



Heating and Cooling

**Heat Pumps**  
**Your Most Energy Efficient**  
**Heating & Cooling Appliance**

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*Business Development – Strategic Accounts*

# What is a Heat Pump?

Most homes have an air conditioner to cool in summer and a furnace to heat in winter.

A Heat Pump is an alternative highly energy-efficient system to cool or heat your home with ONE appliance, which provides year-round consistent indoor comfort.

In cooling mode (summer), it acts as an air-conditioner. In heating mode (winter), it extracts heat from outside air to heat your home.

And it is very energy efficient.

The Heat Pump does not use fossil fuel [*natural gas or oil*] to produce heat [*like a furnace does*]. It only uses some electricity to power a compressor that moves heat energy from one place to another.



# What is a Heat Pump?

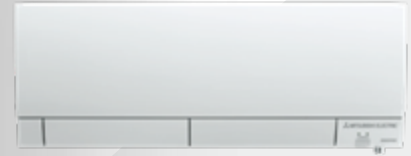
A typical heat pump system consists of:

- An outdoor condenser unit and
- An indoor air handler

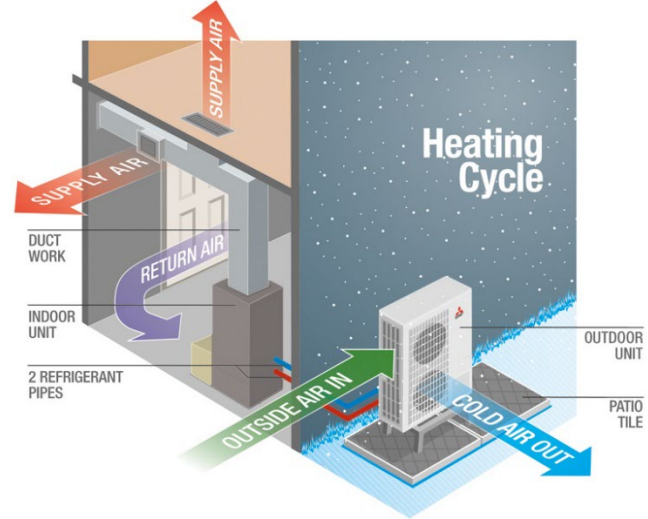
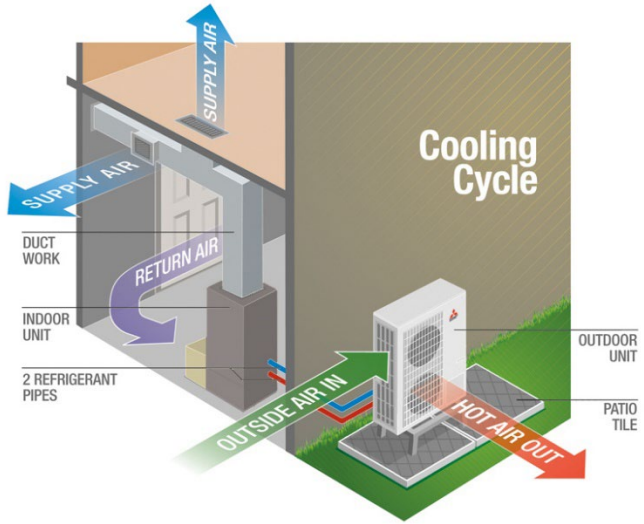
Heat pumps have the ability to extract heat from the cooler outdoor air (*using properties of the refrigerant*) and transfers that heat into the home.

This heat transfer technology costs much less to operate than conventional electric heat and this translates to ongoing savings over the life of the heat pump system.

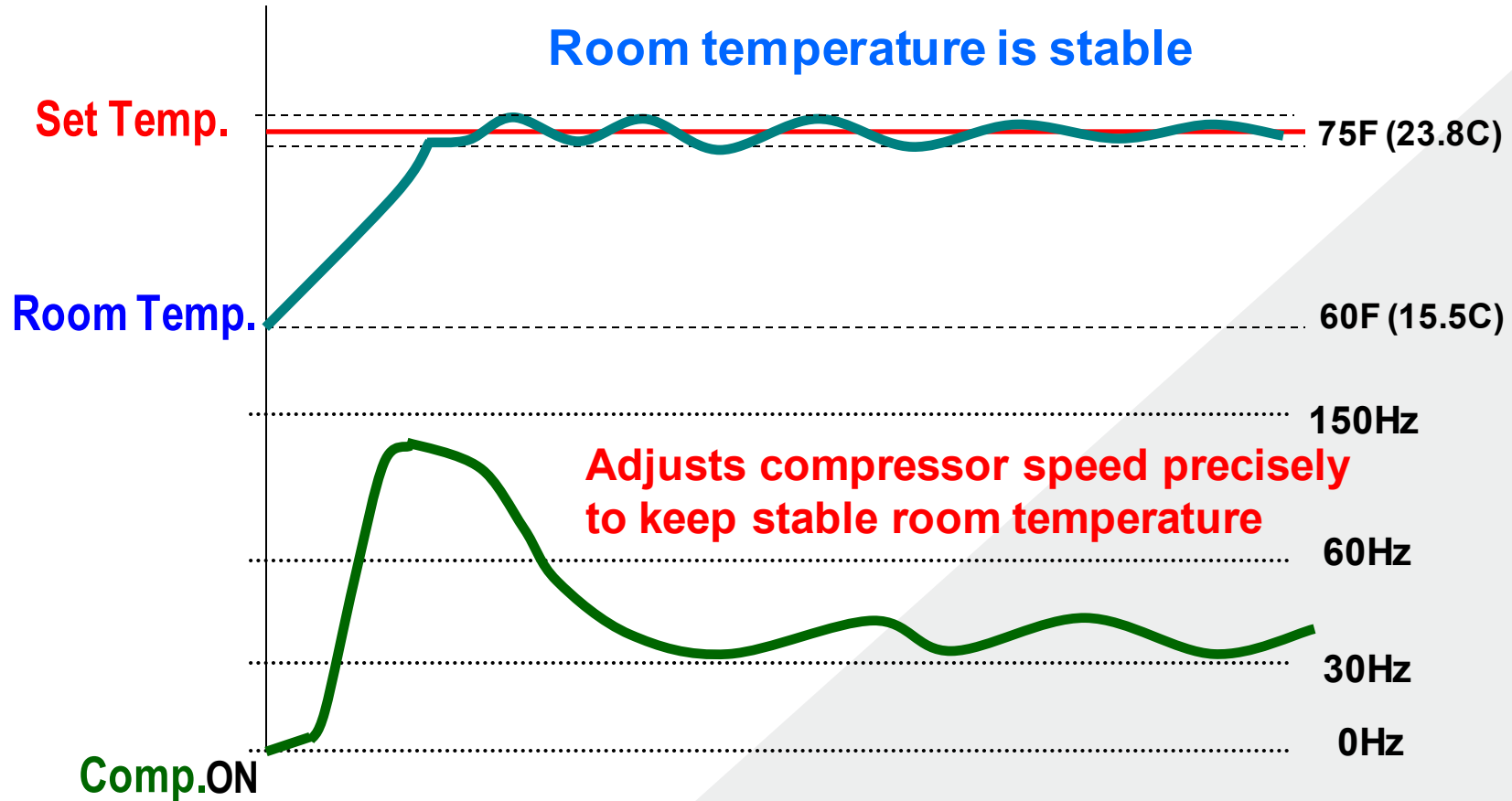
In the summer the system reverses the cycle to operate as an air-conditioner.



# What is a Heat Pump?



# Operational Efficiency of Heat Pumps

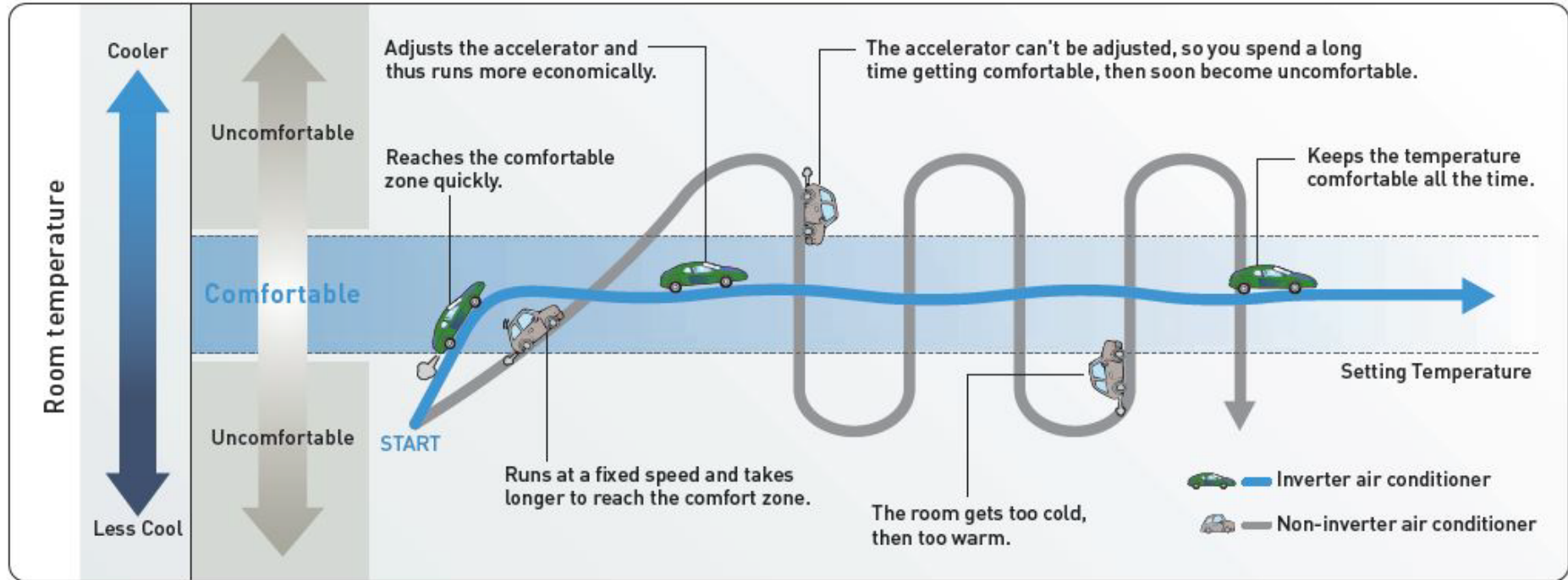


# Operational Efficiency of Heat Pumps

## ■ The Advantages of Inverter Control

Comparing inverter and non-inverter air conditioners to cars...

\*Image of output power fluctuation



# Different Types Of Heat Pumps



**Single Zone:** Ideal for small homes or for heating/cooling one room.



**Multi Zone:** Provides heating/cooling to up to 8 zones and is ideal for homes with no ducts



**Central:** Ideal for homes with new or existing ductwork and furnace.

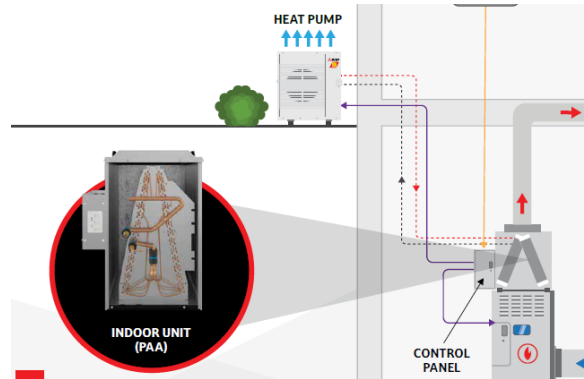
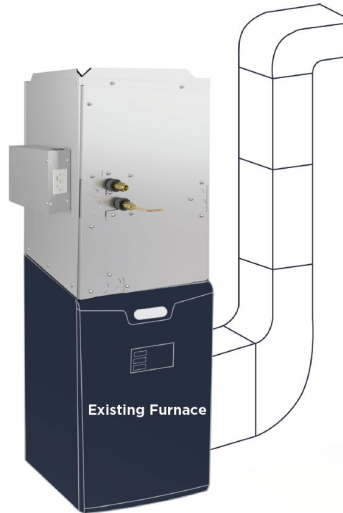
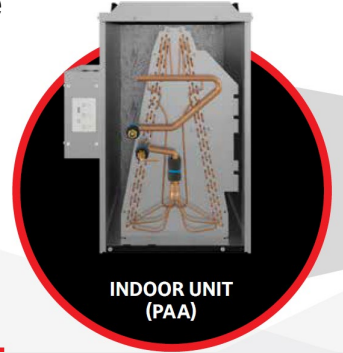
# Different Types Of Heat Pumps

**Hybrid:** For ducted homes where the existing natural gas / propane furnace is left in place and can be used as a supplemental or backup heating source.



A heat pump replaces the air conditioner on the outside along with an A-Coil installed inside.

A control box switches on the furnace only if required and allows for Hybrid Heating and Cooling.



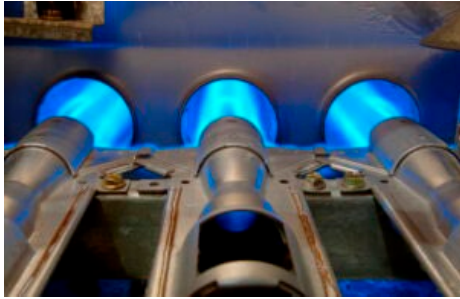


# Benefits of Heat Pumps

<b>Furnaces</b>	<b>Heat Pumps</b>
<b>Heats ONLY</b> - Provides heating only.	<b>Heats and Cools</b> - Provides both heating and cooling.
<b>Lower Efficiency</b> - Energy Efficiency Rate only up to 99%.	<b>Higher Efficiency</b> - Energy Efficiency Rate up to 425% which translates to ongoing savings over life of the system.
<b>Burns Fuels</b> - Creates heat by burning fossil fuels like gas & propane.	<b>Transfers Heat</b> - In heating mode, the heat pump extracts heat from outside & moves it inside. In cooling mode, the reverse occurs.
<b>Increases GHG (Greenhouse Gas Emissions)</b> - Furnaces running on fossil fuels like gas and propane produce carbon emissions which harm the environment.	<b>Produces NO GHG (Greenhouse Gas Emissions)</b> - Runs on electricity instead of fossil fuels, producing zero carbon emissions.
<b>Inconsistent Heat</b> - Only cycles between ON & OFF.	<b>Consistent Temperature &amp; Comfort</b> - Adjusts incrementally to match heating (or cooling) needs and ensures optimum comfort for the occupants of the unit.

# Comparing Efficiency (COP)

The **Coefficient Of Performance (COP)** is a performance rating that tells us how effective the heat pump or air conditioner is at transferring heat versus the amount of electrical power consumed. Higher the COP the more efficient it is at transferring heat and greater the savings.



**Natural Gas furnace**  
up to 98% Annual Fuel  
Utilization Efficiency  
(AFUE)  
*COP : up to 0.98*



**Propane furnace**  
up to 98% Annual Fuel  
Utilization Efficiency  
(AFUE)  
*COP: up to 0.98*

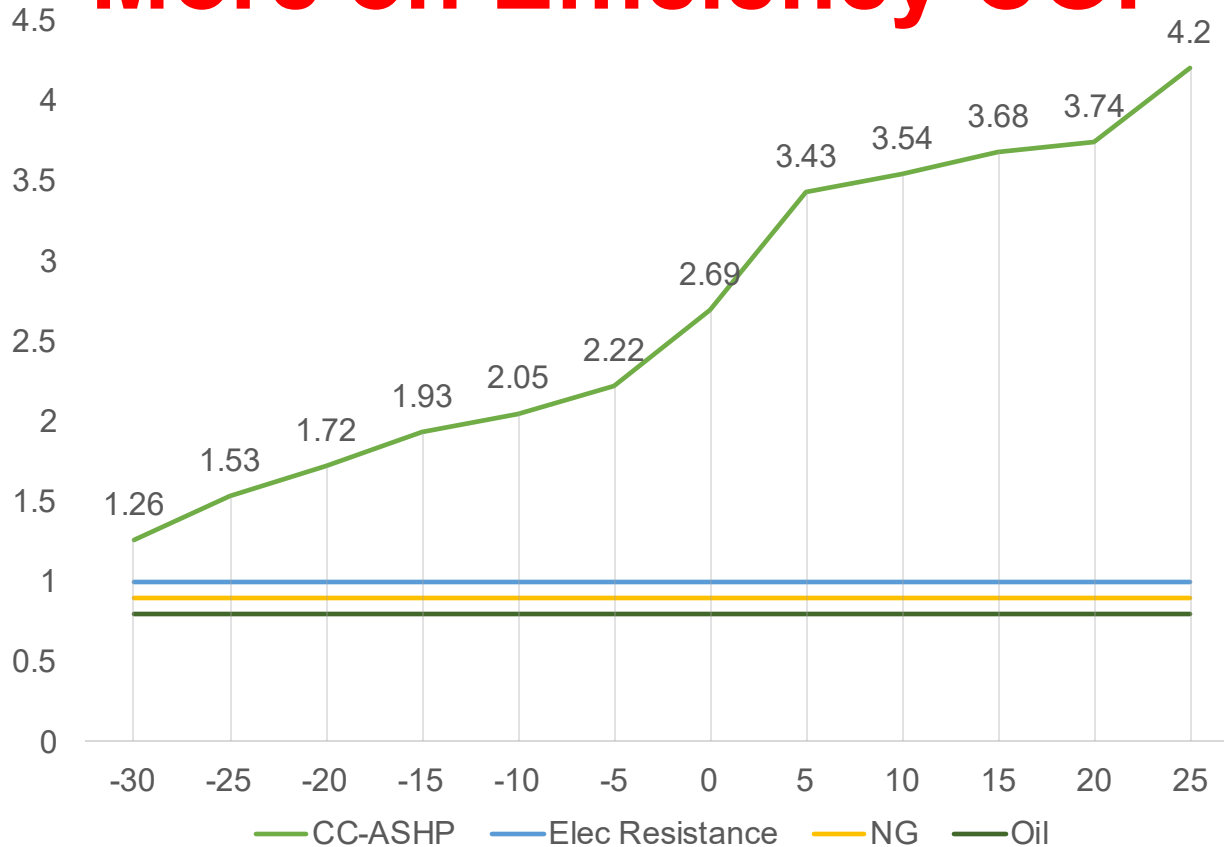


**Electric Baseboard**  
up to 100% efficiency  
*COP: up to 1*



**Heat Pump**  
200% – 425% efficiency  
*COP: 2.00 to 4.25*

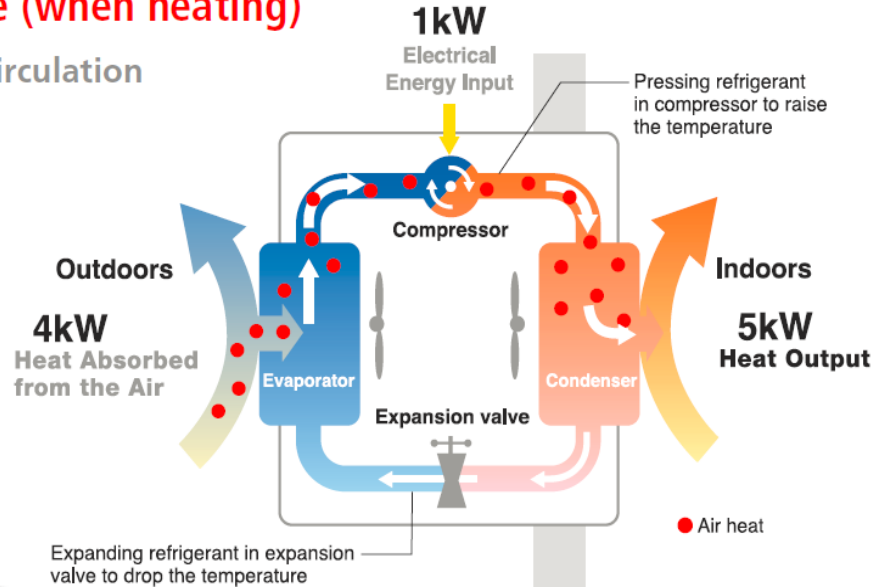
# More on Efficiency COP



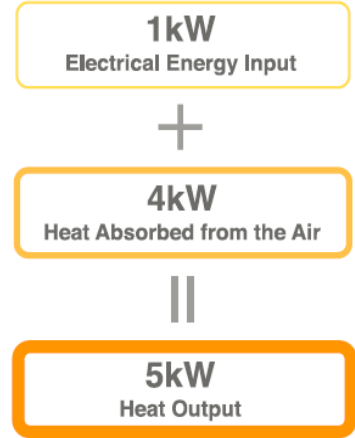
# How is it so Efficient?

## Heat pump principle (when heating)

Refrigerant and Heat Circulation



Output energy is a quintuple of input energy



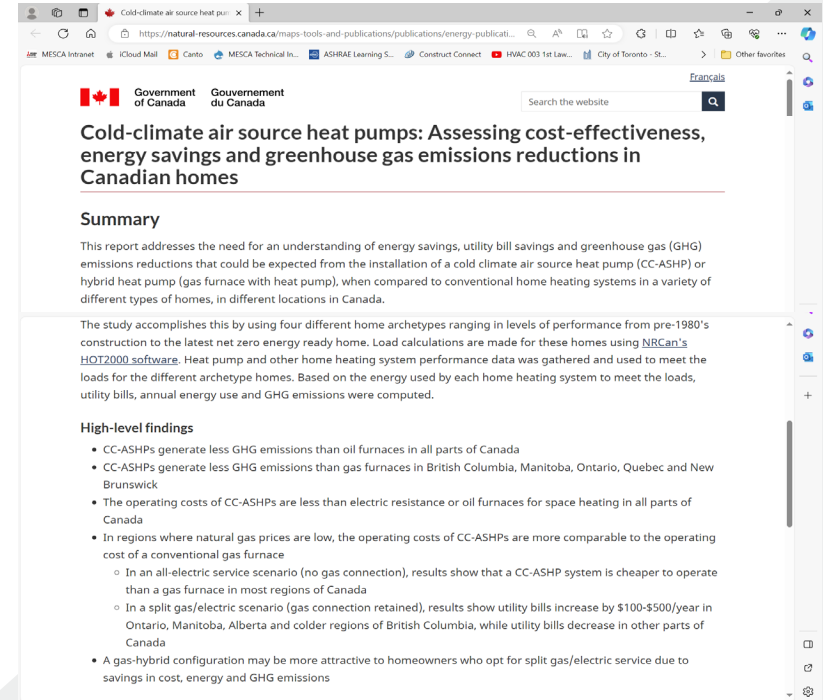
COP= Coefficiency of Performance

# Cost-effectiveness of heat pumps

Costs of the heat pump device by itself can range anywhere from \$ 3,000 to about \$ 19,000, depending on model and capacity.

Typical total cost of a complete system depends on physical attributes of the home or building and related installation costs.

Most important are the ongoing savings on utility bills which in some situations can be over 50%\*.



The screenshot shows a web browser window displaying a report from the Government of Canada. The report title is "Cold-climate air source heat pumps: Assessing cost-effectiveness, energy savings and greenhouse gas emissions reductions in Canadian homes". The page includes a summary, a study description, and high-level findings.

**Summary**

This report addresses the need for an understanding of energy savings, utility bill savings and greenhouse gas (GHG) emissions reductions that could be expected from the installation of a cold climate air source heat pump (CC-ASHP) or hybrid heat pump (gas furnace with heat pump), when compared to conventional home heating systems in a variety of different types of homes, in different locations in Canada.

The study accomplishes this by using four different home archetypes ranging in levels of performance from pre-1980's construction to the latest net zero energy ready home. Load calculations are made for these homes using [NRCCan's HOT2000 software](#). Heat pump and other home heating system performance data was gathered and used to meet the loads for the different archetype homes. Based on the energy used by each home heating system to meet the loads, utility bills, annual energy use and GHG emissions were computed.

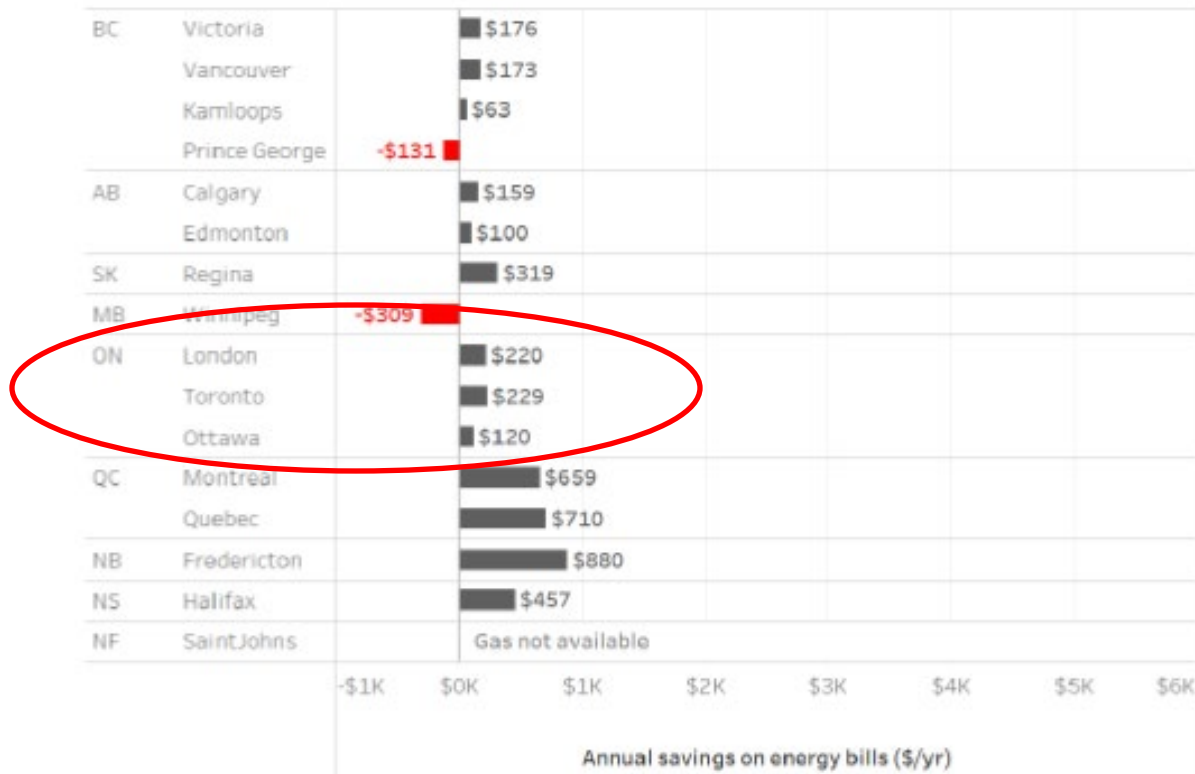
**High-level findings**

- CC-ASHPs generate less GHG emissions than oil furnaces in all parts of Canada
- CC-ASHPs generate less GHG emissions than gas furnaces in British Columbia, Manitoba, Ontario, Quebec and New Brunswick
- The operating costs of CC-ASHPs are less than electric resistance or oil furnaces for space heating in all parts of Canada
- In regions where natural gas prices are low, the operating costs of CC-ASHPs are more comparable to the operating cost of a conventional gas furnace
  - In an all-electric service scenario (no gas connection), results show that a CC-ASHP system is cheaper to operate than a gas furnace in most regions of Canada
  - In a split gas/electric scenario (gas connection retained), results show utility bills increase by \$100-\$500/year in Ontario, Manitoba, Alberta and colder regions of British Columbia, while utility bills decrease in other parts of Canada
- A gas-hybrid configuration may be more attractive to homeowners who opt for split gas/electric service due to savings in cost, energy and GHG emissions

[\\*Cold-climate air source heat pumps: Assessing cost-effectiveness, energy savings and greenhouse gas emissions reductions in Canadian homes \(canada.ca\)](https://natural-resources.canada.ca/maps-tools-and-publications/publications/energy-publications/cold-climate-air-source-heat-pumps-assessing-cost-effectiveness-energy-savings-and-greenhouse-gas-emissions-reductions-in-canadian-homes)

# Operational Costs of Heat Pumps

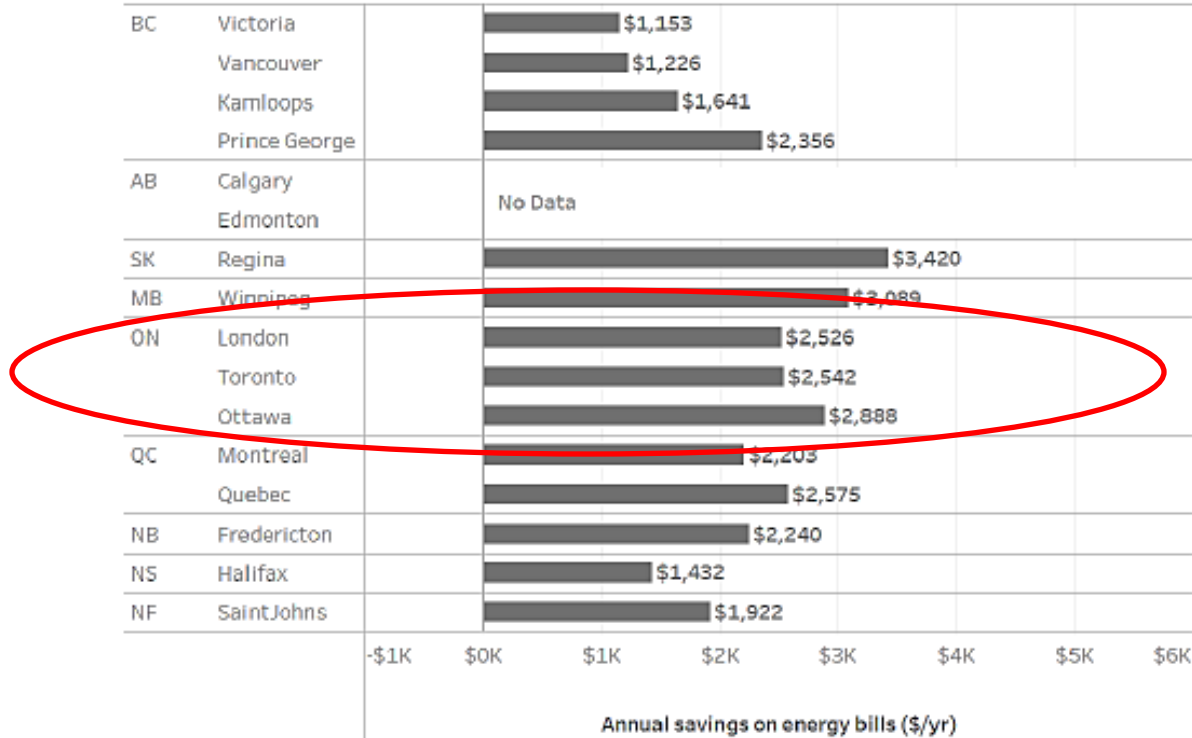
Estimated Annual Savings on energy bills by province for Archetype B CC-ASHP v/s gas furnace with 2020 energy pricing.



For the all-electric service scenario, the analysis assumed that new homes constructed with a CC-ASHP would not also be connected to the gas distribution grid, and that **home owners replacing gas furnaces with heat pumps** would suspend gas service to their property. In this scenario, homeowners can forgo monthly fixed charges associated with natural gas service, amounting to \$150-300/year in savings.

# Operational Costs of Heat Pumps

Estimated annual savings on energy bills by province for Archetype B, **CC-ASHP v/s oil furnace** with 2020 energy pricing.



# Key Considerations

Your Heat Pump is a long-term investment you are making for the future.

For best performance and peace of mind, some key considerations include:

## ❖ Choosing the right contractor:

- For quality work, make sure that your contractor is **licensed, bonded and insured** to ensure that they meet professional standards & legal requirements.
- Check **references and reviews** to gauge their reputation.
- Look for a contractor with **specific experience in heat pump installation** and who is knowledgeable for both design & installation. Ask about familiarity with different types of heat pumps – **air source, cold climate, etc.**
- Confirm that the contractor is **trained by the manufacturer** to ensure that your system is optimally installed and as recommended by the manufacturer.
- A good contractor will guide you through the decision-making process and help you make informed choices. They should provide **high-quality installation** to ensure optimal system performance
- A thorough contractor will analyze the home to **determine the best heat pump solution**. They will consider factors such as insulation, ductwork and your specific heating needs.
- Inquire about manufacturer's **warranty and on-going maintenance services** to keep your system running efficiently.
- **ASK QUESTIONS**



# Key Considerations

Your Heat Pump is a long-term investment you are making for the future.

For best performance and peace of mind, some key considerations include:

## ❖ **Choosing the right manufacturer:**

- Check the **reputation** of the manufacturer and reviews.
- Make sure that the manufacturer has a **wide range of product** to choose from to meet your specific requirements.
- Confirm that the manufacturer is well **established** and **easily reachable**.
- Confirm that the manufacturer has a **local inventory of product and spare parts** backed by **local factory-trained technical support**, should you need any assistance in the future.
- Confirm that the manufacturer conducts **regular training for contractors** to ensure quality of installation and ongoing service and that your contractor is trained by the manufacturer for the specific heat pump you will be installing.
- Inquire about the **manufacturer's warranty**.

# Application Samples

## Boivin House



### Solution:

3-ton Mitsubishi Electric Zuba Central cold climate system with centrally ducted vertical air-handling unit.

### Outdoor Unit:

1 x PUZ-HA36NHA

### Indoor Unit:

1 X PVA-A36AA7

### Results:

Significant energy savings: over \$4,000 per year and continuous comfort: warmth during winter & cooling in summer

## Victoria House



### Solution:

Mitsubishi Electric Zuba Multi

### Outdoor Unit:

1 x MXZ-4C36NAHZ-U1

### Indoor Units:

2 X PEAD-A18AA7

### Results:

Achieved net-zero emissions  
Quiet & comfortable living environment  
Energy Cost Savings

# Application Samples

## Harbord Village



### **Solution:**

3-ton Mitsubishi Electric  
Zuba Central cold climate  
ASHP system with  
centrally ducted  
air-handling unit.

### **Outdoor Unit:**

1 x PUZ-HA36NHA4

### **Indoor Unit:**

1 X PVA-A36AA4

### **Other:**

EH15-MPAS-LB Backup  
electric resistance coil.

### **Results:**

Continuous comfort:  
constant warmth during  
winter & cooling in  
summer, very quiet and  
lower running costs.

*Many such examples  
can be shared upon  
request*



## Summary

Heat Pumps can contribute tremendously towards improving heating & cooling comfort while saving money over the life of the system and contributing towards greenhouse gas emissions reduction.

Mitsubishi Electric offers a wide range of Residential and Commercial Heating, Ventilation and Air Conditioning (HVAC) Systems that can be selected and optimized to meet the specific goals of your HVAC upgrade project.

Mitsubishi Electric HVAC solutions are available across Canada through an established and trained distribution and dealer network, backed by locally available product and spare parts inventory and factory-trained technical support specialists, to ensure peace of mind throughout the life of your HVAC system.

Contact us or our local trained distributor or dealer(s) for assistance with your HVAC requirements





# Thank You

For more information contact us:

- Main Line: (905) 475-7728
- Web-site: [www.mitsubishielectric.ca](http://www.mitsubishielectric.ca)