More for Less

A B.C.-wide switch to heat pumps could provide cooling, comfort, and lead to lower energy bills and less carbon pollution—without increasing total electricity usage

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CLEAN ENERGY CANADA

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Authors | Jana Elbrecht, Evan Pivnick
Contributors | Joanna Kyriazis, Trevor Melanson, Kim Old, Sicellia Tsui
Modelling | McDiarmid Climate Consulting

SFU MORRIS J. WOSK CENTRE FOR DIALOGUE

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Executive summary

British Columbia faces a triple heat threat.

Firstly, summers are getting hotter and dangerous heat waves are becoming likelier, posing serious risks to public health and safety. Half of B.C. households currently don't have access to cooling in their homes and could experience extreme discomfort or even serious health issues like heat stroke and dehydration. Already, many households have turned to plugging in inefficient, standalone air conditioners. If this trend continues, it will add significant demand to B.C.'s electricity grid and lock households into needlessly expensive summer hydro bills.

Secondly, the rapidly rising cost of living is still a top issue on everyone's mind. Home energy costs are a major contributor to household bills, and some families may be forced to choose between heating or cooling their homes to a comfortable temperature or paying for groceries. And thirdly, as the warming of the world continues, B.C. needs to do its part to limit climate change by reducing emissions.

One technology can help address all of these issues: the electric heat pump. While they work much like a central air conditioning system, heat pumps can heat as well as cool. In the summer, heat pumps will protect their owners from scorching heat waves while also filtering air pollution associated with forest fires. In the colder seasons, they provide affordable, comfortable, and evenly distributed heating with zero emissions.

For this report, Clean Energy Canada commissioned new modelling from an independent consultant to assess exactly how big heat pump benefits could be for British Columbians. **We found that heat pumps could lead to lower energy bills and emissions without increasing total electricity usage in the province.**

What heat pumps could deliver

For the province

Cost savings for consumers
$675 million less in annual energy bills

Lower annual electricity usage
If all existing electric resistance and natural gas systems were switched to heat pumps, electricity usage would go down today and avoid future load from inefficient A/C units

Carbon emissions reductions
3.5 megatonnes CO_2e of savings annually

For households

Comfortable temperatures in summer and winter

Improved indoor air quality

Lower annual energy bills

Smaller carbon footprint

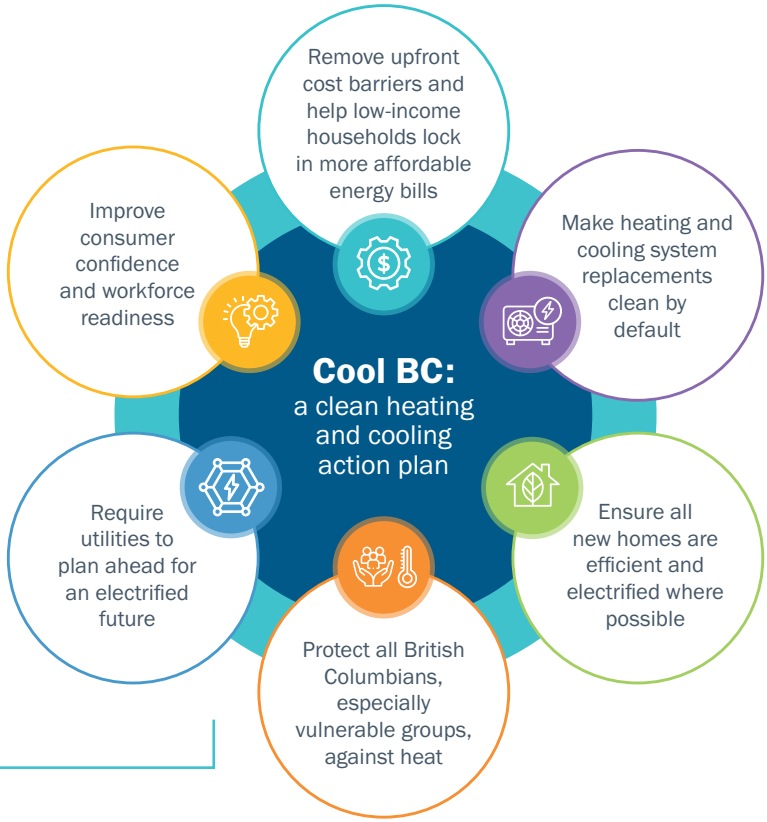
Savings compared to:		
Natural gas + A/C	↓ - $358	↓ - 97%
Electric resistance + A/C	↓ - $1,039	↓ - 72%

(Compared to cold climate air source heat pump, annual savings)

The opportunity is clear, but this is a transition that the province needs to plan for. Without a coordinated effort by the provincial government and utilities, vulnerable British Columbians may not be protected in the coming heat waves, the electricity grid will face challenges through the addition of many inefficient A/C units being plugged in, and while higher-income households will reap the benefits of efficient heat pumps, lower-income households will be stuck with higher energy bills and paying for maintaining natural gas infrastructure with a shrinking customer base.

Getting ahead of these challenges with careful planning is the best way the B.C. government can protect consumers, secure cost savings for households, and stabilize the grid.

The solution: **CoolBC**, a clean heating and cooling action plan that unlocks lower energy bills for all British Columbians, drives down emissions, and ensures energy systems are ready for an electrified future.



The modelling for this report

For this report, Clean Energy Canada commissioned modelling from McDiarmid Climate Consulting to assess the benefits of a switch to heat pumps for heating, cooling, and water heating in the province of B.C. The consultant modelled the impacts on energy bills, emissions, and total energy use. Results are based on a comparison with the current mix of heating, cooling, and water heating systems, as well as current energy prices and emissions factors.

The modelling includes scenarios for four of B.C.'s "climate zones," representing different weather circumstances (CZ 4, 5, 6, and 7A in the figure below) and three different building types (single-detached, single-attached, and apartment). For province-wide results, we modelled a heat pump scenario with a mix of heat pump types, and heat pump and electric resistance water heating. More details on the methodology can be found in the appendix.

B.C.'s climate zones

- Climate zone 8
- Climate zone 7B
- Climate zone 7A
- Climate zone 6
- Climate zone 5
- Climate zone 4

Key takeaways from the modelling

- On average, annual household energy bills with a cold climate air source heat pump would be **$358 lower than with a natural gas furnace and A/C, and $1,039 lower than with electric resistance heating and A/C.**
- **For the province as a whole, these energy bill savings could add up to $675 million annually.**
- **Heat pump hot water heaters** are the least expensive option for water heating in all housing types.
- **A heat pump produces 97% less pollution than a natural gas furnace.** If the entire province switched from current heating systems to fully electric heat pumps and electrified water heating systems, savings could be as high as 3.5 megatonnes annually, equivalent to 6% of B.C.'s total emissions.
- If all of B.C.'s heating and cooling systems were switched out to heat pumps, adding cooling for half of all households, it would result in **net savings of 800 GWh compared to current annual electricity usage for heating and cooling.**
- **Electrified heating and cooling will increase peak electricity demand, but this is something utilities can, and should, plan for.**

The trouble with heat

Summers are getting less comfortable in B.C. as the province heats up at a rate faster than the rest of the world.

Climate change has made summer heat waves in the province 10 times more likely, and access to cooling is no longer just a matter of comfort.[1,2] Rather, it has become a health issue, especially for vulnerable populations like the elderly. High levels of heat can lead to discomfort or even pose health risks, including heat stroke, dehydration, cardiovascular strain, and respiratory issues.[3] The 2021 heat dome caused 619 deaths according to estimates from the BC Coroners Service, with scientists finding the heat wave was amplified by climate change.[4,5] Unfortunately, **B.C. does not have the best starting position: the province has the lowest uptake of air conditioning in the country, with only about half of households reporting access to an air conditioning system in 2025.**[6] Air conditioning uptake has already doubled over the course of a decade, but most households are plugging in inefficient, standalone A/C units, adding electricity load to B.C.'s grid that could pose a challenge.

At the same time, winter energy bills are contributing to growing concerns about a rising cost of living. **Forty percent of households in B.C. are heating their homes with inefficient electric baseboard systems, bringing up their hydro bills.**[7] **And for the roughly 32,000 households heating with an oil furnace, often in more remote regions, winters come with upfront payments for oil deliveries running into the thousands of dollars.**[8] The largest group of B.C. households heats their homes with natural gas, and while the removal of the carbon tax reduced the cost of gas, in the same year FortisBC received two approvals to increase rates for customers, first by an estimated $170 per year for the average customer and then by an additional $35 annually.[9,10]

And with each season change, B.C. moves closer to its climate targets. If the province is to achieve net-zero emissions by 2050, we cannot ignore the 7% of annual emissions that come from residential buildings, with most caused by fossil-fuel-fired space and water heating.[11] The recently released, independent review of the province's CleanBC plan made it clear that we need to rethink the way we do climate policy.[12] B.C. can meet this economic moment while still doing its part to reduce global emissions.

The province is already progressively electrifying. Households are adopting clean technologies because they want to reduce their monthly bills and their emissions, or because they see the improvements in efficiency and comfort. While the benefits are great for those who switch, an uncoordinated transition risks leaving people behind and incurring high systems costs. If we only leave electrification to those who can afford it, a shrinking base of natural gas customers will be left to pay for stranded infrastructure.

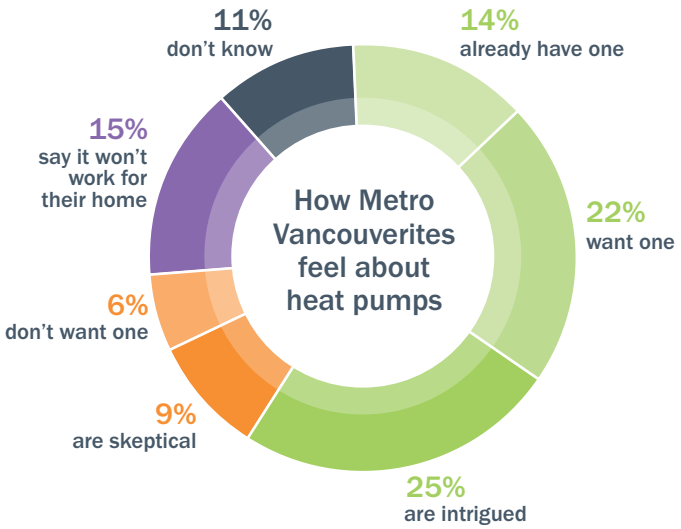
There is no silver bullet to tackle all of these challenges, but the electric heat pump can play an outsized role in addressing them. Unlocking the clean heat opportunity will require a deliberate and coordinated set of policies.

The heat pump opportunity

Ensuring all B.C. families stay comfortable during hot summers and have energy bills they can afford will require a combination of efforts.

Building new homes with shading, ventilation, and green roofs can help keep them cool.[13] Thermal Energy Networks can heat and cool high-density neighbourhoods using waste or geoexchange energy, but the heat pump is likely to play an outsized role.[14] It functions like a familiar air conditioning system and can be installed in the vast majority of houses, whether new or existing.

A heat pump will usually provide multiple benefits to a household at the same time: cooling, affordable energy bills, and lower emissions. And for the provincial energy system as a whole, a well-coordinated transition to heat pumps can ensure a smarter use of energy and an equitable distribution of costs.



Source: Abacus Data / Clean Energy Canada 2025[26]

The heat pump opportunity

- Health and safety
- Lower energy bills
- Energy efficiency
- Lower emissions

Types of heat pumps

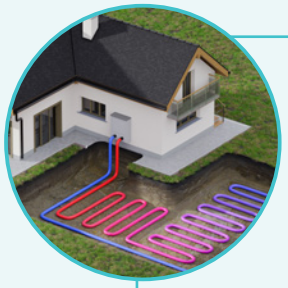
There are multiple types of heat pumps on the Canadian market, and it is helpful to understand the main differences between them to know which one may make sense for a certain type of home.[15]

Air source heat pumps

Air source heat pumps are the most commonly sold heat pump in Canada. They use technology similar to that in a refrigerator or air conditioner and function by transferring and compressing heat. Even when the air outside feels cold, there is still heat energy present that a heat pump can leverage. In the summer, the heat pump transfers heat from inside to outside the home to keep cool.

Cold climate air source heat pumps

Cold climate air source heat pumps are specifically designed to maintain high efficiency in very cold winters. They can function in outside temperatures as low as -30 °C, maintaining efficiencies twice that of other heating systems at very low temperatures. They usually come at somewhat of a price premium compared to “conventional” air source heat pumps.



Ground source heat pumps

Ground source heat pumps (also called geoexchange heat pumps) use heat from the earth or ground water. Since the earth remains at a stable temperature, they can be extremely efficient even on the very coldest winter days. However, they rely on a buried ground loop, which means they require outdoor space and usually come at a relatively high installation cost.

Hybrid heat pump systems

Heat pumps can also be installed in combination with an existing (or new) natural gas furnace, with the furnace being used as a supplementary system or when outside temperatures drop below a pre-set “switchover” temperature.

Central, mini-split, window, or air-to-water heat pumps

Heat pumps can be installed in different ways, just like a heating system or air conditioner. Large homes or homes with existing ducts may benefit from a centrally installed heat pump system, with the hot or cool air spread through the house via ducts. An alternative is to have one or multiple mini-splits in rooms of the house. Not yet widely available on the Canadian market is the window-mounted heat pump, which can be installed similar to a window A/C unit in some window types and may be a cheaper alternative for apartments. Heat pumps can also be installed with an air-to-water system, where the heat is transferred through the home in the form of hot water, using radiators or in-floor heating.

Health and safety

Extreme heat is a growing concern in B.C., especially after the 2021 heat dome. If we do not address the need for people to stay cool, we will see both immediate and long-lasting health effects.[13] Heat pumps can help keep British Columbians healthy, safe, and comfortable. In addition to cooling, heat pumps can also provide air filtration, protecting families against the pollution from ever more common wildfire smoke.[16]

As hot summers have become more prevalent, the uptake of air conditioning systems has increased significantly over the past decade. In 2013, only 21% of B.C. households had any type of air conditioner in their home—by 2023, this number had risen to 56%.[17] One in five of these new systems was a heat pump, but the biggest increase was actually in standalone air conditioners (such as window units), which are often relatively inefficient and can lead to high increases in electricity bills during the warmest seasons, while delivering uneven cooling and often a lot of noise.

Air source heat pumps work similarly to (central) air conditioners, compressing heat and moving it from one place to another. But where air conditioners only do so in one direction, heat pumps can switch directions and heat as well as cool, costing only a few hundred dollars extra in manufacturing costs to add the required parts. In fact, a research collaboration between several Canadian organizations showed that installing heat pumps instead of central A/C systems across Canada could save Canadians $10.4 billion in energy bills and reduce 19.6 million tonnes of CO_2 emissions between 2025 and 2035.[18]

Lower energy bills

Heat pumps have the potential to make energy bills more affordable across B.C. **If the entire province was heated by electric heat pumps and water heaters, annual energy bills would be a total of $675 million lower than they are with current systems** according to the modelling commissioned for this report.

For an individual household, energy bills with a cold climate air source heat pump are on average $358 a year lower than with a natural gas furnace and A/C, and $1,039 a year lower than with electric resistance heating and A/C.

The exact savings of a heat pump compared to another system depends on the type of house, what part of the province it is in, and the exact system. The next section of this report shows the impact of a heat pump on different household energy bills according to new modelling.

Who wants heat pumps?

According to data from the federal government, 7% of B.C. heating systems were heat pumps in 2022.[24] The provincial government has cited a higher number, saying that approximately 13% of B.C. households used a heat pump.[25]

Clean Energy Canada recently worked with Abacus Data to conduct market research about interest in heat pumps in Metro Vancouver: **14% reported already having a heat pump and another 22% said they would like to get a heat pump.**[26] An additional **25% said they had a positive impression of them but needed to learn more.** Only 6% said the technology did not appeal to them.

Notably, we found that half of respondents were unaware of key facts about heat pumps, such as the fact that they can provide cooling, function well in cold weather, and are highly energy efficient. After receiving this information, the share of people who wanted to install a heat pump (but did not have one yet) jumped from 22% to 34%.

Heat pump water heaters (tested as “efficient electric water heaters”) were even more popular, with 80% of Metro Vancouver respondents having a positive impression of the technology and 59% indicating they were likely to consider installing one.

Energy efficiency

Heat pumps can lead to huge energy efficiency savings, being two to five times more efficient than a natural gas furnace or electric baseboard.[19] While heat pumps lose some of their efficiency in extremely low temperatures, they still far outcompete the efficiency of natural gas furnaces and electric resistance heating on cold days. A recent study of heat pump performance in B.C. homes found that at -20°C, cold climate air source heat pumps were still on average twice as efficient as a natural gas furnace.[20]

This added efficiency provides a great opportunity for B.C.'s electricity system. Currently, 40% of households heat with electric resistance heating which is a significant draw on the power system.[21] **According to our modelling, replacing electric resistance heating with a cold climate heat pump saves on average 67% of annual electricity use for a household.** In the province as a whole, replacing electric resistance heating with heat pumps could save almost half of the electricity currently used for heating and cooling in B.C.

Additionally, the increasing uptake of air conditioning systems in B.C. presents a potential challenge for the grid. The share of households with A/Cs has already doubled between 2013 and 2023, and most of these new systems were standalone units.[17] Without intervention, it is likely that many more British Columbians will see the need to install inefficient A/C systems like window units to stay comfortable and safe in sweltering summers. **Providing A/C across the province would add an estimated 1,563 GWh of annual electricity demand, according to our modelling. If heat pumps were installed instead of conventional A/C systems, this could be reduced by a quarter.**

Heat pump appliances also offer opportunities to save energy in other parts of the home. A heat pump water heater, for example, uses on average only a quarter of the energy of a conventional electric water heater. A heat pump clothes dryer uses half the energy of a conventional dryer.[22]

Reduced climate pollution

Heat pumps are a great way to save emissions from home heating, especially when they are powered in B.C. where 98% of electricity comes from renewable sources.[23]

Our modelling finds that **a B.C. household in a single-detached house switching from a gas furnace to a cold climate air source heat pump would save 97% of its emissions from heating and cooling.** That is an estimated 3,200 kg of CO_2 every year, which is equivalent to an individual flying roundtrip from Vancouver to Paris.

If the entire province switched from current heating systems to fully electric heat pumps and electrified water heating systems, savings could be as high as 3.5 megatonnes annually. That is 6% of all of B.C.'s current emissions.

A hybrid heating scenario where heat pumps are paired with gas furnaces* would still cut climate pollution, but it reduces the potential emissions savings by approximately half compared to a fully electrified scenario.

* In this scenario, we assumed all current natural gas furnaces would be supplemented by a conventional air source heat pump, while all electric resistance heating would remain in place.

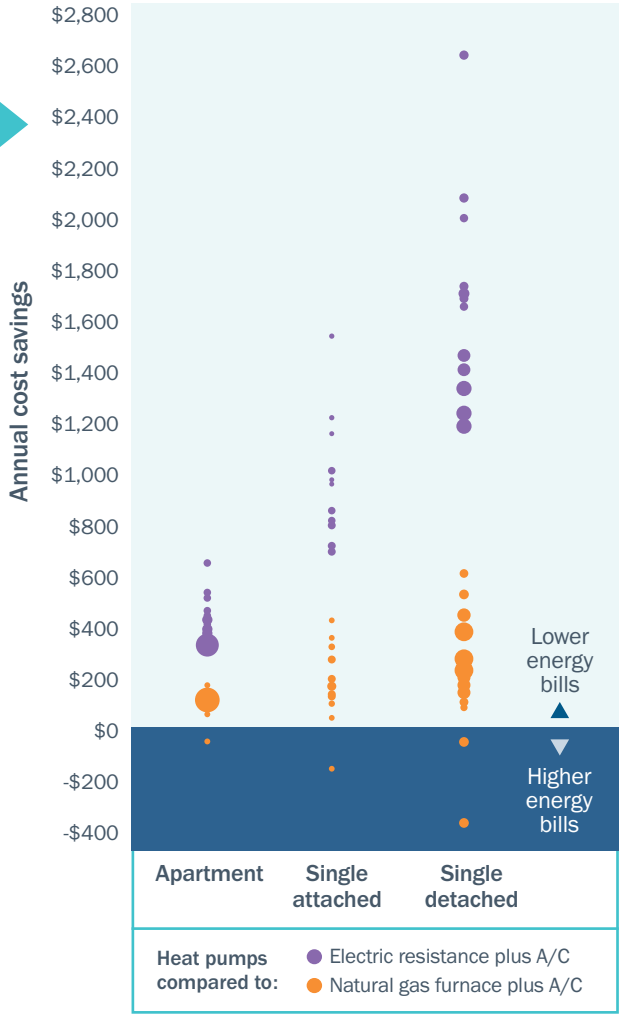
How much can households save

Heat pumps are highly efficient and can therefore bring down monthly energy bills for almost all households in B.C., from an apartment in Vancouver to a single family home in Cranbrook.

The vast majority of B.C. households would have lower energy bills with a heat pump

The graphic to the right visualizes different scenarios for heat pump energy bill savings with different heat pump types and in different climate zones. Larger dots represent more homes.

- All types of heat pumps in all scenarios lead to lower energy bills than electric resistance heating and an A/C. **On average, annual energy bills are $1,039 lower with a cold climate air source heat pump compared to electric resistance heating and air conditioning.**
- In almost all cases, a heat pump will lead to lower energy bills than a natural gas furnace plus A/C. **On average, bills with a cold climate heat pump are $358 lower.**
- Ground source heat pumps lead to the greatest energy bill savings, but these do come at a high upfront cost and may not work for every home.
- Hybrid heating systems generally lower bills but less so than fully electrified cold climate heat pumps in most parts of the province, except in the northernmost climate zones.



Savings are especially high in comparison to electric resistance heating. **A household in B.C. is expected to spend an average of $1,039 less on energy bills annually with a cold climate air source heat pump compared to electric resistance heating and air conditioning.** Savings potential is influenced by climate zone as well as housing and heat pump types. A family in a single-detached home in Nanaimo, for example, would pay $1,480 less in energy bills with a cold climate air source heat pump than when running electric resistance heating and A/C. A household in an apartment in Vancouver would cut energy bills by $318 per year by using a conventional air source mini-split heat pump instead of electric baseboards and a window A/C unit.

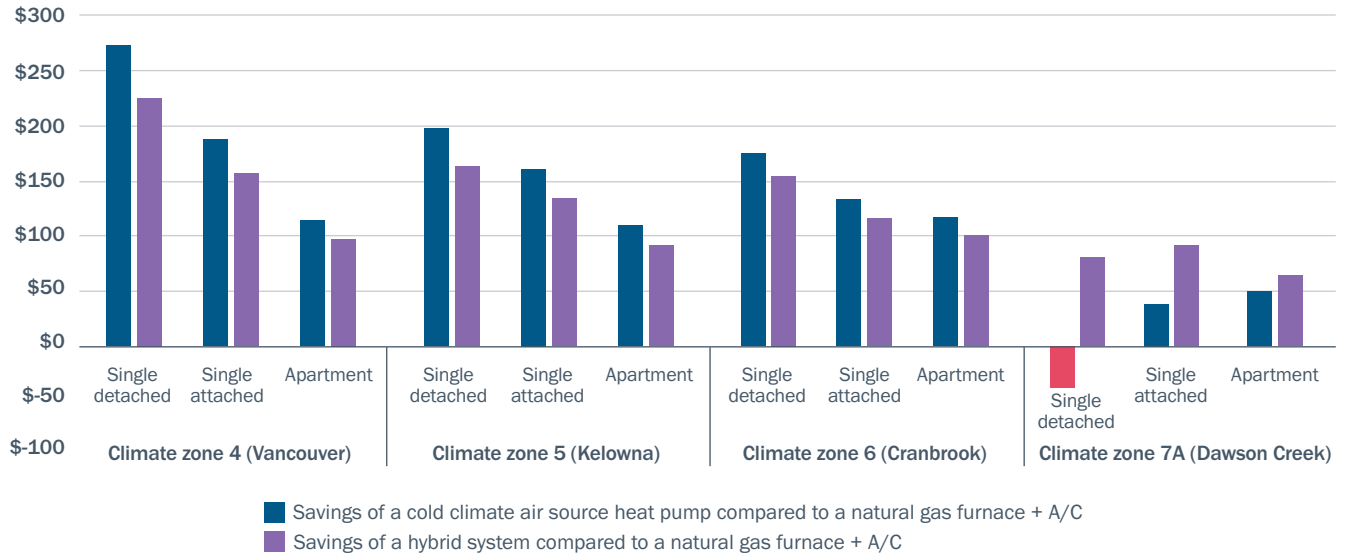
When compared to natural gas systems, cost outcomes vary based on a range of factors including size of the home, climate zone, and fluctuations in gas prices over time. In our modelling (based on current utility rates), **almost all cases with a heat pump resulted in lower annual energy bills than a natural gas furnace plus A/C.** The highest difference was found for a single-detached home in climate zone 6 (e.g. Revelstoke or Prince George), comparing a natural gas furnace to a ground source heat pump with the heat pump resulting in energy bills that were $608 lower per year, but a conventional air source heat pump can also bring home the savings for most British Columbians. For someone living in a single-detached home in the Lower Mainland, a conventional (non-cold climate) heat pump would result in energy bills an average of $228 lower than a natural gas furnace and A/C.

There are a few cases where energy bills are higher with a heat pump. These are primarily the cases where a natural gas furnace is compared to a conventional (non-cold-climate) air source heat pump in northern climate zones with very low winter temperatures. These non-cold-climate heat pumps are designed to work efficiently in more moderate climates and lose their efficiency in extreme winter temperatures, bringing up energy bills.

Instead of relying fully on electricity, heat pumps can also be installed in combination with an (existing) natural gas furnace, which is referred to as a hybrid system. Such a setup could be a good fit in the coldest parts of the province. When temperatures drop to extreme lows, an air source heat pump will work less efficiently and therefore be more expensive to run. At -30°C or lower, even a cold climate air source heat pump relies on electric resistance heating, which is a lot less efficient. Our modelling found that for households in the coldest climate zone (Dawson Creek), savings were higher with a hybrid system than a fully electrified cold climate air source heat pump.

In southern B.C. (from Victoria to Kelowna), however, our modelling finds that annual energy bill savings from a fully electrified cold climate heat pump are higher than those of a hybrid system in all housing types. In these more moderate climates, a hybrid system will still see the heat pump taking on most of the load. If the switchover temperature were set at -3°C, for example, the heat pump would cover approximately 98% of heating. A properly sized conventional (not cold climate) heat pump can efficiently cover all heating in this climate zone and will also save consumers on the equipment and service cost of maintaining a furnace. Even when a household does not use any natural gas, the service cost of being connected to FortisBC's gas grid is $154 per year (these potential savings were not included in any of the scenarios).[27]

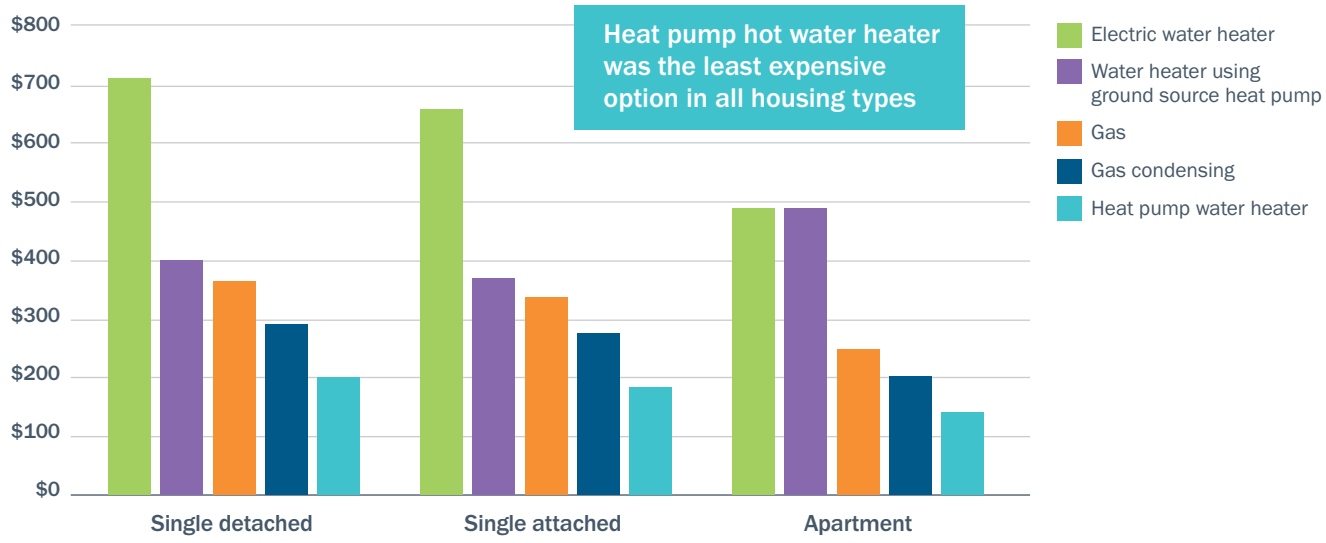
Savings from a fully electrified or hybrid heat pump



Our modelling did not include a comparison between oil furnaces and heat pumps, since this is a relatively small section of the provincial population. However, these savings are expected to be among the highest. The Oil to Heat Pump Affordability program, co-funded by the federal and provincial governments, has issued grants to over 1,500 households in B.C. to replace their heating systems. The federal government estimates that the average household participating in the program (countrywide) saves $1,377 on energy costs and 2.78 tonnes in greenhouse gas emissions every year.[28]

Heat pumps can also cut the cost of water heating. Currently, almost half of B.C. households use electric water heaters. A heat pump water heater functions on electricity but is around 3.5 times more efficient than a common electric water heater, cutting annual energy bills by an average of $435. But savings are also available for B.C. households heating their water with gas. An average household in a single-detached house in B.C. switching from a natural gas water heater to a heat pump water heater is expected to save $165 per year on their energy bills. Even in comparison to newer, efficient, condensing natural-gas-powered water heaters, a heat pump water heater still comes out cheaper.

Annual energy cost of water heating with different technologies in B.C.



Overcoming upfront costs

While heat pumps can significantly lower energy bills across the province, they're often more expensive to install than a natural gas furnace, A/C system, or electric resistance heating.

In a survey of Metro Vancouver which Clean Energy Canada conducted with Abacus Data, 76% of respondents said upfront cost differences were a barrier to installing a heat pump.[26]

The exact installation costs of a heat pump vary depending on the size of the home and the model, size, and complexity of the heat pump, as well as localized factors such as the cost and availability of installers. An aggregation of air source heat pump estimates collected across Canada between 2022 and 2025 found an average installation cost for a smaller, conventional mini-split air source heat pump to be $6,600 (before tax), while the average price for a cold climate air source heat pump for a large single-family home came to an average of $16,000.* Ground source heat pumps can come at prices as high as $30,000.

Allowing all households to make decisions for the long term

Even with the promise of lower monthly bills, households may struggle to make the decision to invest in a more expensive system. How long it takes for monthly savings to make up that difference in upfront costs depends on fluctuating energy prices and the exact quote a household will get for installation costs.

Take, for example, a single-family home in the Lower Mainland. Installing a cold climate air source heat pump would cost around $1,500 to $4,500 more than installing a new natural gas furnace and central A/C system, but energy costs with the heat pump would be an estimated $190 to $275 lower every year. On the lower end of those estimates, the heat pump would

* Dataset not publicly available.

break even in eight years and, on the higher end, would do so in around sixteen years, which is similar to the lifespan of a heat pump. This is not accounting for any incentives, which many British Columbians receive when installing a heat pump—meaning that in reality many people are breaking even, and then saving money, far sooner.

Another example may be a home on Vancouver Island that already has baseboards installed and is deciding whether to install a central A/C system or a heat pump. The heat pump costs them an extra $8,000 to install compared to the central A/C system but saves them $1,200 per year on their hydro bills due to more efficient heating and cooling. After around seven years, they would break even on that investment. In the meantime, they have access to more comfortable, even heat, and BC Hydro benefits from the efficiency savings.

However, households often do not have the cash available to invest in a heat pump. And while a new furnace and A/C may be installed at different times, the two-for-one benefit of a heat pump also means a larger investment all at once. Taking out financing for the home upgrade may add additional cost.

Governments can help bridge this gap and help all households get access to efficient, emissions-free heating and cooling with lower monthly bills. This can be done through incentives or affordable financing solutions, such as the zero-interest loans that were previously offered by the federal government but ended in October 2025.[29]

Locking in savings for low-income families

High upfront costs in particular pose a barrier for lower-income households. Approximately 5% of B.C. households live in energy poverty (based on the 2021 Census),[30] meaning they may have to choose between heating and cooling their home or buying groceries. Lowering heating bills and providing access to affordable cooling would help these families make ends meet every month and be more safe and comfortable in their homes.

However, these households do not have the cash or credit to invest in efficient heating or cooling systems and therefore get locked into paying higher energy bills. In an apartment in Vancouver or Victoria, for example, a household heating with baseboards and cooling with a window A/C unit pays on average $318 in energy costs more every year than they would with a heat pump.

Governments or social housing providers can help lower-income households unlock cooling, comfort, and lower energy bills through heat pumps. The Boston Housing Authority has launched a pilot with easy-to-install window heat pump units in affordable housing, providing affordable heating and cooling for residents into the foreseeable future.[31] This same technology was also recently piloted in Vancouver. In B.C., government initiatives like the Energy Savings Program and the Greener Affordable Housing Program provide good opportunities to give lower-income families access to efficient and affordable energy usage.[32,33]

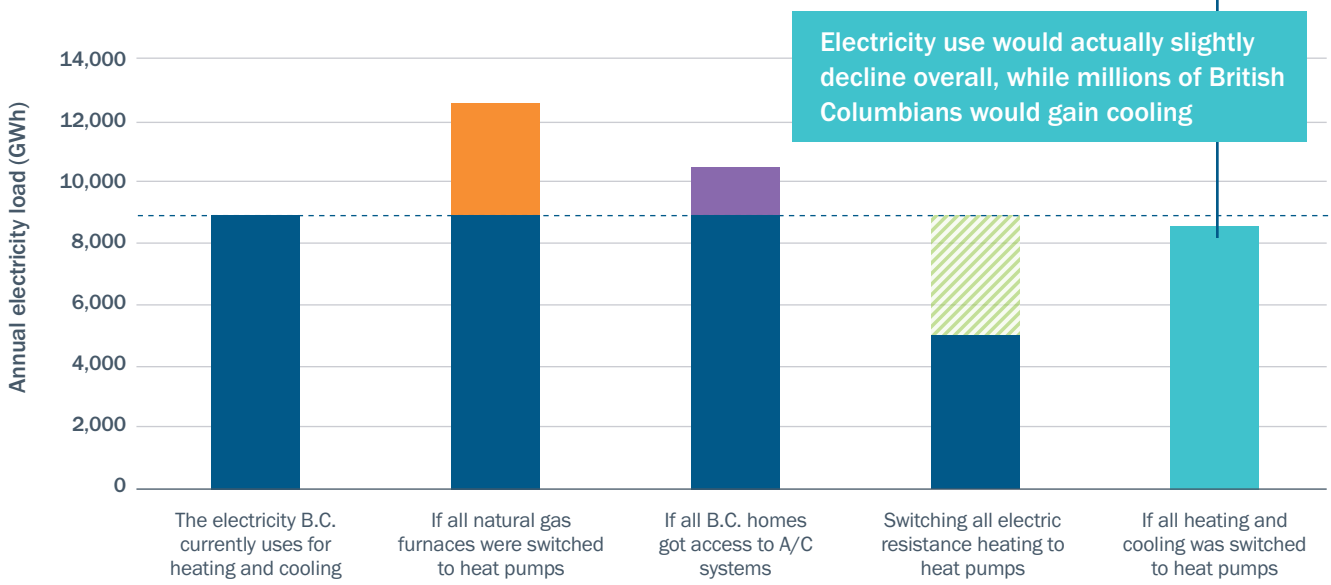
Our energy system can handle it

In addition to energy bill savings, the modelling analyzed the effects of a province-wide switch to heat pumps and electrified water heating on the energy system as a whole.

Heat pumps can lead to huge energy efficiency savings. They are two to five times more efficient than a natural gas furnace or electric baseboard.[19] When a household switches from a natural gas furnace to a cold climate heat pump, it significantly reduces its energy usage. However, those savings do entail a switch from one type of energy (natural gas) to another (electricity). Concerns have been raised that switching B.C. heating systems to heat pumps would overload the electricity grid.

Across the whole province, replacing all natural gas furnace systems with heat pumps would add an annual 3,635 GWh of electricity. Adding cooling systems, which more households are expected to do in ever-hotter summers, will also add significantly to the electricity usage of homes. Thankfully, additions from gas-to-heat pump switches can be balanced out by the electricity saved from switching inefficient electric resistance heating systems to electric heat pumps. Switching B.C.'s widespread electric resistance heating systems for more efficient heat pumps could save an estimated 4,271 GWh of electricity. **All in all, in the scenario where all of B.C.'s heating and cooling systems were switched out for heat pumps, adding cooling for half of all households, it would result in net savings of 800 GWh compared to current annual electricity usage for heating and cooling.** When compared to a scenario where conventional A/C systems are added to all homes, savings are as high as 2,339 GWh.

Getting every home in B.C. on a heat pump would provide more for less



What happens to the power system on the coldest night?

Electricity systems are built to meet not only our annual energy usage but to ensure that the power is available at peak demand. Although heat pumps are not expected to increase annual usage (when replacing both electric and natural gas systems), our modelling showed that electrifying our heating and water heating systems will increase household electricity demand on the hottest and coldest days compared to current usage. The same was found in a study conducted by Navius, although they found the impact on B.C. to be relatively muted compared to other provinces considering B.C.'s milder climate and more ambitious energy efficiency requirements.[34]

As more consumers increasingly turn to electrified heating and cooling solutions, utilities need to plan ahead for those days when everyone needs their heating or cooling the most. There is no one-size-fits-all solution for the entire province. In the north, a home's peak electricity demand on a cold winter night will be quite a bit higher than in the rest of the province. In dense urban areas, we need to plan for sweltering summer days when everyone turns on their cooling at full blast.

Thankfully, there are a growing array of tools and approaches that can be leveraged to reduce peak impacts. Firstly, peak demand is expected to be significantly lower in more energy efficient buildings because it takes less energy to maintain indoor temperatures in these homes.[34] Secondly, utilities should leverage the technologies in electrified homes to help flatten peaks and build more resilient, cost-effective energy systems.[35] At-home technologies like smart thermostats, programmable electric water heaters, and EV chargers and batteries will play a large role in an increasingly decentralized system. On the very coldest hour of the night, EV charging can be paused to free up more electrical load for heating. On the very hottest day, rooftop solar panels can help provide some of the power households need to cool.

In short, electrified heating and cooling will increase peak electricity demand, but this is something utilities can, and should, plan for.

Leaving no one behind

B.C.'s energy systems are largely funded through customer bills. Customers pay for the energy they use, but also for a large share of the infrastructure used to deliver that energy. For natural gas, those infrastructure costs are currently spread out across a ratepayer base of over a million customers, who pay through a flat monthly charge as well as delivery and transport charges on every unit of natural gas used.[36] Investments in new pipelines are commonly spread out over 40 to 50 years and paid off with customer revenue over time.[37]

The majority of natural gas used by households in B.C. is used for home heating. However, heat pumps have grown in popularity in recent years, as many households see the benefits of cooling, comfort, and reduced climate impacts. The number of heat pumps installed in the province doubled between 2010 and 2020, from 63,000 to 132,000.[24] Since then, at least another 30,000 heat pumps have been installed with assistance from the federal government and certainly even more with other or no support programs.[38]

As an increasing number of households electrify, natural gas infrastructure costs may be spread out over a smaller consumption base. Pipelines will still have to be paid off, even if less natural gas is flowing through them. If utilities do not adequately plan for electrification, stranded assets will result in a financial burden.[37] For customers using natural gas to heat, this may mean the delivery charges on each unit of natural gas have to go up to compensate for the lower use across the province.

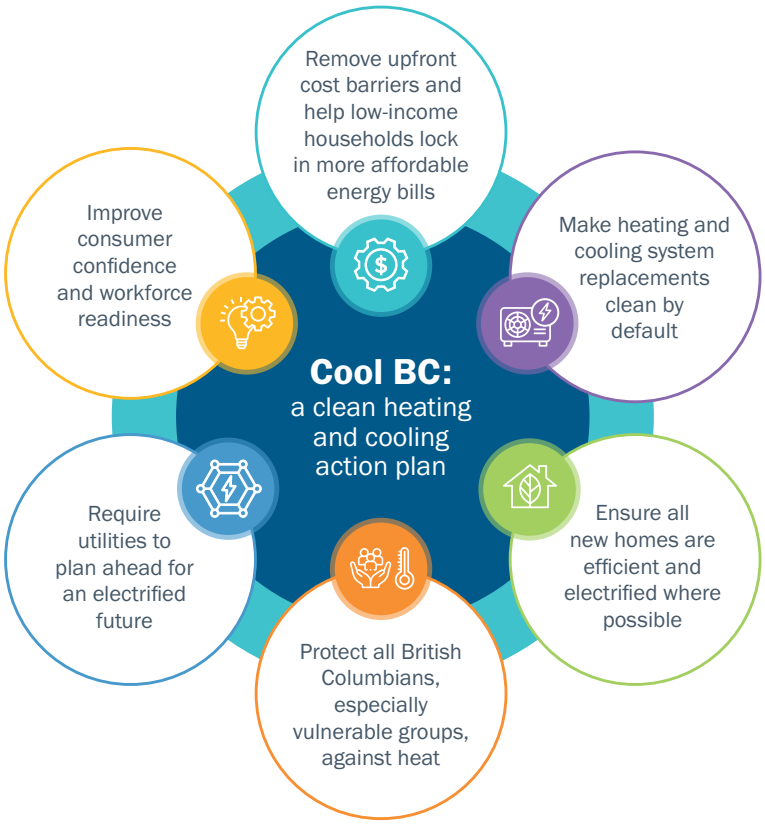
Crucially, if electrification is only accessible to higher-income households, the shrinking natural gas ratepayer base paying for those infrastructure costs will be made up disproportionately of lower-income and more vulnerable households. Lower-income households may struggle to install a heat pump because of the upfront cost, or because they rent or live in an apartment building where it's difficult to make changes. When higher-income homeowners install heat pumps to reap the comfort and benefits but pay less or zero in natural gas delivery charges, this could cause a higher cost burden for those left heating with natural gas. An energy pathways assessment in Ontario found that although electrification of heating would have overall affordability benefits for households, there is a risk of "high energy bills for households remaining on natural gas due to a large drop in consumers."[50] **An equitable energy transition therefore requires the provincial government and utilities to plan ahead.**

Unlocking the opportunity through an action plan

To unlock the many benefits heat pumps provide—improved health, lower energy bills, energy efficiency, and reduced emissions—and to ensure the energy transition is well-managed and leaves no one behind, the provincial government should take a strategic approach to clean heating and cooling.

While incentives have helped many households make the switch to date, the next phase of heat pump support and related regulations should focus on scaling deployment and reaching those households that would benefit most from the cost-savings and comfort heat pumps provide. **British Columbia needs CoolBC: a clean heating and cooling action plan.**

Heat pumps will play an important role in the transition to clean heating and cooling, and an action plan should help unlock the opportunities of this crucial technology while also enabling the role of other solutions, such as thermal energy networks and designing homes to be energy efficient and enable passive cooling.



A clean heating and cooling action plan should do the following:

Remove upfront cost barriers and help low- and middle-income households lock in more affordable energy bills

Heat pumps can unlock lower heating bills for the majority of households in B.C. Especially for lower-income households that may be heating and cooling with inefficient systems like baseboards and window A/Cs, savings can add up to hundreds of dollars per year—but heat pumps still come at a higher upfront cost than less efficient systems. Low- and middle-income households are especially unlikely to be able to make that upfront investment and are more likely to get stuck with high energy bills and no or inefficient cooling.

What the provincial government should do:

- **Continue providing support through initiatives like the Energy Savings Program and the Greener Affordable Housing Program.**[32,33] These programs should be available for renters as well as homeowners and should be delivered as direct installations or as upfront payments paired with concierge services, so that households with fewer resources, time, and knowledge can benefit. Current income limits, which take into account household size, should be maintained relative to inflation.
- **Support whole-building upgrades for affordable multi-unit housing**, implementing either a building-wide solution or in-unit heat pumps. The Boston Housing Authority, for example, launched a pilot with easy-to-install window heat pump units in affordable housing, locking in affordable heating and cooling for residents into the future.[31]
- **Provide zero-interest financing to all households for the installation of clean heating systems.** This will better allow British Columbians to make a long-term decision for their homes at relatively low cost to the government. As an alternative to a provincial loan program, the government could work with utilities on developing heat-as-a-service payment models, such as the offer available in Manitoba to install a ground source heat pump for a monthly charge of $75, or enable local governments to provide financing through PACE programs, which allow households to take out low-interest loans that are attached to the property and paid off through property tax bills.[39,40]

Make heating and cooling system replacements clean by default

Households commonly do not start thinking about a new HVAC system until their old system breaks down or nears the end of its lifetime. In fact, anecdotal evidence from the sector suggests 80-90% of HVAC installations are emergency replacements. This means there is a short window for households to decide whether they will switch to a heat pump or replace their furnace or A/C system with a like-for-like replacement. Households often do not have the time or resources to look into a new technology during an emergency HVAC replacement. If a household does not opt for a heat pump, it will likely be another 15 to 20 years before an opportunity to switch arises given the lifetimes of these technologies. Instead of relying on individual households to research new, more efficient options for heating and cooling, the provincial government should move the market toward making the most efficient systems the default.

What the provincial government should do:

- **Move forward on the proposed Highest Efficiency Equipment Standards,** which would require all new heating and water heating systems to be at least 100% efficient.[41] The efficiency requirement will ensure customers are set up with the best available technology by default. Hybrid systems, which combine a natural gas furnace with an air source heat pump, would be able to comply with the standards. The province should provide an exception for B.C.'s coldest climates (climate zones 7A, 7B, and 8) under the Highest Efficiency Equipment Standards, where air source heat pumps are not as cost-effective and ground source heat pumps may come at too high of an installation cost.
- **Require all new (permanent) A/C systems to be reversible through energy efficiency standards under the provincial Energy Efficiency Standards Regulation, meaning they can bring in warm air as well as cool air.** A/Cs and heat pumps are essentially the same technology, and making every A/C a heat pump provides a great opportunity to cover a share of household heating with an efficient electric system, supplementing existing natural gas or electric resistance heating systems.

Ensure all new homes are efficient and electrified where possible

Building homes the right way from the start will always be the most cost-effective solution. In B.C.'s planned housing build-out over the coming years, the province should continue its efforts to ensure new homes are energy efficient and electrified where possible.

What the provincial government should do:

- **Maintain minimum performance requirements for new homes through the Energy Step Code and the Zero Carbon Step Code.** These ensure new homes are built efficiently and electrified where possible while giving municipalities the room to set more ambitious requirements or take more time for implementation where necessary.[42]

Protect all British Columbians—especially vulnerable groups—against heat

High levels of heat can cause discomfort or even pose health risks including heat stroke, dehydration, cardiovascular strain, and respiratory issues.[43] People with existing health issues and the elderly are especially vulnerable, and this can be a particular threat for people living in energy-inefficient housing. Renters may not have the agency or resources to install cooling systems in their own units.

What the provincial government should do:

- **Explore ways to implement a maximum temperature limit to protect renters in all buildings.** The BC Centre for Disease Control and much of the available scientific literature have identified 26 °C as the safe temperature limit.[44–47] The province took an important step for health and safety by introducing a maximum temperature requirement for new dwellings in the BC Building Code. However, this only protects renters moving into newly constructed buildings. The province should work with stakeholders to phase in a maximum temperature limit in existing rental units, while ensuring costs of cooling systems are not passed on to tenants and do not impose undue burdens on affordable housing providers.

Require utilities to plan ahead for an electrified future

Natural gas is currently used to supply the majority of home heating in the province.[48] However, the share of natural gas in home heating has been steadily decreasing from 55% of heating systems in 2000 to 43% of heating systems in 2022.[24] If the government invests in a transition to clean heating and cooling for all British Columbians, this trend will accelerate over the coming decades. Planning for this transition will provide certainty for households, utilities, and investors to pivot. At the same time, it will ensure the infrastructure costs of the natural gas grid are not spread out over a shrinking demand, which may be disproportionately made up of lower-income households.

What the provincial government should do:

- **Work with the British Columbia Utilities Commission to implement an integrated planning process across utilities (i.e. Fortis and BC Hydro).** Require utilities to produce long-term resource plans as part of a process that coordinates the investments across energy systems in line with our climate and energy objectives.
- **Commission a pathways assessment** to help inform the development of an energy plan. A pathways assessment sits at the centre of an orderly and affordable energy transition, helping to evaluate costs, choices and tradeoffs, understand the impacts on different groups of consumers, identify no- and low-regret options, and bring key stakeholders together for an evidence-based discussion about a jurisdiction's future energy mix.[49] The province can look to Ontario, Western Australia, and other jurisdictions for examples of how to do this effectively.[50]

Improve consumer confidence and workforce readiness

Recent market research in Metro Vancouver by Clean Energy Canada and Abacus Data found that households have low knowledge of heat pumps and their benefits.[26] Only 37% of Metro Vancouverites were aware that heat pumps are two to five times more efficient than gas furnaces and only 59% knew heat pumps can provide cooling. After learning some key facts about heat pumps, the share of people who said they wanted a heat pump at some point (but didn't have one yet) jumped from 22% to 34%.

Improved understanding of heat pumps can also help overcome other perceived barriers. For instance, there is a common misconception that electrifying heating and water heating systems will require households to upgrade to an electrical panel that is bigger than the 100 Amp panels common in existing homes. In our market research, 74% of respondents cited the need to make electrical upgrades as a barrier to adopting heat pumps. However, in many cases this costly upgrade is not actually necessary.[51]

While consumer awareness is important, local contractors must also have the knowledge, skills and credentials to inform homeowners about the benefits and requirements of a heat pump, and to install and service systems reliably. A homeowner's decision to choose and purchase a heat pump also depends on their confidence that local contractors possess the knowledge, skills, and credentials to install and service systems reliably. Moreover, heat pumps can only realize optimal efficiency gains and cost savings when they are installed well and sized properly.

What the provincial government should do:

- **Expand existing public awareness campaigns to improve popular knowledge of heat pumps.** Ensure households receive accurate, accessible information when making system replacement decisions, reinforcing trust in both the technology and the workforce delivering it. This includes accurate information about heat pump characteristics and the need for panel upgrades, but also ensuring heat pumps installed are the right size to avoid inefficiencies.[52]

- **Work with industry and labour to assess skills gaps and make it easier for HVAC professionals to develop the skills necessary to install heat pumps.** Industry associations like the Heating, Refrigeration and Air Conditioning Institute of Canada have already taken initiative to conduct skills gap assessments and develop training curriculums in partnership with colleges.[53,54] The province should support scaling these efforts and implement supporting measures, such as hands-on training in partnership with community colleges and wage support for technicians who undertake retraining or upskilling. Additionally, the province should drive demand for existing training programs by setting minimum requirements. The Home Performance Stakeholders Council and BCIT are already working to align incentive requirements with high-quality training for contractors. In the longer term, the province may consider establishing a designated Residential Heat Pump Installer trade category, similar to the ones implemented by Ontario and Manitoba.

Methodology

Modelling for this report on the emissions, cost, and energy outcomes of a transition to heat pumps in B.C. was completed by McDiarmid Climate Consulting.

Results are based on the following assumptions:

- Impacts of electrifying heating, cooling, and domestic water heating on GHG emissions, annual energy usage, peak electricity draw, and energy costs were determined for different housing types (single-detached, single-attached, and apartments) and climate zones (4, 5, 6, and 7A). These were then aggregated and weighted by population into province-wide results.
- The baseline scenario is based on current shares of heating, cooling, and domestic hot water systems in B.C. as per the Comprehensive Energy Use Database.[21] This is 54% natural gas furnaces, 40% electric resistance, and 6% air source heat pumps for heating; 15% central A/C systems, 16% window A/C systems, 6% air source heat pumps for cooling, and 60% no active cooling system; and 28% natural gas water heaters, 28% condensing natural gas water heaters, and 44% electric resistance water heaters for domestic hot water.
- The electrified scenario models 45% cold climate air source heat pumps, 45% conventional air source heat pumps, and 10% ground source heat pumps for heating and cooling, and 45% heat pump water heaters, 45% electric resistance water heaters, and 10% ground source heat pumps for domestic hot water.
- The hybrid scenario assumes all current natural gas furnaces (56% of households) are replaced with hybrid heating and cooling systems consisting of a conventional air source heat pump and a natural gas furnace and no changes are made to water heating systems.
- Heating is assumed to be turned on when outdoor temperatures fall below 18°C and cooling turned on when outdoor temperatures go above 24°C. Average hourly temperature taken from NRCan's Canadian Weather Year for Energy Calculations database.[55]
- Results were modelled for climate zones 4, 5, 6, and 7A. Climate zones 7B and 8 were left out of consideration for this modelling given the very small population. For each climate zone, the weather data of its largest city was used to calculate heating loads. Average heating loads per housing type and climate zone were calculated using a population and climate weighting.[56]
- Energy costs are based on current (October 2025) utility rates per BC Hydro and FortisBC, not including fixed monthly charges.[27,57] For electricity rates, BC Hydro's flat rate is used. Some parts of the province are not serviced by BC Hydro for electricity, but the electricity rate is expected to be largely representative.

- Average air source heat pump and cold climate air source heat pump output capacity, power draw by temperature, and heat pump size were collected from multiple (incentive-eligible) models from seven manufacturers, with all cold climate air source heat pumps models qualifying for incentives offered by the provincial government.
- Electricity usage on an annual basis and during peak hours was calculated using the coefficient of performance at different temperatures. For temperatures below 7 °C, average power draw is increased by 20% to account for defrosting, but it is assumed no defrosting is done during peak hours.[58] Electricity usage of natural gas air handlers was included for single-attached and single-detached homes but not for apartments.
- Heat pumps switch entirely to electric resistance heating where temperatures drop below -30 °C for cold climate air source heat pumps and below -20 °C for air source heat pumps. Electric resistance heating may supplement heat pumps above these temperatures when the heat pump output capacity is lower than the heating load.
- Hybrid systems were assumed to switch from using a heat pump to a natural gas furnace for heating at pre-set temperatures. These were set at 0 °C for climate zone 4, -5 °C for climate zones 5 and 6, and -13 °C for climate zone 7A. See the table below for details on switchover temperatures and efficiencies.

Assumptions and resulting efficiencies for hybrid scenarios

Climate zone	**CZ 4** (Vancouver)	**CZ 5** (Kelowna)	**CZ 6** (Cranbrook)	**CZ 7A** (Dawson Creek)
Set switchover temperature (°C)	0	-5	-5	-13
How much of the heating is covered by the heat pump	91%	82%	85%	70%
How much of the heating is covered by the natural gas furnace	9%	18%	15%	30%
Average efficiency of hybrid system	314%	278%	264%	250%

More detailed assumptions on equipment specifications, weather data, performance calculations, and other factors are available upon request.

Appendix: detailed results for different household setups

Table 1: Average energy bill savings (installation cost not included) for different heat pumps by climate zone and housing type, compared to natural gas heating and air conditioning

A natural gas furnace + A/C compared to:	Air source heat pump	Cold climate air source heat pump	Ground source heat pump	Hybrid heat pump
Apartments				
Climate zone 4 (Vancouver)	$101.67	$114.31	$119.00	$97.83
Climate zone 5 (Kelowna)	$94.37	$110.86	$143.66	$91.78
Climate zone 6 (Cranbrook)	$95.63	$116.71	$168.33	$101.13
Climate zone 7A (Dawson Creek)	$(36.11)	$48.45	$164.54	$63.54
Single-attached homes				
Climate zone 4 (Vancouver)	$160.08	$188.39	$267.26	$157.46
Climate zone 5 (Kelowna)	$124.61	$161.29	$319.77	$134.22
Climate zone 6 (Cranbrook)	$86.87	$133.54	$351.40	$117.17
Climate zone 7A (Dawson Creek)	$(145.80)	$38.91	$424.90	$92.07
Single-detached homes				
Climate zone 4 (Vancouver)	$228.24	$274.13	$378.08	$225.64
Climate zone 5 (Kelowna)	$138.72	$199.40	$443.91	$164.66
Climate zone 6 (Cranbrook)	$97.42	$175.75	$525.09	$154.53
Climate zone 7A (Dawson Creek)	$(359.80)	$(37.76)	$608.44	$81.22
Weighted average	**$132.56**	**$171.87**	**$268.70**	**$146.41**

Table 2: Average energy bill savings (installation cost not included) for different heat pumps by climate zone and housing type, compared to electric resistance heating and air conditioning

Electric resistance heating + A/C compared to:	Air source heat pump	Cold climate air source heat pump	Ground source heat pump
Apartments			
Climate zone 4 (Vancouver)	$318.42	$331.05	$335.74
Climate zone 5 (Kelowna)	$376.22	$392.70	$425.51
Climate zone 6 (Cranbrook)	$442.58	$463.66	$515.28
Climate zone 7A (Dawson Creek)	$450.40	$534.96	$651.06
Single-attached homes			
Climate zone 4 (Vancouver)	$696.60	$724.91	$803.78
Climate zone 5 (Kelowna)	$822.28	$858.96	$1,017.44
Climate zone 6 (Cranbrook)	$966.57	$1,013.24	$1,231.10
Climate zone 7A (Dawson Creek)	$983.58	$1,168.28	$1,554.27
Single-detached homes			
Climate zone 4 (Vancouver)	$1,198.58	$1,244.48	$1,348.43
Climate zone 5 (Kelowna)	$1,420.49	$1,481.17	$1,725.68
Climate zone 6 (Cranbrook)	$1,675.26	$1,753.58	$2,102.93
Climate zone 7A (Dawson Creek)	$1,705.29	$2,027.33	$2,673.54
Weighted average	**$812.86**	**$852.16**	**$948.99**

Endnotes

1. British Columbia Ministry of Environment. Indicators of Climate Change for British Columbia: 2016 Update. https://www.env.gov.bc.ca/soe/indicators/climate-change/temp.html (2015).
2. Crawford, T. Climate change is making B.C.'s summer heat waves worse: Environment Canada. *The Vancouver Sun* (2024).
3. Quick, M. *The Impacts of Extreme Heat Events on Non-Accidental, Cardiovascular, and Respiratory Mortality: An Analysis of 12 Canadian Cities from 2000 to 2020*. https://www150.statcan.gc.ca/n1/pub/82-003-x/2024006/article/00001-eng.htm (2024).
4. Bartusek, S., Kornhuber, K. & Ting, M. 2021 North American heatwave amplified by climate change-driven nonlinear interactions. *Nature Climate Change* 12, 1143–1150 (2022).
5. Statistics Canada. Surviving the heat: The impacts of the 2021 western heat dome in Canada. https://science.gc.ca/site/science/en/blogs/science-health/surviving-heat-impacts-2021-western-heat-dome-canada (2022).
6. Statistics Canada. A heated discussion: Who uses air conditioning in Canada in 2025? https://www150.statcan.gc.ca/n1/daily-quotidien/250708/dq250708a-eng.htm (2025).
7. Statistics Canada. Primary heating systems and type of energy. https://doi.org/10.25318/3810028601-ENG (2018).
8. Efficiency Canada. Why Canada Should Phase Out Fuel Oil for Space and Water Heating. https://www.efficiencycanada.org/why-canada-should-phase-out-fuel-oil-for-space-and-water-heating/ (2024).
9. FortisBC. Gas rates will change on January 1 for FortisBC customers. https://www.fortisbc.com/about-us/news-events/media-centre-details/2024/12/06/gas-rates-will-change-on-january-1-for-fortisbc-customers (2024).
10. FortisBC. FortisBC gas bills to change for customers July 1. https://www.fortisbc.com/about-us/news-events/media-centre-details/2025/06/18/fortisbc-gas-bills-to-change-for-customers-july-1 (2025).
11. Environment and Climate Change Canada. Canada's Official Greenhouse Gas Inventory: Annex 12 - Provincial and Territorial Greenhouse Gas Emissions Tables by Canadian Economic Sector 1990–2023. (2025).
12. Schrott, J. Safe Temperatures in BC Rental Housing: Municipal and Provincial Policy Pathways. Ecotrust Canada. https://ecotrust.ca/latest/research/safe-temperatures-in-bc-rental-housing-municipal-and-provincial-policy-pathways-2025/ (2025)
13. Schrott, J. Thermal Safety Policy Backgrounder. in *Home Energy Justice Conference* (Ecotrust Canada).
14. Building Decarbonization Alliance. *Thermal Energy Networks in Canada: Unlocking Impact Potential and Advancing Enabling Policy*. https://buildingdecarbonization.ca/wp-content/uploads/2025/09/BDA-Thermal-Energy-Networks-in-Canada.pdf (2025).
15. Natural Resources Canada. Heat pump basics. https://natural-resources.canada.ca/energy-efficiency/electric-heat-pumps/heat-pump-basics#a3 (2023).
16. Better Homes BC. Do heat pumps provide air filtration? https://www.betterhomesbc.ca/products/do-heat-pumps-provide-air-filtration/ (2020).
17. Statistics Canada. Air conditioners. https://doi.org/10.25318/3810001901-ENG (2018).
18. Gard-Murray, A., Haley, B., Miller, S., Poirier, M. *The Cool Way to Heat Homes: Installing Heat Pumps Instead of Central Air Conditioners in Canada.* https://transitionaccelerator.ca/wp-content/uploads/2023/08/The-Cool-Way-to-Heat-Homes.pdf (2023).
19. International Energy Agency. How a heat pump works – The Future of Heat Pumps – Analysis. https://www.iea.org/reports/the-future-of-heat-pumps/how-a-heat-pump-works.
20. Pan, Q. C. *Heat Pump Performance in Part 9 Residential Homes Across Climate Zones.* https://sustain.ubc.ca/sites/default/files/2025-026_Heat%20Pump%20Performance%20in%20Part%209_Pan.pdf.
21. Natural Resources Canada. Comprehensive Energy Use Database: Residential Sector – British Columbia. (2025). https://oee.nrcan.gc.ca/corporate/statistics/neud/dpa/menus/trends/comprehensive/trends_res_bc.cfm

22. Rewiring America. Heat Pump Clothes Dryer Home Electrification. https://homes.rewiringamerica.org/projects/electric-clothes-dryer-homeowner.

23. Government of Canada & Canada Energy Regulator. Provincial and Territorial Energy Profiles – British Columbia. https://www.cer-rec.gc.ca/en/data-analysis/energy-markets/provincial-territorial-energy-profiles/provincial-territorial-energy-profiles-british-columbia.html (2024).

24. Government of Canada & Natural Resources Canada. Residential Sector British Columbia Table 21: Heating System Stock by Building Type and Heating System Type. https://oee.nrcan.gc.ca/corporate/statistics/neud/dpa/showTable.cfm?type=CP&sector=res&juris=bc&year=2022&rn=21&page=0 (2025).

25. BC Gov News. More households saving money with expanded heat-pump program. https://news.gov.bc.ca/releases/2024EMLI0038-001043 (2024).

26. Clean Energy Canada. *Empowering Household*s. https://cleanenergycanada.org/report/empowering-households/ (2025).

27. FortisBC. Residential natural gas rates. https://www.fortisbc.com/accounts-billing/billing-rates/natural-gas-rates/residential-rates.

28. Natural Resources Canada. Oil to Heat Pump Affordability (OHPA) program at a glance. https://natural-resources.canada.ca/energy-efficiency/home-energy-efficiency/canada-greener-homes-initiative/oil-heat-pump-affordability-ohpa-program-glance (2024).

29. Natural Resources Canada. Canada Greener Homes Loan. https://natural-resources.canada.ca/energy-efficiency/home-energy-efficiency/canada-greener-homes-initiative/canada-greener-homes-loan (2022).

30. Statistics Canada. *Estimation of Energy Poverty Rates Using the 2021 Census of Population*. https://www150.statcan.gc.ca/n1/pub/46-28-0001/2024001/article/00001-eng.htm (2024).

31. Takemura, A. F. Boston is piloting window heat pumps in affordable housing. *Canary Media* https://www.canarymedia.com/articles/heat-pumps/boston-gradient-window-heat-pump-public-housing (2025).

32. Better Homes BC. Energy Savings Program. https://www.betterhomesbc.ca/rebates/energy-savings-program/ (2024).

33. Natural Resources Canada. Canada Greener Homes Affordability Program. https://natural-resources.canada.ca/energy-efficiency/home-energy-efficiency/canada-greener-homes-initiative/canada-greener-homes-affordability-program (2024).

34. Peters, J., Marstokk, A. & Riehl, B. *Can Canada's Electricity Systems Handle the Electrification of Buildings?* https://www.naviusresearch.com/wp-content/uploads/2024/04/Impact-of-building-electrification-on-Canadas-electricity-systems.pdf (2024).

35. Clean Energy Canada. *The Rise of the Energy Smart Home*. https://cleanenergycanada.org/report/the-rise-of-the-energy-smart-home/ (2025).

36. FortisBC Energy Inc. *Consolidated Financial Statements for the Years Ended December 31, 2024 and 2023*. https://www.cdn.fortisbc.com/libraries/docs/default-source/about-us-documents/fei-q4-2024-fs-final-sedar.pdf?sfvrsn=f25ac764_1 (2025).

37. Harland, K. *Who Pays for Stranded Costs in Underutilized Gas Distribution Systems?* https://climateinstitute.ca/wp-content/uploads/2025/02/Who-pays-stranded-costs-underutilized-gas-distribution-systems.pdf (2025).

38. Natural Resources Canada. Heat pumps uptake at a glance. https://natural-resources.canada.ca/energy-efficiency/home-energy-efficiency/canada-greener-homes-initiative/heat-pumps-uptake-glance-0 (2024).

39. Efficiency Manitoba. Ground Source Heat Pumps. https://efficiencymb.ca/gshp-home/ (2025).

40. Pembina Institute. Property Assessed Clean Energy Legislation. https://www.pembina.org/pub/property-assessed-clean-energy-legislation.

41. CleanBC. *Highest Efficiency Equipment Standards - Regulatory Consultation*. https://www2.gov.bc.ca/assets/gov/farming-natural-resources-and-industry/electricity-alternative-energy/energy-efficiency/highest_efficiency_equipment_standards_-_consultation.pdf (2023).

42. Government of British Columbia. BC Energy and Zero Carbon Step Codes. http://www2.gov.bc.ca/gov/content/industry/construction-industry/building-codes-standards/bc-codes/2024-bc-codes/step-codes (2025).

43. Quick, M. *The Impacts of Extreme Heat Events on Non-Accidental, Cardiovascular, and Respiratory Mortality: An Analysis of 12 Canadian Cities from 2000 to 2020*. https://www150.statcan.gc.ca/n1/en/pub/82-003-x/2024006/article/00001-eng.pdf?st=qZX-xm2Y (2024).

44. Chief Coroner of British Columbia. *Extreme Heat and Human Mortality: A Review of Heat-Related Deaths in B.C. in Summer 2021*. https://www2.gov.bc.ca/assets/gov/birth-adoption-death-marriage-and-divorce/deaths/coroners-service/death-review-panel/extreme_heat_death_review_panel_report.pdf (2022).

45. Meade, R. D. *et al.* Effects of daylong exposure to indoor overheating on thermal and cardiovascular strain in older adults: A randomized crossover trial. *Environmental Health Perspectives* 132, 27003 (2024).

46. Lindemann, U. *et al.* Effect of indoor temperature on physical performance in older adults during days with normal temperature and heat waves. *International Journal of Environmental Resilience and Public Health* 14, (2017).

47. Uejio, C. K. *et al.* Summer indoor heat exposure and respiratory and cardiovascular distress calls in New York City, NY, U.S. *Indoor Air* 26, 594–604 (2016).

48. Natural Resources Canada. Residential Sector - British Columbia. Table 5: Space Heating Secondary Energy Use and GHG Emissions by Energy Source. (2025).

49. Clean Energy Canada. *Modernizing energy sector planning and oversight for a net-zero world.* https://cleanenergycanada.org/report/modernizing-energy-sector-planning-and-oversight-for-a-net-zero-world/ (2024).

50. ESMIA and Dunsky Energy + Climate Advisors. *Cost Effective Energy Pathways Study for Ontario*. https://www.ontario.ca/files/2025-06/mem-cost-effective-energy-pathways-study-for-ontario-en-2025-06-10.pdf (2024).

51. Building to Electrification Coalition. *Home Electrification: Service Upgrade Not Required!* https://b2electrification.org/home-electrification-service-upgrade-not-required (2023).

52. Building Decarbonization Alliance. *Modern Tech, Modern Practices: Upgrading Heat Pump Sizing Guidelines in Canada*. https://buildingdecarbonization.ca/report/modern-tech-modern-practices/ (2025).

53. Stephanie Meyer, Chris Walsh, George Gritziotis, Martin Luymes. *Bridging the Skills Gap for Heat Pump Proficiency*. https://www.hrai.ca/skills-for-heat-pump-proficiency.aspx (2025).

54. Heating Refrigeration and Air Conditioning Institute of Canada. HRAI Post HVAC Trades Training Courses. https://www.hrai.ca/hrai-training-courses.

55. Natural Resources Canada. Canadian Weather Year for Energy Calculations database. https://collaboration.cmc.ec.gc.ca/cmc/climate/Engineer_Climate/CWEC_FMCCE/CWEC_FMCCE_v_2020/

56. Statistics Canada. Census Profile. 2021 Census of Population. Statistics Canada Catalogue number 98-316-X2021001. (2023).

57. BC Hydro. Residential rates. https://www.bchydro.com/accounts-billing/rates-energy-use/electricity-rates/residential-rates.html.

58. Nawaz, K. & Fricke, B. A Critical Literature Review of Defrost Technologies for Heat Pumps and Refrigeration Systems. in *International Refrigeration and Air Conditioning Conference* (2021).

CLEAN ENERGY CANADA

Clean Energy Canada
Morris J. Wosk Centre for Dialogue
Simon Fraser University | Harbour Centre
3311-515 West Hastings Street
Vancouver, B.C., V6B 5K3

SFU MORRIS J. WOSK CENTRE FOR DIALOGUE