Pumping Up Savings in Heating: What We've Learned

August 2020

Community Energy Association

About this Report

This report was produced by Community Energy Association.

Acknowledgements

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Disclaimer

The views expressed herein do not necessarily represent the views of the Community Energy Association. Details related to the various programs discussed in this report may also change over time. Therefore, please contact or visit the websites of the cited organizations for the most up to date information.

About Community Energy Association

The Community Energy Association is a charitable organization that supports BC local governments with climate action in their community and own corporate operations. CEA helps to accelerate building energy efficiency, renewable energy projects and sustainable transportation through community energy planning and project implementation. To download a copy of this guide or additional resources for local governments, please visit: www.communityenergy.bc.ca

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Introduction

Community Energy Association's previous publication "Business Model Innovation to Support Air Source Heat Pump Retrofits in Metro Vancouver" (2019) discussed the potential for a new business model to re-align the industry to effectively and efficiently deliver the electric air source heat pump (ASHP) retrofits needed for Metro Vancouver to reach its GHG emission reduction targets. The potential business model proposed is a "one-stop-shop" or concierge service with a single interface for homeowners (Figure 1). The proposed program will source quality ASHP products, contractors and financing.

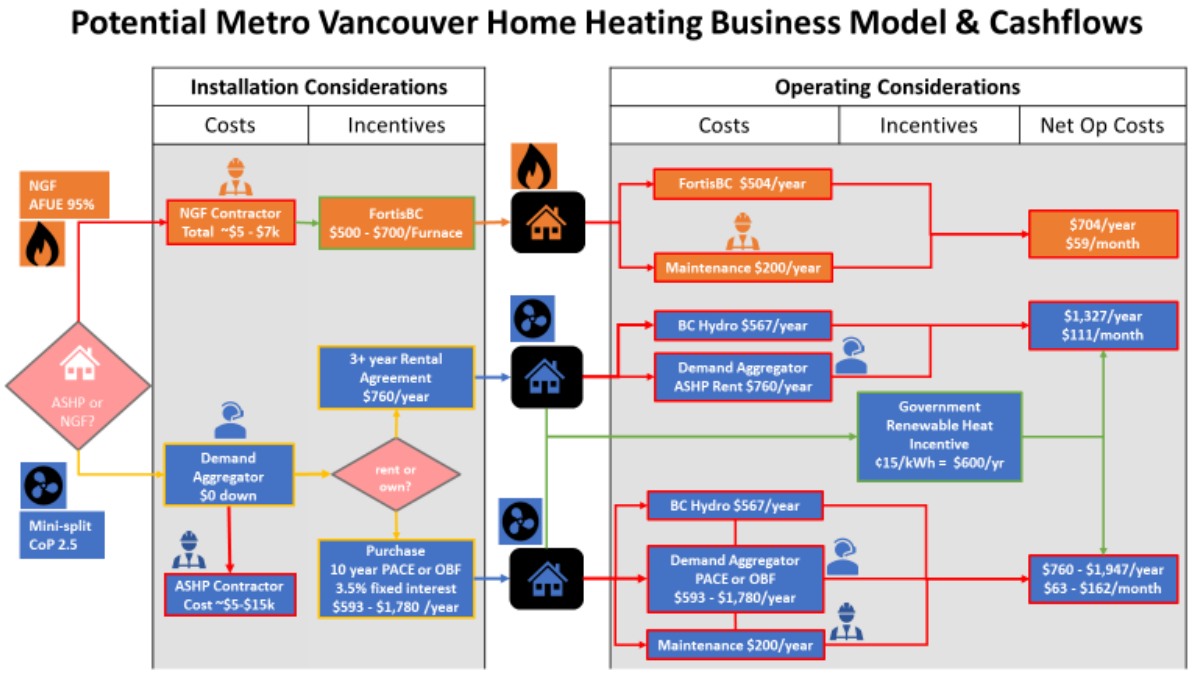

Figure 1. Visual summary of potential "one-stop-shop" business model to accelerate adoption of heat pumps in Metro Vancouver

At the conclusion of the report, the following recommendations were noted for consideration by Metro Vancouver;

1. Partner with potential third-party model leaders (ESCOs (energy service companies) and regulated and non-regulated utilities) to further research the potential of demand aggregators and a heat pump rental model and conduct in-depth feasibility analysis.
2. Identify legislative restrictions which may limit participation by regulated utilities to operate heat pump rental programs or other roles in a new business model which involved household heating equipment.

3. Engage with industry partners such as the High-Performance Stakeholder Council, the Vancouver Economic Commission, ZEBx and electric air source heat pump (ASHP) manufacturers to increase the availability, accessibility, training and marketing of high performance ASHPs with a focus on local production and servicing by small and medium sized enterprises.
4. Advocate for customer centered on-bill financing with regulated and non-regulated utilities as an effective means of encouraging retrofit uptake.
5. Engage with Provincial partners for long-term incentive strategies such as GHG offset purchases and production-based incentives.

Additionally, several areas were noted for further research by CEA;

1. The viability of a heat pump rental program is determined by the heat pump lifecycle costs. Lifecycle costs depend on a number of variables such as the type of heat pump chosen, home configuration, heat pump and system cost, installation costs, in field performance, regular maintenance costs, and refurbishment, if needed.
2. Because it is uncommon to rent home heating and cooling appliances in both the Metro Vancouver and Western Canadian markets, any rental program would benefit from research on best practices to further define this concept with households.
3. A detailed economic and feasibility analysis of a production-based incentive scheme.
4. Determine what role local governments, not-for-profit organizations, or the private sector can play in aggregating customer demand to accelerate the scaling of innovative ASHP business models.

The following discussion expands on the learnings summarized in the original report and seeks to answer several outstanding questions which will be used to inform the design of a prototype program for possible deployment in pilot communities throughout Metro Vancouver and area.

Demand Aggregation & Feasibility Analysis

Following the publication of the November 2019 report, CEA engaged a diversified utility, utility system designer, constructor and operator, to discuss the proposed home heating one-stop-shop business model detailed in the original report. Given their expertise with customer care and utility billing services, the utility is well positioned to provide advice and input as the model is refined during the feasibility analysis phase. The following observations were provided for consideration as we advance program design;

- Consider the additional option of 'rent to own' along with rental-only model; possibly On Bill Financing over a definitive amount of time (e.g. 15 years)
- Explore SMART ASHP to enable demand/load management via monitoring and communication.

Going forward, City of New Westminster and other lower mainland municipalities, with advisory services from CEA, will conduct further research into aggregating consumer demand and will also complete an in-depth feasibility analysis of the prototype program with the intent to pilot, if proven successful. A further supplement to this report will be produced at the conclusion of this next phase.

Legislative Restrictions

The British Columbia Utility Commission (BCUC) regulates electric and natural gas utilities, while sales of other forms of energy (crude oil, gasoline, coal, bulk propane, steam, wood and hydrogen) are not regulated, except where they are distributed in a monopoly grid system, for example a District Energy System (BCUC, 1999). Non-regulated services also include energy supplied directly to a customer without the need for a transmission system or distribution grid (BCUC, 1999). For example, a solar-powered water pump installed on-site does not require access to a transmission wires to deliver power service to the customer (BCUC, 1999).

According to the definitions above, the business model proposed in our previous report – a one-stop-shop for heat pump purchase (rental or financed) and installation, is likely to be labelled as a non-regulated service. The program is designed for single-family homes where each heat pump installation will be for a separate dwelling with no connection to other dwellings. If the pilot is successful and scalable into the future, a regulated or non-regulated utility could operate the program. The service provided through the new business model (one-stop-shop) will operate behind the meter, which put simply, is how the homeowner decides to use the electricity in the home. The use of electricity in the home (behind the meter) is not regulated by BCUC.

Section 5.1.2, Figure 6: Commission Objectives in the BCUC 1997 publication, *Retail Markets Downstream of the Utility Meter* outlines what activities or risks a public utility can undertake or subject ratepayers to when considering participation in the retail market downstream of the utility meter.

Capacity & Awareness Building

There are several organizations and industry partners such as the Home Performance Stakeholder Council (HPSC), the Vancouver Economic Commission, ZEBx and air source heat pump manufacturers, to name a few, that are working to increase the availability, accessibility, training and marketing of high performance electric air source heat pumps. A brief overview of each of their existing programming to date follows:

Home Performance Stakeholder Council

Home Performance Stakeholder Council (HPSC) is a non-profit society representing residential interests as they relate to energy efficiency and conservation in the home; "Home performance is a holistic approach to identifying and addressing energy-efficiency, comfort, health and safety related issues in order to make a home perform better" (HPSC, 2020).

HPSC is comprised of six sector councils, each with participation from contractors & sub trades, trade suppliers, manufacturers & suppliers and sector leaders.

Figure 2. Home Performance Stakeholder Council Structure.

Beginning in June 2020, HPSC's Heating & HVAC Sector Council will be offering free online training to residential HVAC contractors in BC – *HPSC: Quality Installation of Forced Air Furnaces and Air Source Heat Pumps Retrofits in BC Homes.*

Figure 3. Summary of HPSC Training Event

Vancouver Economic Commission

Vancouver Economic Commission (VEC) is the economic development agency for the City of Vancouver, working to strengthen the local economy by supporting businesses, attracting investment and promoting international trade (VEC, 2020).

Given Vancouver's aspiration to be the greenest city in the world, a green economy and clean technology are priority pillars for VEC. Within clean technology VEC is supporting businesses working within the built environment in their transition to a zero-carbon economy. VEC does not provide training typically, but rather connects and highlights different opportunities. Their SHIFT tool provides building industry participants with a picture of how the BC Energy Step Code will shift the anticipated demand from low to high performance buildings (applicable to new buildings only). To date, VEC have not completed any consumer focused marketing with respect to clean technology or more specifically heat pumps.

Zero Emissions Building Exchange (ZEBx)

The mission of ZEBx is to "rapidly accelerate the knowledge, capacity and passion for zero emissions building in Vancouver and British Columbia" (ZEBx, 2020). ZEBx supports dialogues, project tours, curated research, training and demonstrations. Case studies, reports, articles and upcoming training opportunities are detailed on their website for developers, builders, architects and designers. Through their available case studies, ZEBx

> *ZEBx is a collaborative platform that strengthens the public, private and civic capacities for zero emission buildings in Vancouver and British Columbia. We are an industry hub that facilitates knowledge exchange to accelerate market transformation.*

is making available both technical content and accessible information for interested homeowners and residents. Additionally, they are providing learning opportunities and information exchange through their 'Decarb Lunch Series'. (ZEBx, 2020). ZEBx is participating in the collaborative initiative of the Province and BC Hydro; Building Electrification Roadmap.

Manufacturers

Several of the manufacturers provide training including local offerings. For example, Mitsubishi has an installer training program which consists of online and in person training. Once the technician takes that training they are provided with a three-year certification which allows them to register the equipment for the extended 10 year parts and compressor warranty. With the current restrictions associated with COVID-19 they are not offering the in class part of the training, thus only a one-year certification, if the contractors complete the online portion, is provided. Mitsubishi anticipates they will be able to have the in class portion offered in the fall 2020 with smaller class sizes (K. Czycz, personal communication, June 8, 2020).

Daikon is another example of a manufacturer offering training at their local facility in Burnaby, BC. Due to COVID-19 restrictions they have temporarily closed their showroom/classroom until further notice but they are equipped to do so once restrictions are lifted. Daikon typically runs the courses in small classes with multiple contractors at a time and have a calendar of availability up for 6 months prior to the course date (S. Zucchetto, personal communication, June 8, 2020).

Thermal Environmental Comfort Association (TECA)

TECA is a non-profit society setting minimum standards for the **residential and light commercial** heating, ventilating and cooling trade, "TECA's mandate is to offer the residential heating, cooling and ventilation industry up-to-date training courses" (TECA, 2020). TECA's trademarked training programs have been developed by the industry, for the industry. Training is typically in person during the Spring and provided in the Lower Mainland, Vancouver Island and Okanagan. Due to COVID-19 restrictions, as of May 2020 online training is on offer. Training programs and courses include;

- Forced Air Guidelines
- Heat Loss/Heat Gain
- Heat Recovery Ventilator Design & Installation
- Hydronic Systems Design
- Principles of Moving Air
- Ventilation Guidelines

Additionally, TECA is developing a heat pump specific retrofit training course for all types of heat pumps (natural gas, electric, air to water, air to air, etc.) with an anticipated release date in 2021. TECA has previously developed a heat pump training program for new construction, details of its offering is available at their website.

Clean BC

CleanBC is advertised across the province through traditional marketing streams such as television, social media, print, radio and online. Through the main website www.cleanbc.gov.bc.ca, CleanBC provides information to BC residents about all of the programming and actions affiliated with the CleanBC Plan. Residents of the province can come to this page and learn/access more information specific to better buildings, including access to program registered contractors, heat pump rebates, product information, energy advisors and more via the supporting website – www.betterhomesbc.ca. The website is not easily navigated but a determined homeowner can access the information they are seeking if they know where to look.

BC Hydro

A stakeholder interview with BC Hydro (BC Hydro, personal communication, June 19, 2020) reveals heat pump marketing to customers mostly on Vancouver Island. Marketing and communication efforts include;

- Customer success stories in Connected e-newsletter
- Posts on Facebook and Twitter
- Tiles on MyHydro and bills
- Working with retailers like Home Depot to raise awareness of offers
- Communicating with contractors to let them know about offers
- Partnering with manufacturers to offer limited time top-up offers
- Distributing program brochures to local municipalities to distribute at their facilities
- Providing municipalities digital/web banners to promote the channel on their channels
- Geo-target ads to promote Program Registered Contractors
- Seasonal mass communication advertising in the following channels: digital, print and social to promote heat pumps and other Home Renovation Rebates.

Fortis Electric

Fortis BC's electricity divisions recent marketing on heat pumps has been face-to-face (pre-COVID 19) and via third parties. For example;

- Fortis BC doubled the rebate values for Trade Ally quality assured contractors to market for a limited period of time in 2019.
- Fortis BC provided coop advertising for contractors to advertise heat pumps (and an annual training allowance)
- Fortis BC promoted heat pumps and programs at every trade/building show and environmental events

Further, Fortis BC has invested significantly into newspaper, radio and social media advertising campaigns about rebates in general, and at a smaller order of magnitude into social media campaigns for heat pumps more specifically. Further, they ensure copies of brochures and other

marketing collateral are available at municipal offices within the FortisBC electricity service area, and provide copy (blogs, Facebook) for local governments webpages and/or newsletters (C. Suhan, personal communication, June 17, 2020).

Municipal Utilities

Unlike most municipalities in the province of BC, the City of Nelson operates its own utility and markets all aspects of energy efficiency, including heat pumps via its EcoSave program.

The City of New Westminster is a BC Hydro reseller and through Energy Save New West employs a number of communication channels to raise awareness on their community energy program and the availability of rebates/incentives for home energy upgrades. For the Existing Homes program, they typically execute two (2) comprehensive marketing campaigns in a calendar year with fall and spring being targeted as the main home renovation periods. The tactics incorporated include a combination of utility bill inserts, display ads, digital billboards, social media and City options (e.g. print media, online, etc.). Aside from the spring/fall campaigns, they have ongoing communications with local residents through utility bill notifications, monthly e-newsletter, blog posts, website updates and social media (R. Coleman, personal communication, June 15, 2020).

Air Source Heat Pump Supplier/Manufacturers

Stakeholder interviews with several experienced installers revealed that the preferred cold-climate air source heat pump manufacturers include Fujitsu, Mitsubishi, Daikon and Danfoss. Direct outreach and stakeholder interviews with suppliers has proven beneficial in understanding heat pump equipment accessibility, availability, and affordability. Discussions with suppliers suggest initial capital cost savings could be achieved with a commitment to purchase a significant volume of air source heat pumps.

Financing Options

A homeowner may have several options to address the affordability of an electric ASHP beyond the programs detailed below, higher-income homeowners can elect to purchase and install a heat pump using their existing capital or traditional financing (line of credit, etc.). Homeowners selecting this pathway are eligible for Clean BC and local municipal incentives applicable to heat pumps.

On Bill Financing

Currently no communities in the lower mainland region offer On Bill Financing (OBF). On Bill Financing (OBF) can be provided by an electrical utility to the home owner as an addition to their monthly utility bill. All customers of Nelson Hydro are eligible for OBF as part of the EcoSave program.

Property Assessed Clean Energy

Property Assessed Clean Energy (PACE) is similar to OBF but provided to the homeowner via their municipality and typically administered via property taxes. No communities in the lower mainland region provide PACE. Nearby on Vancouver Island, the District of Central Saanich is piloting PACE for 50 homes in their community to fuel switch their heating systems to electric ASHP. The arrangement provides the homeowner financing over 10 years. It is understood this is the first PACE program to operate in BC. Homeowners will be eligible for CleanBC and applicable municipal incentives with respect to heat pumps (D. Herbert, personal communication, May 5, 2020). The PACE program is offered through Local Improvement Charges, and requires a bylaw for applicant. Further, the ministry of municipal affairs has indicated that maintaining local government borrowing power / access to low rates is a priority and significant municipally funded pace programs could impact that.

Provincial Zero-interest Clean Energy Financing

As of May 2020, the Province, through CleanBC, is providing 0%, 5-year financing as per the details below to residents;

- Provided to homeowner through CleanBC financing partner - FinanceIT
- HP installers sign up with FinanceIT and can provide the financing option to the consumer
- To sign up with FinanceIT the installers must meet FinanceIT registered contractor requirements
- Full details of installer/homeowner eligibility are provided in Appendix 1
- Homeowners are not eligible for Clean BC incentive but still eligible for municipal top-up

(CleanBC, personal communication, May 7, 2020)

The original intent of our project was to evaluate a one-stop-shop heat pump rental (leasing) model. Given the no-interest five-year financing announced in May 2020 by the Province through CleanBC, we have updated the project to assess both options; leasing (rental) and financing (ownership) for heat pump purchases and installs.

Leasing/Rental

Currently there are a limited number of financiers who can provide leasing arrangements for heat pump purchase and installs. Leasing is advantageous as it can significantly lower the monthly costs, enabling affordability across all income levels (high, low- and mid-income). FinanceIT and Snap can provide leasing arrangements for homeowners in BC. FinanceIT has rental terms available up to 180 months (15 years) to consumers for products, but the interest rate currently associated is 8.99% (D. Gleeson, personal communication, May 11, 2020). The opportunity to lower rental rates with a bulk agreement for participation (number of homeowners) will be assessed through the next phase of this project. Unlike financing (ownership) arrangements, rental programs include inherent risks including;

- House sale and how to manage the transfer to new homeowner
    - Legal concerns
- Homeowners default on loan payments
- Administration and overhead costs for billing

- ASHP maintenance
- Significant issues and negative media coverage of door to door sales and leasing programs in other jurisdictions

Heat Pump Performance

As per Pembina Institute (May 2020),

"Combustion heating systems (e.g. gas furnaces) convert fuel into heat and lose energy in the process. In contrast, heat pumps move energy from the outside of the home to the inside (or vice-versa). Heat pumps available in Canada typically have a coefficient of performance (COP) between three and five; for every unit of input energy, heat pumps provide three to five units of heat energy. Heat pumps using carbon dioxide as a refrigerant reach COPs greater than five but are not commonly available yet in Canada.

The efficiency of air-source heat pumps is directly affected by:

- *Equipment quality and maintenance*
- *Type of refrigerant*
- *Installation quality*
- *Seasonal ambient temperatures*

Air-source heat pumps that are designed specifically for cold climates are eliminating the need for backup heating systems, even in North America's coldest regions."

'Cold-climate' is a technical name for heat pumps with 100% rated capacity to -15C and operation to -25C and beyond.

Figure 4. Map of BC's lower mainland detailing areas where daily temperatures (including overnight lows) do not exceed -15'C (2011-2040).

Source: climatedata.ca

The lack of blue or deep blue coloring in Figure 4. indicates BC's lower mainland is an ideal region for deployment of cold-climate electric air source heat pumps as overnight lows are not projected to dip below -15 °C.

The performance of a heat pump can be measured via;

- Coefficient of performance (COP) is a measure of a heat pump's efficiency. It is determined by dividing the energy output of the heat pump by the electrical energy needed to run the heat pump, at a specific temperature. The higher the COP, the more efficient the heat pump. This number is comparable to the steady-state efficiency of oil- and gas-fired furnaces.
- Heating seasonal performance factor (HSPF) is a measure of the total heat output in Btu (British Thermal Unit) of a heat pump over the entire heating season divided by the total energy in watt hours it uses during that time. This number is similar to the seasonal efficiency of a fuel-fired heating system and includes energy for supplementary heating. Weather data characteristic of long-term climatic conditions are used to represent the heating season in calculating the HSPF.
- Energy efficiency ratio (EER) measures the steady-state cooling efficiency of a heat pump. It is determined by dividing the cooling capacity of the heat pump in Btu/h by the electrical energy input in watts at a specific temperature. The higher the EER, the more efficient the unit.
- Seasonal energy efficiency ratio (SEER) measures the cooling efficiency of the heat pump over the entire cooling season. It is determined by dividing the total cooling provided over the cooling season in Btu by the total energy used by the heat pump during that time in watt hours. The SEER is based on a climate with an average summer temperature of 28°C.

Manufacturer specifications indicate there are several models of heat pumps available and suited for use in the lower mainland and across BC. To date, there have been very few reports detailing in-field performance of said models and if they achieve their design specifications. BC Hydro (Gary Hamer) has completed an in-field performance study of heat pumps but to date have not released their findings. While not included in EcoTrust Canada's initial report "Moving Toward Energy Security in British Columbia's Rural, Remote and Indigenous Communities" (March 2020), conversations with project managers (Dylan Heerema/ Graham Anderson) suggest that an assessment of in-field performance will be analyzed and reported upon at full project completion (May 2020).

Heat pump adoption is greater on Vancouver Island than other parts of the province. Heat Pumps have been installed and operating for the last 30 years on Vancouver Island, and interviews with experienced installers (D. Gulevich, personal communication, April 2, 2020) indicate an observed COP of 3.5 or greater for dwellings there.

Heat Pump Installation

High quality heat pump installations require the right product, as discussed above, experienced installers (training) and post-installation verification.

Training

There is currently no individual accreditation program or company certification program specific to heat pump installation (C. Gustafson, personal communication, Feb 14, 2020). Home performance is a holistic approach to identifying and addressing energy efficiency, comfort, health, and safety-related issues to make a home perform better. They are assessing the opportunity to accredit individuals and certify companies with respect to heat pump installations.

Existing programming to build knowledge and capacity for heat pump installers includes programming provided by TECA. TECA's mandate is to offer the residential heating, cooling and ventilation industry up-to-date training courses and a collective voice in local and provincial issues. Their mission is to see safe, efficient and comfortable heating, cooling and ventilation systems installed in dwellings in BC. They believe that only through the establishment of proper training programs and enforcement of minimum standards will the public be assured that such systems are indeed installed correctly. TECA currently has training available for heat loss/heat gain calculations required of heat pump installation designs.

To support quality installations and to provide customers with a list of contractors who follow best practice installations and have knowledge in the rebate programs, BC hydro and FortisBC launched the "Program Registered Contractor" initiative for heat pump and insulation contractors. A directory of Program Registered Contractors is listed on BetterhomesBC website. Potential customers can access the directory and input their location and installation type to bring up a list of 'Program Registered Contractors'. As per the website, Program Registered Contractors have:

- Completed training with FortisBC and BC Hydro on the Home Renovation Rebate Program and CleanBC Home Efficiency Rebates.
- Completed best practice training: Insulation contractors complete best practice training on the installation of air sealing and insulation. Heat pump contractors completed best practice training on the installation for heat pumps.
- Registered with WorkSafeBC. Confirm the business' current standing with WorkSafeBC prior to choosing a Program Registered Contractor

In addition to meeting program business and training requirements Program Registered Contractors have agreed to comply with a code of conduct that prioritizes such values as fairness, integrity and honesty. They agree to charge customers a reasonable and competitive rate for service, provide equipment and installation warranties, advise about program rebates, handle customer complaints and ensure that their work meets the standard of industry best practices and is performed in a safe manner.

After the upgrade work has been done, Program Registered Contractors will always provide the consumer with a completed Quality Installation summary. The quality summary is important as it outlines the details of the work performed, as well as any noteworthy observations.

As per the BetterHomesBC website*, "This directory is for informational purposes only. The contractors listed on this directory are independent contractors and not affiliated with or employees of FortisBC, BC Hydro or CleanBC Better Homes in any way. The contractors listed on this directory meet the limited criteria of FortisBC and BC Hydro's Program Registered Contractor Program, as set out on this webpage. FortisBC, BC Hydro and CleanBC Better Homes do not endorse the quality of work provided by a Program Registered Contractor or guarantee any of their services. It is your responsibility to interview and select a contractor that meets your needs. You may select a contractor from this directory, or select your own qualified contractor."*

Mitsubishi and other heat pump manufacturers/dealers noted training can be provided directly to an installer.

Verification

Verification of heat pump installations is currently coordinated by the administrators of the Home Renovation Rebate Program and CleanBC Home Efficiency Rebates. Rebate applications are randomly selected for site visits across the province. The in-home site visit results in an approved, denied or conditional approval as per the high-level inspection checklist;

- verification the heat pump is installed and sized to meet the heating load of the home
- the installed heat pump is the primary source of heating for the home
- the model of the heat pump meets the requirements to qualify for the rebate

(Province of BC, personal communication, June 1, 2020)

The site visit does not assess or measure the in-field performance of the equipment. Site visits are completed by a vendor selected by the utilities through an RFP process (BC Hydro, personal communication, July 8, 2020)

Costs

The cost of retrofitting a heat pump into an existing building varies significantly depending on home size, existing or non-existing ductwork, geographical location, climate, etc. Interviews with heat pump installers suggest cost ranges of $10-20K (L. Helfrich, personal communication, January 31, 2020). Further detailing the cost of a heat pump and what variables can be adjusted to reduce overall cost will be evaluated in the next phase of this project.

Timing

The design and installation of an electric ASHP heating system requires 1-2 days (not necessarily consecutive); including a home visit, assessment and evaluation, final design and installation (C. Wilson, personal communication, February 27, 2020). Designer/installer experience can help to shorten this time period. Of note, mini-split/multiple head units typically take longer to size.

Key inputs for heating system retrofits include the home archetype (construction era), heating load, and existing heating system (ducted vs. ductless). Advance knowledge of these details can expedite the design and installation process.

Considerations

Garnered through interviews with heat pump installers located throughout Western Canada, the following considerations should be addressed at a minimum with respect to ensuring a quality install;

- Cold climate installations should have a shelter to avoid snow load on the external condenser

- Colder climates require heat pumps to be mounted a minimum 36" off the ground
- Maintenance can be quite simple;
    - Homeowner to clean the outdoor unit as per manufacturer recommendations which is typically 1-2 times per year
    - Homeowner to annually change the indoor filter as per manufacturer recommendations

Next Steps

In the process of developing this supplement, CEA has been in conversations with several municipalities in the lower mainland to collaborate on a further analysis of the "one-stop-shop" service model proposed in our original report. To date, the City of New Westminster has agreed to a Memorandum of Understanding to complete this scope of work and it is anticipated three to four more local governments will join the collaboration. Discussions are underway at the time of writing.

As part of the next phase, the following will be addressed;

- Because it is uncommon to rent home heating and cooling appliances in the Metro Vancouver or Western Canadian markets, any rental (leasing) program would benefit from research into best practices to further define this concept with households including market research of homeowners in participating communities and their interest.
- A detailed economic analysis of the proposed scheme with the ultimate goal of it being beneficial and cost effective to the municipalities residents.
- Determine what role local governments, not-for-profit organizations, or the private sector can play in aggregating customer demand to accelerate the scaling of innovative ASHP business models.
- Distribution impacts of electrification, both of heating systems and other applications (EV charging infrastructure).
- Installer capacity building requirements and opportunities; how to build the sector to meet the demands of the Municipalities and Province's electrification and GHG emission reduction goals.
- Verifying installations and ensuring quality.

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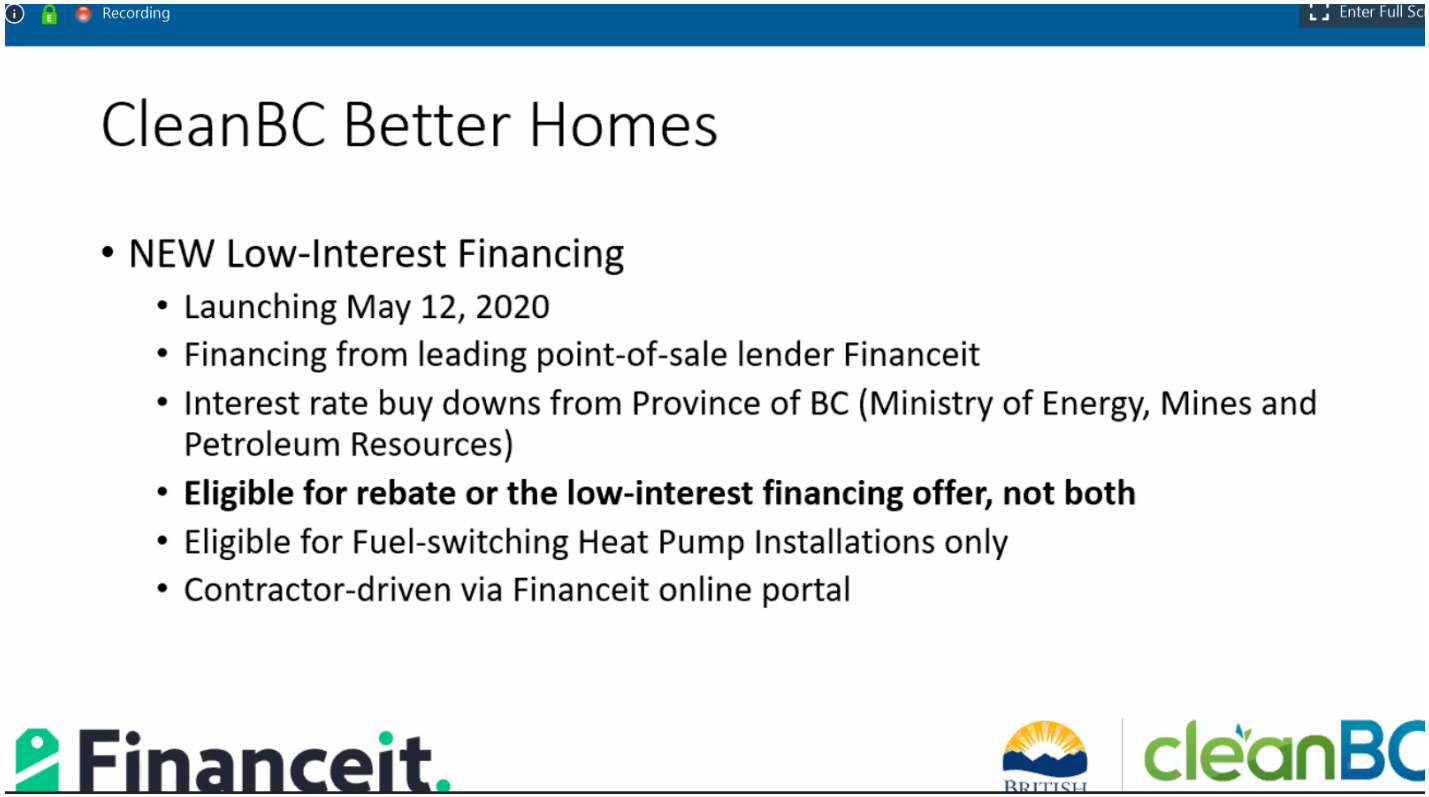
Appendix 1 – CleanBC 0%, 5-year Financing Details



Eligibility Measures

Low-Interest Financing Eligible Measures				
Upgrade Category	**Upgrade Type**	**Technical Details**	**Customer Interest Rate**	**Contractor Administration Fee**
Switch from Natural Gas, Propane or Oil to Electric Heat Pump	Mini-Split Heat Pump or Multi-Split Heat Pump "Tier 2" Heat Pump	Highest Efficiency: Variable Speed, HSPF ≥9.30, SEER ≥16	0%	0%
	Central Ducted "Tier 2" Heat Pump (Dual Fuel Eligible)			
	Central Ducted "Tier 2" Heat Pump (Dual Fuel Eligible)	Highest Efficiency: HSPF ≥9.30, SEER ≥16	0%	0%
	Central Ducted "Tier 1" Heat Pump	High Efficiency: HSPF ≥8.5, SEER ≥15	4.99%	0%

Contractor Requirements

- Become a Financeit contractor
- Sign CleanBC Low-interest Financing Contractor Agreement
- Install program eligible equipment (qualified product list)
- Meet program terms and conditions and rebate requirements
  - Heat pump sized for primary heating
  - Dual fuel system – heat load calculations
  - Decommission fossil fuel equipment
- Support customer application

Financeit and CleanBC process overview

- All approved CleanBC contractors will have access to an additional account with Financeit
  - This process has been streamlined and created by Financeit (Some contractors may require additional docs)
- This account will only give you access to the following options
  - 0% over 60M for Tier 2 units
  - 4.99% over 60M for Tier 1 units
  - Regular Financeit program (To use additional Financeit programs, please use your current account)
- Contractor will required to upload the unit invoice and CleanBC Low-Interest Financing Application

Finance Registered Contractors

- Follow industry best practices
- Participated in specialized technical training
- Have comprehensive knowledge of program requirements
  - Invoices and documentation
  - Help facilitate faster financing processing
- Are committed to quality via:
  - Best practices training & code of conduct

- Required for participation in the Low-Interest Financing offer

Participant Program Eligibility

- FortisBC or BC Hydro residential customer
- Primary heating: natural gas, oil or propane
- 12 months utility billing history
- Use a Better Homes Finance Registered Contractor
- Eligible home:
  - Single family detached home
  - Mobile home on permanent foundation
  - Side-by-side duplex or row townhouse (if each unit has own utility meter)
  - Suite in a single family detached home (if has own utility meter)

Additional Rebates

- Electric Service Upgrade - $500 rebate for upgrading your electrical service to 100, 200, or 400 amp service for your home when upgrading from a fossil fuel (natural gas, oil, propane) primary space heating system to an electric air source heat pump.
- Two Upgrade Bonus - $300 and Home Energy Improvement Bonus - $2,000
- Municipal Top-Ups Rebates – Fuel-switch heat pump rebates of $350, $2,000 or $6,000
  - betterhomesbc.ca/municipal-offers/

Contractor Incentive Program

- $50 contractor incentive available if:
  - Heat pump is installed and replaces a fossil fuel (oil, natural gas or propane) heating system
  - Mini-split, multi-split and central ducted systems qualify
- Monthly payments will be made by cheque to the company
- Municipal contractor incentive top-ups available:
  - City of Vancouver $300
  - City of North Vancouver $50
  - Municipality of Whistler $50
  - District of Saanich $50