also not lower-income. Therefore, a significant financing gap might exist that could be targeted specifically to these homeowners.

Provincial Financing

There has been no uptake of the Provincial Government's zero-interest heat pump installation loans in the City of Powell River. However, a major barrier to this program's adoption is the requirement to forego available heat pump rebates, which are currently up to \$6000 from CleanBC in addition to \$5000 in Canada Greener Homes grants. As a result, this financing program, offered in partnership with Financeit, has seen very little uptake province-wide.

While not available in Powell River, FortisBC offers a Heat Pump Loan of up to \$6,500 over a ten-year term at a 1.9% fixed interest rate for its electric customers to upgrade from an electric heating system. Prequalification is based on a credit check as well as utility payment history. The contractor is paid directly by Fortis, but as with Financeit, household must choose between accessing the rebate or the loan. In recent years, participants have preferred rebates over loans.⁶¹

Lessons from Other Jurisdictions

Past local campaigns that collected data on the number of post-retrofit energy evaluations completed as part of their programs saw an increase of 2-16 times over evaluation rates in the rest of the province, indicating significant increases in retrofit activity compared to homeowners without access to these programs.⁶² A combination of literature review and informal interviews was employed to glean relevant learnings.

A 2014 analysis by the Community Energy Association highlighted some key program components that serve to address common barriers to retrofits. These recommendations included:

- The presence of program coordinators to guide participants through the retrofit process
- Reduced-cost or free EnerGuide evaluations (particularly if required for incentive access)
- Effective local promotion and follow-up
- Close coordination with local contractors

These findings are in line with our experience interviewing program coordinators from across the province, most of whom indicated that an engaged program coordinator, supported by resources for outreach and follow-up, is critical to successful recruitment and conversion of homeowners. Elements of program design that reduce participants' barriers to entry, e.g. low-cost and streamlined access to home evaluations, and a clear pathway to accessing contractors and rebates, are also critical factors for success.

Focusing specifically on the financing aspects of the programs examined, perhaps the most important lesson is that financing schemes must have competitive interest rates and low barriers. Unfortunately, many have failed to satisfy one or both of these key conditions, which is likely part of the reason many of the programs have seen extremely low uptake.

Barriers restricting access and challenges reducing uptake of financing programs include:

⁶¹ Personal communication, Jones, K. (2021, Sept. 28).

⁶² *Home energy retrofit incentive campaigns analysis report*, p. 53.

- Stringent underwriting criteria, such as requiring credit scores/history or long periods of uninterrupted utility bill payments
- Requiring assessments and upgrades to be paid for by the household up front, prior to applying for and receiving the loan
- Uncompetitive interest rates
- Little or no contractor engagement and buy-in
- Restriction to only one or a few types of upgrades

Historical programs that have seen very low or no financing uptake include Vancouver's HERO program, Solar Colwood, and the Rossland, Kootenay, and East Kootenay Energy Diets.

The financing programs that stand out as exceptions with significantly higher uptake than others are the Penticton component of the Okanagan Energy Diet and Nelson EcoSave, with 59% and 44% (respectively) of all program participants who completed post-retrofit audits using financing. In both cases, financing was provided by the municipal utilities via an on-bill financing mechanism. Contributing factors to the success of Nelson's financing program included one-on-one support from a coordinator removing all of the above-listed barriers, with the exception that it too unfortunately requires up-front payment for retrofit completion before a loan can be approved.

Section 5: Housing Archetypes and Energy Modelling

Selection and Modelling Process

For the purposes of this study, seven housing archetypes were selected for energy modelling through an in-person EnerGuide evaluation. These archetypes were based on housing types that are common throughout the City and representative of different eras of construction. Of the seven archetype models, six are single detached homes and one is a semi-detached rowhouse. An evaluation of an apartment unit was planned, but not completed due to a lack of units available to assess. The seven archetype homes selected for this study included:

1. A mid-sized original Townsite home heated with natural gas
2. A mid-sized older home in Cranberry heated with natural gas
3. A small rancher in Westview heated with electric baseboards
4. A mid-sized split-level home in Westview heated with an electric heat pump
5. A mid-sized home with developed basement in Westview heated with an oil furnace⁶³
6. A larger, modern home in Westview heated with natural gas
7. A small rowhouse in Westview heated with natural gas

After the on-site energy evaluation was completed, computer energy models were developed for the housing archetypes in HOT2000, following the EnerGuide evaluation process for existing homes. Representative energy upgrades were then modelled for each archetype, based on the most common and impactful energy upgrades for each housing type. These upgrades fall into four broad categories:

- Air sealing and weather sealing
- Window and door upgrades
- Insulation upgrades (including basement, crawlspace, wall and ceiling insulation)
- Heating system upgrades (in order to maintain a focus on GHG emission reductions, this analysis included only electric heat pump retrofits and did not consider the replacement of fossil fuel burning appliances with more efficient equivalents)

Finally, representative energy savings, cost savings⁶⁴, GHG emission reductions and payback time was calculated for each upgrade in all of the archetype homes. Initial cost of the upgrades is broken down into estimated rebate and homeowner-paid amounts, and is based on a combination of project experience and information from local contractors. These costs are highly variable depending on the contractor, type of home and upgrade and should be considered as representative estimates only.

⁶³ Due to a lack of homes available for evaluation locally, this energy model was based on an in-person assessment performed on a similar home on northern Vancouver Island, with key parameters including weather data changed to reflect conditions in Powell River.

⁶⁴ Cost savings are based on the following monthly utility rates from late 2021: BC Hydro basic charge \$6.24, <675kWh @ \$0.0939/kWh, >675kWh @ 0.1408/kWh. FortisBC basic charge \$12.65, \$11.57/GJ (including carbon tax). Current rates can be found at: <https://app.bchydro.com/accounts-billing/rates-energy-use/electricity-rates/residential-rates.html> and <https://www.fortisbc.com/accounts-billing/billing-rates/natural-gas-rates/residential-rates>.

Archetype Models

Archetype 1 – Townsite craftsman style home – gas furnace

Mid-sized single or 1.5 storey home built between 1908 and 1930. These homes may or may not have a heritage designation, and were typically heated with oil furnaces or wood stoves before the introduction of natural gas to the community. Many have little or no insulation in the walls and ceiling, original single-paned windows, earthen crawlspaces, and a moderate air tightness rating. These homes are often good candidates for insulation and heat pump upgrades.



Average annual energy costs: \$1396 electricity, \$1651 natural gas, \$3047 total. \$1.90/sf/year.

Average annual GHG emissions: 6.8 tCO₂e. 4.25 kg/sf/year.

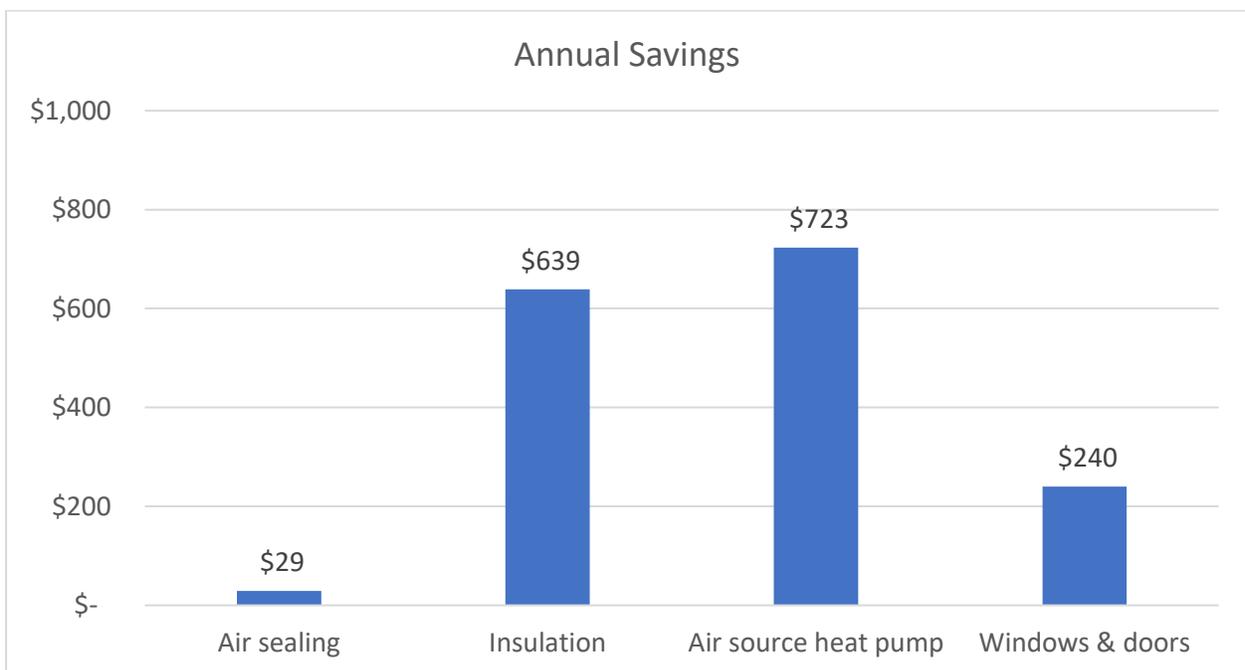
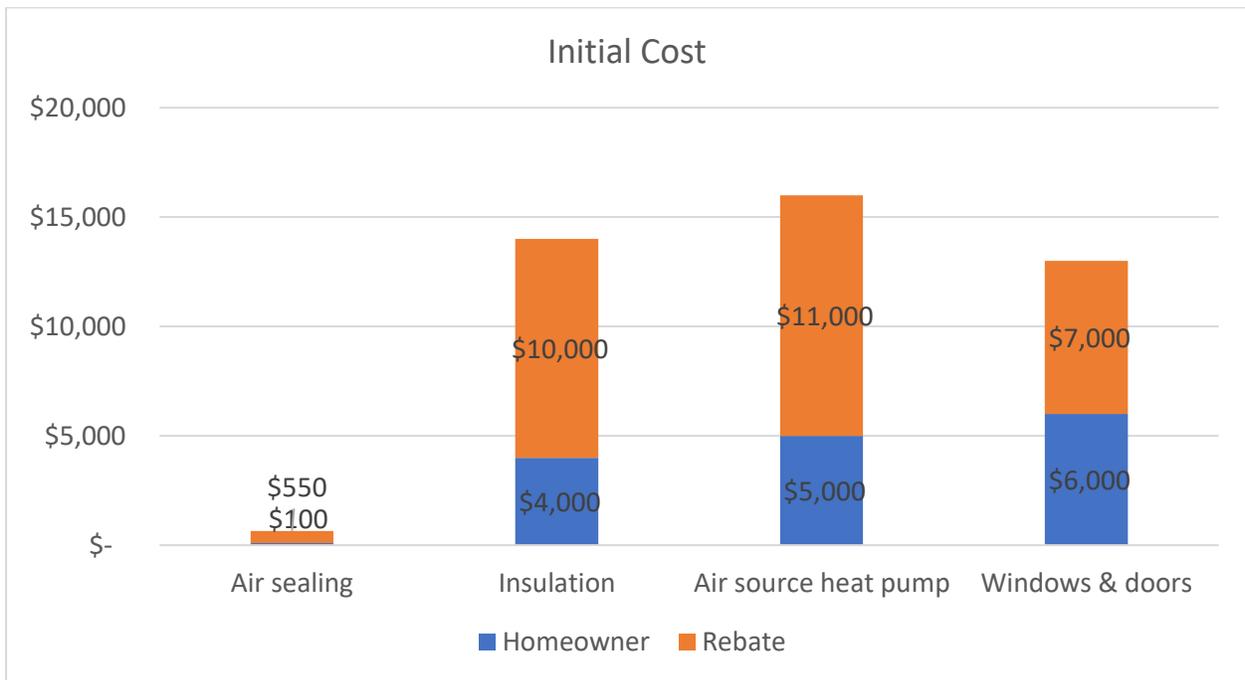
| Variable | Archetype 1 |
|-----------------------------------|-------------------------------------|
| Vintage | Pre-1930 |
| Floor area (sf) | 1600 |
| Primary heating source | Natural gas furnace, 78% efficiency |
| Hot water system | Electric tank |
| Ventilation type | None |
| Ceiling insulation (R) | 24 |
| Wall insulation (R) | None |
| Foundation insulation (R) | None |
| Windows (RSI) | 0.17 |
| Doors (RSI) | 0.39 |
| Electricity consumption (GJ) | 43 |
| Natural gas consumption (GJ) | 130 |
| Energy score (GJ) | 173 |
| Carbon score (tCO ₂ e) | 6.8 |
| Air Tightness (ACH50) | 7.4 |

Other example:



Modelled upgrades for Archetype 1 included:

- Improve airtightness by 11% to 6.5 air changes per hour
- Blown cellulose insulation in 2x4 wall cavities to R-12
- R-12 insulation added to crawlspace and foundation walls
- Upgrade 11 single-paned windows to double-paned, vinyl units
- Upgrade all doors to foam core insulated type
- Installation of a centrally-ducted air source heat pump with HSPF of 10



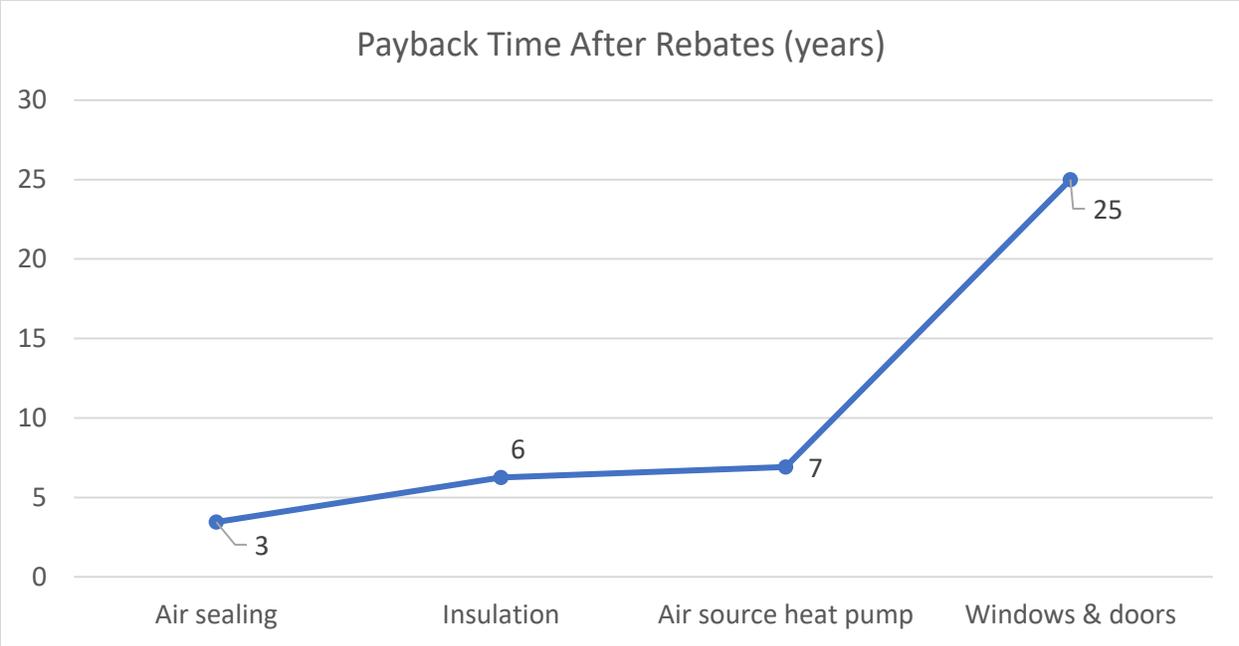


Figure 16: Upgrade cost and impact for Archetype 1

Archetype 2 – Cranberry single storey home – gas furnace

Smaller, single storey home built between 1930-1960 in Cranberry. Some of these homes continue to utilize oil furnaces, while some are electrically heated and some use natural gas. Many of these homes have low levels of wall and ceiling insulation, poor airtightness ratings, and single or double paned windows. These homes are often good candidates for insulation, air sealing and window upgrades.

Average annual energy costs: \$786 electricity, \$1630 natural gas, \$2417 total

Average annual GHG emissions: 6.7 tCO₂e/year. 2.3 kgCO₂e/sf/year.



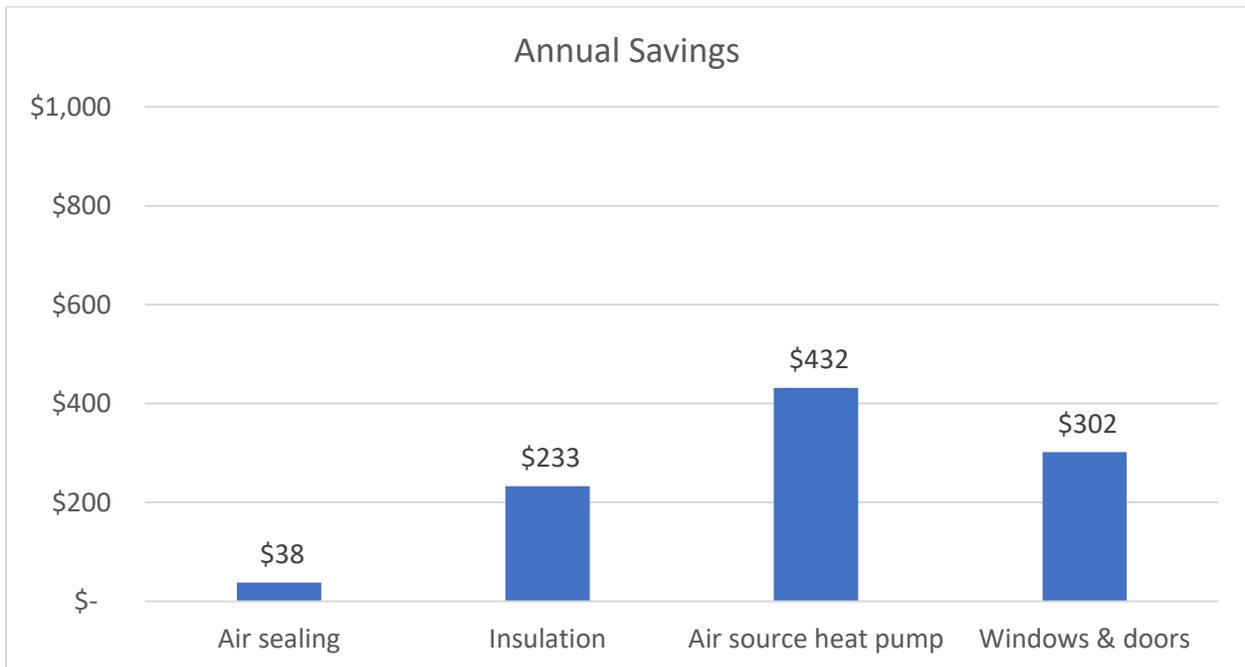
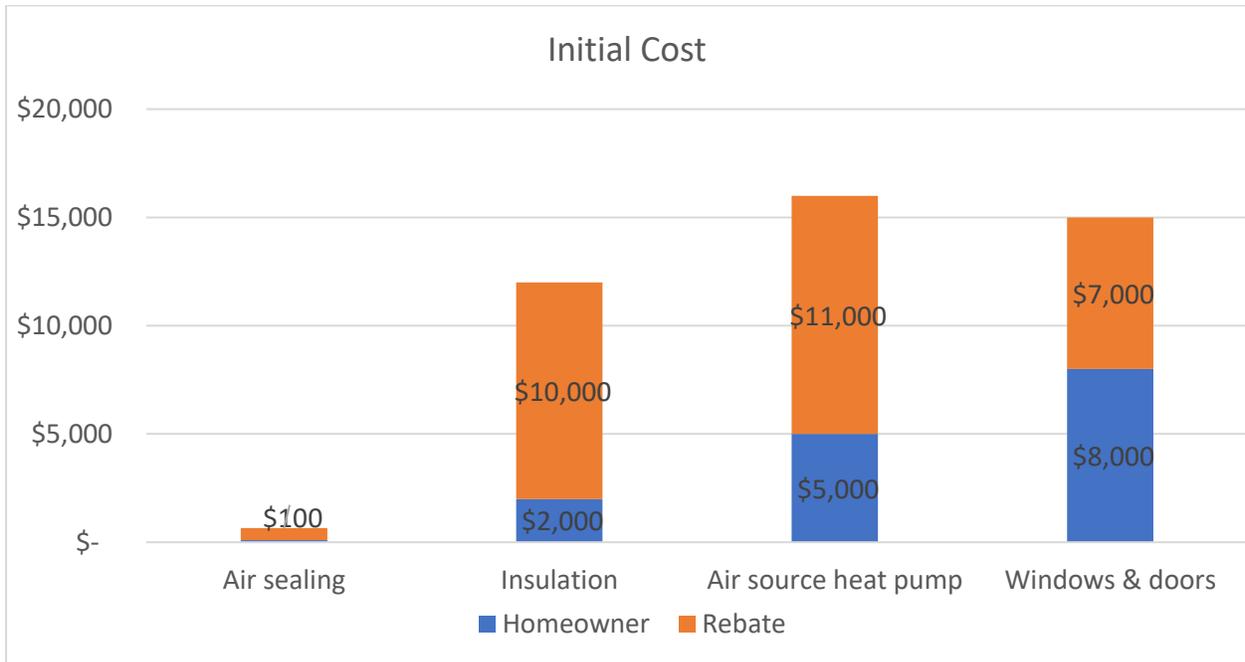
| Variable | Archetype 2 |
|-----------------------------------|-------------------------------------|
| Vintage | 1930s-1950s |
| Floor area | 2900 sf |
| Primary heating source | Natural gas furnace, 78% efficiency |
| Hot water system | Natural gas tank |
| Ventilation type | None |
| Ceiling insulation (R) | 20 |
| Wall insulation (R) | 10 |
| Foundation insulation (R) | N/A |
| Windows (RSI) | 0.8 |
| Doors (RSI) | 0.29 |
| Electricity consumption (GJ) | 27 |
| Natural gas consumption (GJ) | 128 |
| Energy score (GJ) | 155 |
| Carbon score (tCO ₂ e) | 6.7 |
| Air Tightness (ACH50) | 8.75 |

Other examples:



Modelled upgrades for Archetype 2 included:

- Improve airtightness by 15% to 7.5 air changes per hour
- Insulate main walls to R-20
- Insulate foundation walls to R-20
- Upgrade 15 single-paned windows to double-paned vinyl units
- Upgrade all doors to foam core insulated type
- Installation of a centrally-ducted air source heat pump with HSPF of 10



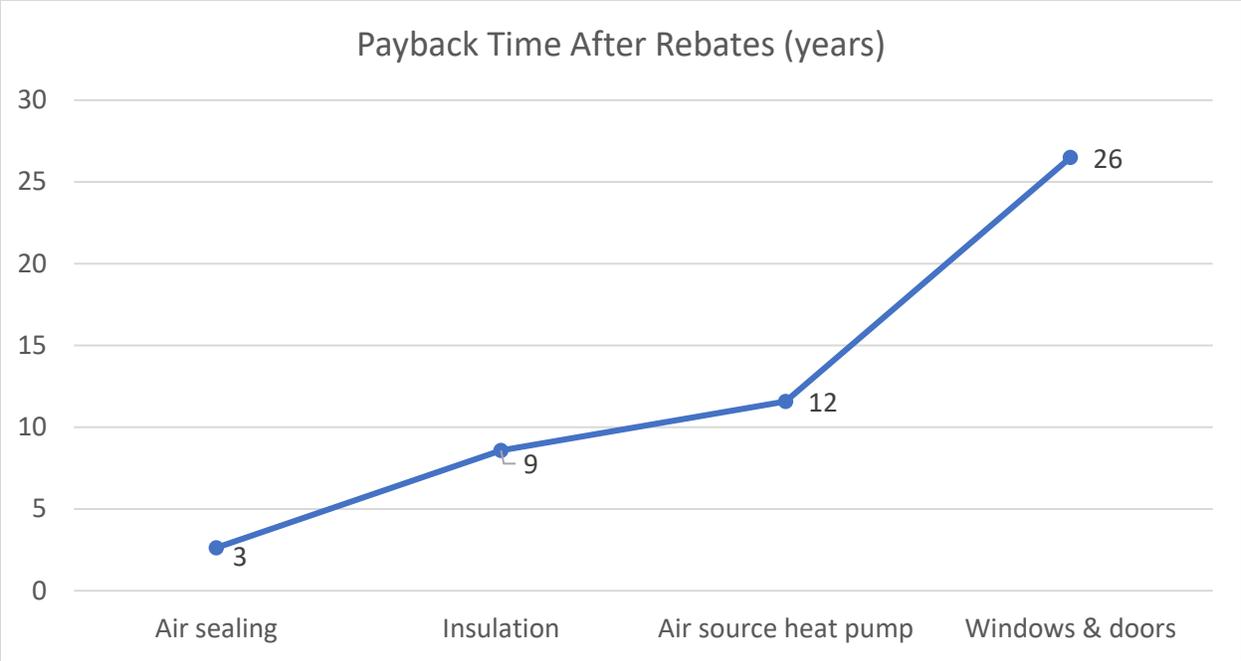


Figure 17: Upgrade cost and impact for Archetype 2

Archetype 3 – Single storey walk-in rancher – electric baseboard

Single level, mid-sized home popular throughout Powell River. Built across several decades with widely differing construction types and energy performance. Slab on grade or shallow crawlspace with baseboard electric or natural gas heating. This archetype represents an older home with a poor air tightness rating that is an excellent candidate for retrofits. These homes may be good candidates for air sealing and mini-split heat pumps.



Average annual energy costs: \$2869 electricity. \$3.25/sf/year.

Average annual GHG emissions: 0.3 tCO₂e. 0.34kg/sf/year.

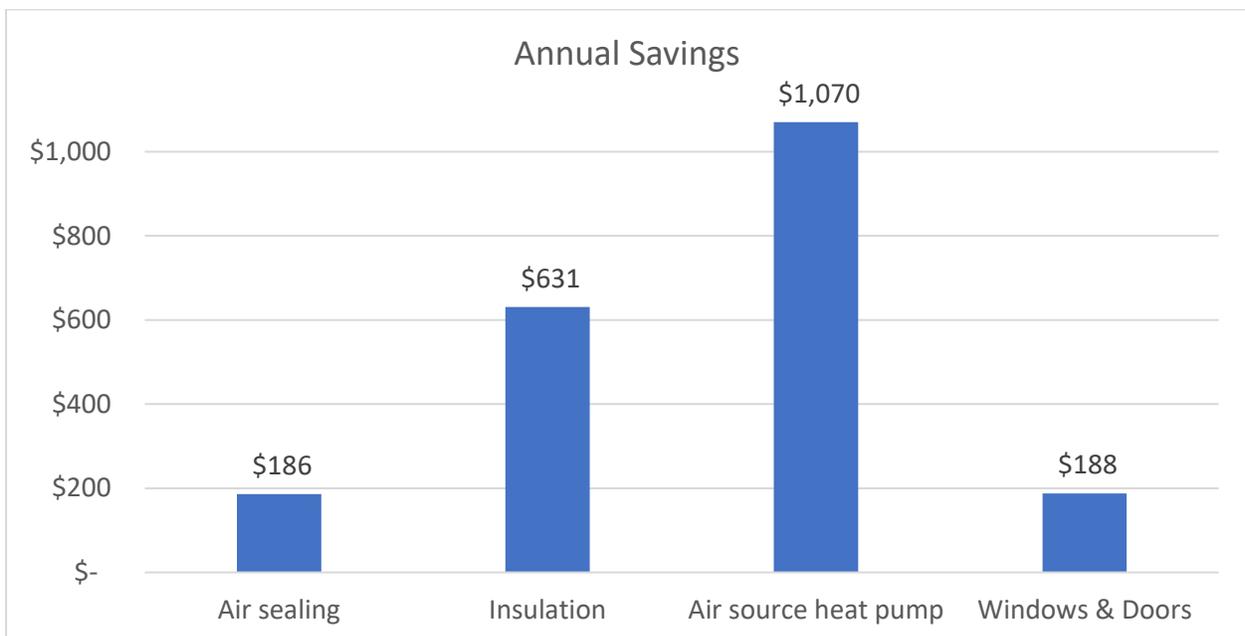
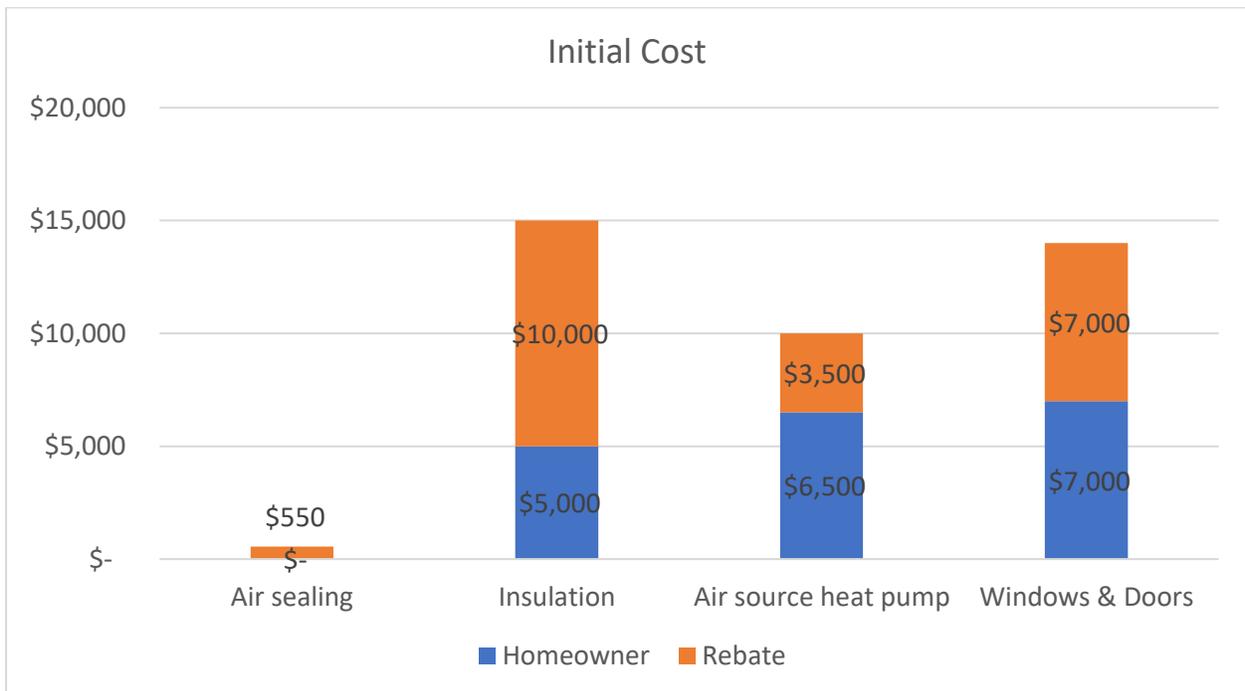
| Variable | Archetype 3 |
|-----------------------------------|--------------------|
| Vintage | 1960s-2020s |
| Floor area (sf) | 900 |
| Primary heating source | Electric baseboard |
| Hot water system | Electric tank |
| Ventilation type | None |
| Ceiling insulation (R) | 10 |
| Wall insulation (R) | 12 |
| Foundation insulation (R) | None |
| Windows (RSI) | 0.36 |
| Doors (RSI) | 0.39 |
| Electricity consumption (GJ) | 81 |
| Natural gas consumption (GJ) | None |
| Energy score (GJ) | 81 |
| Carbon score (tCO ₂ e) | 0.3 |
| Air Tightness (ACH50) | 16.5 |

Other example:



Modelled upgrades for Archetype 3 included:

- Improve airtightness by 31% to 11.4 air changes per hour
- Insulate main walls to R-15
- Insulate crawlspace walls to R-12
- Insulate cathedral ceiling to R-40
- Upgrade 15 double-paned windows to triple-paned vinyl units
- Installation of a ductless air source heat pump with HSPF of 10



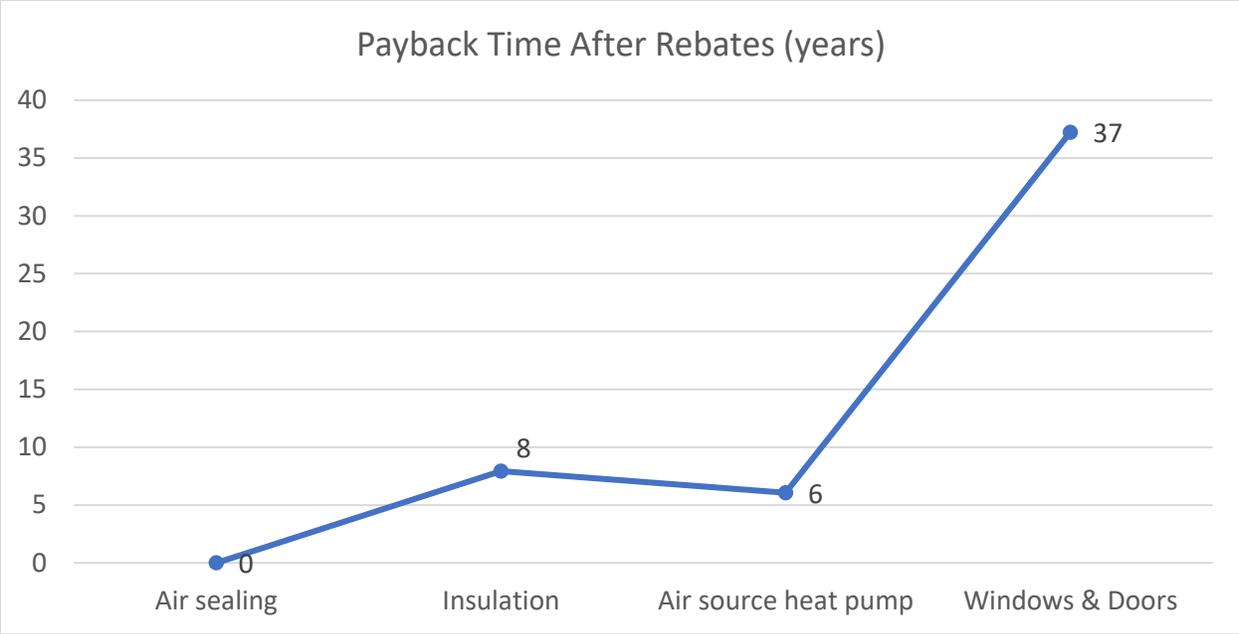


Figure 18: Upgrade cost and impact for Archetype 3

Archetype 4 – Westview mid-century split level – electric heat pump

Split level home from the mid- 20th century with full basement and sealed crawlspace components. Upgraded windows and doors, with natural gas or electric heating. Moderate wall and ceiling insulation and air tightness levels typical for the period. This archetype represents a home that has already upgraded to an air source heat pump, but retains original insulation throughout. Good candidate for insulation upgrades and air sealing.



Average annual energy costs: \$1536 electricity, \$430 natural gas, \$1967 total. \$1.16/sf/year.

Average annual GHG emissions: 1.4 tCO₂e. 0.82kg/sf/year.

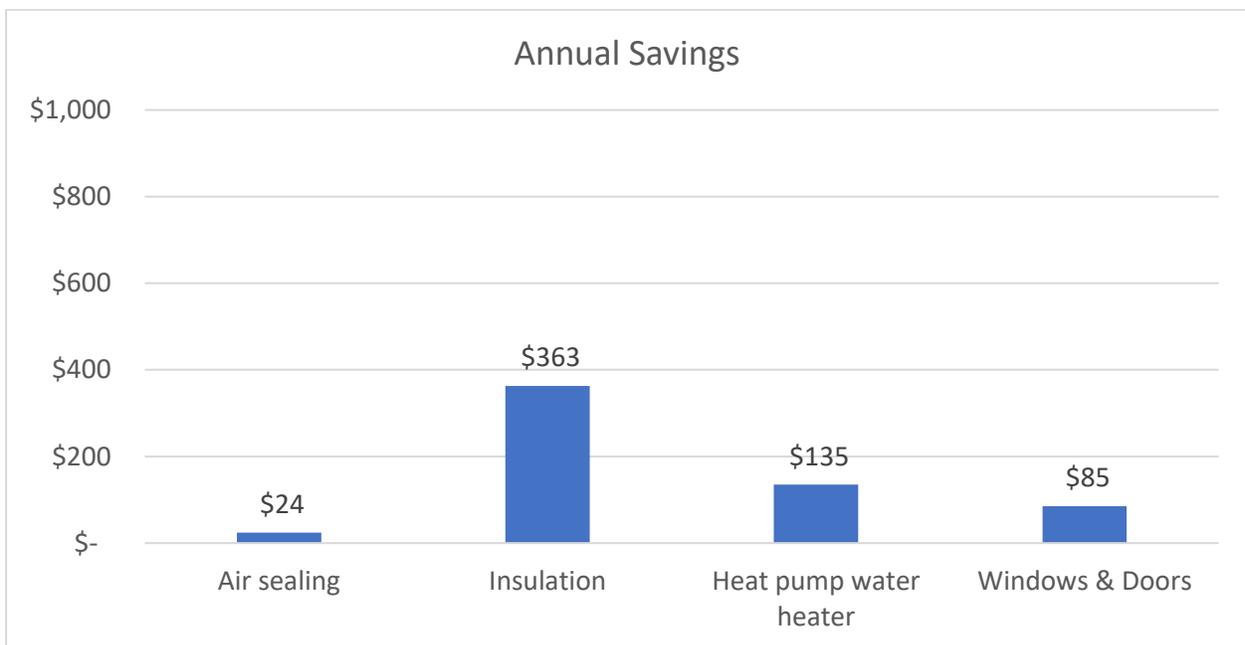
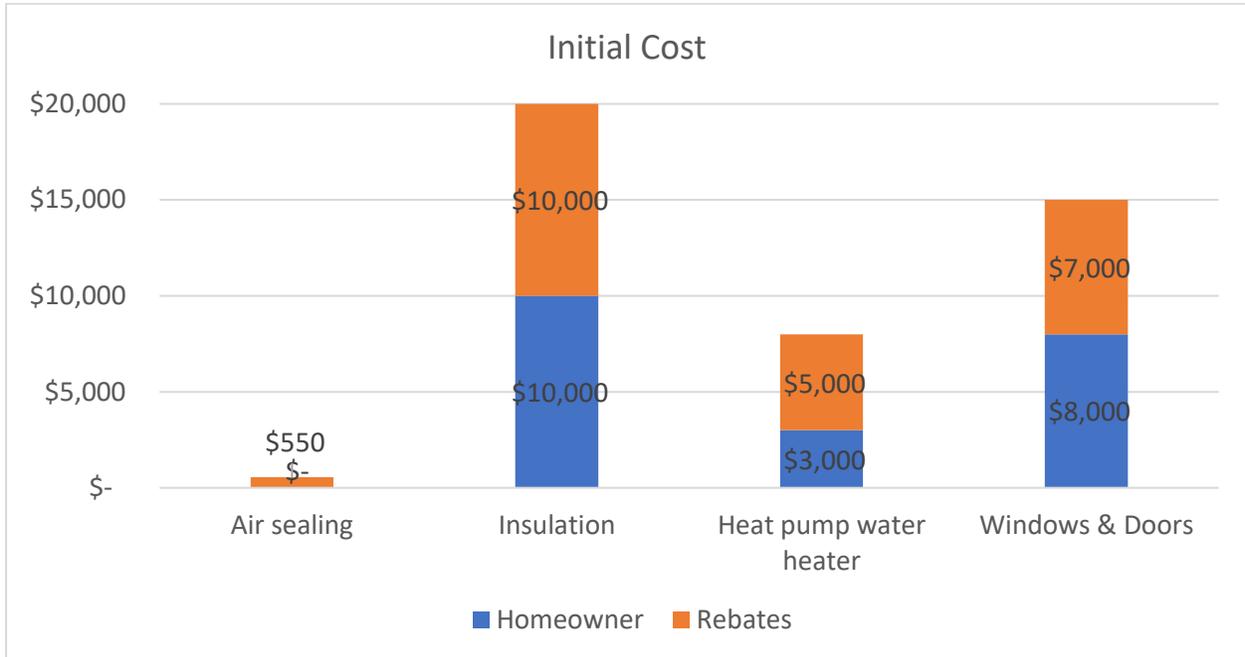
| Variable | Archetype 4 |
|-----------------------------------|----------------------------|
| Vintage | 1960s-1970s |
| Floor area (sf) | 1800 |
| Primary heating source | Central heat pump, HSPF 10 |
| Hot water system | Natural gas |
| Ventilation type | None |
| Ceiling insulation (R) | 10 |
| Wall insulation (R) | 8 |
| Foundation insulation (R) | None |
| Windows (RSI) | 0.34 |
| Doors (RSI) | 0.39 |
| Electricity consumption (GJ) | 46 |
| Natural gas consumption (GJ) | 24 |
| Energy score (GJ) | 70 |
| Carbon score (tCO ₂ e) | 1.4 |
| Air Tightness (ACH50) | 7.7 |

Other example:



Modelled upgrades for Archetype 4 included:

- Improve airtightness by 12% to 6.8 air changes per hour
- Insulate main walls to R-22
- Insulate crawlspace and foundation walls to R-12
- Insulate attic to R-50
- Upgrade 10 double-paned window to triple-paned vinyl
- Upgrade 2 doors to insulated foam core type
- Installation of a heat pump water heater with a uniform energy factor of 2.25



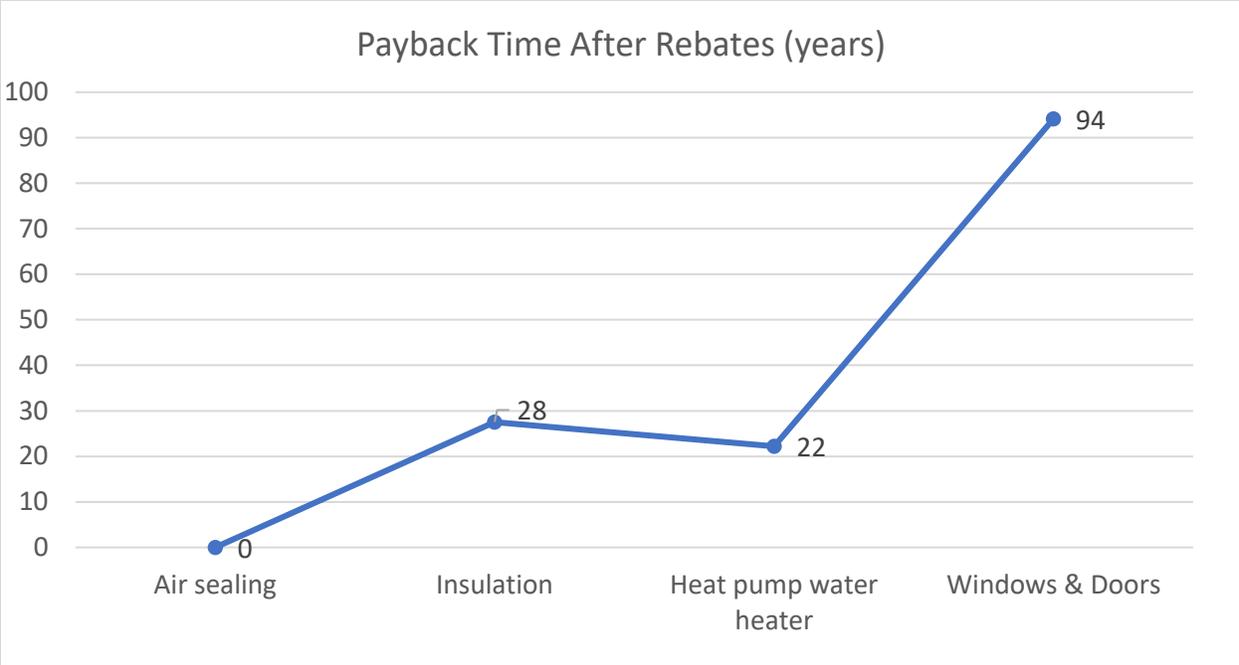


Figure 19: Upgrade cost and impact for Archetype 4

Archetype 5 – Mid-late 20th century split-entry – oil furnace

Extremely common housing archetype throughout Powell River. Split entry with a shallow basement, many with original deck over carport configuration converted to upstairs living space and/or garage. Moderate levels of wall and ceiling insulation and air tightness typical for the period. Often originally heated with oil, many homes have converted to natural gas. Often good candidates for insulation and central heat pumps (especially if still using oil).



Average annual energy costs: \$1377 electricity, \$2910 heating oil, \$4288 total. \$2.26/sf/year.

Average annual GHG emissions: 7.9 tCO₂e. 4.2 kg/sf/year.

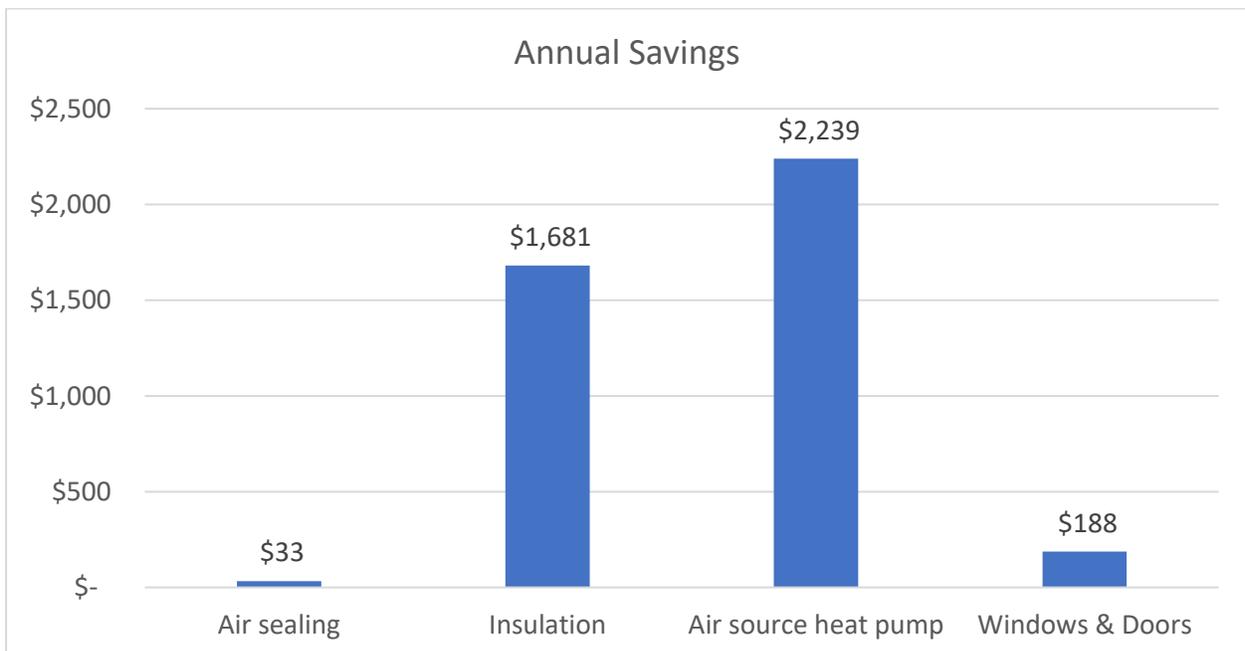
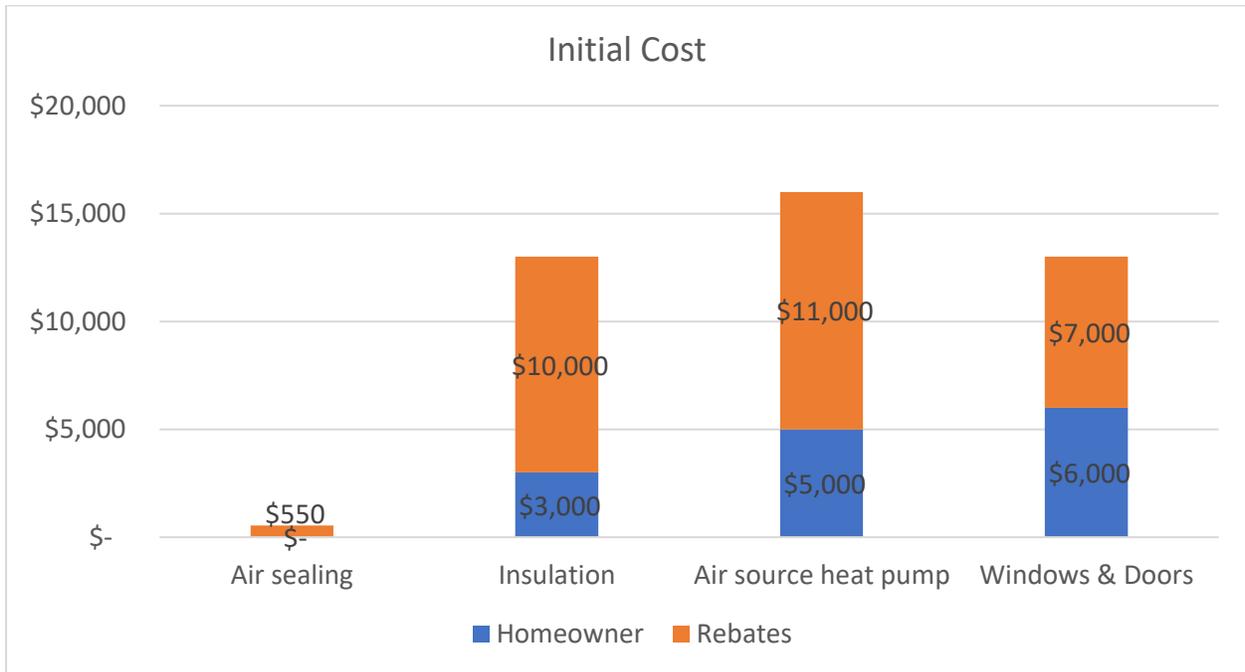
| Variable | Archetype 5 |
|-----------------------------------|------------------------------------|
| Vintage | 1960s-1980s |
| Floor area (sf) | 1900 |
| Primary heating source | Heating oil furnace, 71% efficient |
| Hot water system | Electric tank |
| Ventilation type | None |
| Ceiling insulation (R) | 12 |
| Wall insulation (R) | 12 |
| Foundation insulation (R) | None |
| Windows (RSI) | 0.14 |
| Doors (RSI) | 0.39 |
| Electricity consumption (GJ) | 42 |
| Heating oil consumption (GJ) | 110 |
| Energy score (GJ) | 151 |
| Carbon score (tCO ₂ e) | 7.9 |
| Air Tightness (ACH50) | 4.92 |

Other examples:



Modelled upgrades for Archetype 5 included:

- Improve airtightness by 27% to 3.6 air changes per hour
- Insulate crawlspace and foundation walls to R-20
- Insulate attic to R-40
- Upgrade 12 single-paned window to double-paned vinyl
- Upgrade 3 doors to insulated foam core type
- Installation of a central ducted air source heat pump with HSPF of 10



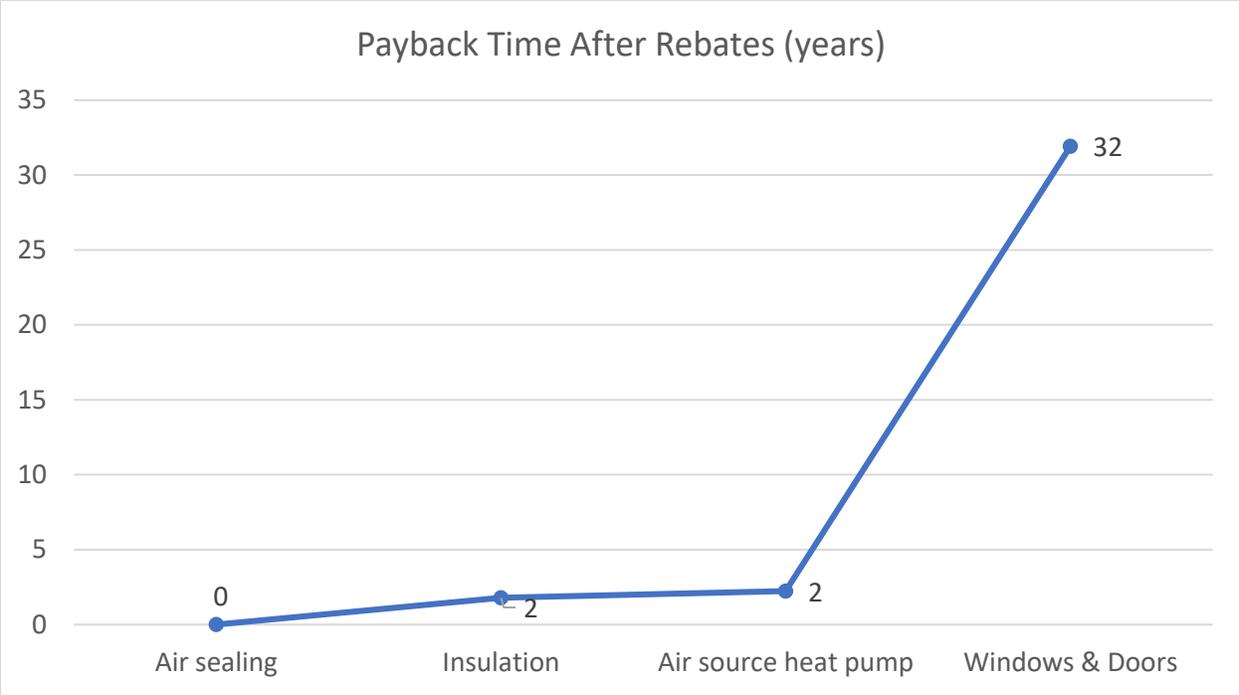


Figure 20: Upgrade cost and impact for Archetype 5

Archetype 6 – Modern Westview large home – gas furnace

This archetype is typical of larger single-family homes built in newly developed areas of Westview in the late 20th and early 21st centuries. Large amounts of glazing, larger floor area, and natural gas heating are typical for this vintage of home. Modern levels of insulation in ceilings, walls and crawlspaces, with good airtightness ratings. These homes are good candidates for central heat pumps and heat pump water heaters.



Average annual energy costs: \$769 electricity, \$1224 natural gas, \$1993 total. \$0.81/sf/year.

Average annual GHG emissions: 4.4 tCO₂e. 1.80kg/sf/year.

| Variable | Archetype 6 |
|-----------------------------------|------------------------------------|
| Vintage | 1990s-2010s |
| Floor area (sf) | 2450 |
| Primary heating source | Natural gas furnace, 80% efficient |
| Hot water system | Natural gas tank |
| Ventilation type | None |
| Ceiling insulation (R) | 40 |
| Wall insulation (R) | 20 |
| Foundation insulation (R) | 10 |
| Windows (RSI) | 0.36 |
| Doors (RSI) | 1.14 |
| Electricity consumption (GJ) | 27 |
| Natural gas consumption (GJ) | 92 |
| Energy score (GJ) | 119 |
| Carbon score (tCO ₂ e) | 4.4 |
| Air Tightness (ACH50) | 5.3 |

Other examples:



Modelled upgrades for Archetype 6 included:

- Improve airtightness by 10% to 4.8 air changes per hour
- Upgrade 21 double-paned window to triple-paned vinyl
- Installation of a central ducted air source heat pump with HSPF of 10
- Installation of a heat pump water heater with a uniform energy factor of 2.7



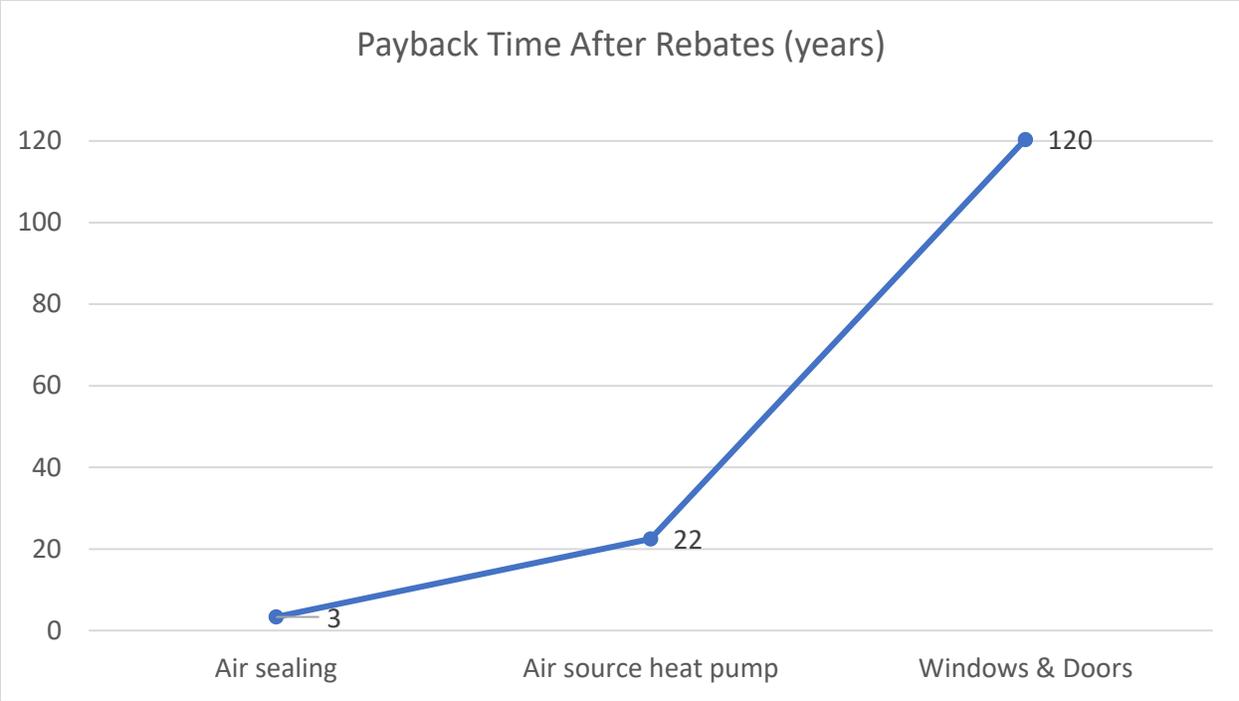


Figure 21: Upgrade cost and impact for Archetype 6

Archetype 7 – Rowhouse – gas furnace

Small, 2 storey rowhouse (townhome) built between 1980 and 2000. These homes are heated by electric baseboard or natural gas. Generally good levels of insulation in the attic, walls and crawlspace, and a moderate air tightness rating. These homes can be prone to overheating, and are good candidates for air source heat pumps due to their summer cooling capability.



Average annual energy costs: \$750 electricity, \$452 natural gas, \$1202 total. \$1.28/sf/year.

Average annual GHG emissions: 1.4 tCO₂e. 1.49 kg/sf/year.

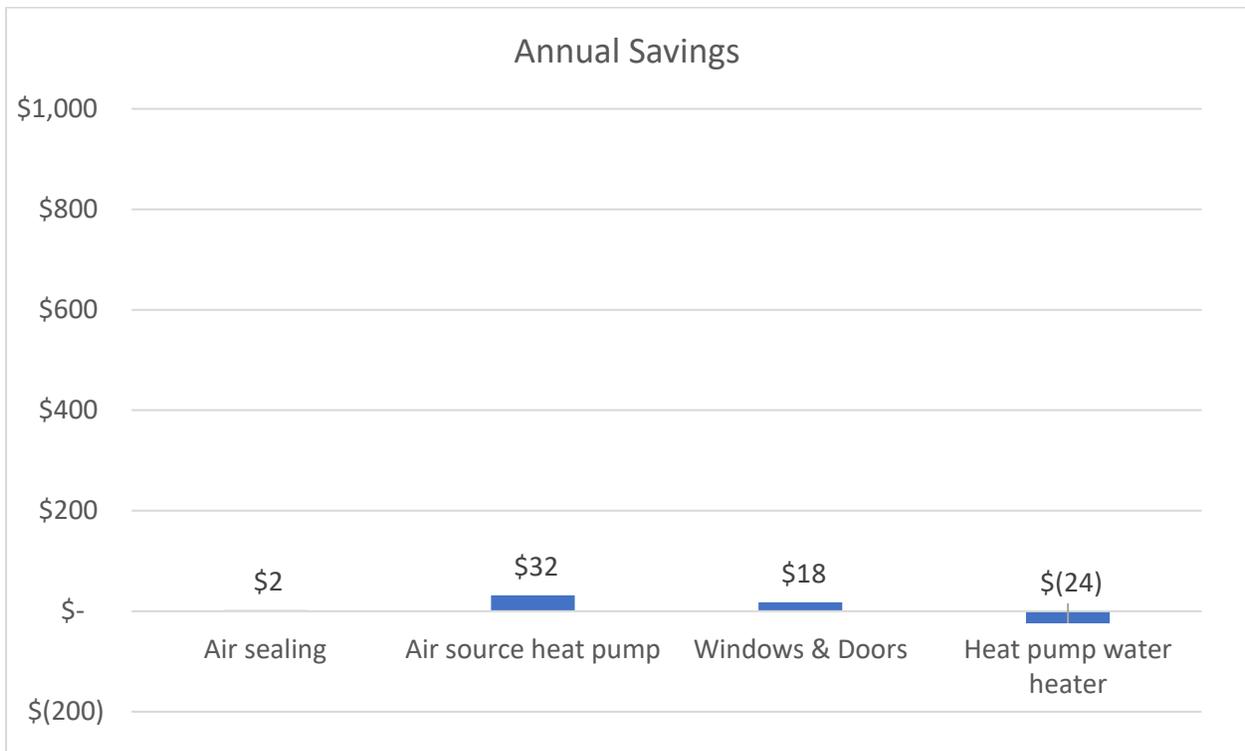
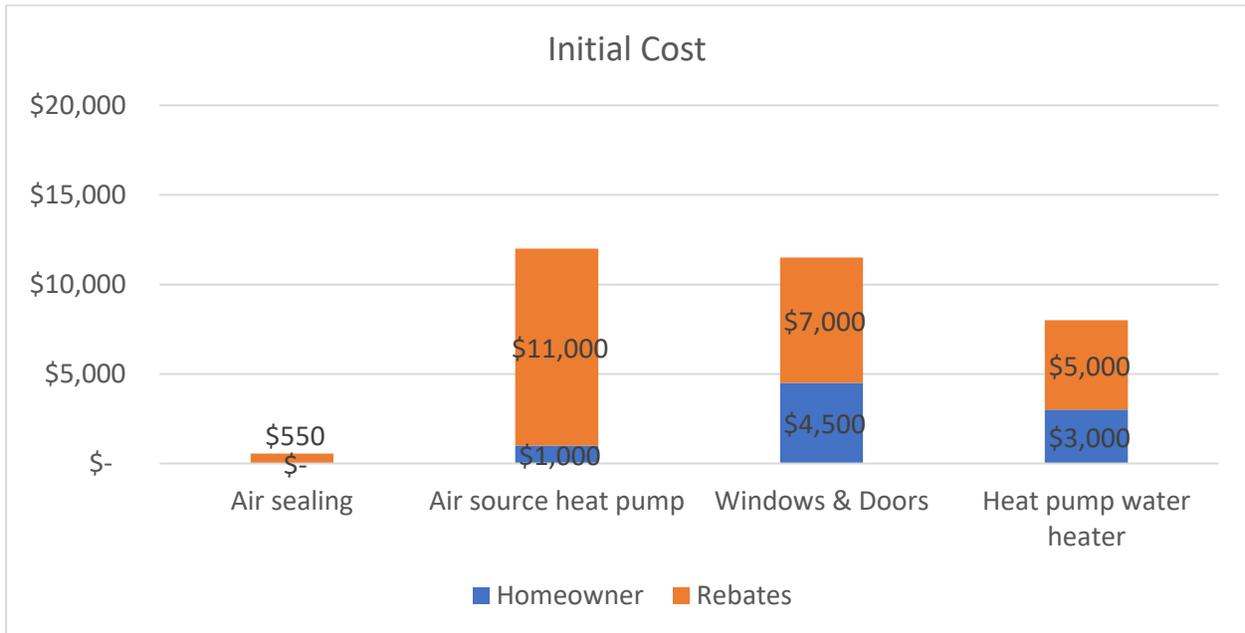
| Variable | Archetype 7 |
|-----------------------------------|---------------------|
| Vintage | 1980s-1990s |
| Floor area (sf) | 1000 |
| Primary heating source | Natural gas furnace |
| Hot water system | Natural gas tank |
| Ventilation type | None |
| Ceiling insulation (R) | 40 |
| Wall insulation (R) | 20 |
| Foundation insulation (R) | 12 |
| Windows (RSI) | 0.36 |
| Doors (RSI) | 0.98 |
| Electricity consumption (GJ) | 26 |
| Natural gas consumption (GJ) | 26 |
| Energy score (GJ) | 52 |
| Carbon score (tCO ₂ e) | 1.4 |
| Air Tightness (ACH50) | 7.7 |

Other example:



Modelled upgrades for Archetype 7 included:

- Improve airtightness by 12% to 6.7 air changes per hour
- Upgrade 6 double-paned windows to triple-paned vinyl
- Installation of a central ducted air source heat pump with HSPF of 10
- Installation of a heat pump water heater with a uniform energy factor of 2.25



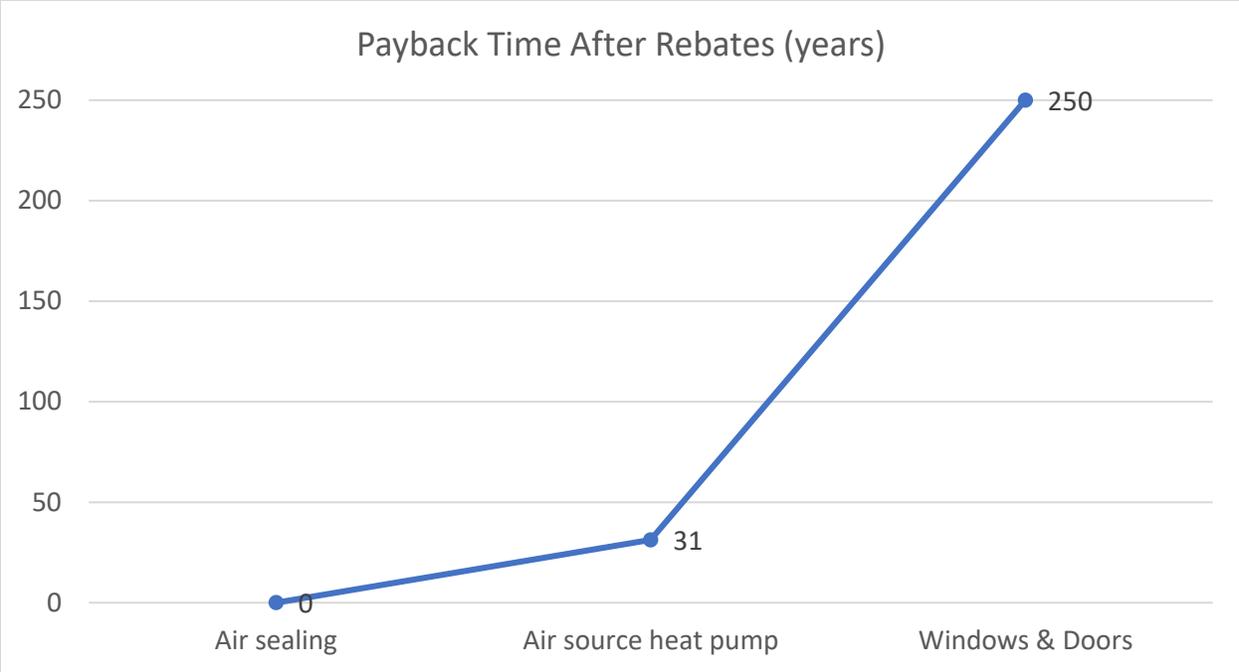


Figure 22: Upgrade cost and impact for Archetype 7

Modelling Results

The following table provides a comparison of the opportunity provided by each major type of retrofit.

| Archetype and Retrofit measure | Payback time | Energy Savings | GHG Savings (tCO ₂ e/yr) ⁶⁵ |
|---|--------------|----------------|---|
| Heat Pump | | | |
| 1. Older gas furnace, very poor envelope | 8 | 60% | 5.3 |
| 2. Older gas furnace, poor envelope | 12 | 55% | 4.3 |
| 3. Electric baseboard, very poor envelope | 6 | 30% | <0.5 |
| 4. ASHP heat, medium envelope | - | - | - |
| 5. Oil heat, medium envelope | 2 | 25% | 5.4 |
| 6. Gas heat, good envelope, large | 22 | 9% | 2.2 |
| 7. Gas heat, good envelope, small | 31 | 8% | 1.3 |
| Insulation | | | |
| 1. Older gas furnace, very poor envelope | 6 | 27% | 2.7 |
| 2. Older gas furnace, poor envelope | 9 | 13% | 1.0 |
| 3. Electric baseboard, very poor envelope | 8 | 20% | <0.5 |
| 4. ASHP heat, medium envelope | 28 | 13% | <0.5 |
| 5. Oil heat, medium envelope | 2 | 27% | 3.9 |
| 6. Gas heat, good envelope, large | - | - | - |
| 7. Gas heat, good envelope, small | - | - | - |

⁶⁵ British Columbia Ministry of Environment and Climate Change Strategy. (2019). *2018 B.C. methodological guidance for quantifying greenhouse gas emissions*. Retrieved from <https://www2.gov.bc.ca/assets/gov/environment/climate-change/cng/methodology/2018-pso-methodology.pdf>

| Air Sealing | | | |
|---|-----|-----|------|
| 1. Older gas furnace, very poor envelope | 3 | 1% | <0.5 |
| 2. Older gas furnace, poor envelope | 3 | 2% | <0.5 |
| 3. Electric baseboard, very poor envelope | 0 | 6% | <0.5 |
| 4. ASHP heat, medium envelope | 0 | 1% | <0.5 |
| 5. Oil heat, medium envelope | 0 | 1% | <0.5 |
| 6. Gas heat, good envelope, large | 3 | 2% | <0.5 |
| 7. Gas heat, good envelope, small | 0 | 0% | <0.5 |
| Windows and Doors | | | |
| 1. Older gas furnace, very poor envelope | 25 | 12% | 1.0 |
| 2. Older gas furnace, poor envelope | 26 | 16% | 1.3 |
| 3. Electric baseboard, very poor envelope | 37 | 6% | <0.5 |
| 4. ASHP heat, medium envelope | 94 | 3% | <0.5 |
| 5. Oil heat, medium envelope | 32 | 4% | <0.5 |
| 6. Gas heat, good envelope, large | 120 | 8% | <0.5 |
| 7. Gas heat, good envelope, small | 250 | 3% | <0.5 |

Some general conclusions can be drawn from the above table.

For **heat pump retrofits**, the greatest energy savings will be realized in older homes with inefficient gas or oil furnaces. However, the fastest payback times for heat pumps will be seen in homes currently heating with electric baseboard heaters or oil – on the order of 2 to 6 years. In older natural gas heated homes, the payback times tend to be somewhat longer – 7 to 12 years. Newer homes with good energy efficiency will see a relatively smaller benefit from a heat pump, whether heated by fossil fuels or electricity. Payback times aside, heat pump retrofits are the measure with the single greatest potential impact on energy use and GHG emissions, with the potential to nearly eliminate emissions in many homes currently heating with oil or natural gas.

Insulation upgrades are shown to represent the highest energy savings and best payback times for older homes with poor energy efficiency, currently heating with fossil fuels. This is

unsurprising, since older homes tend to have lower levels of insulation, or no insulation particularly in foundations. Overall, insulation upgrades represent the second greatest potential for energy savings and GHG reductions. While they do not present the same level of savings as a heat pump retrofit in many homes, the payback times can be faster in some cases. 5-10 years is a common payback time for insulation upgrades, across several heating system types and fuels.

Air sealing was shown to have marginal benefit in terms of energy savings or GHG reductions, except in homes with very serious airtightness issues (e.g., a missing window or open hole in the building envelope). Air sealing generally has a fast payback time – from 1 to 3 years – but the overall benefits are marginal.

Window and door upgrades are, generally speaking, the most expensive upgrade type with the slowest payback period. Window upgrades often do not pay back on energy savings alone during the useful life of the window itself. Payback times were 25+ years across all housing types. These upgrades can be beneficial in certain circumstances, for example, homes which still have a large number of original single pane windows or homes that have moisture or mildew issues with their existing windows. Overall, window and door upgrades should be considered as part of an overall renovation or to address a failed assembly, but are unlikely to be competitive measures on an energy savings basis alone.

Based on this analysis, **we recommend prioritizing** heat pump retrofits in electric and oil heated homes, and a combination of heat pump and insulation upgrades in gas heated homes with poor building envelopes. On the basis of energy savings alone, it is difficult to justify retrofits of gas heated homes with good building envelopes, however the GHG reduction potential from these homes is significant. We do not recommend air sealing or window and door upgrades as standalone measures justified on an energy efficiency or GHG reduction basis, however these measures can be worthwhile when considering multiple upgrades and/or extensive renovations.

Section 6: Retrofit Program Design

As a first discussion of potential design options for a retrofit program serving the City of Powell River and surrounding region, we first present some suggested guiding principles, as well as a number of technical and administrative considerations.

Principles of Program Design

In addition to purely technical or practical considerations, our belief is that a number of core principles should guide all aspects of retrofit program design, at every stage of the process from goal-setting through implementation, evaluation and iteration. These principles are inspired in part by a recent Urban Sustainability Directors Network (USDN) report on equitable clean energy program design for local governments, published in late 2018.⁶⁶

Transparency

Municipalities and program partners should seek meaningful engagement with the community, and be transparent about the resources and processes that will guide the program. Ideally, the served community should help define program goals and be involved with evaluating and improving the program. This can be accomplished through direct engagement or by working with trusted local organizations.

Inclusivity

A home retrofit program should seek to reduce barriers to participation for all residents, including vulnerable, underserved and systemically disadvantaged groups. Program participation should be simple, efficient and culturally appropriate, with alternative participation methods made available e.g. to those without consistent access to internet services. An equity-based program design will also seek to improve participation by low- and moderate-income households, BIPOC residents and other populations that have not been able to benefit from historical programs.

Commitment

Programs should establish baselines and metrics to track equity targets, including participation by underserved or disadvantaged populations, and commit to a long-term support structure that tracks progress against these metrics and continuously improves programs to increase impact and improve community resilience in these populations. Program administrators should also carefully consider consumer and worker protection as part of program design, through contractor and workforce training and certification as well as homeowner and tenant education.

Meaningful Impact

A well-designed retrofit program will seek to go beyond “low hanging fruit” and traditional target markets in order to drive toward meaningful cost savings, health benefits, and housing resilience for program participants. Energy efficiency and fuel switching are key pathways toward reducing household cost burdens, improving home health and comfort, and lifting residents out of energy poverty. Home energy upgrades can also meaningfully contribute to

⁶⁶ *A guidebook on equitable clean energy program design for local governments and partners.*

climate resilience and adaptation in homes and buildings; this will be a critical concern for many communities as extreme weather events increase in frequency and severity.

Key Design Considerations

- Inclusion – the population of the region is diverse and includes the City of Powell River, the qathet Regional District, and Tla’amin Nation. The ideal financing solution will be accessible to all households in the region regardless of their location within municipal boundaries. Each model under consideration should be assessed for its applicability across each community type.
- Ease of Access – Our homeowner survey showed that a high percentage of residents are facing challenges paying their energy bills and some lack the financial means to pay for new efficiency retrofit measures. It will be fundamental that any new program is easy to access and does not present needless barriers for residents in need.
- Ease of Repayment – Our studies on financing mechanisms in other communities have identified clear and practical repayment mechanisms as one of the key considerations for any successful program.
- Alignment of Economic Incentives – A number of studies have identified that a misalignment of economic incentives is partly responsible for limited investment in household efficiency retrofits.
- Complexity and Administrative Burden – The simpler the model is to administer, the lower the administrative costs will be for the program and its participants. Programs should prioritize models with reasonable levels of complexity in execution.
- Partnerships – Most mechanisms will require the development and maintenance of partnerships between municipalities and external organizations. The feasibility of essential partnerships will be one of the key considerations informing project feasibility.
- Integration with Retrofit Contractors – Lack of awareness and access to local contractors and energy advisors was identified as a barrier to access efficiency upgrades in this study. Regardless of the mechanism, any financing program will be more successful if it can provide seamless integration with contractors for retrofit scoping, installation, and payment.
- Trust with Program Administration – Financing mechanisms will be evaluated on their ability to include local resources and skills and support local employment. Lack of familiarity and trust with broad-based programming has been identified as an important area of consideration in rural and remote contexts.
- Going beyond Financing - A study on energy efficiency retrofits by Canada’s Energy and Mines Ministers’ Conference, as well as reviews of municipal programs and feedback from communities point to the importance of complementing financing offers with other tools, such as raising awareness of opportunities and solutions, customized guidance on what needs to be done and who needs to do it, understanding of potential savings, and availability of grants/rebates in order to reduce the variety of barriers households face.⁶⁷

⁶⁷ *Financing energy efficiency retrofits in the built environment*, p. 13.

Financing Products and Options

Specific to the financing component of home retrofit program design, there are three leading options for a municipality to consider as targeted retrofit financing offers. These are:

- PACE financing, which is tied to the property tax bill and administered by the municipality
- On-bill financing, which is tied to the energy bill and administered by the utility
- Third-party financing, which is repaid traditionally and administered by a financial institution

In addition to these three options, there are offers designed to enhance the viability of a retrofit offer, including credit enhancements, loan loss reserves, and operating grants.

Property Assessed Clean Energy (PACE)

PACE financing is perhaps the most well-known example of municipally administered retrofit program models in North America. PACE loans are generally issued by a municipality (or a third-party program partner) and repaid through a homeowner's property tax bills. Like OBF loans, PACE financing has the advantage of being transferred from one property owner to another when a home is sold. Unlike OBF where this is accomplished by tying the loan to a utility meter, a PACE loan involves placing a lien on a property much like a mortgage. This mechanism offers advantages but can also pose problems when issues such as priority of liens and mortgage lender consent arise.

There are two primary mechanisms by which a municipality in BC is theoretically able to offer a PACE-style loan program:

1. LICs
2. Amended provincial legislation

The first option is through the mechanism of local improvement charges (LICs), which are an established method for financing community improvements such as sidewalks. BC's Community Charter sets out the areas of authority of municipalities in the province, including the power to levy local improvement charges (LICs) or local area services, which in BC are broadly defined as "service that the council considers provide particular benefit to part of the municipality," meaning it neither specific allows nor prohibits energy efficiency improvements on private property.⁶⁸

However, using LICs as a means to establish a PACE program for home energy retrofits is often considered unconventional and may be interpreted as not being within the spirit of this legislation and legal uncertainty around doing so remains. Costs to the municipality administering a LIC program include interest on capital expenditures, staff and council time,

⁶⁸ Queen's Printer. (2003). Division 5 – Local Service Taxes, 210 (2). In *Community Charter*. Victoria, British Columbia.

program promotion, and contractor certification.⁶⁹ If needed, a municipality may borrow capital without approval of the electors for this purpose if the costs are recovered.⁷⁰

Despite these limitations, jurisdictions such as the District of Saanich have long asserted their authority to implement a residential PACE program utilizing the LIC mechanism, and have initiated plans for pilot programs based on this assertion.⁷¹

The second, and generally preferable mechanism for establishing a residential PACE program in BC is for the Province to introduce legislation specifically permitting the use of the property tax mechanism as a means for municipalities and their program partners to recover lending costs related to energy efficiency financing. After several years of municipal lobbying through channels such as the Union of BC Municipalities, the Government of BC commissioned in 2021 a roadmap for implementation of PACE programs in the province.⁷²

This roadmap, which was not publicly released, is expected to include recommendations on the feasibility and target market for a residential PACE program and was intended to support the development of pilot projects in two BC jurisdictions. The first jurisdiction to launch its pilot program was the District of Central Saanich, which was planned for release in fall 2021 and targets homeowners switching from oil furnaces to electric heat pumps.⁷³ PACE was publicly announced in BC as part of the Roadmap to 2030 climate plan update in late 2021, with legislative amendments expected in 2022.

PACE programs appear to show the most promise in jurisdictions that have limited access to other supportive retrofit programming. For example, two of the newest PACE programs in Canada, implemented in the cities of Edmonton and Saskatoon, are based in provinces that offer extremely limited support for energy efficiency retrofits, with little to no rebate or incentive funding available. In this situation, a loan program becomes more attractive as there is a larger capital barrier to overcome.⁷⁴

Municipal financial reserves, the Municipal Finance Authority of BC, and FCM's Green Municipal Fund are possible sources of capital. It is recommended that a minimum improvement cost be set to justify transaction costs, and payments should be scheduled to ensure the amount is offset by the energy savings achieved.⁷⁵ LICs effectively address barriers related to:

- High upfront costs, as the homeowner is not required to pay out of pocket
- Access to capital, as they do not add to personal debt

⁶⁹ Pembina Institute. (2005). *Using local improvement charges to finance energy efficiency improvements*, p. 16. Retrieved from <https://www.pembina.org/pub/using-local-improvement-charges-finance-energy-efficiency-improvements>

⁷⁰ Division 5 – Local Service Taxes, 217 (1). In *Community Charter*.

⁷¹ Pembina Institute. (2020). *Property assessed clean energy enabling legislation: Recommendations to the Province of British Columbia*, p. 1. Retrieved from <https://www.pembina.org/reports/pace-enabling-legislation-recomendations-for-bc.pdf>

⁷² Dunsky Energy + Climate Advisors. (2021, January 12). *Dunsky to develop British Columbia PACE retrofit financing roadmap*. Retrieved from <https://www.dunsky.com/dunsky-to-develop-british-columbia-pace-retrofit-financing-roadmap/>

⁷³ *Central Saanich to launch PACE financing program for homeowners looking to get off oil heating*.

⁷⁴ Daly, B. (2021, September 22). *PACE programs: Edmonton's clean energy improvement program*. City of Edmonton: CUSP Webinar Series. Retrieved from <https://www.youtube.com/watch?v=XOLmiFIGKTo>

⁷⁵ Additionally, the property tax increase resulting from the upgrade should be factored into this calculation.

- Long payback periods, in being tied to the property, there is no disadvantage to the owner who initiated the retrofit if the home is sold

Benefits of PACE or Local Improvement Charge (LIC) programs in comparison with other financing options include:

- Loans being attached to the property rather than an individual
- Municipal rather than for-profit provision can allow for favourable loan terms and pursue accessibility to households with limited access to credit without being predatory
- Low risk⁷⁶, which can be further minimized via special priority lien, caps on loan amount based on property value, and loan loss reserves as offered by FCM
- Administrative charge on loan can be considered to recover operating costs to municipality.

Nonetheless, PACE requires the municipality to have the capacity for such a program, which will require some time investment even if the day-to-day administration is outsourced. Program administration and loan capital, as well as loan loss reserves need to be accessed, e.g., via FCM, and monitored. Especially in the case of third-party administration, careful regulation and monitoring of the provider is recommended to avoid predatory lending and maximization of private profits at the expense of vulnerable households. Another potential challenge lies in mortgage lenders' and insurers' concern if the municipality applies a priority lien.

On-Bill Financing (OBF)

On-bill financing (OBF) is a model that allows energy efficiency and renewable energy improvements to be financed by a utility company, with repayments made as part of a customer's utility bill. There are two main flavors of OBF: loan and tariff. Loan-based OBF programs tie repayment to a utility customer's account, therefore the customer is responsible for repayment of the loan. In tariff-based OBF, the loan is instead tied to the utility meter itself, meaning that a loan can be transferred as part of the sale of a property. In this way, tariff-based OBF is similar to PACE financing in that it can be transferred to a new owner and remain tied to a property rather than a homeowner.

One of the strengths of the OBF model is the ability to "Pay As You Save" (PAYS), a label that has been used for Manitoba's OBF program since 2012.⁷⁷ A PAYS program works by coupling a utility loan with an estimate of energy bill savings resulting from the energy efficiency or renewable energy measure. As long as the monthly repayments do not exceed the expected energy savings, the customer sees no net increase to their utility bill, and also does not need to pay the upfront cost of the retrofit. In this way, a PAYS-style OBF program can be extremely attractive to a homeowner.

OBF has other advantages from a program administration and customer experience perspective: On-bill financing has the most flexible eligibility criteria (utility bill payment history),

⁷⁶ California's PACE programs have not made a single claim into its loan loss reserve in first five years of its existence: *Accelerating home energy efficiency retrofits through local improvement charge programs*, p.123.

⁷⁷ Province of British Columbia. (2013, April 11). *On-bill financing pilots to be expanded next year*. Retrieved from BC Gov News: <https://news.gov.bc.ca/releases/2013EMNG0072-000827>

a strong enforcement mechanism (service disconnection), and a simplified process for the customer (on-bill repayment and bill neutrality).⁷⁸

BC Hydro and FortisBC administered a trial on-bill financing (OBF) program in the City of Colwood and the RD of Okanagan-Similkameen in 2013, initially promoted under the PAYS moniker. The pilot ended after demonstrating very little uptake, and issues around the complexity of administering the loans. The pilot programs experienced high costs, and utilities determined that they would require costly upgrades to their billing and administration systems in order to process OBF loans on a larger scale. The pilots suffered from a few other limitations, including restrictive eligibility requirements and relatively uncompetitive interest rates that dampened interest in the program.⁷⁹ Since that time, utilities have been reticent to consider OBF as an option.

If an OBF program was designed with some of the lessons from the failed 2013 pilots in mind, it might have the potential to be one of the best options for home energy retrofit financing, with clear strengths including centralized administration by a large utility rather than a small municipality, straightforward underwriting criteria (utility account payment history), bill neutrality for the customer, and transferability between property owners.

BC Hydro was approached by Ecotrust Canada in September 2021 to discuss the possibility of reviving an OBF program, but with a specific focus on Indigenous communities that may not otherwise be able to take advantage of financing models like PACE due to differences in their property taxation structure. BC Hydro demonstrated a willingness to discuss this possibility, and was interested in further research that identified the potential for OBF in this unique context.⁸⁰ However, given the current focus in BC on PACE financing for settler municipalities, it remains unlikely that BC Hydro or FortisBC would consider reviving a wider OBF program.

On-bill financing in BC is currently only offered by municipal utilities such as those existing in the cities of Penticton and Nelson. As part of engagement for this study, BC Hydro was contacted to explore the possibility of re-introducing a OBF pilot in BC. However, such a program, if it existed, would likely be targeted specifically to communities that face challenges in implementing PACE financing (including on-reserve Indigenous communities), and so a wider deployment of OBF in BC is unlikely at this time.

Third Party Financing

In addition to the Financeit offer affiliated with Better Homes BC, third-party retrofit-specific financing for individual households is also currently available from banks like RBC (Energy Saver™ Loan)⁸¹ and Vancity (Planet-Wise Renovation Solutions).⁸² RBC offers 5-10 year loans over \$5,000, with 1% off the loan interest rate (or a \$100 rebate on a home energy audit) for products and services that are recommended during a home energy audit or are eligible for

⁷⁸ *Moving toward energy security in British Columbia's rural, remote and Indigenous communities*, p. 32.

⁷⁹ *Cheaper power bills, more jobs, less CO2*, p. 11.

⁸⁰ Personal communication, Seabrooke, A. & Oldham, S. (2021, September).

⁸¹ Royal Bank of Canada. (n.d.). *RBC Energy Saver™ Loan*. Retrieved December 21, 2021, from <https://www.rbcroyalbank.com/personal-loans/energy-saver-loan.html>

⁸² Vancity. (n.d.). *Planet-wise renovation solutions - Renovation loan*. Retrieved December 21, 2021, from <https://www.vancity.com/Loans/TypesOfLoans/PlanetWiseRenovationSolutions/>

NRCan grants, ENERGY STAR qualified products, renewable energy projects, and hybrid cars. Vancity credit union three loan options energy efficiency home renovations: A term loan of \$3,500-\$50,000 for up to 15 years, at Vancity prime + 0.75% interest rate, an unsecured creditline loan of \$5,001 or more at a preferred interest rate, or a creditline mortgage secured by residential real estate also at a preferred interest rate. Eligible projects include insulation, space heating, ventilation, draft proofing, hot water heating, replacement of window/doors, solar panels for hot water or solar electric systems. SNAP Home Finance is a commercial financing provider offering such loans as well, though no details are available on the financing terms.⁸³

Credit Enhancements and Financing Grants

For municipal governments and their partners, the Federation of Canadian Municipalities offers grants in combination with loans or credit enhancement for local home-energy upgrade financing programs.

Engagement workshop with First Credit Union (FCU)

On October 27, 2021, an in-person workshop was held with representatives from Ecotrust Canada, the City of Powell River and First Credit Union, a local financial institution with branches in Powell River as well as Vancouver Island and the Gulf Islands. The meeting was intended to gauge the interest of FCU and the City in collaborating to deliver a third-party retrofit financing product as part of a broader program design, with specific attention paid to the credit enhancements and grants offered by FCM that would enhance such as offer.

In general, there was a strong values and objectives alignment between the City and FCU, with a clear desire to enable more homeowners to be able to improve the energy performance of their homes and take advantage of rebate and incentive programs. FCU does not currently have a dedicated home retrofit loan offer like some other financial institutions, but expressed an interest in creating one if sufficient demand and a supportive program ecosystem and funding was in place.

Key questions raised during the workshop included the role of loan securitization in designing a retrofit product, with a secured loan enabling a much higher degree of confidence for FCU in extending preferential loan terms and eligibility criteria to clients pursuing home energy retrofits. The role of FCM's credit enhancement was also seen as a positive enabler for creating a new type of loan product, though there were concerns raised about the initial administrative costs of setting up and designing such a loan product, including approximately \$1000 in legal fees to secure the loan with a mortgage lien, if required.

Subsequent follow-up conversations with FCM clarified the role of operating grants, which could be shared between the City and FCU in order to cover administrative costs and potentially to create a new staff position which focused on administering these loans. FCM also emphasized the importance of a holistic retrofit program design that included homeowner education and support, EnerGuide services, and streamlined access to incentives and contractors. These aspects of program design, as well as the ability to leverage grant funding for administrative costs, are of particular importance in the current financing environment which is dominated by

⁸³ See: <https://www.snap4home.com/>

lower interest rates and a potential zero-interest product under development by the Government of Canada for home retrofits.

Based on the initial conversations at the October 2021 workshop, FCU and the City agreed to continue the dialogue and explore possible options for program design and funding. A full Program Design Study phase would consider in much greater detail the possible collaboration between FCU, the City, and other stakeholders (e.g. the qathet Regional District) in designing a home retrofit program for the region.

For more details on the FCU engagement workshop, see [Appendix C](#).

Program Uptake

In order to arrive at a reasonable but optimistic estimate of retrofit program uptake and impact, we will consider the likely target market for such a program, and the energy, GHG and cost savings that could result from associated home retrofits.



1. Total market

The total number of residential homes in Powell River is around 5500. Of these, the vast majority, 5485, are low-rise ground-oriented homes which could be suited to a retrofit program focused on smaller homes and buildings, in contrast to programs targeted at larger apartment and commercial buildings which typically take advantage of different funding and incentive streams, as well as being markedly different in their technical approach to HVAC, insulation and fenestration systems.

For the purposes of this feasibility study, we will focus on the total market that represents low-rise residential units.

2. Retrofit market

Of low-rise residential units in Powell River, around 70% are single detached homes (around 4220 units).⁸⁴ In defining a likely retrofit market, we will focus on this housing archetype as it is among the most straightforward to upgrade in terms of technical feasibility, access to incentives, and simplicity of process.

Around 90% of these homes are likely built prior to 2000, assuming that the overall distribution of housing vintage applies to single detached homes as well. Based on this assumption, there are perhaps 3800 detached homes in the City that could be good candidates for a home energy retrofit. We will consider this to be the initial retrofit market.

⁸⁴ Statistics Canada. (2017, November 29). [Powell River \[population centre\], British Columbia: Census profile, 2016 census](#). Retrieved from Statistics Canada Catalogue no. 98-316-X2016001.

3. Target Market

In defining the likely target market, this study does not consider in great depth the question of improving access to home retrofits for renters. This is a unique issue which is impacted by the split incentive between owners who typically pay for energy upgrades, and tenants who typically pay for their own utility bills.

The vast majority of Powell River residents are also homeowners, as opposed to renters – 88% identified as owners in the 2021 survey. While a retrofit program should certainly not be designed to exclude renters (in fact, the opposite is true from an equity perspective), we will consider owner households to be the most likely to be participants in the first years of operation of a retrofit program, until issues around renter outreach, split incentive and landlord consent can be explored and addressed.

Based on this assumption, there may be **around 3,300 homes** in the initial target market.

Program Impact

Rough program impact estimates are shown below, based on representative assumptions for home retrofit depth and energy reduction, overall program participation, and participation in a financing offer specifically.

1. Per-home Impact

Considering the community-wide opportunity for a broadly-based retrofit campaign, we will combine the retrofit measures modelled in Section 5 in order to arrive at a **representative cost, energy savings and GHG reduction** for two major categories of Powell River homes – electrically heated and natural gas heated. For both housing types, an insulation upgrade combined with a heating system upgrade to an electric air-source heat pump will be considered. These upgrades combined have the potential to reduce home energy consumption **by 50% or more**.

This approach, intended to estimate benefits across the entire community, is necessarily a rough estimate, informed by the above analysis of housing archetypes, modelled energy upgrades, and representative costs. It is intended to illustrate the savings that are possible from upgrading generally **older, less efficient homes** that have moderate levels of insulation and are currently utilizing less efficient heating systems – either mid-efficiency gas furnaces or baseboard electric heaters.

Archetype – Representative Impact

Average annual energy costs: \$2625 (gas heating) / \$3800 (all-electric)

| Variable | Gas Heating | All Electric |
|-----------------------------------|-----------------------------|---------------------|
| Vintage | 1960s-1980s | 1960s-1980s |
| Floor area (sf) | 1900 | 1900 |
| Primary heating source | Gas furnace (77% efficient) | Electric baseboard |
| Hot water system | Electric tank | Electric tank |
| Ventilation type | None | None |
| Ceiling insulation (R) | 12 | 12 |
| Wall insulation (R) | 12 | 12 |
| Foundation insulation (R) | None | None |
| Windows (RSI) | 0.14 | 0.14 |
| Doors (RSI) | 0.39 | 0.39 |
| Electricity consumption (GJ) | 43 | 105 |
| Natural gas consumption (GJ) | 95 | 0 |
| Energy score (GJ) | 138 | 105 |
| Carbon score (tCO ₂ e) | 5.0 | 0.3 |
| Air Tightness (ACH50) | 4.92 | 4.92 |

Upgrades included:

- Replacement of natural gas furnace or electric baseboards with a central electric air source heat pump with HSPF of 10
- Insulation of foundation walls to R-12
- Upgrade attic insulation from R-12 to R-40
- Improving airtightness by 10% to 4.43 air changes per hour

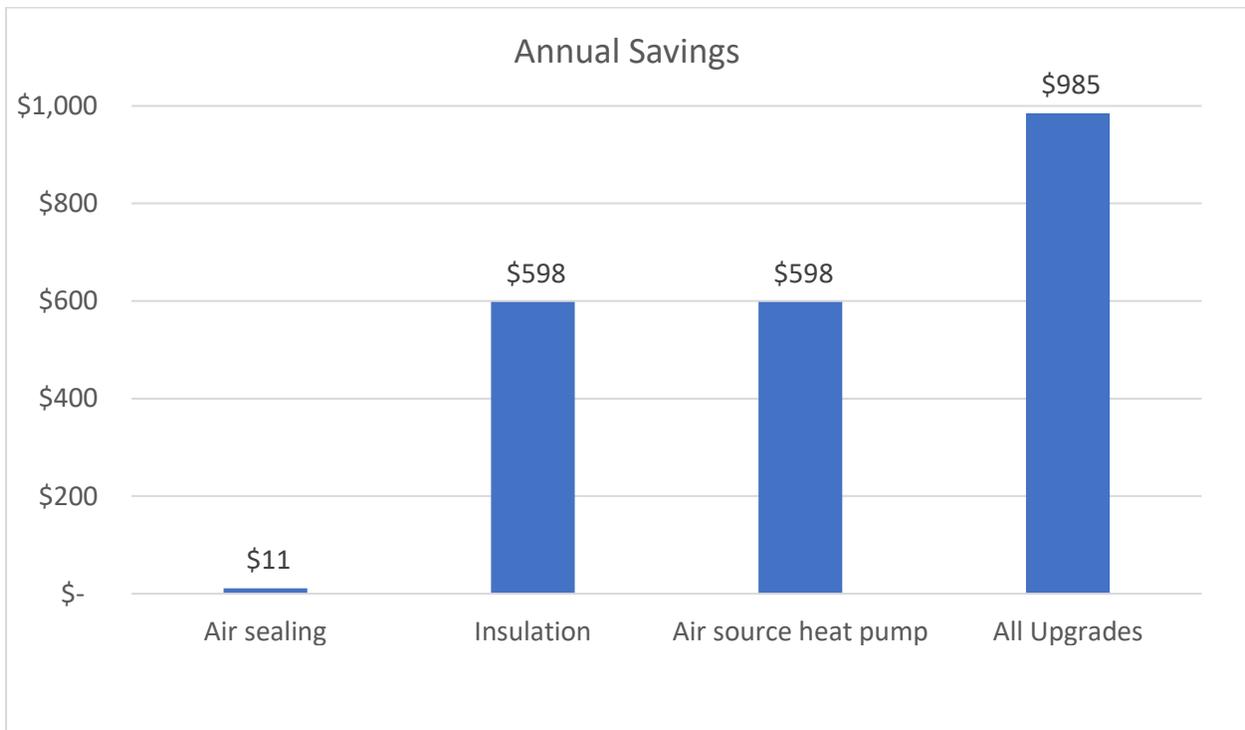
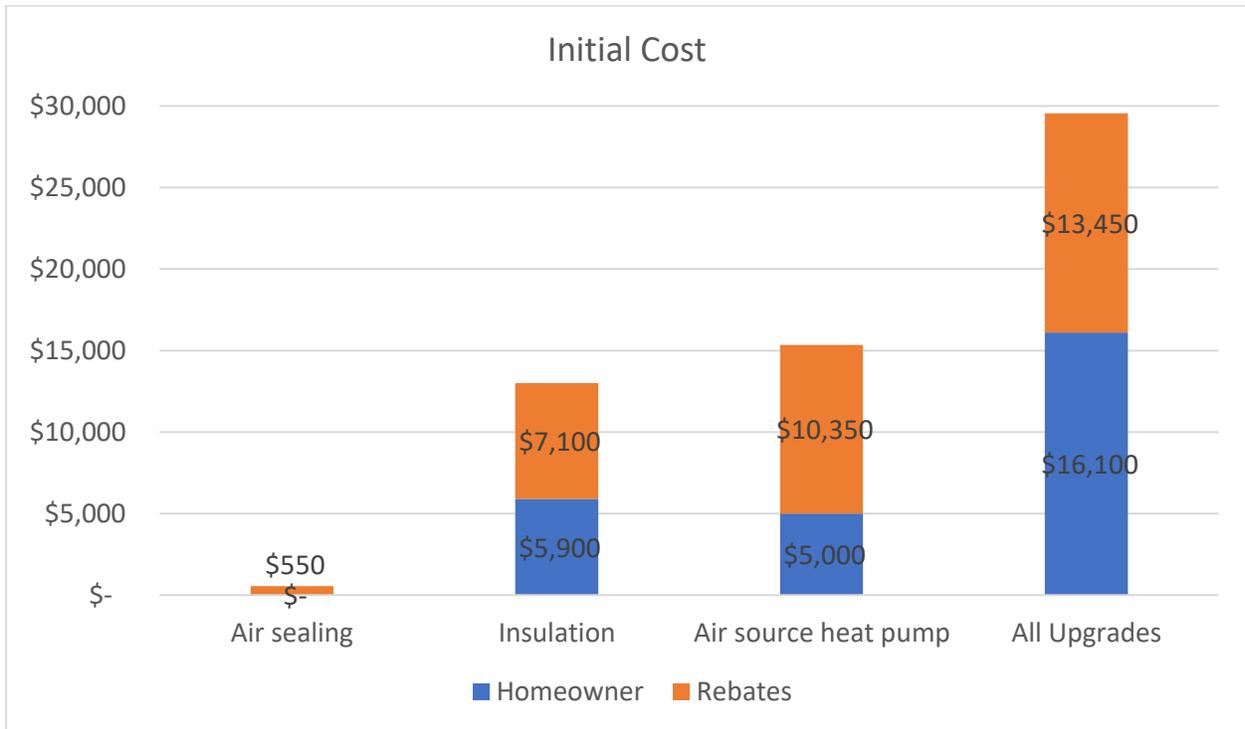
Initial costs and rebates:

Note that the cost of completing all upgrades in the following charts is not equal to the sum of the individual upgrade costs. This is due to the maximum incentive of \$5000 currently available through the Canada Greener Homes Grant. For individual upgrade costs, this entire grant can be applied to one upgrade, whereas the grant amount is split when completing multiple upgrades.

Energy and cost savings:

The total cost savings resulting from completing all upgrades is not equal to the sum of completing upgrades individually. This is due to the nature of a heating system upgrade, which will realize higher energy savings in a home that has a less efficient envelope. Once an insulation upgrade has been completed, subsequently increasing the heating system efficiency results in relatively smaller energy savings, since the heat loss load of the home has decreased.

Gas to ASHP + Insulation:



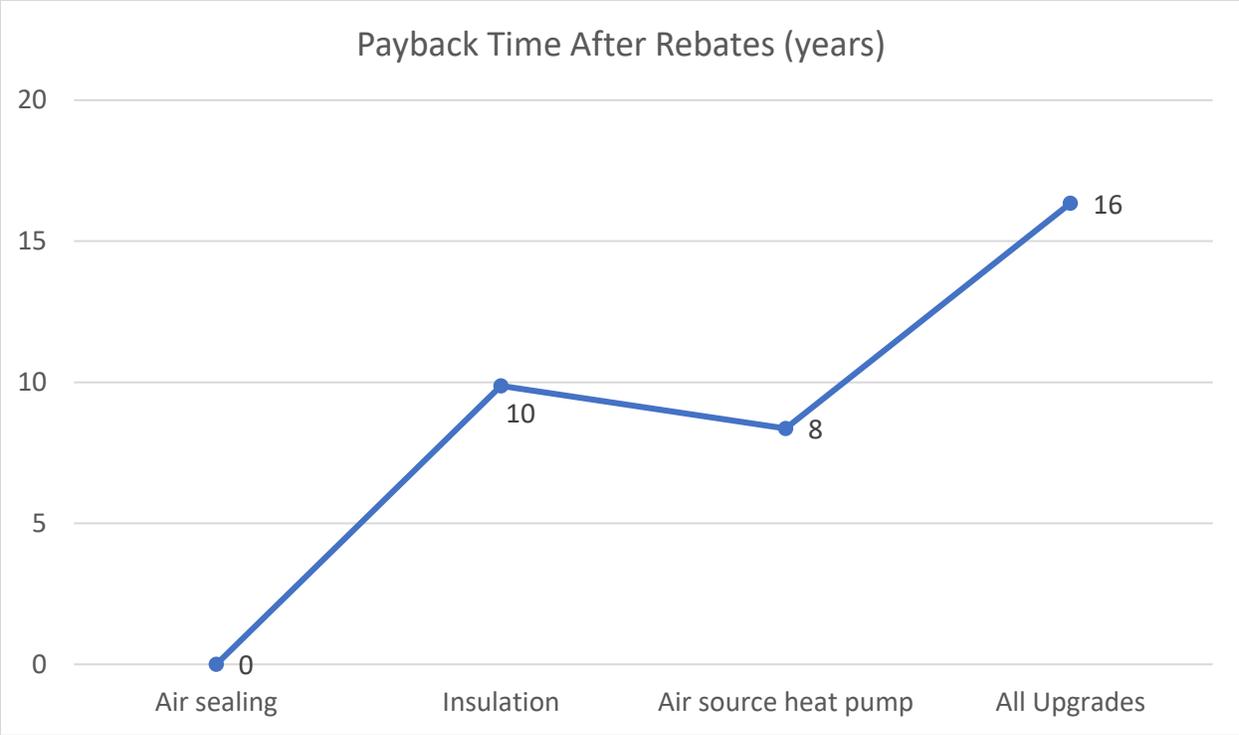
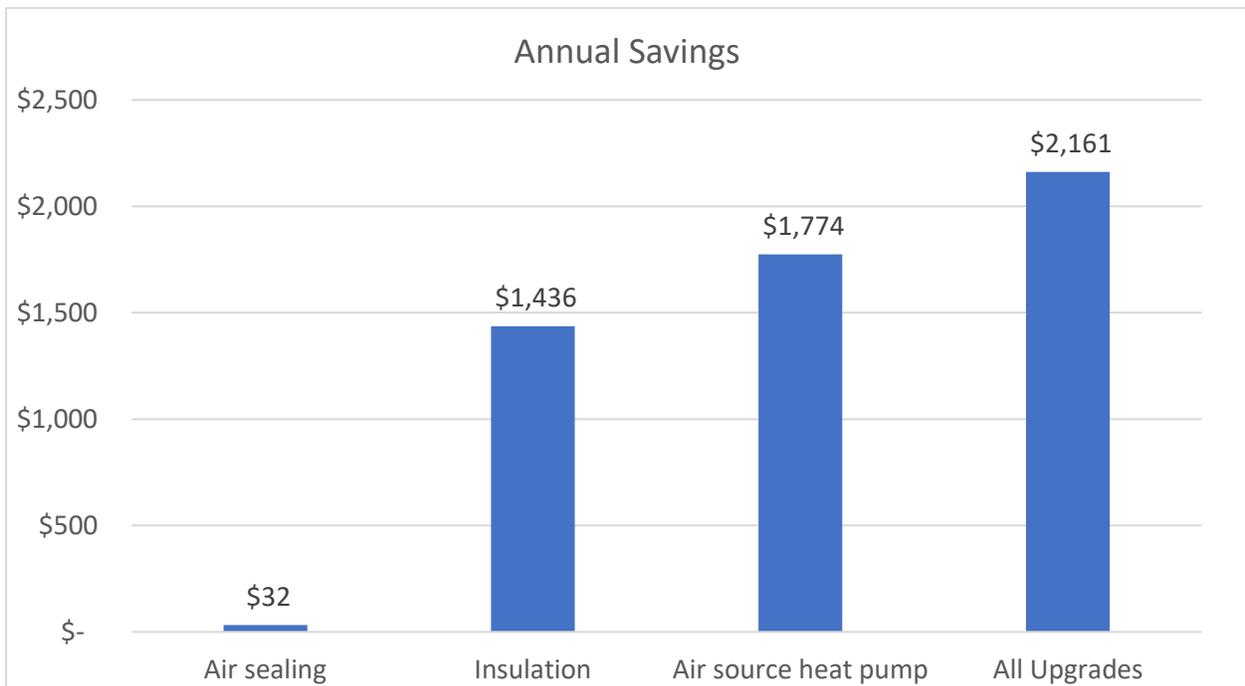
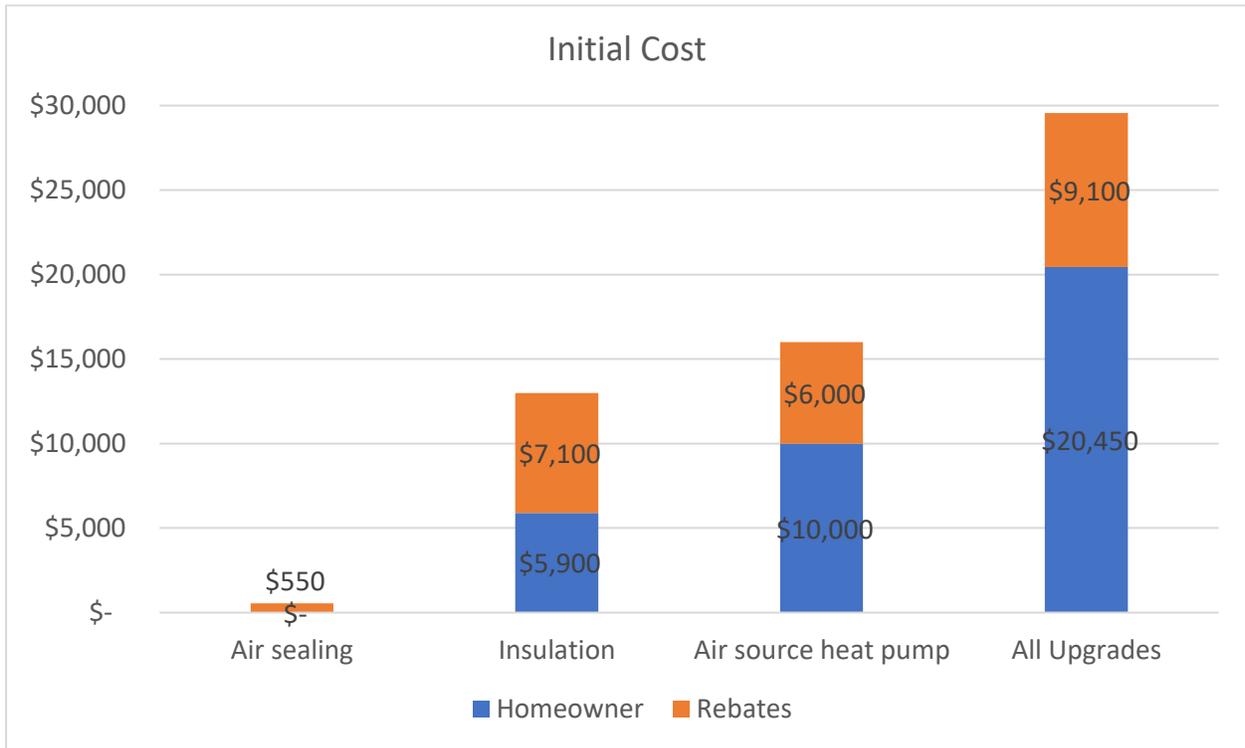


Figure 23. Upgrade cost and impact for a representative gas-heated home

Electric Baseboard to ASHP + Insulation:



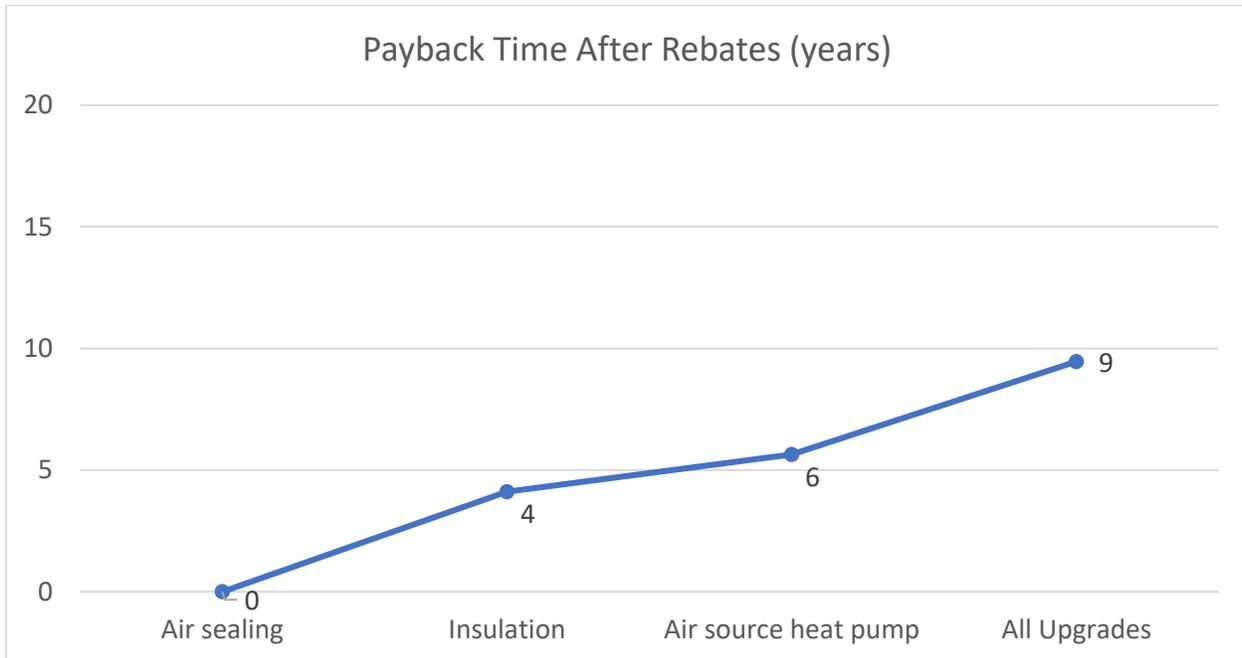


Figure 24. Upgrade cost and impact for a representative electrically-heated home

The relative cost-benefit for the representative upgrade in gas and electrically-heated homes is shown in the table below.

| | Gas to ASHP + Insulation | Electric to ASHP + Insulation |
|--|--------------------------|-------------------------------|
| Initial consumption (GJ) | 138 | 105 |
| Energy Savings (GJ) | 88 | 55 |
| Energy Savings (%) | 64% | 52% |
| Upgrade cost (after rebates) | \$16,100 | \$20,500 |
| Cost savings (\$/yr) | \$985 | \$2,160 |
| GHG Savings - (tCO₂e/yr) | 4.8 | 0.1 |
| Payback time (years) | 16 | 9 |

In general, we see that the return on investment for upgrading older, **electrically heated** homes is relatively good, despite relatively lower rebate amounts being available for these types of retrofits. A retrofit with 50% energy savings was modelled with a payback time on the order of 9 years and annual energy bill savings potentially **exceeding \$2000**, with the added benefit of heat pumps providing summer cooling capability. However, the GHG benefit is minimal as these homes are already utilizing clean electricity.

For **gas heated homes**, the payback times for a 60% energy savings retrofit are much longer due to the low cost of natural gas – 16 years in this example, with annual energy bill savings of **around \$1000**. However, the GHG benefits of these retrofits are enormous, and these benefits

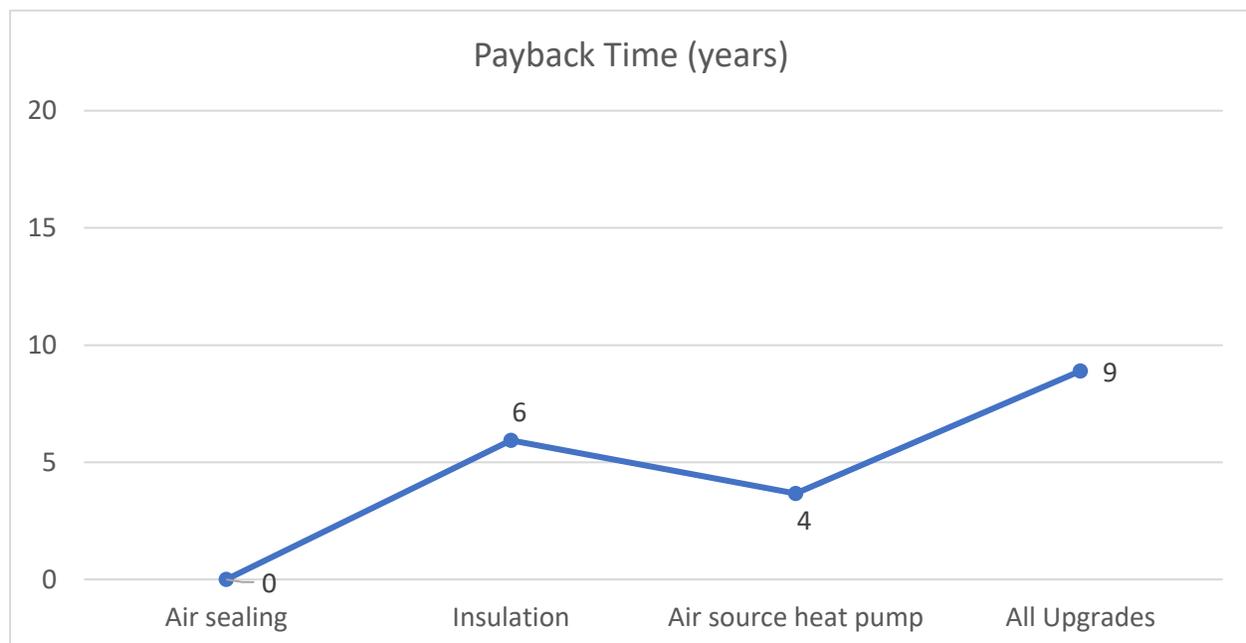
plus the addition of summer cooling may justify the otherwise marginal business case. Fuel switching a heating system from fossil fuels to electricity can reduce the operating GHG footprint of the home by **up to 96%**, assuming the domestic hot water system is switched to an electric or heat pump unit as well.

Utility Cost Sensitivity

In order to illustrate the potential impact of changing energy prices on the above analysis, representative gas and electric utility costs projected to 2030 were applied to the representative homes as a point of comparison. The cost of natural gas in BC is projected to nearly double by 2030, reaching a price of around \$17/GJ when considering both increases to commodity costs and the impact of increases to BC's carbon tax, which is expected to rise to \$170/tonne by 2030.

Similarly, forecast increases in BC Hydro's rates were considered. Although an accurate forecast of rates in 2030 has not been developed by BC Hydro, the five-year rate forecast from F2020 through F2024 indicates an overall 8% increase.⁸⁵ Extrapolating this figure out to 2030, we can assume that rates will increase by at least 16% by 2030 (and likely more, as the cost of the Site C dam will begin having an impact on rates starting in 2024/2025)⁸⁶. For this exercise, we will assume that BC Hydro rates will increase by at least 25% by 2030.

Gas to ASHP + Insulation:



⁸⁵ British Columbia Ministry of Energy, Mines and Petroleum Resources. (n.d.). *Comprehensive Review of BC Hydro: Phase 1 Final Report*. Retrieved from https://www2.gov.bc.ca/assets/gov/farming-natural-resources-and-industry/electricity-alternative-energy/electricity/bc-hydro-review/final_report_desktop_bc_hydro_review_v04_feb12_237pm-r2.pdf

⁸⁶ Bennett, N. (2021, February 26). Province will complete Site C dam with new \$16-billion price tag. *Vancouver is awesome*. Retrieved from <https://www.vancouverisawesome.com/bc-news/province-will-complete-site-c-dam-with-new-16-billion-price-tag-3461456>

Figure 25. Upgrade cost and impact for gas-heated home forecasting 2030 utility rates

Electric Baseboard to ASHP + Insulation:

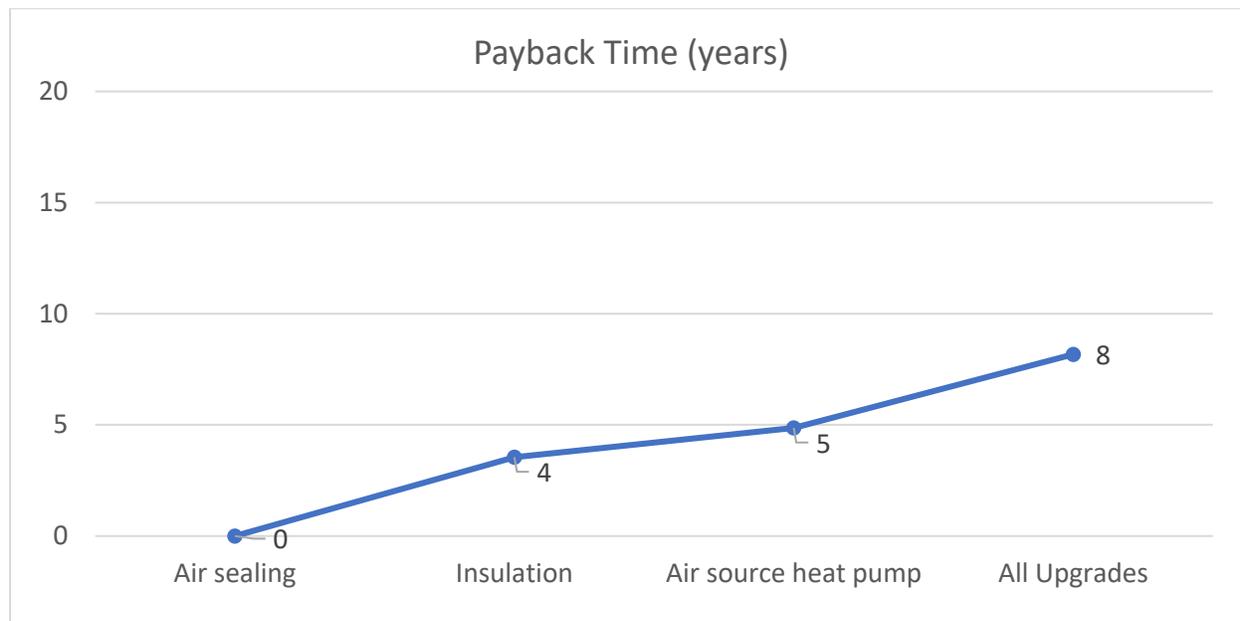


Figure 26. Upgrade cost and impact for electrically-heated home forecasting 2030 utility rates

The business case for both gas and electrically-heated homes is significantly better when considering forecast 2030 utility costs, with payback periods for homes switching from gas furnace to electric heat pump systems becoming comparable to homes replacing electric baseboards with heat pumps.

2. Estimated Annual Impact – Program-wide

In order to achieve BC’s building sector target of 60% GHG emissions reductions, approximately 80,000 home retrofits per year are needed across the entire province, out of 2 million total households⁸⁷ (a rate of 4% of homes per year).⁸⁸ Regardless of the heating fuel currently used, we assume that a similar level of retrofit activity is desirable across all regions of the province in order to achieve optimal renewal of the housing stock. For the City of Powell River, this 4% annual target translates to 200 homes retrofitted per year, out of a total ~5000 low-rise homes built prior to 2000.⁸⁹

Such a high rate of retrofit activity (more than one home every two days) is unprecedented in Powell River and indeed in the province as a whole. We wish to include this scenario as representative of the level of effort that is required to meet BC’s climate targets and keep global heating to within safe limits. However, a second scenario, based on realistic uptake from previous municipal programs will also be considered. Nelson’s EcoSave program had

⁸⁷ Statistics Canada. (2017, November 29). [British Columbia \[province\] and Canada \[country\]: Census Profile, 2016 census](#). Retrieved from Statistics Canada Catalogue no. 98-316-X2016001.

⁸⁸ Pembina Institute. (2021, April 20). [B.C. budget takes small steps toward clean economy goals](#). Retrieved from <https://www.pembina.org/media-release/bc-budget-takes-small-steps-toward-clean-economy-goals>

⁸⁹ Powell River [population centre], British Columbia: Census profile, 2016 census.

approximately 1000 participants since 2012, serving a municipality of comparable size to Powell River (11,000 vs. 13,000 residents). This translates to around 100 participating homes per year.

The overall split of gas vs. electric heating in Powell River can be estimated from the 2021 homeowner survey. For the purposes of this rough estimation, oil and wood heating are ignored, focusing on the more common heating fuels. The current prevalence of heat pumps in electrically heated homes is assumed to be around 25%, based on the results of the homeowner survey. This leaves an overall prevalence of 35% of homes utilizing gas furnaces and 18% using electric baseboards or electric furnaces.

Applying the distribution of gas and electrically heated homes to their respective model energy and GHG reductions, an optimistic estimate of overall annual program impact is calculated below, assuming that retrofit activity proceeds either at a pace in line with BC's building sector emissions and housing renewal targets, or with that of a historically successful municipal retrofit program (Nelson EcoSave):

| | High Retrofit Activity (BC Climate Targets) | Moderate Retrofit Activity (Nelson EcoSave) |
|---|--|--|
| Total participating homes | 200 | 100 |
| Gas participating homes | 132 | 66 |
| Electric participating homes | 68 | 34 |
| Energy savings - (GJ) | 15,360 | 7,680 |
| Total upgrade costs | \$3.5M | \$1.75M |
| Total annual cost savings | \$277,000 | \$138,000 |
| Total annual GHG savings (tCO ₂ e) | 640 | 320 |
| Jobs created ⁹⁰ | 46 | 23 |

3. Financing Uptake

In terms of the number of households accessing financing in order to complete these retrofits, current program examples within the province are limited, and make estimating uptake difficult. Generally speaking, uptake of retrofit financing has been limited in BC compared to the overall uptake of rebate and incentive programs.

Financing uptake – High scenario

- The City of Penticton's Energy Retrofit Loan Program is a moderately successful program in BC that from 2013-2019 issued 81 loans out of a municipal total of approximately 17,000 households, translating to a financing uptake rate of 0.09% annually.⁹¹
- In terms of the rate of financing uptake as a percentage of participation in the retrofit program more broadly, the City of Penticton's program is higher than most other examples, with 59% conversion.⁹²

⁹⁰ Pembina Institute. (2017, March 2). *The many benefits of energy efficient homes and buildings*. Retrieved from <https://www.pembina.org/pub/efficient-buildings-infographic>

⁹¹ Personal communication, Felice, S. (2021, July 21).

⁹² *Home energy retrofit incentive campaigns analysis report*, p.69

- Achieving a ~60% conversion rate in Powell River would require the issuing of **120 loans per year**, out of 200 retrofits required to meet the province-wide retrofit target.
- For a moderate level of overall retrofit activity, these numbers would be halved, i.e. **60 loans per year** out of 100 retrofits overall.

Financing uptake – Moderate scenario

- The City of Nelson's EcoSave program, which offers on-bill financing, is another example of a moderately successful retrofit financing program in BC. This program has administered approximately 130 retrofit loans since its inception in 2012, out of approximately 5,000 total households. This translates to a financing uptake rate of 0.2% annually.⁹³
- In terms of the rate of financing uptake as a percentage of participation in Nelson's broader retrofit program, the program has achieved 44% conversion.⁹⁴
- Achieving a ~40% conversion rate in Powell River would require the issuing of **80 loans per year**, out of 200 retrofits required to meet the province-wide retrofit target.
- For a moderate level of overall retrofit activity, these numbers would be halved, i.e. **40 loans per year** out of 100 retrofits overall.

Financing uptake – Low scenario

- BC Hydro and FortisBC's pilot on-bill financing pilot program from 2012-13 is an example of a low uptake financing program. Over the year this program was offered, only four homes participated from the City of Colwood and the RD of South Okanagan. Given an approximate total of 50,000 households between the two regions, this translates to a financing uptake rate of 0.008% annually.⁹⁵ An uptake rate similar to the 2012 OBF pilots, scaled to Powell River's population would result in **zero participating homes**.
- Third party financing offered by contractors has had very little uptake in Powell River, according to anecdotal evidence from these contractors (estimated at less than 10 participants per year). Similarly, the zero-interest heat pump retrofit loans offered through CleanBC have had no uptake in Powell River in the program's first year of operation.
- Examples of less successful financing program in BC include the East Kootenay, Okanagan, and Kootenay Energy Diet program, which achieved a 0%, 2% and 5% financing conversion rate, respectively. For the purposes of estimating a low uptake scenario for Powell River, a 2% uptake rate will be assumed. This would require the issuing of **4 loans per year**, out of 200 retrofits required to meet the province-wide retrofit target.
- For a moderate level of overall retrofit activity, these numbers would be halved, i.e. **2 loans per year** out of 100 retrofits overall (assumed one each of gas and electric retrofits).

⁹³ Personal communication, Proctor, C. (2021, June 10).

⁹⁴ *Home energy retrofit incentive campaigns analysis report*, p.69

⁹⁵ *Cheaper power bills, more jobs, less CO2*, p. 11. Statistics Canada 2016 census data was used to estimate total households

4. Estimated Annual Impact – Financing Participants Only

Specific to program participant that access financing, the above estimates are filtered by high, moderate and low estimates of financing uptake as a proportion of overall program participation. The program impact from financing participants could vary widely, as shown below:

For **high** overall retrofit activity (200 homes/year):

| | High Financing | Moderate Financing | Low Financing |
|---|-----------------------|---------------------------|----------------------|
| Total participating homes | 120 | 80 | 4 |
| Energy savings - (GJ) | 9200 | 6100 | 320 |
| Total upgrade cost | \$2.1M | \$1.4M | \$69,000 |
| Total annual cost savings | \$166,000 | \$111,000 | \$5,000 |
| Total annual GHG savings (tCO ₂ e) | 383 | 257 | 15 |
| Economic activity (jobs created) | 27 | 18 | 0 |

For **moderate** overall retrofit activity (100 homes/year):

| | High Financing | Moderate Financing | Low Financing |
|---|-----------------------|---------------------------|----------------------|
| Total participating homes | 60 | 40 | 2 |
| Energy savings - (GJ) | 4600 | 3100 | 140 |
| Total upgrade cost | \$1M | \$700,000 | \$37,000 |
| Total annual cost savings | \$83,000 | \$55,000 | \$3,000 |
| Total annual GHG savings (tCO ₂ e) | 192 | 129 | 5 |
| Economic activity (jobs created) | 14 | 9 | 0 |

Example Lending Scenarios

Based on the representative home archetypes developed for this analysis, example lending scenarios can be developed to test parameters including interest rate, loan principal and payback time. Two scenarios will be considered as examples for a home retrofit loan, based on a variety of payback times, monthly payments equal to expected energy savings, and interest compounding monthly:

1. Heat pump + insulation upgrade in a representative gas-heated home
2. Heat pump + insulation upgrade in a representative electrically-heated home

Based on existing home retrofit loan products, the current prime interest rate will be assumed as a baseline lending rate (with available third-party lender credit enhancements reflected in the qualifying criteria for the loan rather than the interest rate).

Scenario 1: Heat pump + insulation upgrade in a representative gas-heated home

| | |
|---|----------|
| Loan principle (cost of upgrade before rebates) | \$18,000 |
| Available rebate amount (6-month processing time) | \$11,000 |
| Monthly energy savings (repayment amount) | \$65 |
| Loan term (years) | 10 |
| Example prime interest rate ⁹⁶ | 2.45% |
| Cumulative interest | \$1085 |

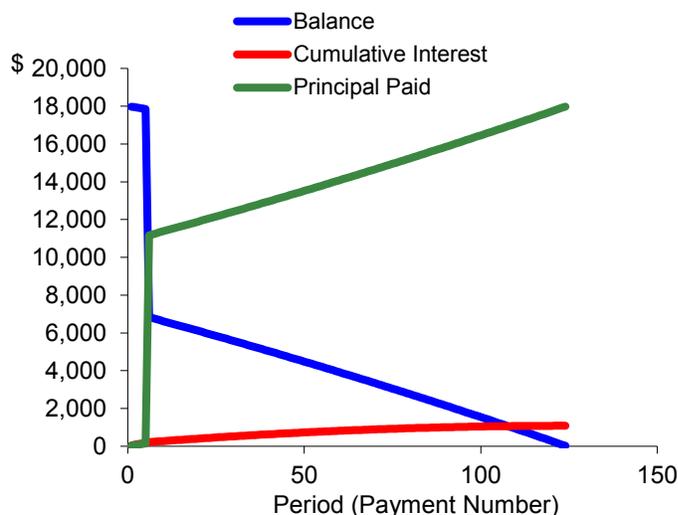


Figure 27: Loan repayment example in a gas-heated home

In this scenario, the loan principal is paid in full after 124 months, with payments approximately equal to the anticipated energy bill savings (bill neutrality). The total cumulative interest for the loan is \$1085.

Scenario 2: Heat pump + insulation upgrade in a representative electrically-heated home

| | |
|---|----------|
| Loan principle (cost of upgrade before rebates) | \$18,000 |
| Available rebate amount (6-month processing time) | \$7000 |
| Monthly energy savings (repayment amount) | \$180 |
| Loan term (years) | 5.5 |
| Example prime interest rate | 2.45% |
| Cumulative interest | \$859 |

⁹⁶ First Credit Union. (2021, October 22). *First Credit Union rates*. Retrieved from <https://www.firstcu.ca/rates>

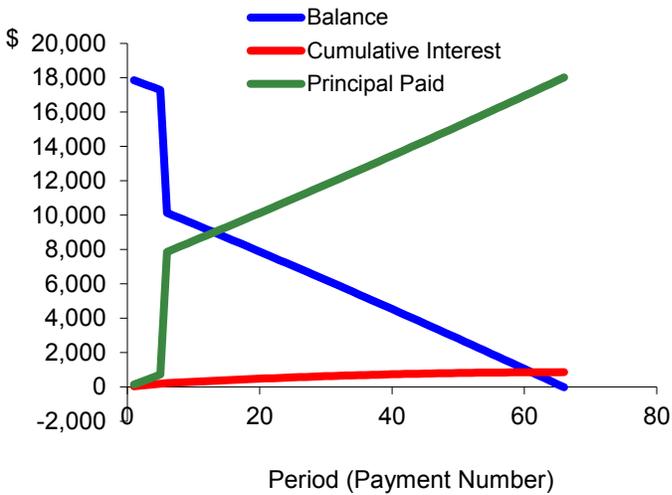


Figure 28: Loan repayment example in an electrically-heated home

In this scenario, the loan principal is paid in full after 66 months, with payments approximately equal to the anticipated energy bill savings (bill neutrality). The total cumulative interest for the loan is \$859.

Interest Rate Sensitivity

The following table compares the sensitivity of an example loan (Scenario #2 above) with a principle of \$18,000 to changes in the preferred interest rate (assuming monthly compounding).

| Annual Interest Rate | 2% | 3% | 4% |
|----------------------|-------|---------|---------|
| Loan term (months) | 65 | 67 | 69 |
| Cumulative Interest | \$688 | \$1,075 | \$1,495 |

Repayment Schedule Sensitivity

The following table compares the sensitivity of an example loan (Scenario #2 above) with a principle of \$18,000 to changes in the loan repayment schedule (assuming monthly compounding at the example prime rate of 2.45%).

| Monthly payment | \$100 | \$150 | \$200 |
|---------------------|---------|---------|-------|
| Loan term (months) | 126 | 80 | 59 |
| Cumulative Interest | \$1,580 | \$1,029 | \$776 |

Administration options

Any local program will have administrative costs that need to be considered, and can be managed by adjusting the level of service, the program scale, the partners involved, etc. Below is a recap of common tasks involved in delivering a municipal retrofit program:⁹⁷

- Putting in place administrative staff resources for program coordination/oversight
- Legal/regulatory review of and preparation for chosen activities/financing
- Putting in place funds or partnerships for financing
- Marketing/promotion and community engagement
- Maintaining a list of qualified EnerGuide auditors and retrofit contractors (option to rely on provincial/federal lists instead)
- Supporting group purchasing and group rebate codes
- Contracting some services like audits to offer to households free of charge
- Screening households for eligibility
- Assisting households in process navigation (e.g., applications, retrofit planning, access to government rebates and/or financing)
- Monitoring and reporting on the program.

There will likely be some tension between, on the one hand, keeping administrative cost burdens to a minimum, and, on the other hand, being able to support public awareness and one-on-one guidance. Considerations and opportunities for managing administrative costs include:

- Simplicity of process is key to reduce administrative burden, but also to increase participation. For instance, using electronic processes rather than paper-based ones is generally recommended, provided an access option is included for those without internet access at home.
- Local regulations, such as bylaws should support rather than obstruct retrofits. Waiving the requirements for permits for certain retrofits, or waiving application fees and fast-tracking applications may reduce time required both for households as well as the program supporting them.
- Providing a point of connection for residents to engage in group purchasing may be a low-cost way for local governments to remove contractor travel costs.
- Some programs (often only in that case that financing is provided) choose to add administrative fees to recover some of their costs, such as a one-time fixed or percentage charge, or rate rider fee based on the loan amount. This can be waived for low-income households, and included in loan repayments in order to not present an up-front barrier.
- The extent of one-on-one guidance provided to participants to navigate processes can be explicitly limited, or focused on only certain target groups or measures to reduce overall cost.
- In-house vs third-party administration will be a key consideration and potentially impact cost.

⁹⁷ Adapted from: *Accelerating home energy efficiency retrofits through local improvement charge programs*, p. 86.

Administrative costs can also be influenced by program scope: Targeting only certain measures, households, or areas can reduce scope and cost. However, if pursuing a one-stop-shop program, it is recommended to include all covered by provincial and federal programs. It has been shown that restricting measures may result in lower uptake. There is also potential to address other retrofit needs that the local government intends to address as part of the same program, such as accessibility (likely an increasing need due to aging population), mould remediation, seismic safety, flood proofing, or other climate resilience upgrades. Similarly, a comprehensive program would ideally include all types of households. However, focusing on single-family homes may be simpler. Alternatively, emphasis, or exclusive focus can be placed based on certain priority demographics (e.g., low-income, elderly, etc.) or based on home/heating type (e.g., single-detached only, fossil-heated only).

Contractor and Energy Advisor related administrative considerations include:

- Concerns regarding the availability and capacity of Energy Advisors as well as contractors may require some level of program staff time and intervention, e.g. to coordinate bulk service.
- Contractors may be able to amplify outreach efforts and support household education if they have the capacity and are involved by program coordinators.
- If a free or reduced-cost service is offered as part of a program, issuing an RFP to one energy auditor or contractor to complete the service is likely less time-intensive than reimbursing each individual household.

As awareness-raising and promotional activities will be key, cooperating with and obtaining support from a variety of local and provincial partners is recommended to reduce costs and increase uptake. For instance, BC Hydro and CleanBC Better Homes may be willing to support local promotions if they support uptake of their programs. In the absence of direct support and collaboration, aligning local promotions with provincial/federal promotion of rebates can serve to amplify their impact. Collaborating with other local programs on education content/materials, using existing materials, and involving local resident champions to spread the word are some other options to amplify efforts with little to no additional cost.

At the design stage, decisions can be made on around these considerations to balance program costs and benefits.⁹⁸

⁹⁸ For cost reference, see breakdown in: *Home energy retrofit incentive campaigns analysis report*, p. 16-19.

Section 7: Recommendations and Next Steps

Key Learnings

This Feasibility Study has revealed some insights into the current state of the housing stock, retrofit market, demographics and program design options for a home retrofit program serving Powell River.

1. There is significant potential for retrofits in Powell River

Powell River's housing stock is aging, and most homes are now at least twenty years old and up to 100 years old. Many of these homes have very poor energy efficiency and would significantly benefit from energy efficiency upgrades. In addition, most homes are still heated using fossil fuels, and despite a relatively high prevalence of heat pumps, price trends are still encouraging some homeowners to switch to natural gas. More needs to be done to encourage energy efficiency and low-carbon heating in Powell River's homes, both of which have the potential to unlock very significant energy cost and GHG emissions reductions for homes.

2. There is a high incidence of energy poverty in Powell River

Powell River and the surrounding region experiences a relatively high incidence of energy poverty compared with the rest of the province. This reality reflects not only the high energy consumption of many homes due to poor efficiency, but also the relatively low average household income and high number of fixed income, low-income and senior households in the City. Additional supports could help the most vulnerable residents of the region to retrofit their homes and reduce their energy costs.

3. The retrofit market is currently very busy, a reflection of rapid change

Powell River is a city in the midst of rapid change, with an extremely busy real estate market and many out of town buyers, a large percentage of whom are first-time homebuyers. As a result, the home renovation market is very busy in general, with long waits and high costs for general renovation services, as well as for energy advisors and energy efficiency-specific services. Despite this activity, many homeowners still likely cannot afford to significantly invest in energy efficiency, or are currently defaulting to high-emissions heating fuels like natural gas. Contractors and energy advisors indicated that the greatest need in the local home retrofit industry is a simplified process and single point of access to help homeowners navigate existing programs and rebates

4. More work needs to be done to improve industry capacity and encourage a shift toward low-carbon homes

Larger rebates were also identified as an important need for driving higher uptake of low-emissions options like heat pumps, which are often significantly more expensive than natural gas equipment even after existing rebates are applied. Whole-house window upgrades are also a major expense that could benefit from a municipal top-up rebate, according to contractors.

The benefits of low-carbon heating systems also need to be promoted beyond their potential operating cost savings. In the case of heat pumps, the greatest additional benefit is the ability to

provide air conditioning in the summer as well as heating. The two largest HVAC contractors in Powell River (Tempco and PR Heating & Air Conditioning) are both well-versed in current rebate and financing offers, but based on our interviews only Tempco is active in promoting heat pumps as a pathway toward reducing a homeowner's carbon emissions. Both would represent important stakeholders and partners in the delivery and awareness of any municipal retrofit program.

Local Energy Advisors also indicated a significant need for outreach and training, not just for homeowners but extending to the local building, contracting and trades community, who are currently not well-informed or experienced in best practices for energy efficiency in homes and buildings.

5. Demand for retrofit financing is relatively low, but the market lacks targeted loan products

The homeowner survey conducted in October 2021 reflects larger trends in the province suggesting that uptake of financing for home energy retrofits is relatively low when looking at existing offers like the Province's Financeit loans for heat pumps and contractor loans. It is presumed that most homeowners are able to secure the needed capital for their upgrades through savings or traditional loan products like a home equity line of credit or personal loan which currently carries a low interest rate. However, residents indicated that the availability of a targeted retrofit loan with competitive terms, including relaxed eligibility criteria, loan terms and interest rates could influence their decision to retrofit, particularly as interest rates have begun to rise.

Program Design Recommendations

Based on the results of this initial Feasibility Study, we believe that there is sufficient demand, local capacity and potential impact for a home retrofit program to recommend that the City pursue funding to complete a full Program Design study through the Federation of Canadian Municipalities. Our initial recommendations for the design of such a program are noted below.

1. Include the qathet Regional District and Tla'amin Nation in the next phase of study

The City of Powell River is not an example of a municipality which operates in relative isolation to its neighbors. The City, together with the surrounding qathet Regional District and neighboring Tla'amin Nation form a geographically distinct region with a similar housing stock, demographics, and energy poverty profile. In addition, the relative isolation of the region to the rest of the Province means that restrictions on goods and services and local capacity apply as much to the City as to the surrounding region. The City of Powell River also serves as the hub and main service center for the entire region.

As a result of these practical considerations, as well as the history of close collaboration between the City, Regional District and Tla'amin Nation, we believe it is of the utmost importance that a home retrofit program not be developed for the City in isolation, but include the surrounding communities as well. First Credit Union, which could play a key role as a third-

party financing partner, expressed that they share this view from the point of view of the customer base that their Powell River branch serves.

2. Create a “one stop shop” service that reduces confusion and streamlines the retrofit process

One of the most consistent comments from local stakeholders, from HVAC contractors to energy advisors to homeowners is the need to streamline and de-mystify the home retrofit process. Other jurisdictions such as the City of Nelson have developed highly effective retrofit programs built on this model, with a focus on the homeowner experience and facilitating ease of access.

Such a service could be administered either by the City itself or through a program delivery agent (PDA). Typically, these types of program follow a similar sequence beginning with initial outreach and marketing to direct homeowners toward a single registration process by phone or online. From this point, a program representative will initiate a call with the homeowner to discuss the process and any planned upgrades. From this point, the program will usually connect the homeowner with an energy advisor (or a list of program-registered advisors) to perform an assessment, if this has not been completed already. Many programs offer a rebate to cover some or all of the cost of this assessment.

After the energy assessment has been completed, the retrofit program coordinator will sometimes help the homeowner to discuss the results and what measures should be prioritized. At this point, an integrated financing offer may be utilized by the homeowner to help cover initial costs. The program will typically maintain a list of program-registered contractors, but will not recommend a particular contractor. After upgrades are completed, the program coordinator will assist the homeowner in preparing and submitting all relevant rebate applications.

3. Incentivize and help develop local capacity for EnerGuide services

Natural Resources Canada’s EnerGuide program is an important tool for homeowners to gain insight into the energy performance and upgrade pathways for their homes. Pre- and post-retrofit EnerGuide assessments are also a requirement for the Canada Greener Homes Grant, which provides homeowners with up to \$5000 in rebates for energy upgrades, in addition to incentives provided by the Province and utilities.

Unfortunately, there is very little local EnerGuide energy advisor capacity in the qathet region, leading to long wait times and high costs for homeowners attempting to get an evaluation. Anecdotally, many homeowners in the region are foregoing available rebates or deferring retrofits due to this lack of local capacity. A holistic retrofit program could include outreach and training support for new energy advisors, as well as an incentive for homeowners to improve access to low (or zero) cost home energy evaluations, and to larger incentive amounts by extension.

4. Design a program that is accessible to low-income and renter households

The City of Powell River, and qathet Regional District in particular, experiences a high incidence of energy poverty, in addition to a large proportion of fixed-income households. Though the majority of residents own their homes, the renter population in the region is struggling with high rents, low vacancy rates, no home equity with which to secure financing, and high energy bills resulting from the landlord-renter split incentive. A retrofit program designed with equity in mind

should pay special attention to these residents, as well as others that are underserved by traditional incentive and financing programs.

Equity-based program design could include a retrofit financing product that offered attractive terms and relaxed eligibility criteria, without the need to secure a loan with a home as collateral. It could also include targeted outreach and incentives designed to encourage landlords to improve the energy performance of their rental properties.

In particular, incentives could be enhanced for landlords to convert existing baseboard electric or electric furnace heating to heat pump systems. Electric baseboard heating is much more common in rental properties, as it is typically the least expensive heating system to install. However, tenants are typically left to pay the high energy bills that result from the use of baseboard heaters. Electric to heat pump conversions, which are currently underserved by existing provincial rebates that focus on fuel switching, have the potential to significantly lower energy bills for tenants, and potentially prolong building lifespan for owners by increasing ventilation levels.

5. Provide a targeted, low-cost and low-barrier financing option as part of a broader retrofit program design

Although financing was not identified as a high-importance barrier by homeowners or contractors in the region, gaps do exist in currently available financing products. A new, targeted home retrofit financing option could be very impactful for residents who are currently unable to proceed with retrofits due to a lack of access to traditional financing. It is therefore of particular importance that any new financing offer be designed with accessibility and equity in mind.

A new financing offer could be developed in partnership with a third-party lender that focuses on accessibility gaps in currently available financing. These gaps include eligibility for customers without home equity to secure a loan, customers with a relatively poor credit history, and those for whom prevailing interest rates and loan terms are unfavorable.

More work needs to be done to determine the ideal role for third-party retrofit financing, particularly as new financing streams like PACE and the federal government's planned zero-interest home retrofit loan come online. However, the enabling role that an engaged, locally-based financing partner could play in encouraging home energy retrofits should not be underestimated.

Next Steps

Overall, there is very strong potential for further development of a municipal home energy retrofit program in the City of Powell River. Home retrofit activity in line with BC's climate targets could result in 200 participating homes per year, representing \$288,000 in energy cost savings and 400 tonnes of GHG reductions for Powell River residents annually, in addition to supporting around 23 jobs.

In summary, we strongly believe that a further Program Design study is warranted, and should be inclusive of the neighboring qathet Regional District and Tla'amin Nation, respecting the tight integration and interdependence of these three jurisdictions, and their geographical isolation relative to the rest of the Province.

Appendix A: Municipal Program Descriptions

Rossland Energy Diet (2011-2012) and Regional Energy Diets

The 2011-2012 Rossland Energy Diet, organized by FortisBC PowerSense, offered free energy efficiency assessments, resulting in uptake in 22% of the single-family homes and 100% of small businesses in Rossland.⁹⁹ Of those households, over 95% made some energy efficiency improvements.¹⁰⁰ Awareness and familiarity barriers were addressed via social marketing, connection with home energy assessors, information sessions, and access to a program coordinator to help navigate the incentive program; and financing was offered via the local credit union. The City of Rossland currently operates a comprehensive energy efficiency building incentive program for new buildings as well as renovations.

The success of the Rossland Energy Diet saw it replicated in 2013 on a regional scale in both the Okanagan as well as the Kootenays. Both these regional energy diets offered pre-retrofit evaluations at reduced cost, which were completed by over 800 households in both regions.¹⁰¹ Both also distributed free efficiency products, and held public promotional events. In the Kootenays, 13 municipalities, two regional districts in the Kootenays, and West Kootenay EcoSociety supported the program, and five local credit unions offered financing, accessed by 5-6% of participants.¹⁰²

In the Okanagan, eleven municipalities and two regional districts supported the diet. On-bill financing was offered by FortisBC to residents outside of Penticton. Penticton's own municipal utility offered the program to residents within that city's limits. Interestingly, FortisBC's on-bill financing offer was accessed by only two participants (2% of all participants who completed upgrades and post-retrofit evaluations), while Penticton's saw an uptake of 39 participants (59% of households that completed upgrades). This demonstrates the success that some municipalities have had in directly engaging residents in a regional program, compared to engagement with a larger utility.¹⁰³

Vancouver Home Energy Loan Program (2011-2012)

The City of Vancouver's Home Energy Loan Program (HELP) is an example of a relatively unsuccessful financing program with very low uptake. It offered low interest financing up to \$15,000, and was administered through Vancity Credit Union 2011-2012. It had initially aimed to register loans to property title to make it transferable with a home sale, but this was not

⁹⁹ Kassirer, J. (2014). *Rossland Energy Diet*. Retrieved from Tools of Change: <https://toolsofchange.com/en/case-studies/detail/683/>

¹⁰⁰ Ibid.

¹⁰¹ FortisBC. (2013). *Moving forward with energy solutions: Corporate report*, p. 23. Retrieved from https://www.cdn.fortisbc.com/libraries/docs/default-source/about-us-documents/corp-report2013_smartphone3d141ded12714a878659cf2e741afaa2.pdf?sfvrsn=e06557c8_2

¹⁰² *Home energy retrofit incentive campaigns analysis report*, p. 69.

¹⁰³ Ibid.

possible. Interest rates were not competitive, contributing to low market differentiation and low uptake overall.¹⁰⁴

Vancouver Heritage Foundation

The Vancouver Heritage Foundation offers up to \$12,000 for retrofits or \$18,000 if fuel-switching to heat-pumps to homes within City of Vancouver boundaries that are either built before 1940 or on the Vancouver Heritage Register.¹⁰⁵ It requires EnerGuide evaluations, but offers partial cost coverage. Homes heated primarily by electricity are not eligible.

City of Terrace (2011-2013)

From 2011 to 2013, the City of Terrace offered \$50 pre-retrofit audits, and Energy Advisors billed the City for the remaining \$100 of the total cost. This was a comparatively small, low-budget program that achieved 50-70 initial energy assessments. A learning offered by the city is that times of increased real estate sales are ideal for intervening with a retrofit campaign, as new buyers are often interested in undertaking upgrades to improve the performance of their home.¹⁰⁶

Solar Colwood (2011-2015)

Solar Colwood, a program that took place in the City of Colwood from 2011 to 2015 in partnership with First Nations, academia, utilities, senior governments, and local businesses was one of the more comprehensive municipal programs in BC to date.¹⁰⁷ Colwood is a fast-growing city with a population of 17,000 making it very comparable to Powell River in some respects. Solar Colwood offered a number of rebates, free products, reduced-cost audits, OBF with BC Hydro for solar, and low interest loans with Pacific Solar Smart Homes (for solar only) and Vancity. It targeted both residential and business retrofits.

Unlike municipal programs in the cities of Nelson and New Westminster, Colwood contracted out the management, day-to-day operation and outreach of the program. The program budget was supported by a \$1.6M grant from Natural Resources Canada, \$2.7M of external in-kind contributions, and \$10k in municipal funds. The total economic benefit to the City and participating residents was estimated at \$4.4M.

The total number of participants was around 500 over a period of 4 years. Among the upgrades completed were 39 solar hot water systems, 120 heat pumps, and 12 home EV charging stations. Eleven members of the T'Sou-ke Nation were trained as solar installers. The program also exceeded its intended energy and emissions reduction goals, with final energy savings of 4.96 million kWh/year, GHG reductions of 651 tonnes Co2e/year and utility bill savings of \$525,000/year.

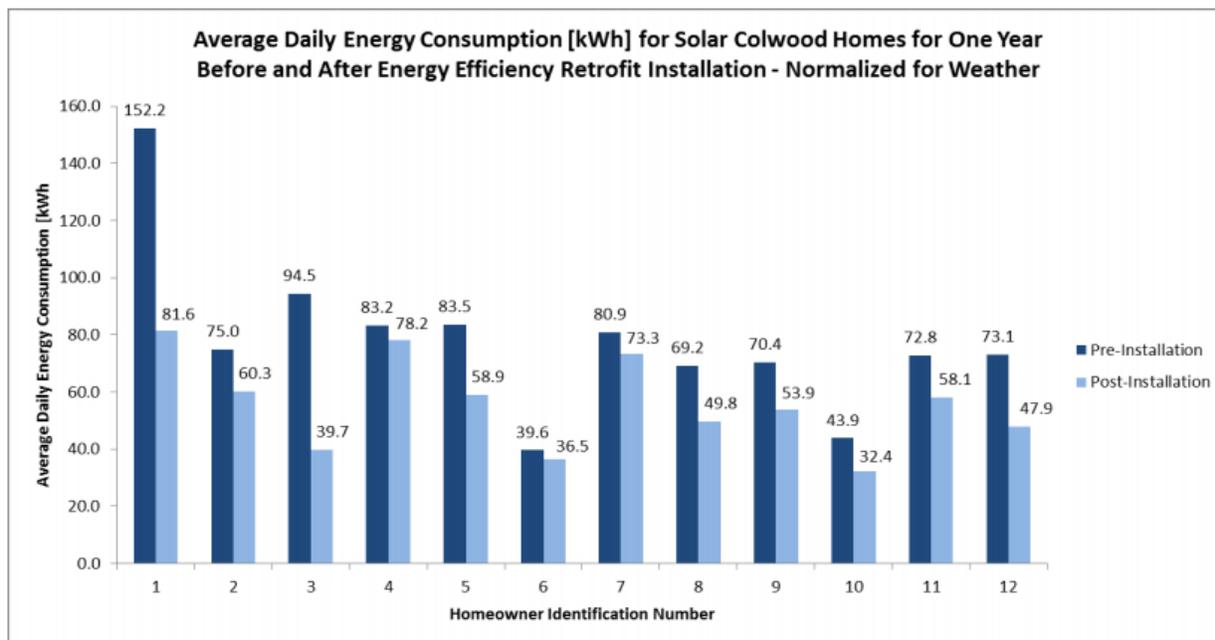
¹⁰⁴ *Home energy retrofit incentive campaigns analysis report*, p. 47

¹⁰⁵ Vancouver Heritage Foundation. (n.d.). *Heritage Energy Retrofit Grant*. Retrieved December 22, 2021, from <https://www.vancouverheritagefoundation.org/grants/heritage-energy-retrofit-grant/>

¹⁰⁶ *Home energy retrofit incentive campaigns analysis report*, p. 43

¹⁰⁷ *The Solar Colwood Story*, p. 2.

The 500 residents who participated accomplished over 1,000 actions, with an average 37% reduction in energy consumption. The program also achieved an average of 43% GHG reductions for participants, representing significantly higher savings than many other programs, historical and current, in the province. These high numbers are partly attributed to the fact that many program participants completed more than one retrofit measure. A sample of pre- and post-retrofit energy consumption for Solar Colwood participants is shown in the figure below.



*Solar Colwood Program Impact*¹⁰⁸

Like reports assessing other programs, the report on Solar Colwood supports the conclusion that financing offers are not sufficient by themselves to catalyze action, but may be enabling for some households in conjunction with campaigns that raise awareness and provide support navigating the upgrade process.

The program was initially funded by a Natural Resources Canada Clean Energy Fund grant, supporting a demonstration project that sought to help achieve the goals of Colwood’s Community Energy and Emissions Plan. The program’s goals included reducing energy consumption and utility costs, reducing GHG emissions, supporting local skills development and jobs, achieving economies of scale in retrofits, and demonstrating a financing model that could be adopted by other municipalities.

Planning and design of the program took one year, with a strong focus on building support and partnerships among City staff and Council, local contractors and trades, utilities, Royal Roads University, and the neighbouring T’Sou-ke First Nation. The emphasis on Solar Colwood as an adaptive “learning project” was designed to promote higher engagement and the sharing of lessons learned among other municipalities.

¹⁰⁸ Figure reproduced from: *The Solar Colwood Story*, p. 15.

Although the main focus of the Solar Colwood program was solar hot water installations, other key features of the Solar Colwood program included a dedicated incentive for EnerGuide assessments, top-up incentives for solar PV and electric vehicle systems, and coordination with BC Hydro to provide a heat pump rebate. The Solar Colwood program also provided energy savings kits to homeowners and renters.

Importantly, Solar Colwood's rebate model was based on a midstream approach, wherein the incentives were provided to installers directly once installations were complete. This process, which relies on pre-qualified and registered contractor relationships, ensures that homeowners are not required to pay the full upfront cost of their upgrade and then wait for a rebate. Rather, the incentive is deducted from the cost paid to the installer. In Colwood's experience, this reduced the need for providing financing.

Power Down Campbell River (2013)

In 2013, Power Down Campbell River, in its first phase, offered free home energy evaluations and the City's recreation department promoted ECAP through its Leisure Involvement for Everyone low-income program.¹⁰⁹ It also utilized a full-time co-op student to coordinate and produce a reality TV style energy use reduction competition between five local families to raise awareness.

A recommendation for future replications was to issue an RFP and use a single contractor to complete the free audits, instead of issuing individual rebate numbers for households to book their own evaluations. Further, the campaign did not have enough funding to build on the momentum created, and ideally would've been a multi-year program.

In its second phase, the program offered discounted home energy audits as well as rebates, and coordinated a number of workshops. Since the start of CleanBC Better Homes, the City has continued to top up rebates, and promoted retrofits via social media, print ads, short videos, and news releases.¹¹⁰ It has seen steady and significant uptake.¹¹¹

Cool North Shore (2013-2018)

Cool North Shore was a grassroots, citizen-led program run by the Cool North Shore Society with support from the City & District of North Vancouver, and West Vancouver. It employed a neighbourhood leader driven, fun-focused campaign model and offered free basic thermal imaging (via local fire departments), free caulking (via Fortis BC) and outlet insulation, while promoting LiveSmart BC upgrade incentives.

¹⁰⁹ For a summary of the initial program, see: Partners for Climate Protection. *City of Campbell River, British Columbia: Power Down Campbell River energy rebates*. <https://www.pcp-ppc.ca/resources/city-of-campbell-river-british-columbia-power-down-campbell-river-energy-rebates>

¹¹⁰ For details on current offerings, see: City of Campbell River. *Power Down Campbell River*. <https://www.campbellriver.ca/planning-building-development/green-city/green-building-renos/power-down-campbell-river>

¹¹¹ Personal communication, Andrews, C. (2021, Oct. 19).

In its first years of operation, 14 neighbourhoods and 350 homes participated. The program appears to have wound down sometime around 2018.¹¹² Currently, the City and District of North Vancouver and West Vancouver are collaborating on a “Jump on a new heat pump” campaign promoting group purchase rebate codes for heat pumps.¹¹³ A free virtual home energy check-up is now also being offered, with a detailed sign-up form available online.

Nanaimo Regional District (2010-present)

The Regional District of Nanaimo initiated its green building program in 2010 specifically to encourage more sustainable new home construction with rebates and promotional activities, and funded these with a portion of its building inspection permit fees. It has since expanded to include renovation of existing buildings and has organized a wide variety of awareness-raising and learning events in the past decade.¹¹⁴

The program is currently focused on connecting people to the available rebates. It also offers the \$350 municipal top-up, which is not financially significant, but provides a helpful way to engage people and demonstrate the district’s commitment to supporting its residents towards energy efficiency. Other ongoing activities include pursuing improved equity of the program, and engaging the relevant vendors and suppliers so they can help nudge people into more energy efficient directions when they are already in a process of making upgrades.¹¹⁵

Nelson EcoSave (2012-present)

Nelson’s EcoSave home retrofit program is an example of a “one-stop-shop” service that provides customized support and resources for participating homeowners. Since its inception in 2012, EcoSave has supported over 1000 participants. For every participant in the program, there have been approximately 4 registrants who do not follow through with upgrades.

EcoSave began as a pilot project with funding available to from NRCan to explore on-bill financing. The City partnered with Columbia Basin Trust and FortisBC to deliver this pilot with an initial target of 200 signups, 50 completed pre-retrofit EnerGuide evaluations, and perhaps 25 post-audit evaluations, representing homeowners who completed the entire process and performed a retrofit. Within 3 months the program hit the 200-home target, with 107 eventually completing retrofits.

As a result of this success, the City of Nelson brought the program in-house with its own funding and did not rely on external funding after that point. The City has stewarded the program through the rise and fall of several complimentary incentive programs, including the federal ecoEnergy, provincial LiveSmartBC, and changing offers from FortisBC. Staff have found that it

¹¹² Cool North Shore. (2021, July 28). *Cool Neighbourhoods*. Retrieved from <https://www.coolnorthshore.ca/programs/cool-neighbourhoods/>

¹¹³ City of North Vancouver. (n.d.). *Jump on a new heat pump*. Retrieved January 26, 2022, from <https://www.cnv.org/your-government/living-city/energy/single-family-homes-duplexes-and-townhouses/jump-on-a-new-heat-pump>

¹¹⁴ Regional District of Nanaimo. (n.d.). *Ongoing Initiatives*. Retrieved July 22 2021, from <https://www.rdn.bc.ca/taking-action-at-the-local-level>

¹¹⁵ Personal communication, Beaubier, J. (2021, Oct. 15).

can be a time-consuming process to steward participants through all of these changing programs.

Residents access the EcoSave program through an online registration form, which leads to a welcome email including a local contractor list and links to rebate programs. The applicant will then be contacted by the City's partner EnerGuide Service Organization, Ecofitt. Under the terms of the programs' RFP, the Service Organization must offer an EnerGuide evaluation within two weeks of the application. The City handles all of the marketing and direct homeowner support for the program, including dedicated phone and email support as applicants go through the retrofit process. The level of support ranges from 30 minutes to 5+ hours for each homeowner over the entire process, depending on the complexity of the retrofit and the homeowner's level of knowledge.

The City of Nelson has always worked exclusively with one Service Organization during the EcoSave program, but indicated that it would have had to offer homeowners a choice of service provider if there were more companies operating locally. Prior to the launch of the NRCan Greener Home program, the EcoSave program would also subsidize the cost of EnerGuide evaluations for applicants, but it no longer does now that these services are covered by Greener Homes grants.

Of the ~1000 EcoSave participants since 2012, approximately 140 have opted to access the on-bill financing offered by the City of Nelson's municipal utility, Nelson Hydro. Terms have been relatively comparable to a personal line of credit, with up to \$16,000 in principal available at a 3.5% interest rate on a 5- or 10-year term. The applicant must be the owner of the home with a utility account in good standing, but having no history of late payments is not a requirement, unlike BC Hydro's on-bill financing pilot.

The financing terms offered by Nelson Hydro are also now being made available to residents of the Central Kootenay Regional District, through a partnership with the Nelson & District Credit Union. This program is supported by FCM's credit enhancement product. The program offered in the Regional District is materially very similar to the City of Nelson program, but does not operate under the EcoSave name.

EnergySave New Westminster (2013-present)

EnergySave New West launched in 2013 as a pilot program in support of the City's first energy and emissions reduction plan. The pilot was funded with seed money from the City, BC Hydro and FortisBC. As New Westminster has its own municipal utility, the program has taken advantage of the existing platforms used by the utility to conduct outreach to customers and the local community.

The goal of the EnergySave program is to enhance, not duplicate existing offers from the Provincial and Federal governments and utilities. The program acts as a facilitator, simplifying the retrofit process for homeowners and connecting them to available rebates and incentives for their planned retrofits.¹¹⁶ The website offers online program registration, as well as a variety of resources. The program has also offered a subsidized EnerGuide evaluation as a first step,

¹¹⁶ See <http://www.energysavenewwest.ca/>

initially through an exclusive relationship with one Service Organization (City Green), but now expanded to offer applicants a choice of two pre-vetted EnerGuide service providers.

Similarly, the City offers homeowners a list of pre-approved contractors based on their participation in the CleanBC Program Registered Contractors listing. As the primary role of the EnergySave program is to provide a one-stop-shop point of support, the level of involvement ranges from 30 minutes up to 3+ hours for each applicant, depending on the complexity of the retrofit and the homeowner's existing level of familiarity with the EnerGuide evaluation, rebate application, and contractor selection process. These figures are strikingly similar to the experience of the Nelson EcoSave program.

Penticton Home Energy Loan Program (2013-present)

The City of Penticton's Home Energy Loan Program (HELP) has offered on-bill financing to Penticton Electric Utility customers since 2013. As of 2019, it had received 215 applications, issued 81 loans (with no defaults), and generated \$63,000 in revenue from interest while spending \$29,000 on administration (excluding wages).¹¹⁷ Participants are required to provide the previous 12 months of utility bill payments as well as up-front payment for the upgrades to receive the loan. Eligible upgrades include anything that reduces energy use and utility bills. EnerGuide assessments are required but are offered at reduced cost for \$35 and \$200 pre-and post-retrofit respectively, by a city-designated contractor. The interest rate is fixed at prime + .5%, and loans need to be repaid in the case of a home sale.¹¹⁸

Invermere Incentive Program (2019-present)

The District of Invermere operates a comprehensive energy efficiency building incentive program for new buildings as well as renovations.¹¹⁹ Notably, it includes incentives for solar photovoltaic systems, toilet replacements, wood stove exchange, as well as visitable residential accessibility. The latter focuses on renovations that make a home's main floor more accessible for all, including seniors and people with mobility issues.¹²⁰

CRD Bring It Home (2020-present)

The Capital Regional District's Bring it Home for the Climate Program offers a free virtual home energy check-up, workshops and demos, as well as heat pump group purchase rebates. It serves as a one-stop-shop and appears to emphasize education and awareness, with a website that showcases resources related to efficiency retrofits, and a Facebook page with success

¹¹⁷ City of Penticton. (2019). *Council report: Energy retrofit loan program update*, p. 55. Retrieved from <https://www.penticton.ca/sites/default/files/uploads/meetings/agendas/2019-04-02%20Regular%20Agenda%20Package.pdf>

¹¹⁸ City of Penticton. (n.d.). *Home Energy Loan Program*. Retrieved July 9, 2021, from <https://www.penticton.ca/city-services/utility-electrical-services/electric-water-accounts/home-energy-loan-program-help>

¹¹⁹ Invermere on the Lake. (n.d.). *Building Incentives*. Retrieved August 26, 2021, from <https://invermere.net/operations/environment/building-incentives/>

¹²⁰ Canadian Centre on Disability Studies. (2015). *Facts about visitable housing in Canada*. Retrieved from <https://med-fom-learningcircle.sites.olt.ubc.ca/files/2015/04/Fact-Sheet-VisitAble-Housing.pdf>

stories from the community. The website encourages interested homeowners to register via an online form as a pre-requisite for participation.

To receive the virtual home energy check-up homeowners must complete an intake form. The check-up involves an up to one-hour long call with a home energy expert to discuss topics such as upgrades suitable for the household's needs and budget, previously completed EnerGuide reports, contractor quotes and CleanBC Better Homes rebates.¹²¹ The City of Vancouver now also partners in the program, making homeowners within either the Capital Regional District or within the City of Vancouver eligible for participation. Primarily wood-heated homes and renters are excluded.

Renovate Smart Kamloops (2020-present)

Renovate Smart Kamloops, launched in 2020, offers free one-on-one renovation consultations with the City of Kamloops' Community Energy Specialist in order to explore ways to integrate efficiency improvements into renovations and to provide guidance for accessing available provincial rebates.¹²² It also offers home energy performance and carbon accounting workshops, and uses these to provide group education prior to one-on-one sessions. It deliberately focuses on using approachable language (hence 'renovate' rather than 'retrofit'), and community-based social marketing to address people's desire to have comfortable homes with good air quality. Feedback collected from participants confirms cost as a top barrier and supports the idea that greater logistical support might help encourage greater action.¹²³

Renovate Smart Kamloops as well as a few other programs have included the use of thermal imaging cameras to visually show households how well their home is insulated. For instance, the Thompson-Nicola Regional Library's "See the Heat" Program offers thermal imaging cameras that library members can connect to their smart phone to get a visual representation of their home's insulation and heat leaks. This program was initially so popular that the waitlist reached wait times into multiple years, resulting in broad promotion being ceased to reduce demand.

Comox Valley Regional District (2020-present)

The Comox Valley Regional District, encompassing Comox, Courtenay, Denman Island, and Hornby Island, has a population of about 66,500. In addition to providing local rebate top-ups, it has expended significant effort in engaging contractors to find those qualified and familiar with the rebate processes and engage them in the district's efficiency retrofit efforts.¹²⁴ It now has a network of local contractors and can easily reach out to and engage via its email list. Unfortunately, a lack of funding has meant that further retrofit industry capacity building and market development actions have not taken place.¹²⁵

¹²¹ Bring It Home 4 Climate. (n.d.). *Program terms and conditions*. Retrieved January 19, 2022, from <https://bringithome4climate.ca/terms-and-conditions/>

¹²² City of Kamloops. (n.d.). *Renovate Smart Kamloops*. Retrieved July 22, 2021, from <https://www.kamloops.ca/business-development/building-permits/home-energy-efficiency/renovate-smart-kamloops>

¹²³ Personal communication, De Candole, D. (2021, July 22).

¹²⁴ Comox Valley Regional District. (n.d.). *Rebates & Incentives*. Retrieved October 20, 2021, from <https://www.comoxvalleyrd.ca/services/environment/rebates-incentives>

¹²⁵ Personal communication, Holme, R. (2021, Oct. 20).

The district is one of nine FCM-funded Transition 2050 Residential Retrofit Market Acceleration Strategy Local Government Project Partners. The other partners are: The Capital Regional District, City of Victoria, District of Saanich, Township of Esquimalt, District of Central Saanich, City of Campbell River, Regional District of Nanaimo, and the Cowichan Valley Regional District. As part of this strategy, over one hundred businesses in the region were consulted, nearly one hundred barriers to heat pump and other retrofits were identified, and the highest-impact retrofit opportunities were defined based on GHG reduction potential:

1. Upgrade oil and natural gas heating systems with air-source heat pumps
2. Building envelope upgrades in oil and natural gas heated homes
3. Improving efficiency in electrically heated homes
4. Increasing retrofit industry capacity¹²⁶

Central Saanich PACE Pilot (2021-present)

The District of Central Saanich is currently coordinating an FCM-funded PACE pilot that launched in the fall of 2021 and aims to provide financing for oil heat to heat pump replacements.¹²⁷ The scope of the two-year pilot is restricted to oil heat to heat pump replacements only in order to reduce complexity and maximize GHG reductions and cost savings. To prepare, Central Saanich obtained a letter of support from the Province of BC and completed a legal review (because of current lack of enabling legislation). The identified legal pathway to PACE is based on the community charter in combination with local area service bylaws that homeowners petition to join and the District council approves individually. GHG reductions are interpreted as a greater good eligible for the local improvement charge approach. The maximum loan repayment amount is designed to be well below the yearly utility savings gained from the heat pump. Notably, contractors were being engaged prior to public launch. A third party administers the program on behalf of the District.

Out of Province Programs

Other examples of programs promoting home energy efficiency at a local or regional level can be found outside of BC, in other provinces as well as in the United States. On-bill financing has seen success in other provinces: Manitoba Hydro offers three on-bill financings products, including a successful Home Energy Efficiency Loan program for financing energy efficiency upgrades.¹²⁸ Nova Scotia Power has a heat pump financing program using a lease-to-own model.¹²⁹ 13,000 of the 57,000 wider program participants (nearly one quarter) took advantage

¹²⁶ City Green Solutions & Home Performance Stakeholder Council. (2020). *Residential Retrofit Market Acceleration Strategy*, pp. 12-13. Retrieved from Comox Valley Regional District:

https://www.comoxvalleyrd.ca/sites/default/files/docs/Projects-Initiatives/20200923_sr_transition2050_residentialretrofitstrategyappendixa.pdf

¹²⁷ District of Central Saanich. (2021, September 17). *Central Saanich to launch PACE financing program for homeowners looking to get off oil heating*. Retrieved from <https://www.centrialsaanich.ca/our-community/news/central-saanich-launch-pace-financing-program-homeowners-looking-get-oil-heating>

¹²⁸ Manitoba Hydro. (n.d.). *Loans & financing*. Retrieved July 28 2021, from https://www.hydro.mb.ca/your_home/loans_financing/

¹²⁹ Nova Scotia Power. (2021, July 28). *Heat pump financing*. Retrieved from <https://www.nspower.ca/your-home/energy-products/heat-pumps/financing>

of the financing option.¹³⁰ Meanwhile, Ontario's Enbridge Gas Distribution Inc. "Open Bill Access" uses third party financing and lets contractors collect payments from customers via their utility bill.

Saskatchewan has ended its on-bill financing program in favour of third-party financing. The province "has a network of efficiency contractors that offer bank financing with a lengthy history of solid success."¹³¹ In the absence of substantial energy efficiency programming at the provincial level, the City of Saskatoon recently announced a PACE-style loan program, offering loans of \$1,000-\$60,000, with a \$500 admin fee (waived for low-income households). Interest rates are based on loan term (5 years at 1.45%, 10 years at 2.31%, and 20 years at 3.14%).¹³² In contrast with some of BC's municipal programs, Saskatoon's program pays the contractor directly, avoiding the need for the homeowner to pay out of pocket. It also does not require credit checks or income verification.

In Alberta, PACE legislation was passed in 2018, and the Alberta Municipal Services Corporation (AMSC) shares administrative responsibility for all PACE programs in the province. In this context, the City of Edmonton recently launched its pilot Clean Energy Improvement Program offering \$3000 to \$50,000 loans as well as assistance with rebate applications.¹³³

In the United States, the Clean Energy Works PAYS program has been implemented by a number of utilities in different states.¹³⁴ In this framework, the utility pays the retrofit contractor from a third-party financed fund, and recovers upgrade costs via a fixed tariff on customers' utility bills. This program is likely one of the most accessible programs available in the North American context in that it is open to renters as well as owners, is tied to the site (and transfers with sale/renter changes), and requires no credit checks, property liens, or upfront payment by the customer.¹³⁵

Just south of the border, there is an example of a successful rural retrofit program run by Orcas Power and Light Cooperative (OPALCO), which delivers energy to twenty of the San Juan islands in the state of Washington. The Switch It Up program supports upgrades to ductless heat pumps, heat pump water heaters, and EV chargers, which can be combined with high speed fiber internet connection.¹³⁶ Customers can choose either rebates or on-bill financing, and currently about half choose one and half the other. About 230 households have taken advantage of OBF since April 2019, which equals about 1% of all households in the county per year.¹³⁷ The Co-op has significantly streamlined its process, moved everything completely online, and can process a household with less than one hour of administrative time, though some households may require more guidance and time. The program website features a

¹³⁰ *Financing energy efficiency retrofits in the built environment*, p. 7.

¹³¹ *Financing energy efficiency retrofits in the built environment*, p. 8.

¹³² City of Saskatoon. (n.d.). *Home Energy Loan Program*. Retrieved November 10, 2021, from <https://www.saskatoon.ca/environmental-initiatives/energy/home-energy-loan-program-help>

¹³³ Daly, B. (2021, September 22). *PACE programs: Edmonton's clean energy improvement program*. City of Edmonton: CUSP Webinar Series. Retrieved from <https://www.youtube.com/watch?v=XOLmiFIGKTo>

¹³⁴ Clean Energy Works. (2014, January 5). *Introduction to inclusive utility investments*. Retrieved from <https://www.cleanenergyworks.org/2014/01/05/introduction-to-inclusive-utility-investments/>

¹³⁵ Toth, M. (2019). *Utility investment vs. consumer loans: Getting to yes on energy efficiency through inclusive financing for all*. Clean Energy Works. Retrieved from https://becconference.org/wp-content/uploads/2019/11/toth_presentation.pdf

¹³⁶ See <https://energysavings.opalco.com/switch-it-up/>

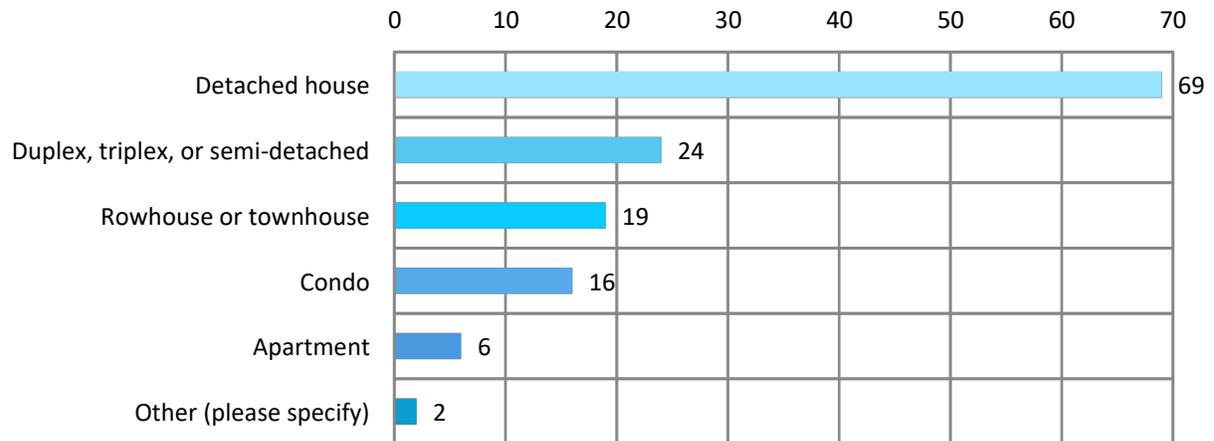
¹³⁷ Personal communication, Gross, L. & Neal, T. (2021, Oct. 21).

savings & impact calculator to give customers an idea of upgrade costs and savings based on a typical home in the county.

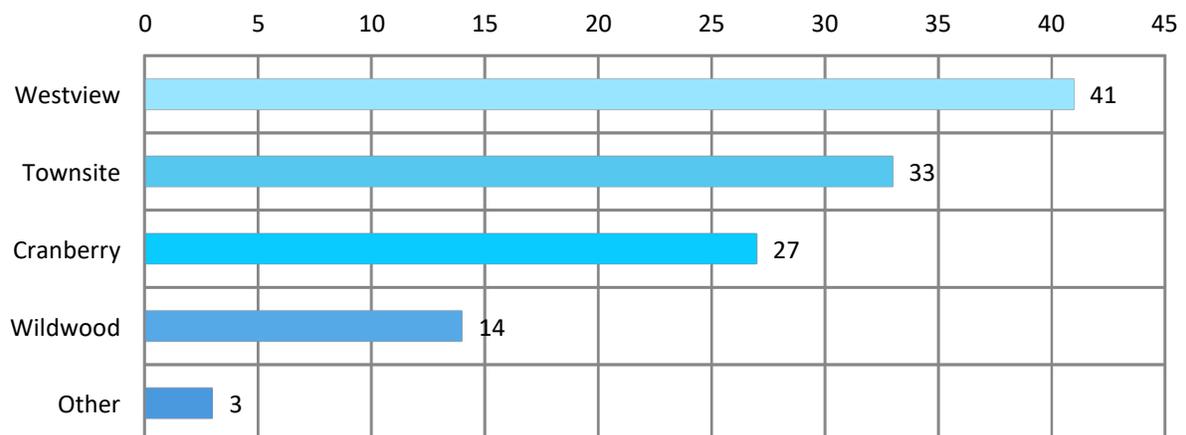
While these out-of-province programs demonstrate the wide variety of possible approaches to financing energy upgrades, BC legislation, utilities and local constraints limit the feasibility of options. An assessment of the feasibility of different financing options for the City of Powell River is provided in Section 6.

Appendix B: Homeowner Survey Results

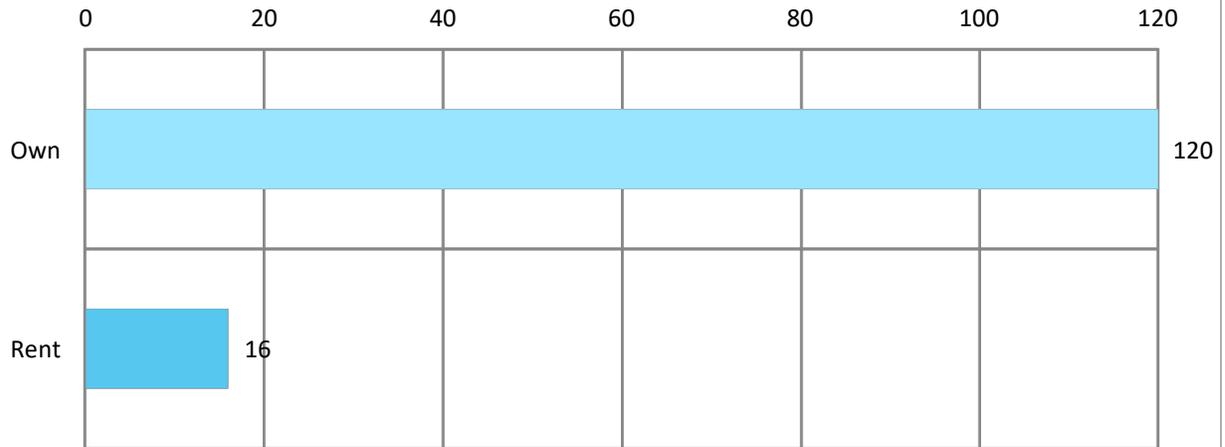
What type of home do you live in?



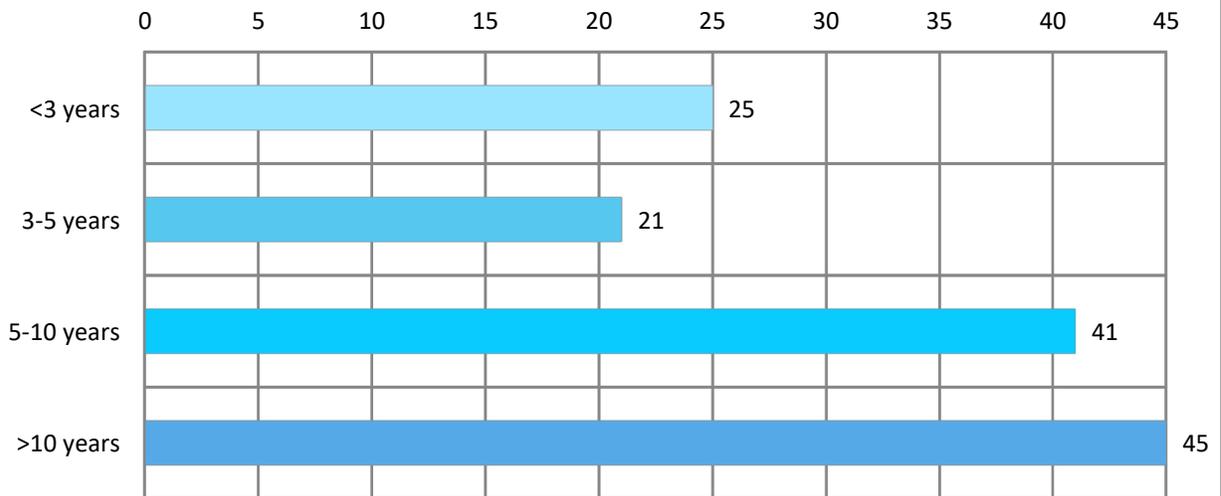
What neighbourhood do you live in?



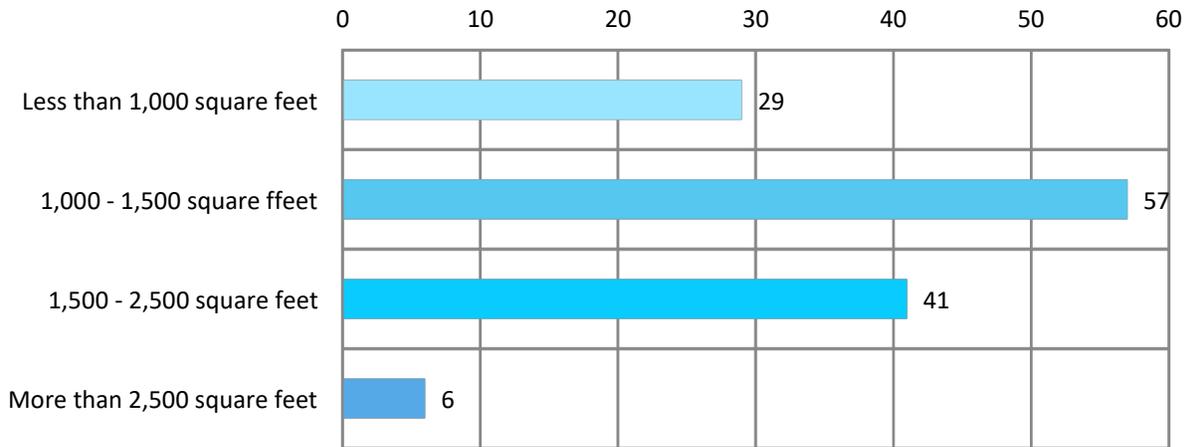
Do you rent or own your home?



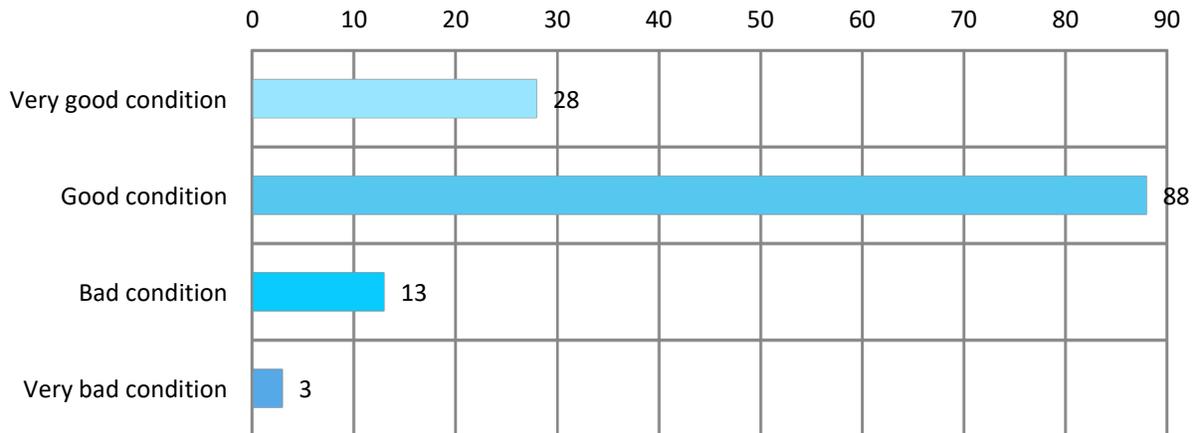
How many years have you lived in your home?



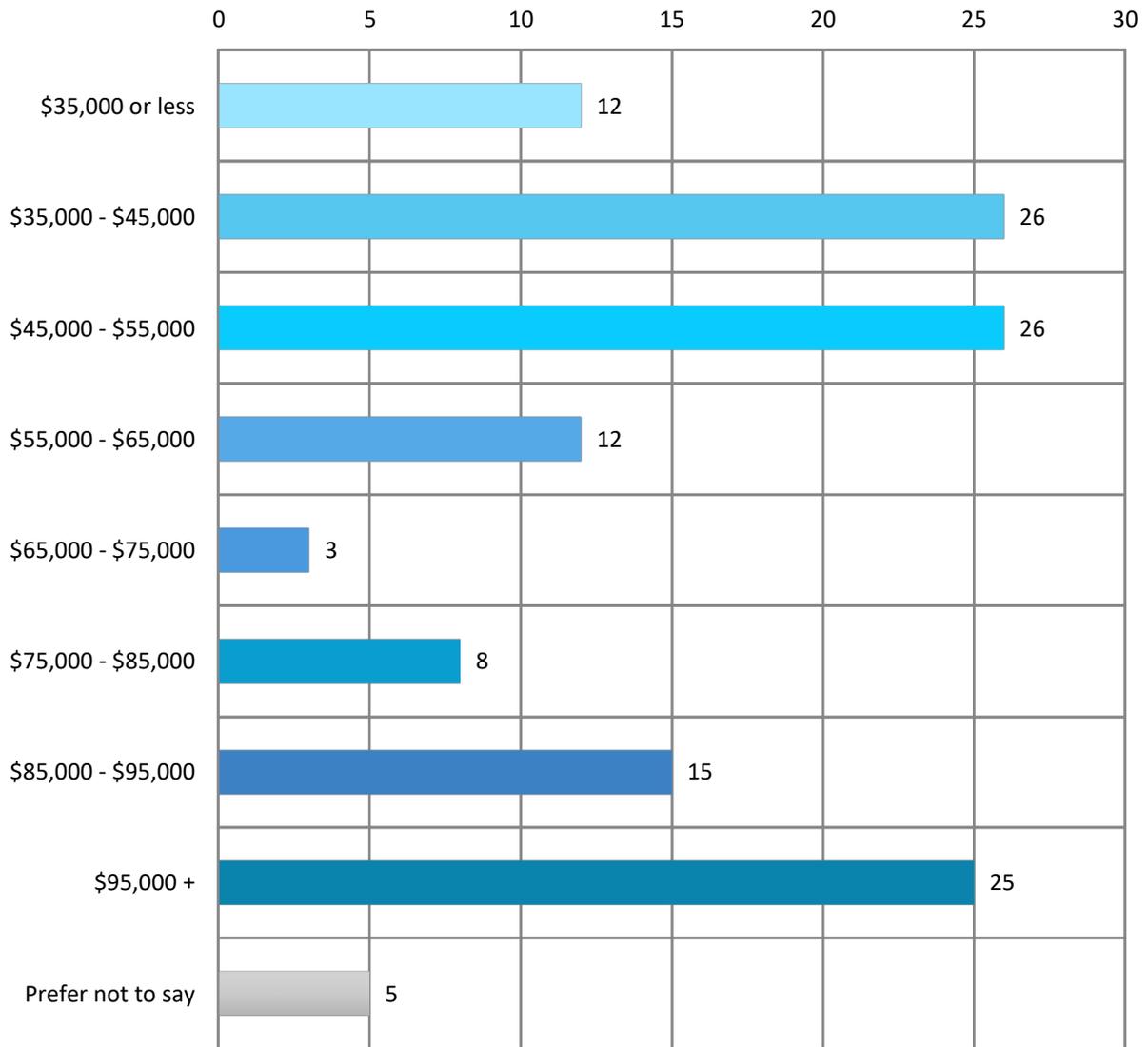
Approximately how much floor space does your home have?



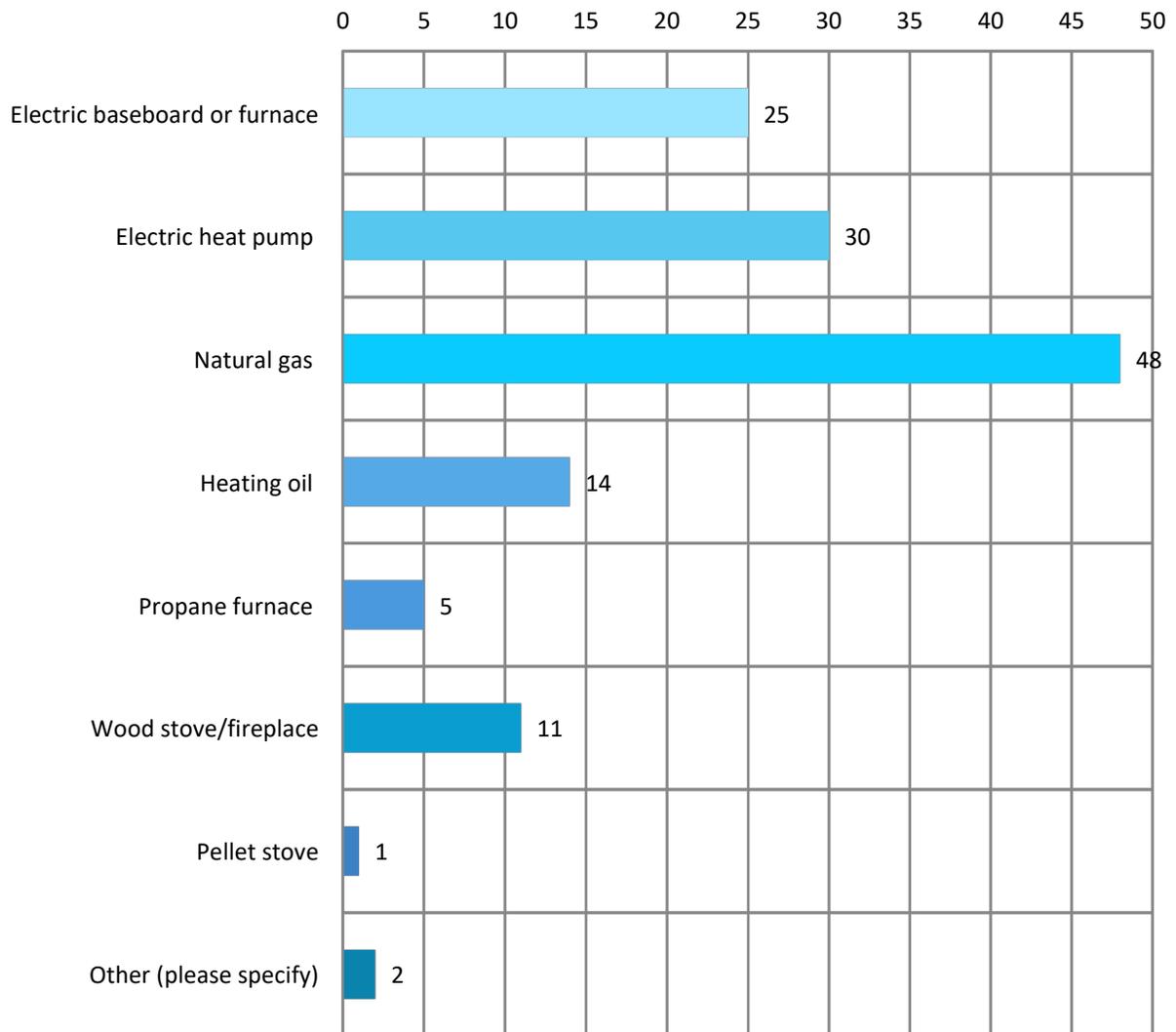
How would you rate the quality of the physical structure of your home?



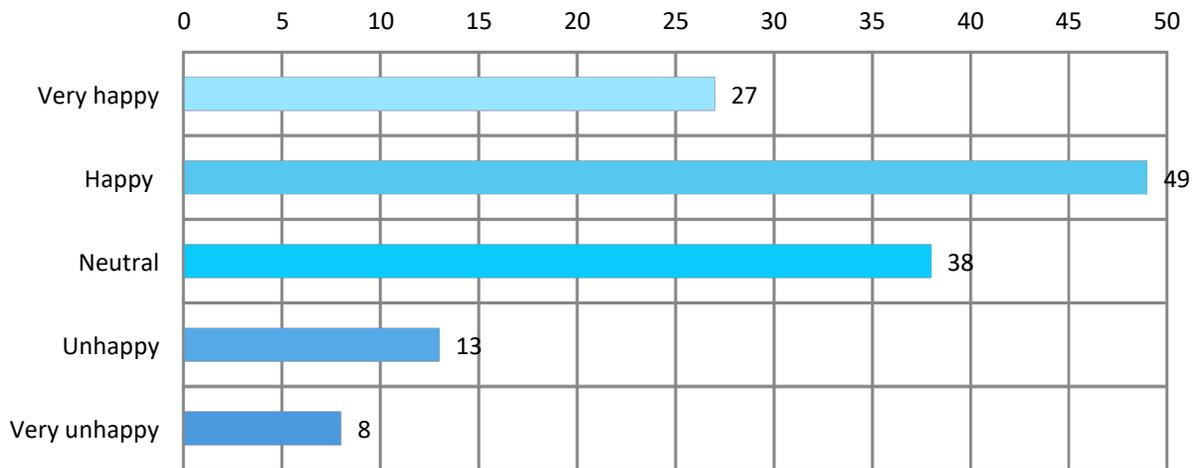
What is your total combined household income?



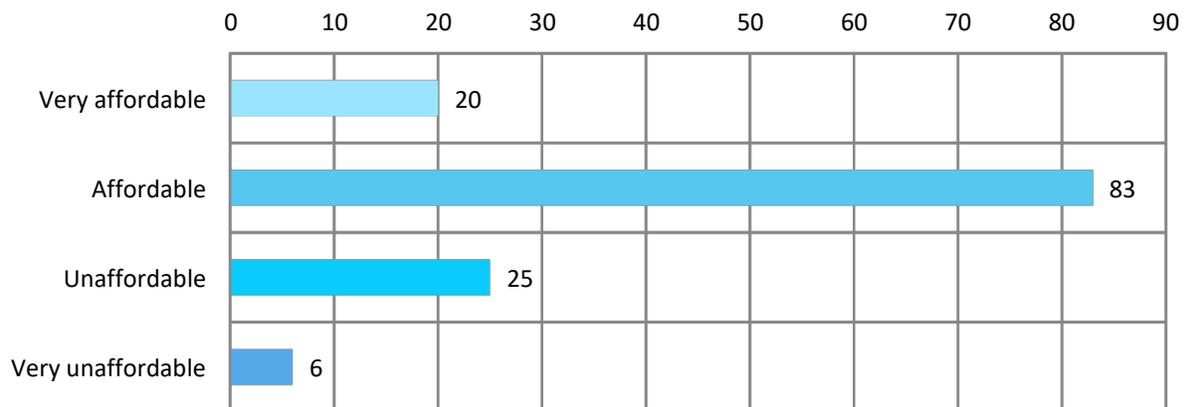
What is the primary source of heating in your home?



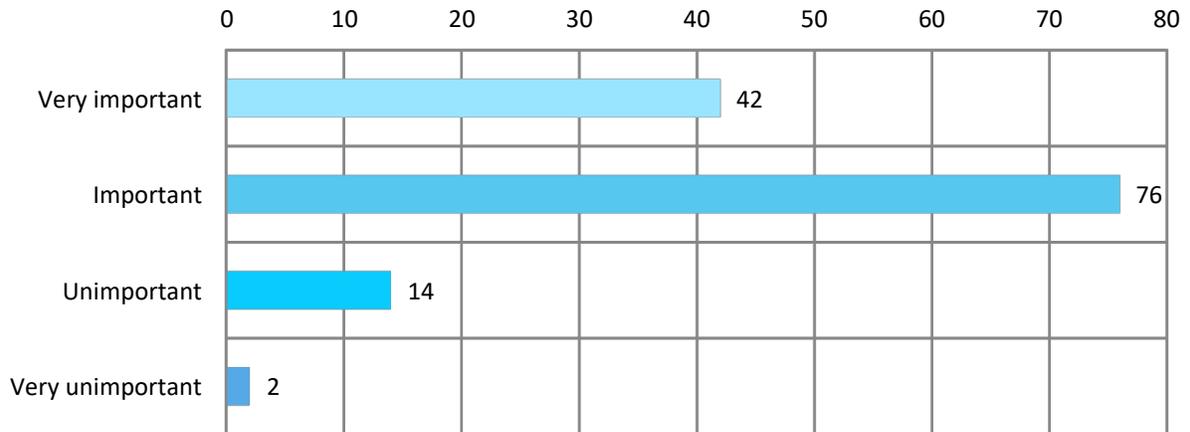
Overall, how happy are you with your home heating situation? (warmth, safety, maintenance etc.)



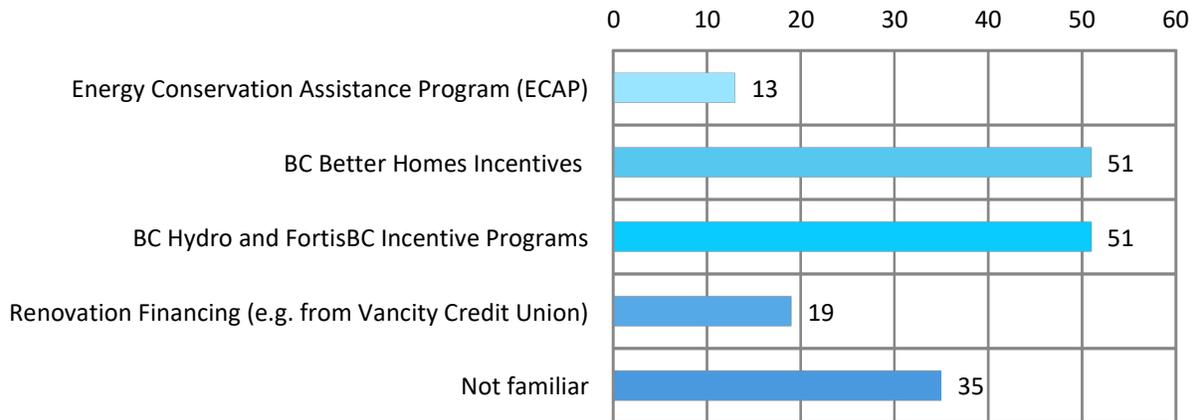
How would you describe the affordability of your heating costs?



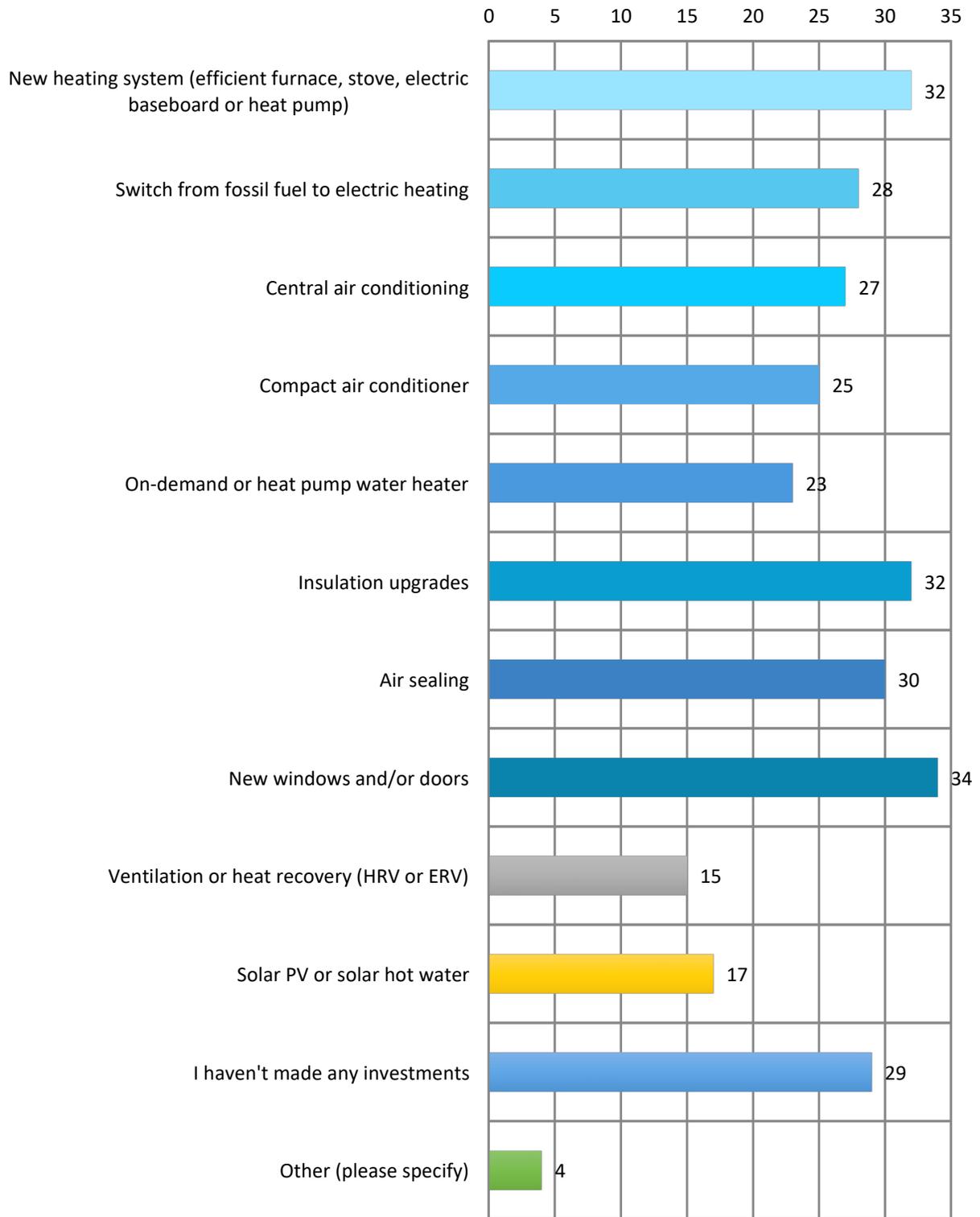
How important is it that your home primarily uses energy from clean, renewable sources?



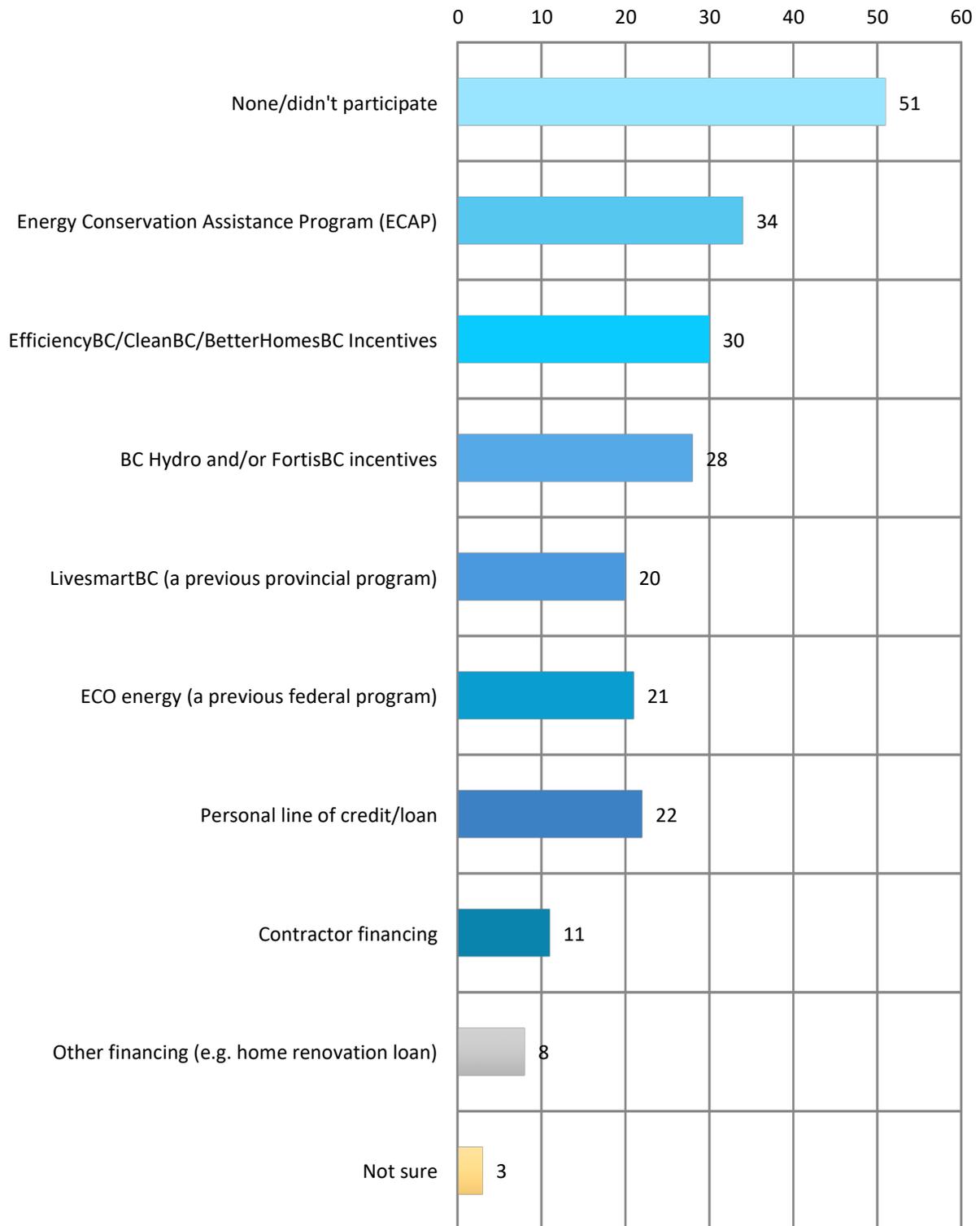
Are you familiar with the following programs that might provide financial support for your planned upgrades?



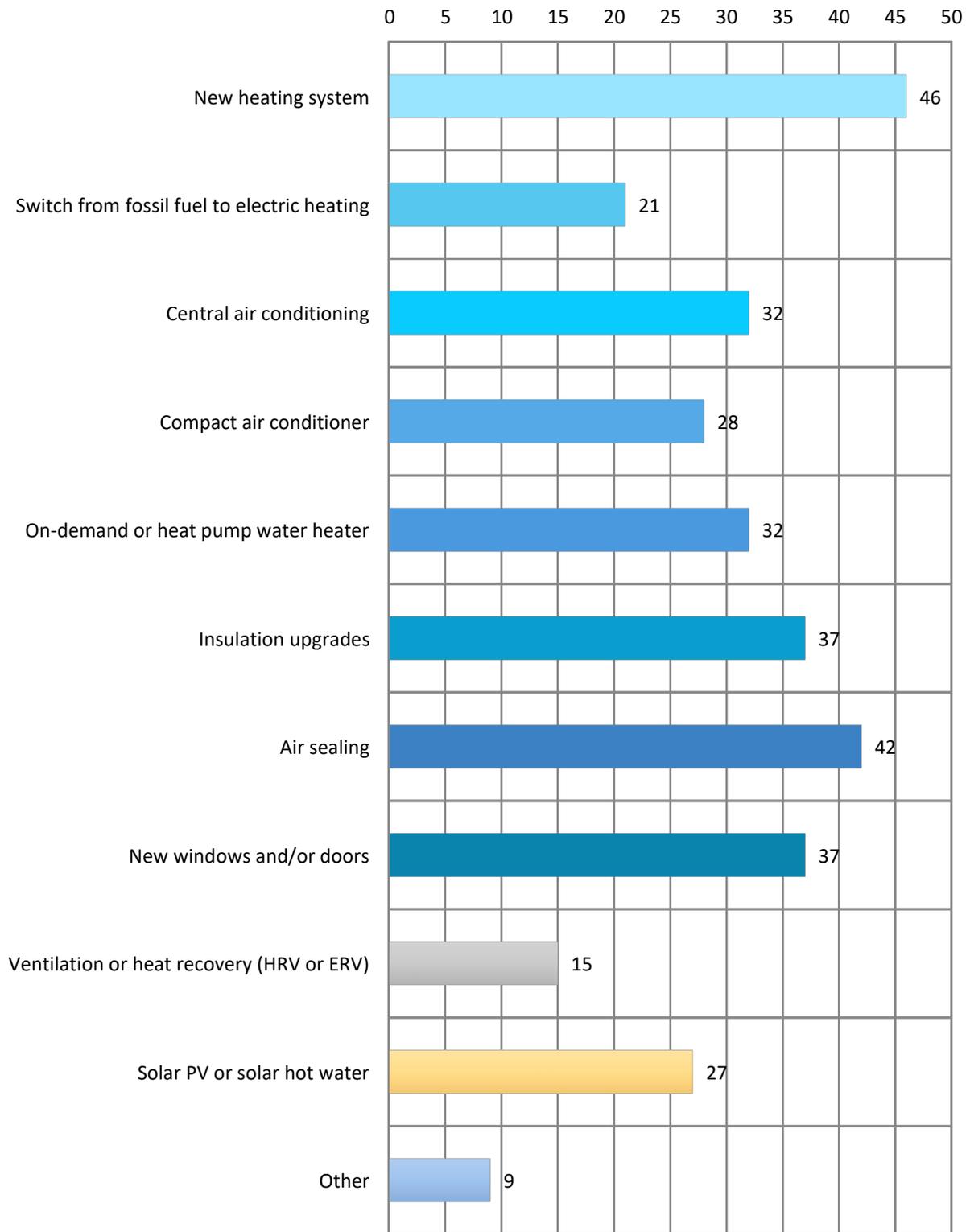
Have you made any of these upgrades to your home in the past 10 years?



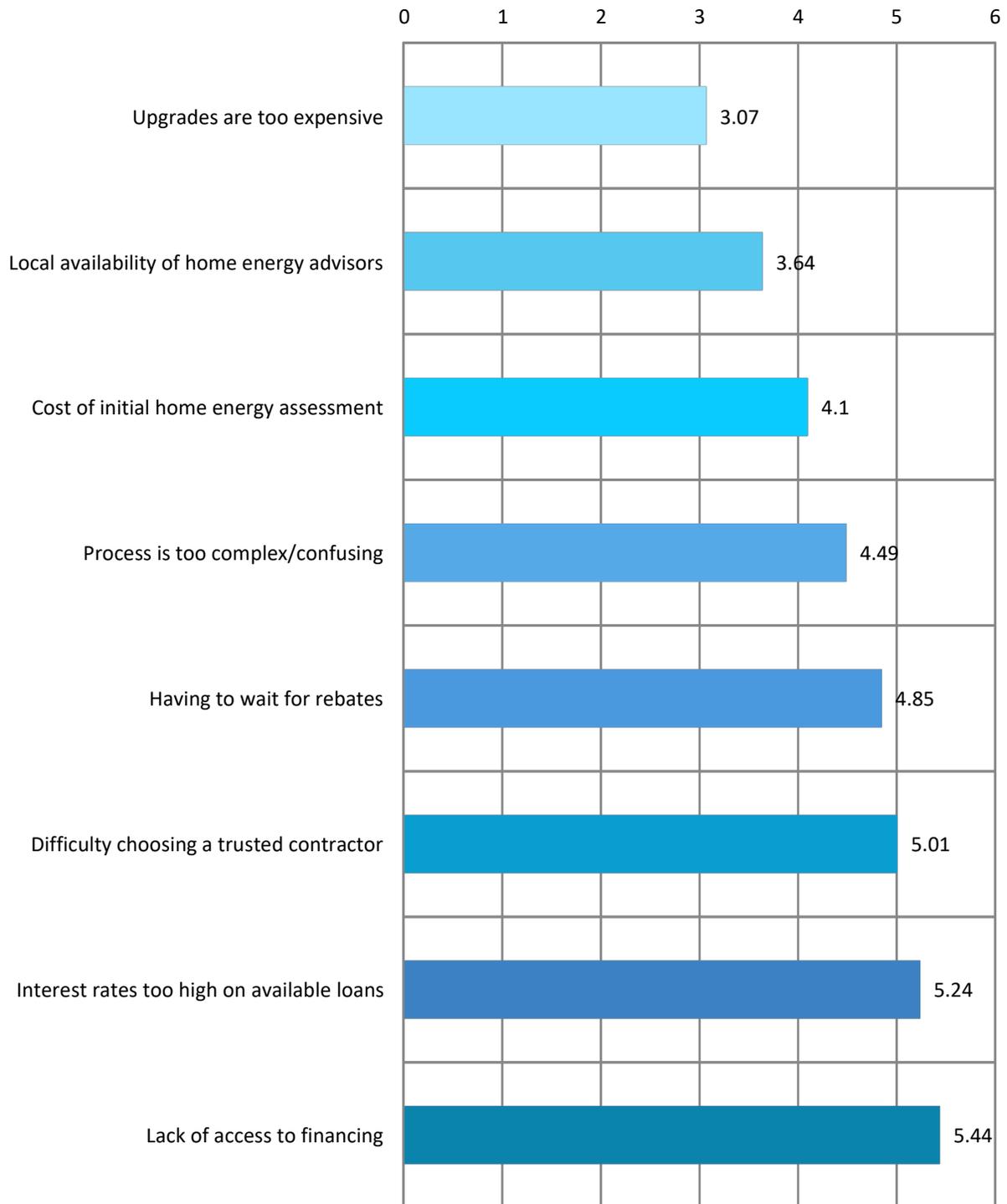
If yes, did you participate in any rebate, incentive or financing programs?



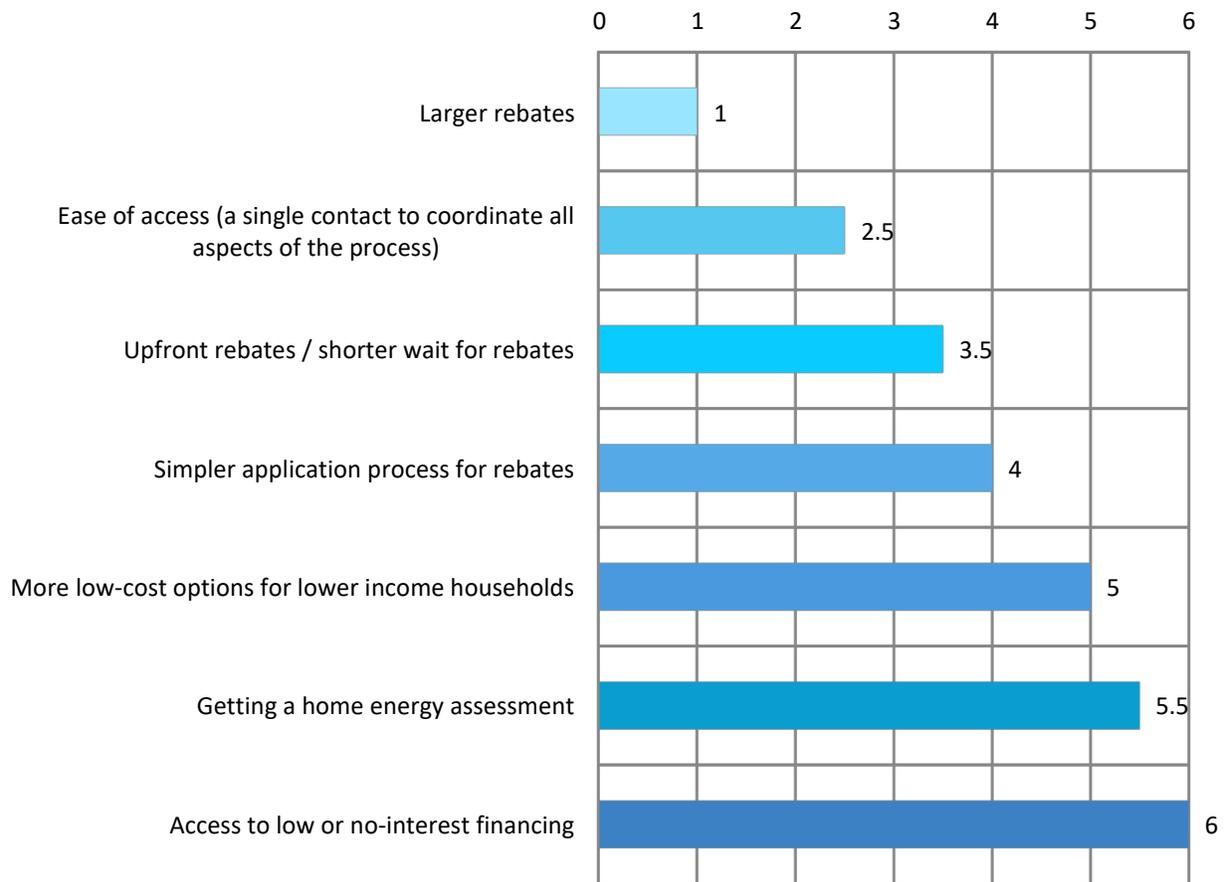
Do you plan to make any of the following upgrades to your home in the next 5 years?



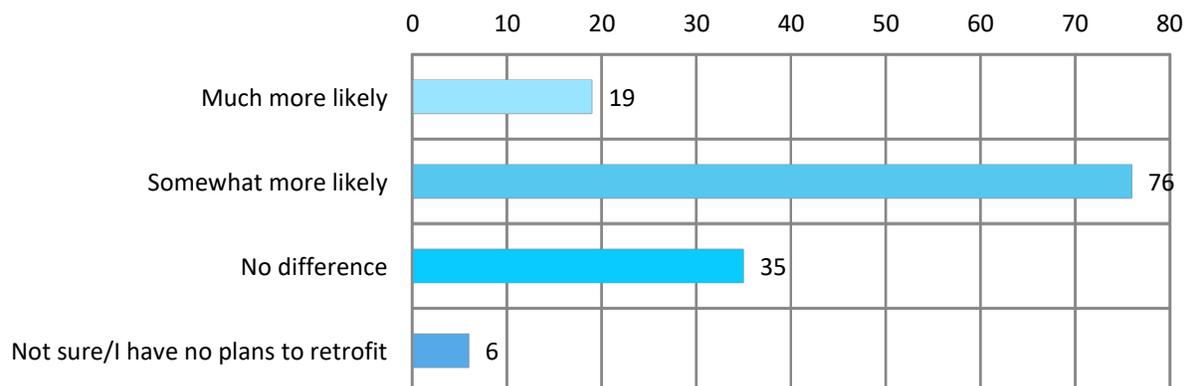
What are the biggest barriers when planning home energy upgrades? (#1 is the most important)



What would enable you to improve energy efficiency of your home (#1 is the most important)

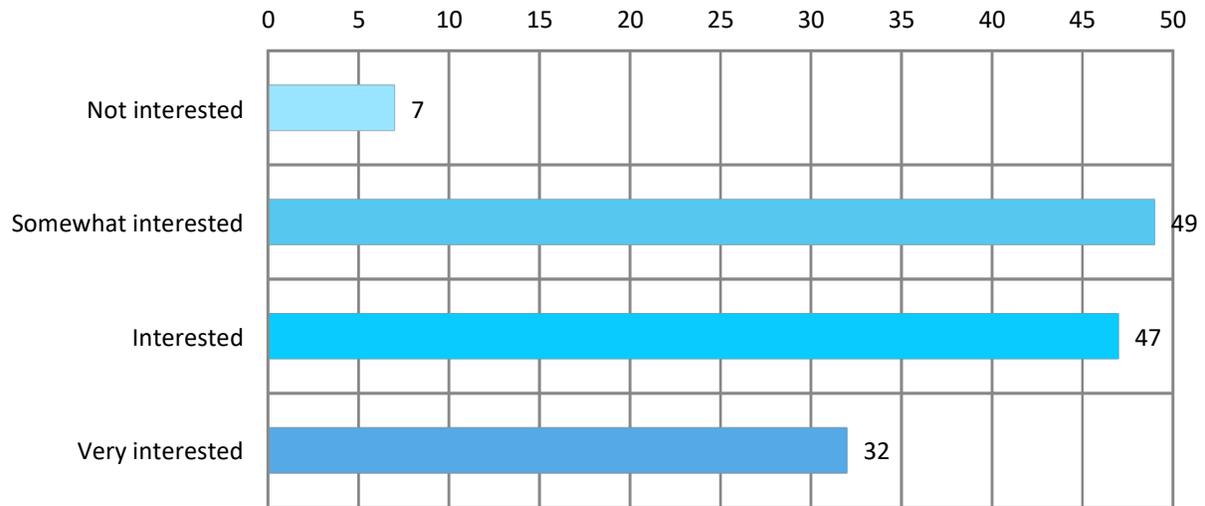


If there was a new financing option available to you (for example, a loan paid back on your property tax or utility bill, or a low interest loan program), would it make you more likely to upgrade your home?

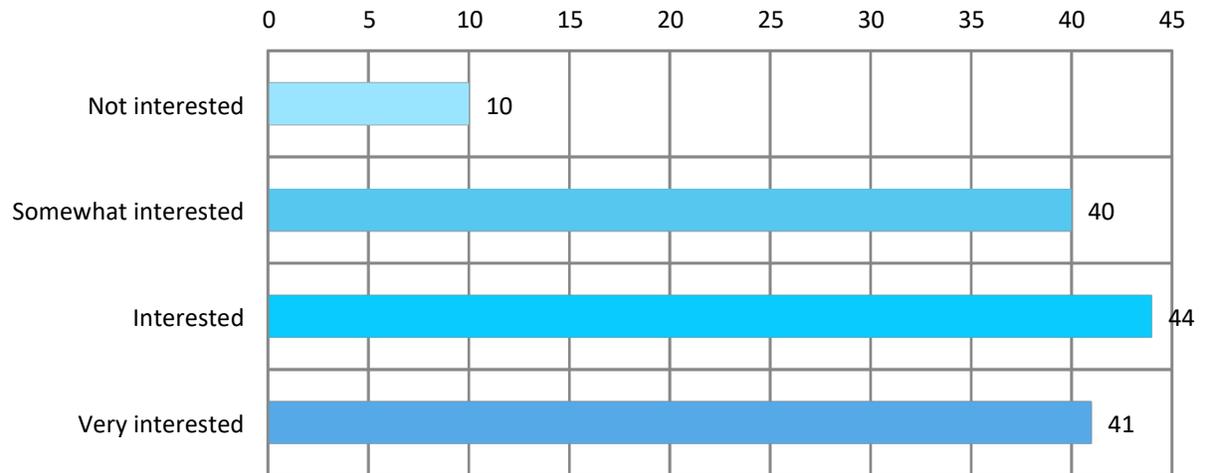


What offers would you be interested in to help you upgrade your home?

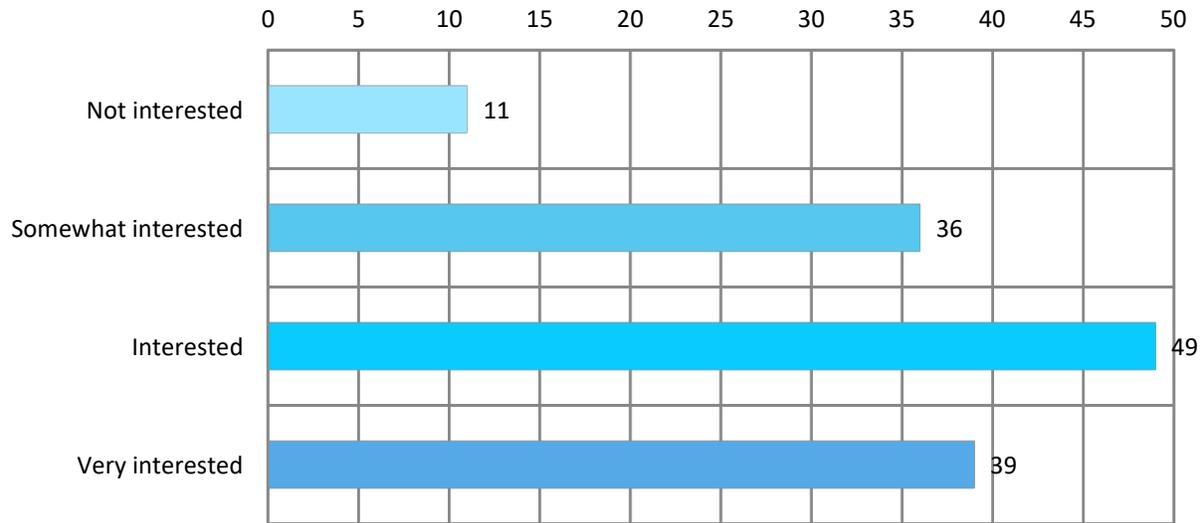
A free EnerGuide assessment for your home



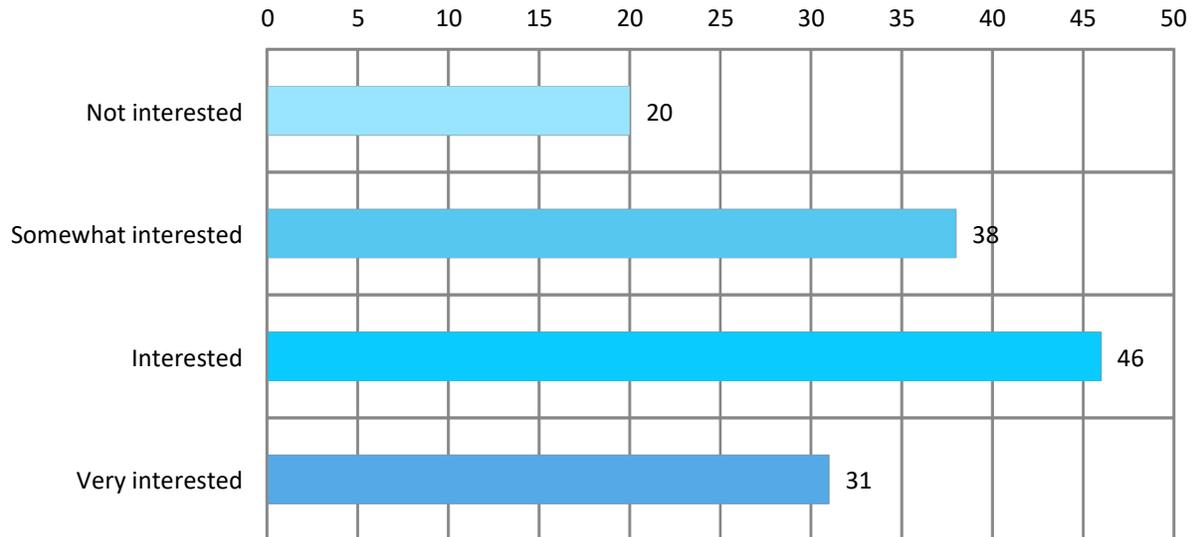
A high-efficiency heat pump that also provides air conditioning



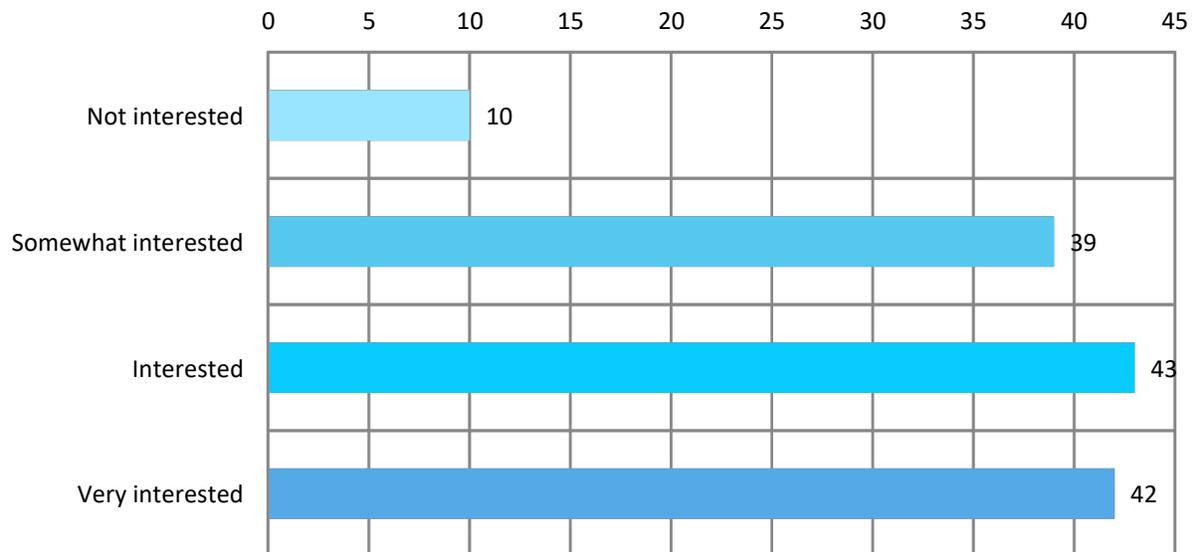
An offer to help upgrade your home's insulation, windows or doors



A contractor directory



Personalized support (one stop shop, from assessments to rebates to contractors)



Comments:

- Better home environment x13
- Air conditioning x2
- Plan to remodel x10
- No ideas yet x7
- Plan to improve home aesthetics/furnishings x17
- Improve life x4
- Focus on practicality x3
- Collocation with the homeowner x3
- I want a heat pump plumbed into my in-floor hydronic to provide AC. And solar panels with net metering.
- Already upgraded but incentives were not available at the time. Heat pumps are expensive to operate especially in the colder months when they are less efficient- use back up natural gas which is much cheaper in the colder months
- So many of the rebates require using a contractor, but what makes some of this affordable is owner's doing the work themselves. Obviously some things can only be done by professionals, but is there a way to support owner's who are DIYing (e.g. replacing windows, adding insulation to attic, etc.)
- Another idea is someone to just ask for advice. I do a lot of research to make sure I do work on my house properly, but sometimes it's nice to be able to double check with someone - not for them to do the work, but just to check that I'm on the right path. Luckily I have friends in various trades, but not always with current energy efficiency knowledge.

- We applied for the BC better homes grant- months ago- still waiting to be able to contact a home assessor- the companies won't even call us back- just sent an email saying they'll book sometime next year- not at all helpful, we wanted to get the heating replaced over the summer. There is no clear way to update our information and pick a different assessor and without the assessment, we're looking at paying an additional \$5000.
- Townsite, in particular, has a lot of homes with inadequate insulation and heating. The cost of retrofitting these homes to be energy efficient is often prohibitive
- Very appreciative of our new heat pump & CleanBC rebates we received early this year
- Another barrier is trying to choose th best option. For example, I have an unfinished crawlspace and have recieved conflicting opinions about the best way to insulate it. I was also wanting an on demand hot water tank but both an electrician and a plumber advised against it. Knowing where to get the best advice would be very helpful. I also find that I usually learn about rebates when there's not enough time left to organize getting the work done.
- Condo owners don't have many options to change existing systems.
- I would like to have rebates available when you buy and install windows and doors yourself. Perhaps a free assessment and recommendations in report form for your house and then just submit your receipts for windows and doors and get a refund. Maybe include photos of the upgrade so a home visit to prove the reno was done isn't necessary.
- If creating a contractor guide have a schedule timeline booking window for contractors and clients so that it works from both sides and is easy to use. Easy to use for both sides.
- All upgrades are on hold until electrical and plumbing are repaired. First challenge is finding an electrician and plumber.
- The costs to switch to electric and to use electric appliances is too expensive. We recently switched back to a gas hot water tank and our utility bills went down substantially. The costs of hiring contractors is prohibitive. We have a gas furnace and a wood stove and our energy costs are very affordable. Cooking on a gas stove is preferred. All of the programs offered require contractors to do the job and the costs become prohibitive. The Province seems to be shutting down the natural gas industry for homeowners yet pushing for LNG?? Very mixed messaging. We want to continue to use natural gas. Our house has had substantial upgrades (new windows insulation weather proofing, etc) our house is a modest size and is efficiently designed, ie stacked plumbing, south and west facing windows, natural air circulation). Maybe if new construction we would consider these programs but for our purposes we are satisfied with our current situation.
- most questions a geared to home owners
- Lack of available contractors seems to be an issue. Also, not sure where to start as far as replacing windows. Need consultation, but do I contact contractor or an energy specialist (is there one in PR?)
- The current cost of heating my home isnt too bad due to low cost of gas but I dont really like burning gas but I dont have a good space to install a heat pump in my yard some where. I could see myself installing a more efficient furnace as mine is 22 years old, however it will take many many years to see a return even this change although its good for the environment. AC is more important but I only need AC the west facing bedrooms in the summer, the remainder of the home is cool enough.

- Process for rebates and retrofits can be confusing. Will be paying off recent upgrades for years, which gets in the way of investing in other upgrades. We end up delaying upgrades until they are absolutely necessary (ie: something has broken) due to the cost of renos, even though caring for the environment is important to us.
- home owner don't need to be incentivized, these changes need to be required. they need to be made affordable and easy to do.
- Environmental protection is the best
- I signed up for the federal government program but none of the listed energy advisors were anywhere near Powell River.
- I'd like to install a heat pump, but it seems very complicated to access the energy rebates and get an assessment. I feel like I'm going to make a mistake when filling out the forms.
- There is only one window that wasn't upgraded when we moved in and it's obvious it was cost prohibitive to the previous owners as well
- The problem is that a lot of people who can do quotes/do the work needed and get a rebate for are not in Powell River but instead Comox or Vancouver so there is a very big barrier there for reaching out to get such work done.
- trades are very busy
- Living on pension makes very difficult to afford upgrades
- If only it were more affordable

Appendix C: Stakeholder Engagement List

Scott Randolph, City of Powell River
Anastasia Lukyanova, City of Powell River
Adam Langenmaier, City of Powell River
Ryan Coleman, City of New Westminster
Nayel Halim, City of New Westminster
Carmen Proctor, City of Nelson
Maggie Baynham, City of Saanich
Ali Rivers, District of Central Saanich
Shawn Filice, City of Penticton
Derek de Candole, City of Kamloops
Chelsey Andrews, City of Campbell River
Robyn Holme, Comox Valley Regional District
Jessica Beaubier, Regional District of Nanaimo
Lindsay Gross, Orcas Power & Light Cooperative
Travis Neal, Orcas Power & Light Cooperative
Kim Jones, FortisBC
Montana Burgess, West Kootenay EcoSociety
Ron Woznow, Westview Ratepayers
Will van Delft, Townsite Ratepayers Association
John Keller, Townsite Heritage Society
Kimberley Young, Cranberry Ratepayers
Tara Chernoff, First Credit Union
Caitlin Bryant, First Credit Union
Kirsty Reid, First Credit Union
Mark Jones, First Credit Union
Michelle Silvester, First Credit Union
Laura de Carolis, Province of British Columbia
Amy Seabrooke, BC Hydro

Seth Oldham, BC Hydro

Jaime-Ann Lew, FortisBC

Tami Hik, Life Cycle Housing Society

Dan Agius, Modern Windows

Matt McDowell, Tempco

Peter Bordignon, PR Heating and Air Conditioning

Dan Tatham, Flex Home Energy

Mark Jackson, Enviromatics

Appendix D: First Credit Union Workshop Materials and Notes

Attendees at Oct. 27, 2021 Meeting

- Anastasia Lukyanova, City of PR
- Adam Langenmaier, City of PR
- Kirsty Reid, First Credit Union
- Mark Jones, First Credit Union
- Michelle Silvester, First Credit Union
- Tara Chernoff, First Credit Union
- Pieter van Gils, Headwater Capital
- Josephine Schrott, Ecotrust Canada
- Dylan Heerema, Ecotrust Canada

Discussion summary

Values and objectives:

- A strong values alignment exists between the City and FCU, and FCU's participation in a home retrofit program would further their community and environmental goals.
- FCU has a three-year strategic plan in place with one-third of this plan focusing on climate and environment. Addressing equity/energy poverty also in alignment.
- FCU does not have an existing dedicated loan product for home energy retrofits but is interested in creating one
- There is clear interest in partnership and setting up a new class of loan products. The largest issue identified was how to fund admin and setup costs for such a product.
- Risk of default and write-off was considered relatively low when factoring in FCM's credit enhancement offer. Still, loan security would likely need to be considered for some customers.

Product type:

- Existing options for homeowners: home equity line of credit (secured) or personal loan (higher interest rates if unsecured)
- A new product would likely be a mix of options, possibly similar to Vancity's PlanetWise offerings depending on if/how the loan is secured.
- Integrating an EnerGuide or other energy assessment into the process would provide a measure of certainty on expected cash flow from energy cost savings.
- A post-retrofit EnerGuide assessment also enables tracking of progress toward carbon reductions (FCU and municipal climate goals).
- Credit enhancement would enable a new class of product – but would involve significant admin to set up and deliver. Expected loan volume is an important consideration.
- FCU indicated that terms and criteria could be more flexible if the loan was further secured by a mortgage. Possibility of introducing a grant to cover the legal costs (~\$1000) of setting up this loan securitization?
- Need for loan security is very dependent on the customer's credit and income.
- Personal loan would be max. 5 years under current rules

Credit enhancement:

- Would allow more flexibility with terms and/or underwriting criteria, but would need to ensure compliance with investment lending policy. Changes to ILP would need considerable uptake to be justified.
- FCM credit enhancement considered a strong offering at 80% loss coverage, would allow FCU to relax lending criteria to some extent.
- Overall, it is relatively simple for FCU to relax existing policies with credit enhancement. A greater challenge lies in program setup and administration costs. Very difficult to recover admin costs if there are only a few loans.

City/FCU Partnership:

- FCU could go ahead and put out their own green products anytime. However, partnership would add access to credit enhancement for offering more relaxed terms in Powell River, and would likely increase uptake.
- Administering a program of this nature would require at least one FTE staff to start – either a third-party program delivery agent, or City staff member
- FCU has talked about having a “green specialist” staff person, who could also be a point person for this kind of program
- One-stop shop with City would be larger program that overlaps with FCU offerings, and would refer those interested in financing to FCU. FCU could refer customers to City person for support beyond loan.

Geographic reach:

- It wouldn't make sense for FCU to offer these products only in Powell River. Ideally open to all qathet RD residents and Tla'amin residents, perhaps available to customers of FCU's other branches as well.
- FCU would design product broadly for all members and pilot any relaxations based on credit enhancement in the City/District.
- City to consider how the program more broadly could be accessible to those outside the city limits. Need to work with FCM to extend credit enhancement offer to qathet residents as well?

Other issues/barriers to address:

- There is a critical need for a full-time EnerGuide energy advisor in the qathet region – homeowners are foregoing rebates or delaying retrofits due to lack of access.
- Many homeowners are not well-versed on current incentives programs and potential for savings – outreach and education will be a critical component of program design.
- Program outreach should focus on energy savings and emissions reductions for older homes – but outreach to residents of newer homes should focus on comfort, ventilation, summer cooling etc.

Open questions:

- What types of retrofits require a permit from the City? There is already a significant permitting backlog.
- How would the City and FCU split the operating grant from FCM?

- Who would take the public facing lead for the program? How would responsibilities be divided and how would homeowners interact with each party?
- Is it necessary to verify that upgrades have actually been completed via a contractor invoice or post-retrofit EnerGuide evaluation?
- Would a pre-retrofit energy savings projection enhance FCU's ability to provide the loan? (e.g. could the expected energy savings be considered as additional income?)

Next steps:

- FCU to discuss with other Credit Unions (e.g. Nelson & District, Kootenay Savings) their experience with these types of programs
- Ecotrust and City to discuss questions regarding the operating grant with FCM
- Based on results of feasibility study, City will decide whether to proceed with design phase funding
- Possible division of roles & responsibilities
- Offered as guidance by FCM and to be tailored as needed.

FCM Credit enhancement overview

A credit enhancement option is available to incentivize private investment into local financing programs for home-energy upgrades. This involves a municipality working in partnership with a third-party lender who provides or arranges capital to finance home-energy upgrades.

Municipalities partnering with participating lenders can access this funding to offset the lenders' risk by providing partial coverage for losses that may arise, while also unlocking preferential financing products for homeowners that would otherwise not be made available in the absence of the credit enhancement (e.g., below-market interest rates, extended repayment terms, or expanded underwriting criteria).

Grant:

- Up to \$5 million (not to exceed the total start-up and operating costs)
- For up to 80 percent of eligible costs
- Credit enhancement:
- Up to \$2 million in credit enhancement for the benefit of lenders to support third-party financing
- Minimum leverage ratio of 5:1 (third-party capital to credit enhancement) For example, a \$1 million loss reserve pledged by FCM must mobilize at least \$5 million in third-party loan capital.
- Partial coverage of 80 percent for unrecovered individual loan losses
- Each participating lender will have a loss reserve account established with an amount (not to exceed \$2 million) commensurate to the value of its loan portfolio (i.e. no risk pooling across separate lenders)

On eligible uses of funding:

- Costs for staff training and market-building activities, such as workforce skills development, including training for renovation contractors and energy advisors, are eligible
- Eligible administrative costs include business systems and tools, such as IT products (software & hardware) needed to support communications, application intake, renovation contractor management and oversight, accounting, and reporting, if the costs are directly linked to and incurred by the project.

On home energy assessments:

- Homes undergoing energy improvements that are funded by the local program are subject to pre- and post-renovation assessments, using the EnerGuide rating system for homes, undertaken by an energy advisor (EA) registered with Natural Resources Canada.
- Alternative assessments or pathways can be considered where there is a lack of available EAs.

Key items to be considered in design phase:

- Specific features to make energy upgrades more equitable, accessible and attractive to homeowners, e.g. streamlined approval process, lower interest rates, stacking with incentive programs, flexible underwriting criteria, etc.
- Consumer protection measures to be implemented
- Min./max. funding amounts, interest rates, amortization periods
- Key milestones, quantifiable outcomes, monitoring, flow of funds
- Marketing and promotions to achieve uptake

Potential responsibilities of municipality or implementing partner:

- Establish eligible energy measures and permitted uses for financing.
- Demonstrate capital commitments needed to meet or exceed leverage ratio.
- Recruit lenders and enter into any necessary agreements.
- Enter into a funding agreement with FCM.
- Periodically report to FCM on program-level lending activity, including loan defaults.

Potential responsibilities of lender:

- Provide or arrange for capital for direct lending.
- Administer homeowner financing applications.
- Originate loans in amounts appropriate to support the objectives and eligible energy measures supported by the local program.
- Offer preferred rates, terms and underwriting criteria compared to conventional financing products in consideration of the availability of the credit enhancement.
- Ensure prudent lending practices consistent with prevailing regulations and standard practices.
- Exhaust standard default loan remedies prior to making claims against the loss reserve.
- Report to the local program on new loan originations and defaults, in a manner prescribed by FCM.

Example Financial institution products

RBC Energy Saver™ Loan

- 1% off the loan interest rate or a \$100 rebate on a home energy audit on a fixed rate installment loan over \$5,000
- Loan eligible products or services:
- Environmentally-friendly products and services recommended during a home energy audit
- NRCan Greener Homes grant qualifying products and services
- ENERGY STAR qualified products
- Renewable energy projects such as solar panels
- Hybrid cars
- Flexible terms from 5-10 years depending on the loan amount
- Monthly, semi-monthly, bi-weekly or weekly payments, with option of automatic deduction from chequing account with RBC Royal Bank or another bank
- No early prepayment charges
- Option to skip up to the equivalent of monthly payment each year

Vancity Planet-Wise Renovation Solutions

Three loan options with lower interest rates:

Term Loan

- Financing terms up to 15 years
- Minimum loan amount of \$3,500 and a maximum of \$50,000
- Preferred interest rate of Vancity Prime Rate + 0.75%

Creditline

- A preferred interest rate based on Vancity Prime Rate (currently 2.45%)
- Unsecured loan
- Minimum loan amount of \$5,001 and maximum loan amount based on how borrowers qualify

Creditline Mortgage (HELOC)

- Secured by residential real estate
- A preferred interest rate based on Vancity Prime Rate
- Maximum loan amount based on how borrowers qualify and security pledged

Eligible projects: Insulation, space heating, ventilation, draft proofing, hot water heating, replacement of window/doors, solar panels for hot water or solar electric systems.

Offer top-up rebate for pre- and post-retrofit EnerGuide audits.

Example municipal / credit union collaborations

Solar Colwood

- City of Colwood, 2011 to 2015
- Was one of the more comprehensive programs to date, involving partnerships with First Nations, academia, utilities, senior governments, and local businesses
- Offered a number of rebates, free products, reduced-cost audits, on-bill financing from BC Hydro for solar, and low interest loans with Vancity.
- Vancity loan much like current offering: Low-interest, up to ten-year loan of \$3,500 to \$20,000. Aim to enable households to pay for the retrofits from their energy savings.

Nelson EcoSave

- City of Nelson's "one-stop-shop" service that provides customized support and resources for participating homeowners, established in 2012
- Nelson's municipal utility provides on-bill financing for City of Nelson residents, but those outside city limits can access low-interest financing through partnership with Nelson & District Credit Union
- Up to \$30k at 2.5%, 5-, 10- or 15-year terms

Kootenay Energy Diet

- Past Kootenay Energy Diet (2013/2014) involved five different local credit unions providing financing
- Nelson & District Credit Union, Kootenay Savings Credit Union, Heritage Credit Union, Grand Forks Credit Union, and the Creston & District Credit Union

Appendix E: Example Powell River Gas Furnace to Heat Pump Case Study

Home type: Archetype 4 (mid-century split level)

Pre-upgrade system:

Carrier Weathermaker 8000 mid-efficiency gas furnace, 27 years old. Assumed 78% efficient.

Gas water heater and range



Post-upgrade system:

Retrofit completed Jan. 7 2021

Fujitsu AOU30RGLX Central heat pump

30,000 BTU, variable capacity, 10.3 HSPF, 3.11 COP

Gas water heater and range (unchanged)



Capital Costs:

Upgrade cost: \$18,500 (including duct cleaning, electrical work and GST)

Rebate received: \$11350 (rebates + Powell River top-up)

Total cost to homeowner: \$7,150

Operating costs (winter 2-month average):

Pre-upgrade BC Hydro: \$40/mo

Pre-upgrade FortisBC gas: \$128/mo

Total = \$168/mo

Post-upgrade BC Hydro: \$68/mo

Post-upgrade FortisBC gas: \$22/mo

Total: \$90/mo

Cost savings: \$78/month

Payback time: 8 years (not counting cost or benefit of summer cooling)

Appendix F: EnerGuide Assessments for Archetype Homes

Individual home EnerGuide assessments and reports have been kept confidential to protect homeowners' privacy – please see attached file.



Vancouver Office

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