Welcome to today's CHBA Net Zero Webinar!

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icon in the top right corner, and by dragging the slider between sections to make the slideshow and webcams smaller/larger.

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The ultimate in comfort and efficiency

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Save the Date for Upcoming Webinars

Jun 16 from 1:30-2:30 ET	**presented by Panasonic Canada**
Jul 14 from 1:30-2:30 ET	**presented by Aerobarrier Canada**
Sep 15 from 1:30-2:30 ET	**presented by Enbridge Gas Distribution**
Nov 17 from 1:30-2:30 ET	**presented by Fortis BC**
Dec 15 from 1:30-2:30 ET	**presented by Reliance Home Comfort**

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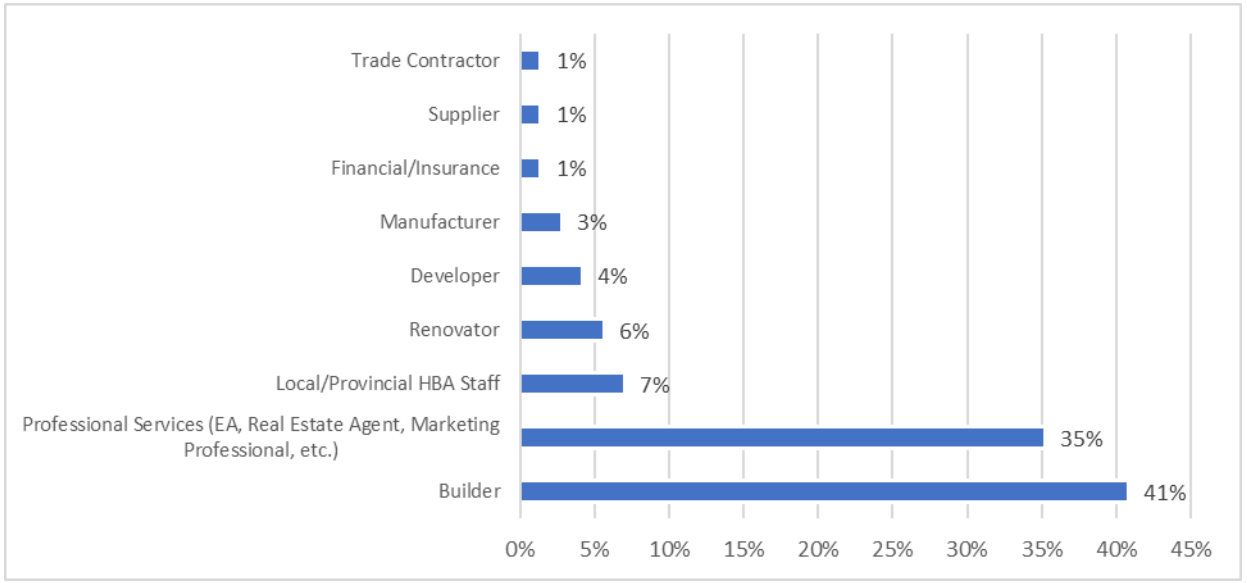
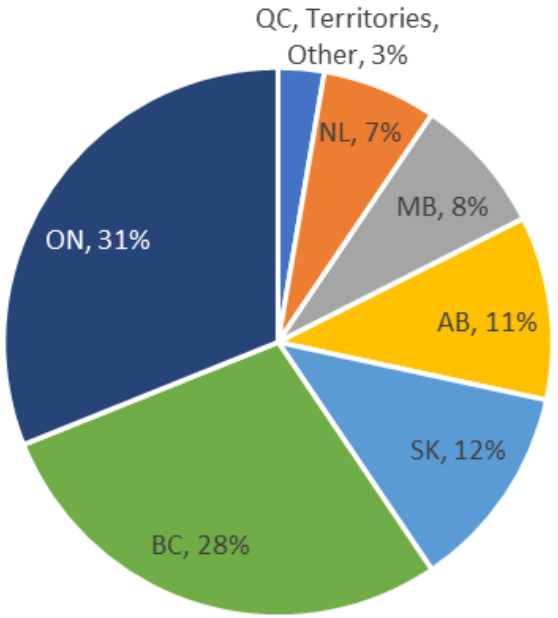
POLLS





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Today's Webinar

April 7, 2022, from 10:30-11:30 PT / 1:30-2:30 ET

Heat Pumps: A More Efficient and Healthier Solution

Presented by Steven Cornelius
Residential Products Business Development Manager, Mitsubishi Electric Sales Canada Inc.

Home construction techniques have seen some impressive advancements in recent years to the building envelope as we strive for greater energy efficiency. Yet most builders haven't made big changes to the mechanical systems they're installing. Point in case: the most used thermal appliance has a co-efficiency of performance of less than 1.

This webinar will explore the energy efficiency gains that heat pumps provide (3-5 times more efficient than conventional systems), as well as the air quality (no risk of carbon monoxide) and comfort (discharge air temperature is variable) benefits for the occupants. Webinar participants will also learn about pairing a hydronic coil and a heat pump air handler run off the water heater, which allows a dwelling to reduce the amount of fossil fuel appliances and thus the carbon footprint.

Members will be able to access the recording & slide deck at chba.ca/NZwebinars

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MITSUBISHI ELECTRIC
Heating and Cooling

Heat Pumps
Your Most Energy Efficient Heating & Cooling Appliance

Presented by Steven Cornelius

Table of Contents

Mitsubishi Electric Heating and Cooling Canada

Vision

To be the most trusted industry leader in providing innovative heating, cooling and ventilation technology engineered specifically for Canadian climates.

Mission

To deliver quality comfort and value to all Canadians through leading-edge engineering, locally inspired design, and a dedication to superior service.

MESCA HVAC Division

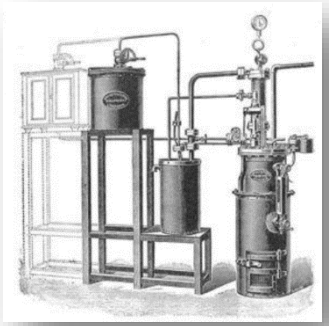
Who we are:

- Canadian subsidiary established in 1979
- Highly involved in sustainability initiatives
- Members of:

  CHBA Net Zero Council, CaGBC, Active House Canada, Passive Buildings Canada,

  EnerQuality NET Zero Technology Advancement Program

History of Heat Pumps



History of Heat Pumps

- Artificial refrigeration was first demonstrated in 1748
- In 1857 Peter von Rittinger built the first heat pump system
- In 1940 Robert C Webber developed the first ground source heat pump by modifying his freezer
- The world's first mini split was introduced in 1968

History of Heat Pumps

History of Heat Pumps

- Mitsubishi Electric introduced the world's first mini split in 1968
- Mitsubishi introduced the first inverter model in 1985
- Mitsubishi introduced Ductless models to the Canadian market in 1987
- CC-ASHP started to appear in Canada in 2012
- In 2022 Mitsubishi has brought to market products that provide 100% capacity at -20C

Energy Efficiency

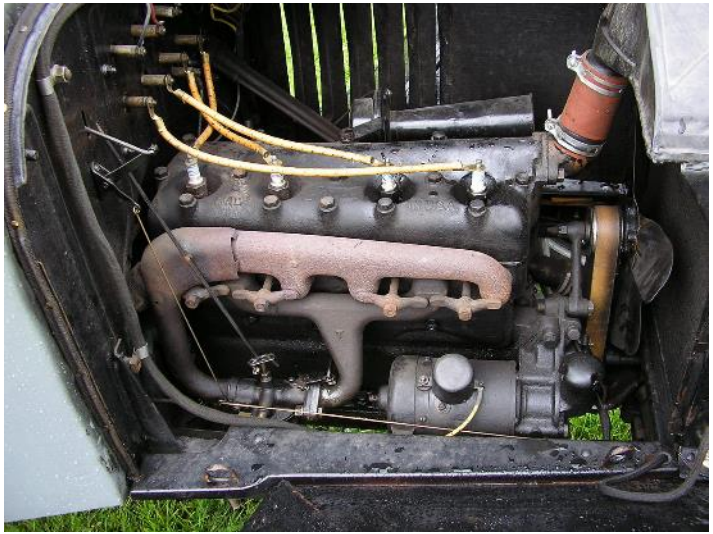
In the most simplest definition; energy efficiency means to use less energy to get a the same task done.

Efficient Use of Energy

5% efficient

80 -90% efficient

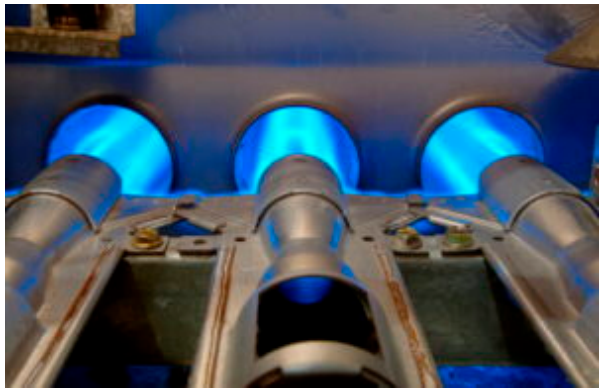
Efficient Use of Energy



15 - 20%

20 – 30%

Efficient Use of Energy



NG furnace is 98% AFUE

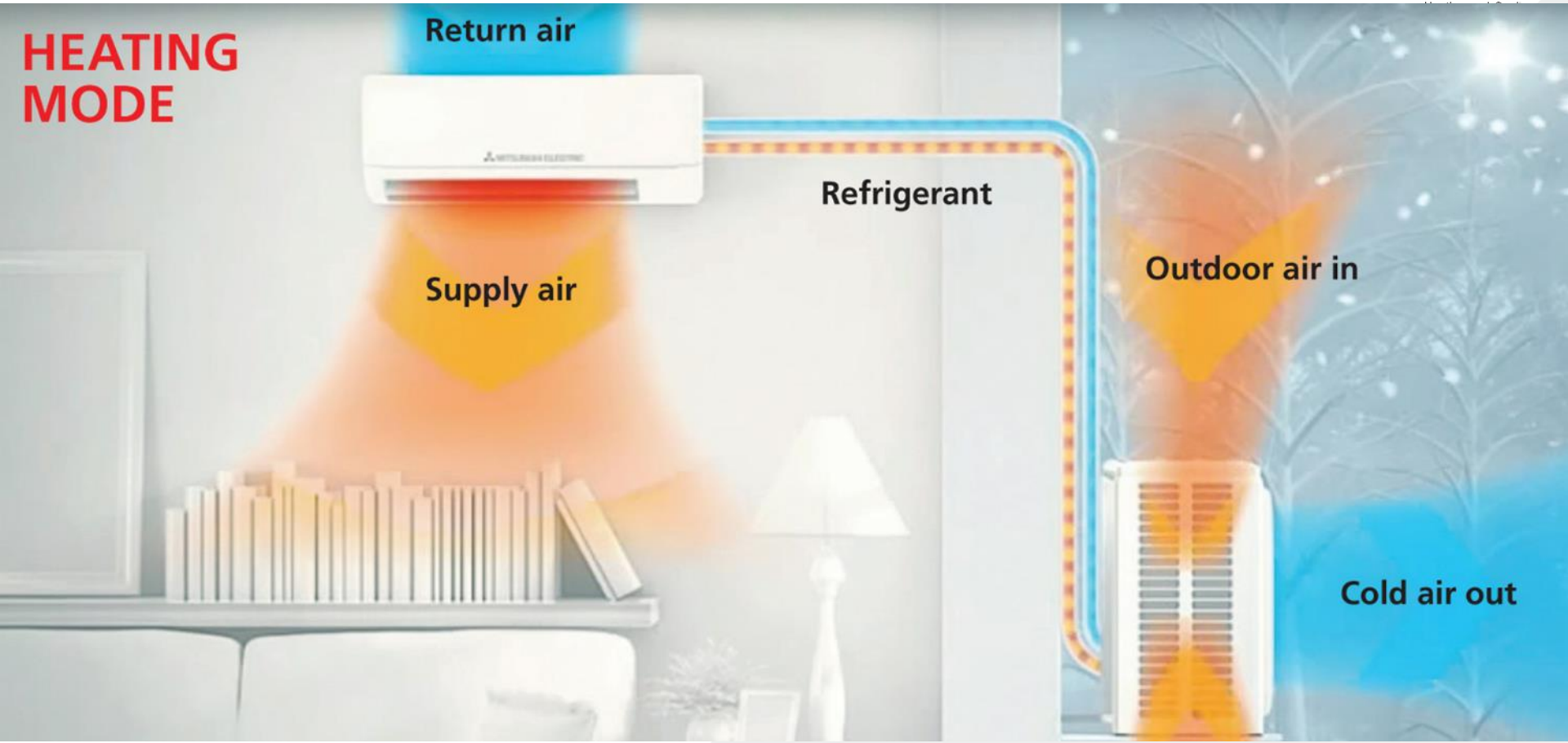
Propane furnace up to 98% AFUE

Efficient Use of Energy

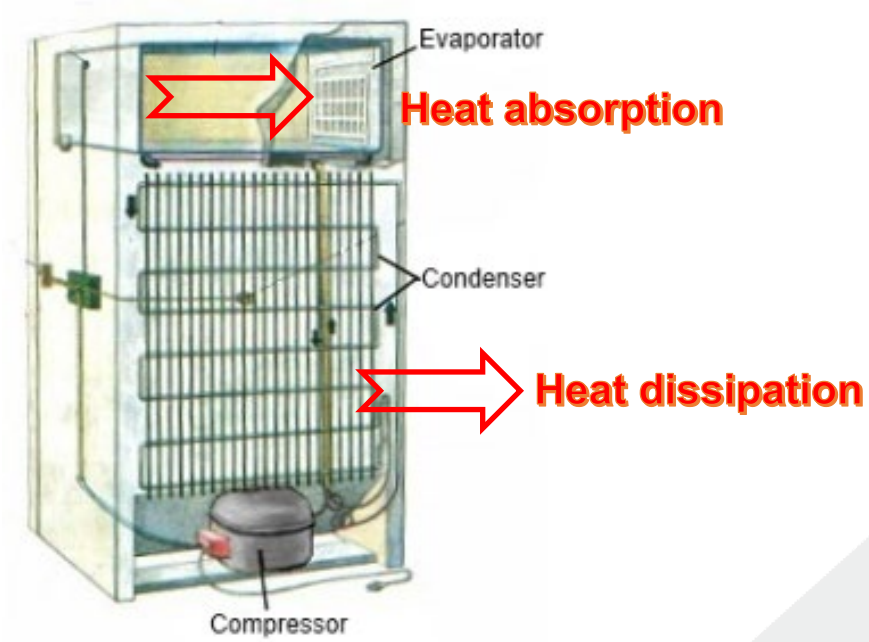
300 – 500% efficient!

MITSUBISHI ELECTRIC
Heating and Cooling

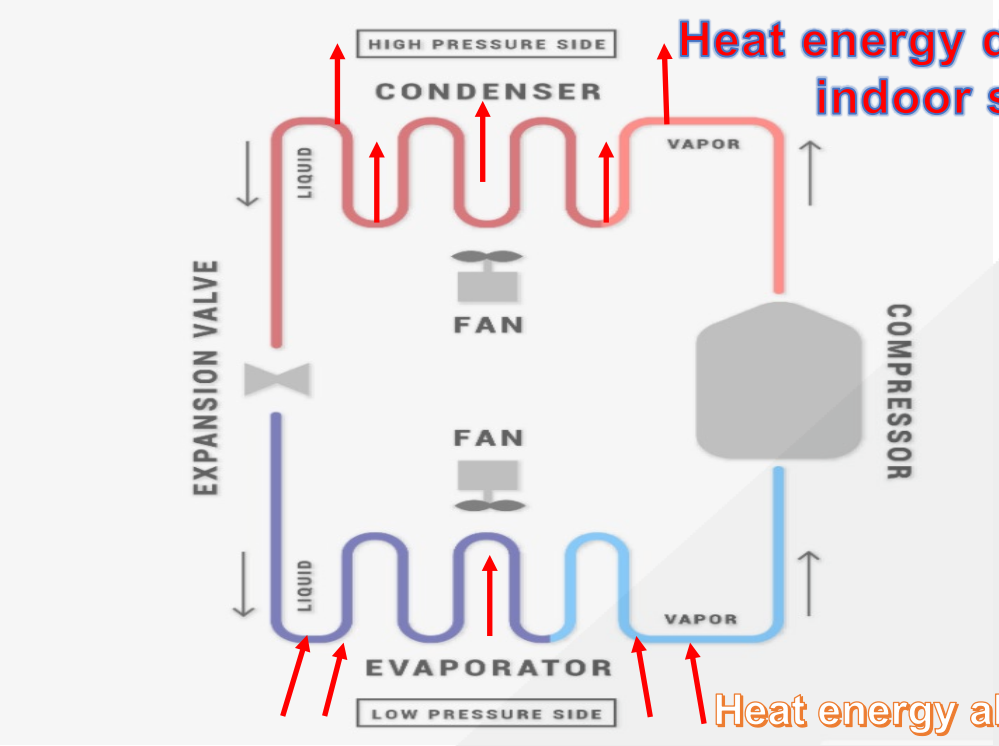
What is a heat pump?


HEATING MODE
Return air
Refrigerant
Supply air
Outdoor air in
Cold air out

How its done?


Evaporator
Heat absorption
Condenser
Heat dissipation
Compressor

Refrigeration Cycle

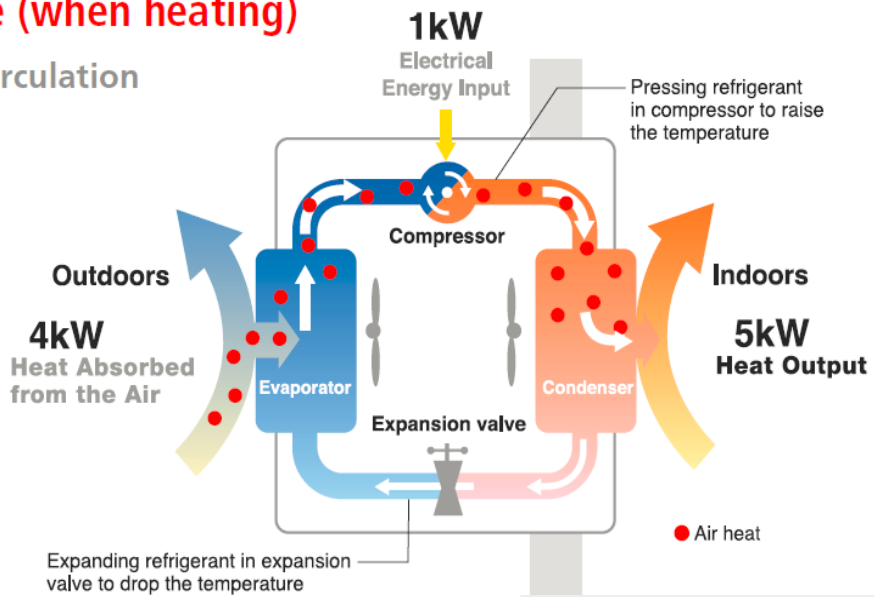



HEAT PUMP

How is it so Efficient?

Heat pump principle (when heating)

Refrigerant and Heat Circulation



Output energy is a quintuple of input energy

1kW
Electrical Energy Input

+

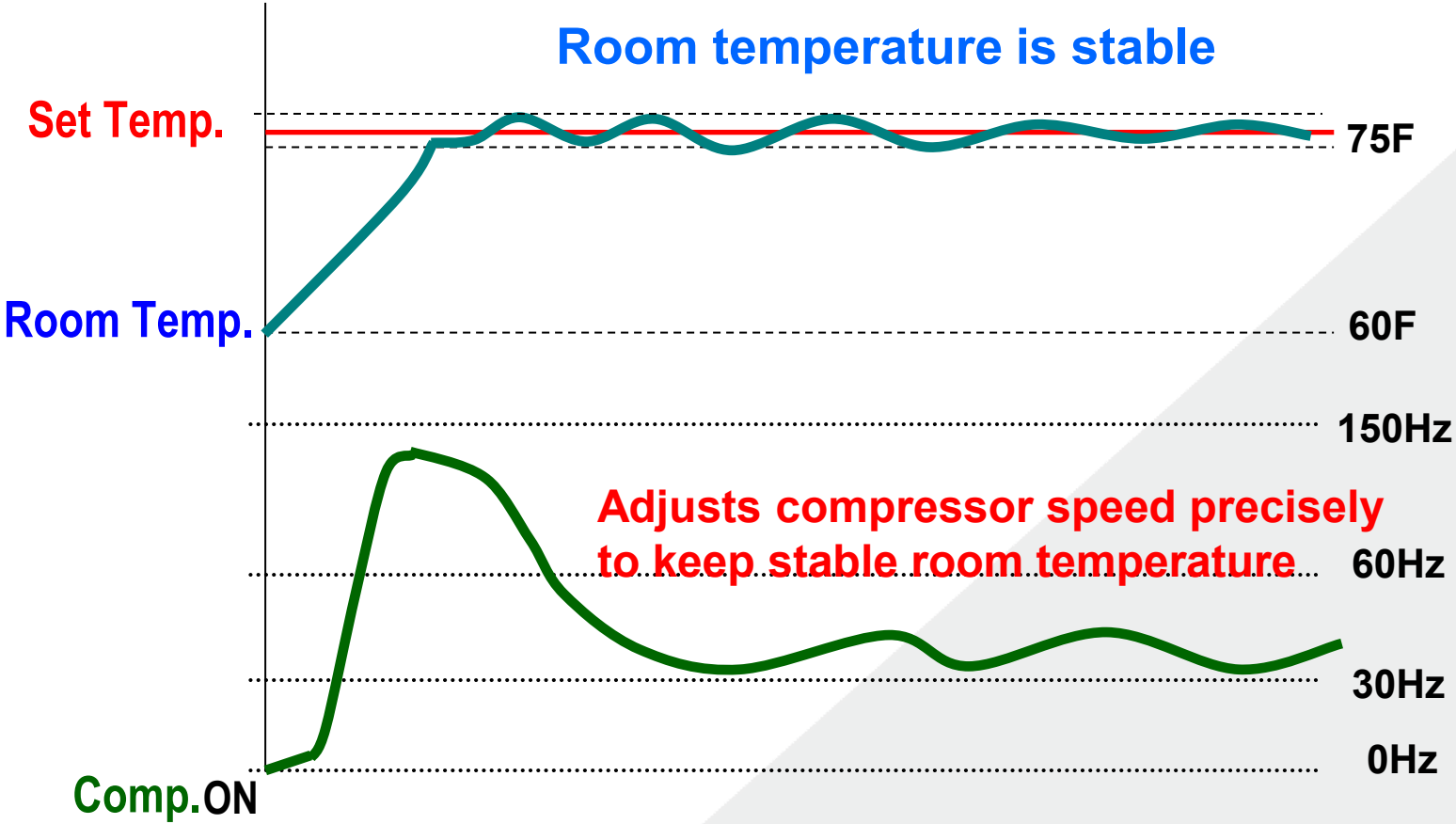
4kW
Heat Absorbed from the Air

=

5kW
Heat Output

COP= Coefficiency of Performance

Operational Efficiency of Heat Pumps

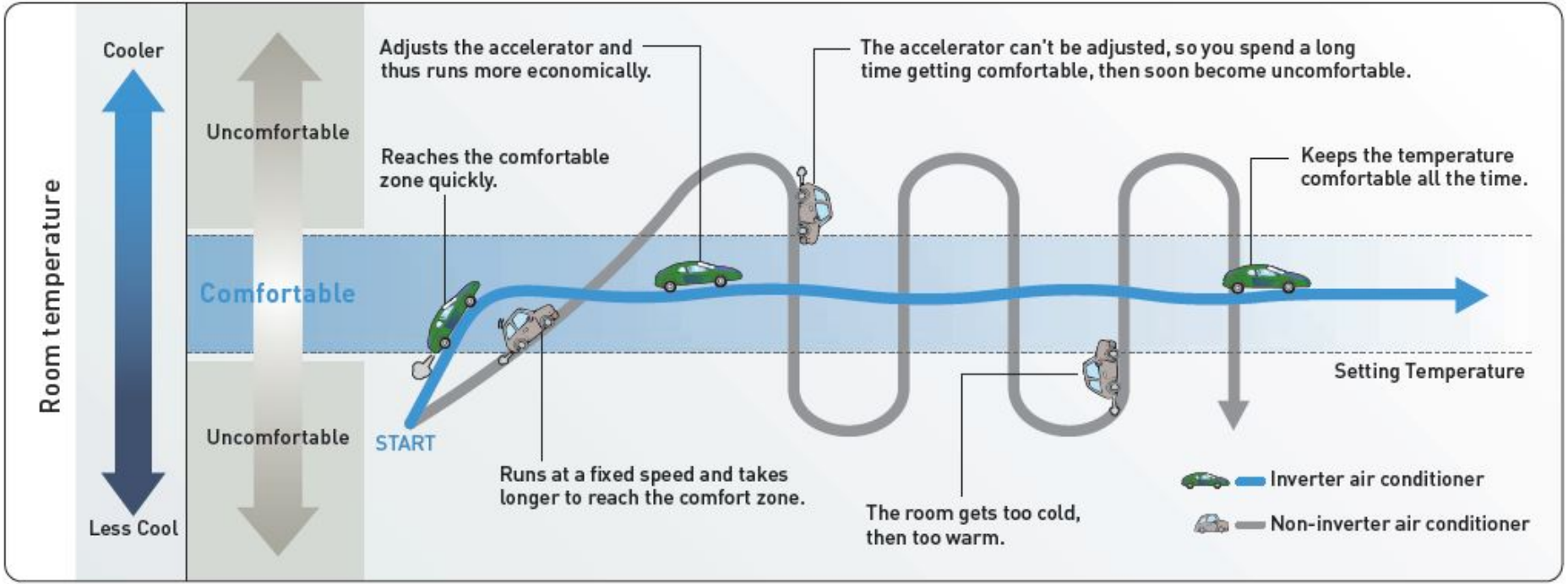


Operational Efficiency of Heat Pumps

The Advantages of Inverter Control

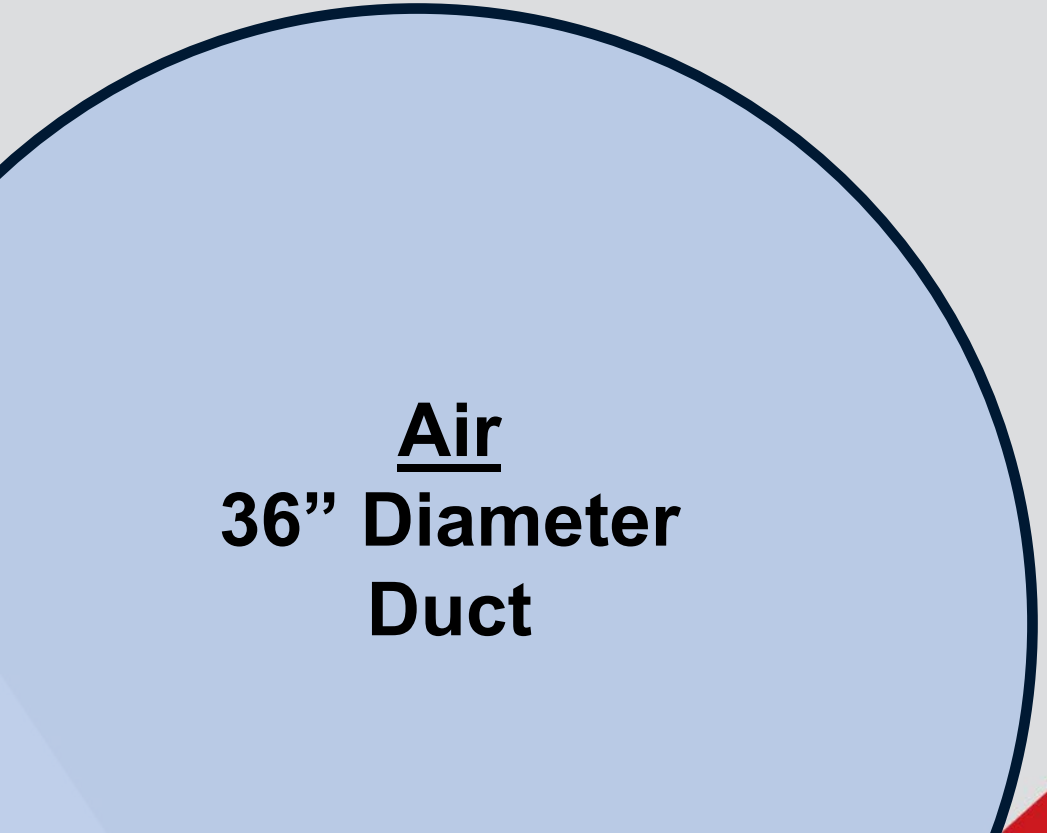
Comparing inverter and non-inverter air conditioners to cars...

*Image of output power fluctuation



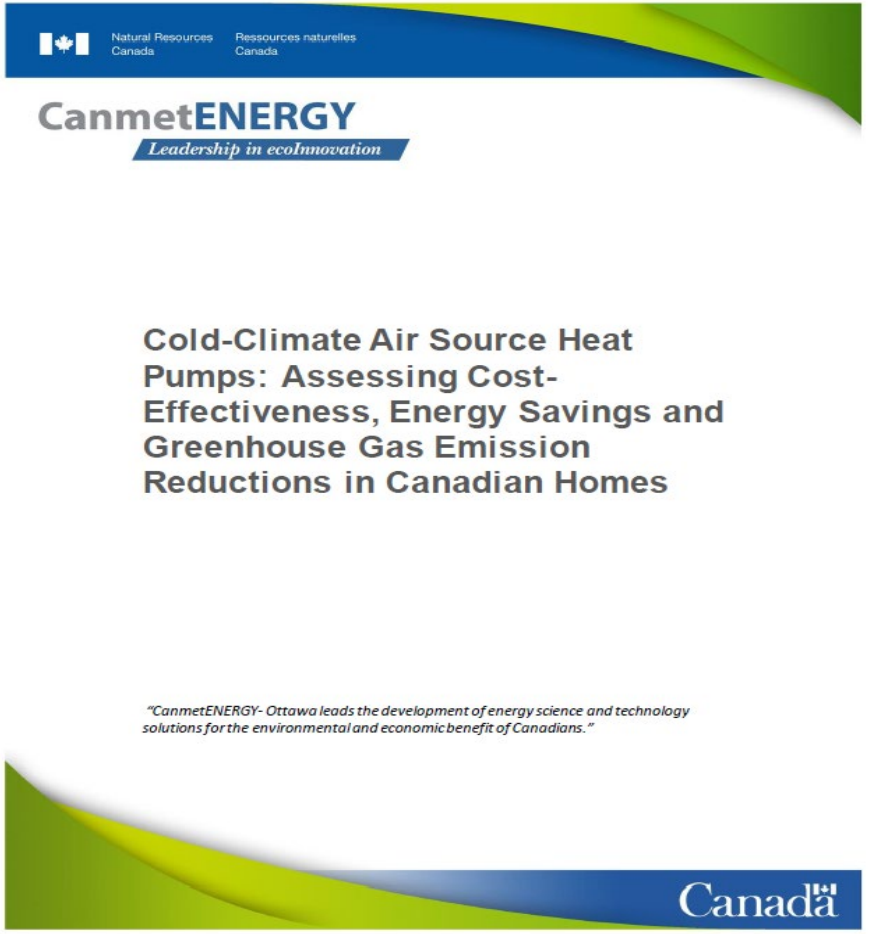
Reduced Building Impact

20 Tons of Cooling



Refrigerant R410A
¾” & 1 3/8 ”
Copper Pipe

Water
2 ½” Sch40
Pipe



https://www.nrcan.gc.ca/maps-tools-and-publications/publications/energy-publications/publications/cold-climate-air-source-heat-pumps-assessing-cost-effectiveness-energy-savings-and-gr/24208

Operational Costs of Heat Pumps

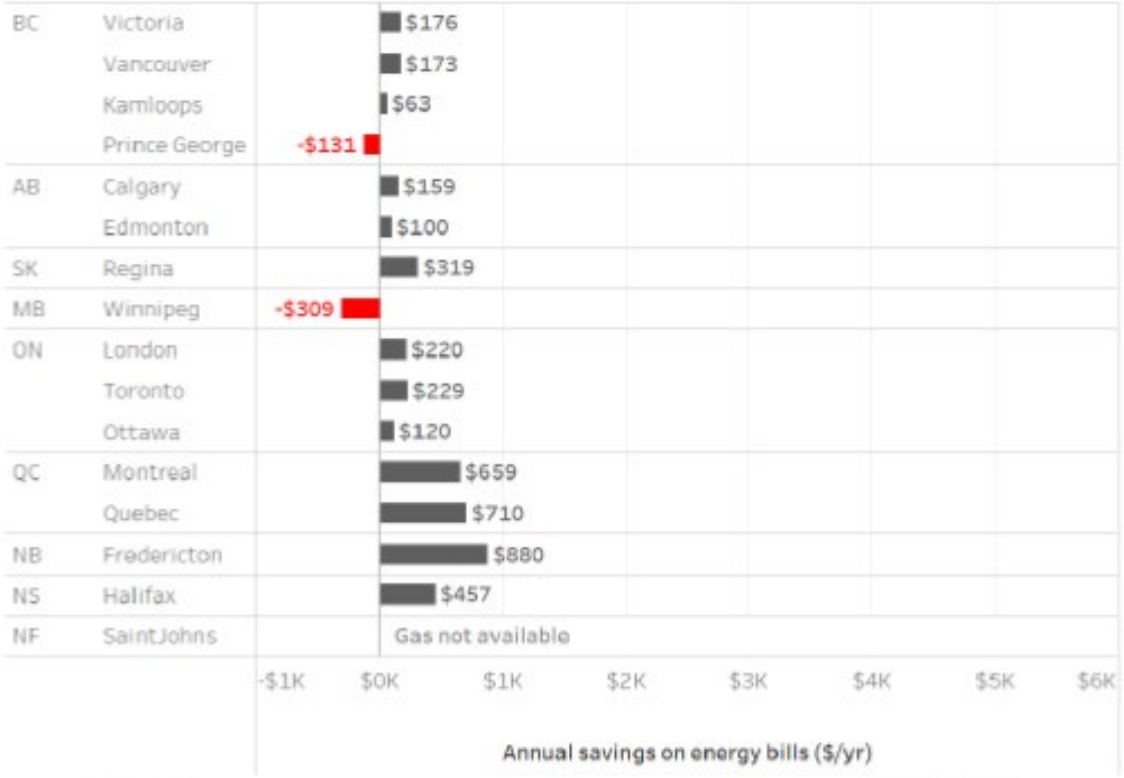


Figure 9: Estimated annual savings on energy bills by province for Archetype B, CC-ASHP vs gas furnace with current (2020) energy pricing

NRCAN/CanmetENERGY-Ottawa ;Cost effectiveness of Cold Climate heat pumps in Canadian homes

Operational Costs of Heat Pumps

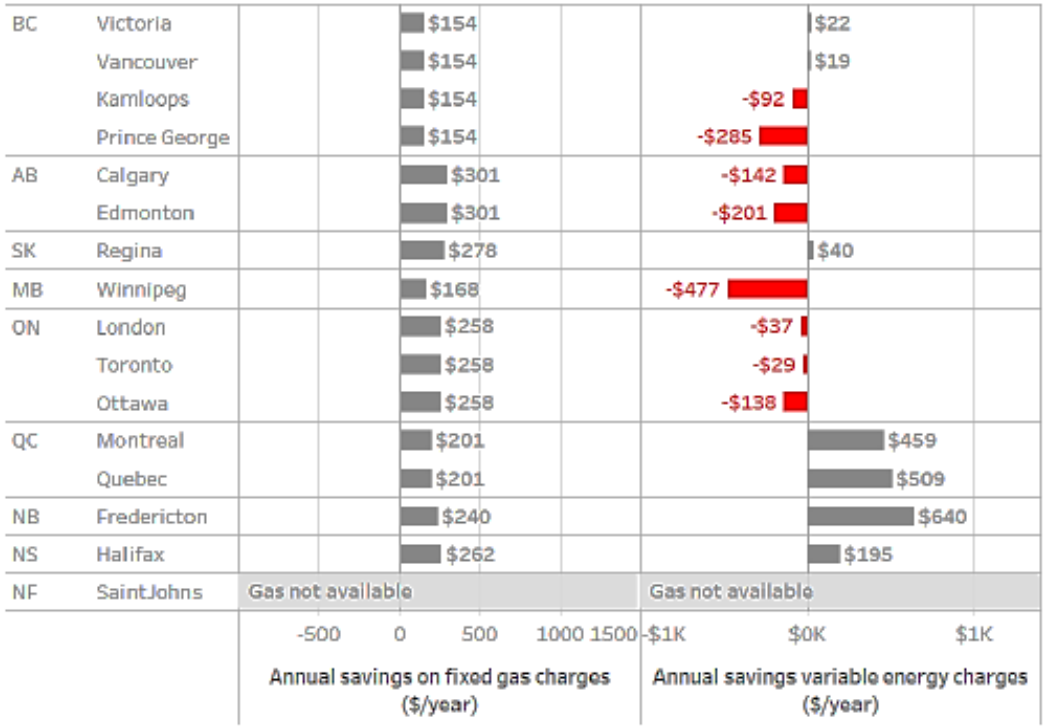


Figure 10: Estimated savings on fixed and variable energy charges, CC-ASHP vs gas furnace, assuming current (2020) energy pricing and all-electric service (suspension of gas service agreement)

NRCAN/CanmetENERGY-Ottawa ;Cost effectiveness of Cold Climate heat pumps in Canadian homes

Operational Costs of Heat Pumps

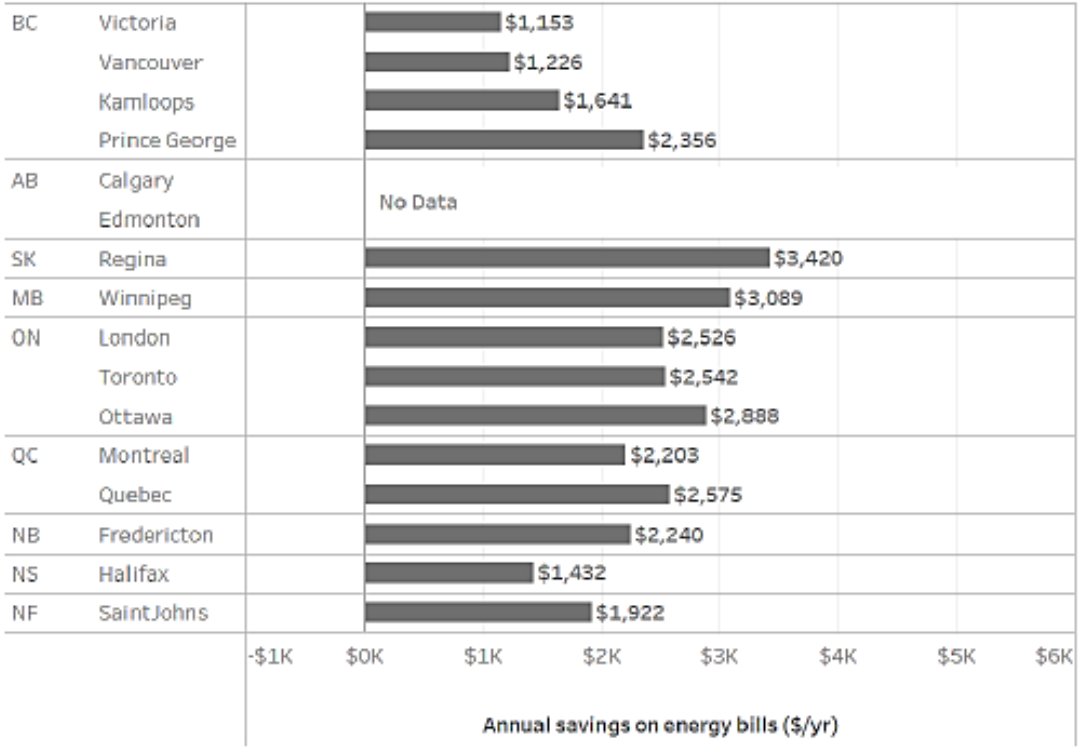


Figure 11: Estimated annual savings on energy bills by province for Archetype B, CC-ASHP vs oil furnace with current (2020) energy pricing

NRCAN/CanmetENERGY-Ottawa ;Cost effectiveness of Cold Climate heat pumps in Canadian homes

MITSUBISHI ELECTRIC
Heating and Cooling

What will you pay for efficiency?

GHG


IAQ

IAQ

After seeing how gas stoves pollute homes, these researchers are ditching theirs

Rob Jackson, professor of environmental sciences at Stanford University, co-authored a recent study that found gas stoves leak unexpectedly high levels of methane, a powerful greenhouse gas, even when they're off — and they generate significant levels of indoor air pollution.

Burning natural gas generates high levels of nitrogen oxides, linked to asthma in children
Emily Chung · CBC News

IAQ

Exposure to nitrogen oxides, produced when gas is burned, is linked to respiratory problems such as asthma and decreased lung function, especially in children.

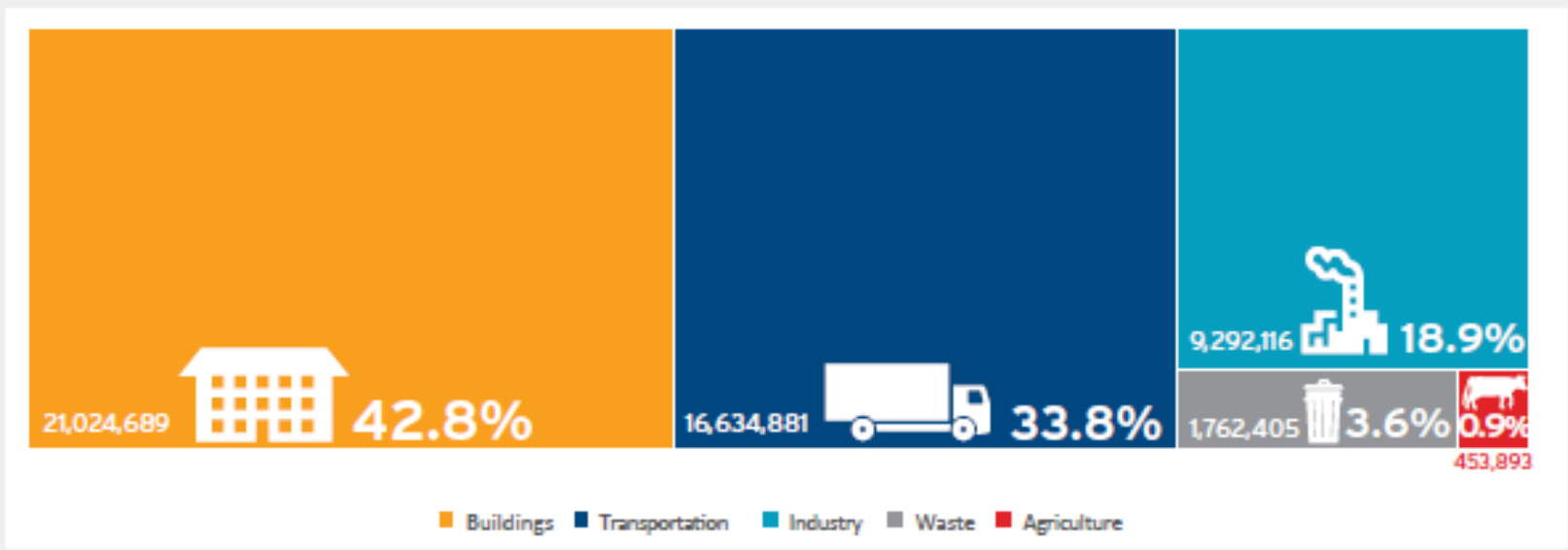
For example, a 2013 meta-analysis of 41 studies found that children living in a home that used gas for cooking had a 42 per cent increased risk of having asthma.

Burning natural gas generates high levels of nitrogen oxides, linked to asthma in children
Emily Chung · CBC News

IAQ

MITSUBISHI ELECTRIC
Heating and Cooling

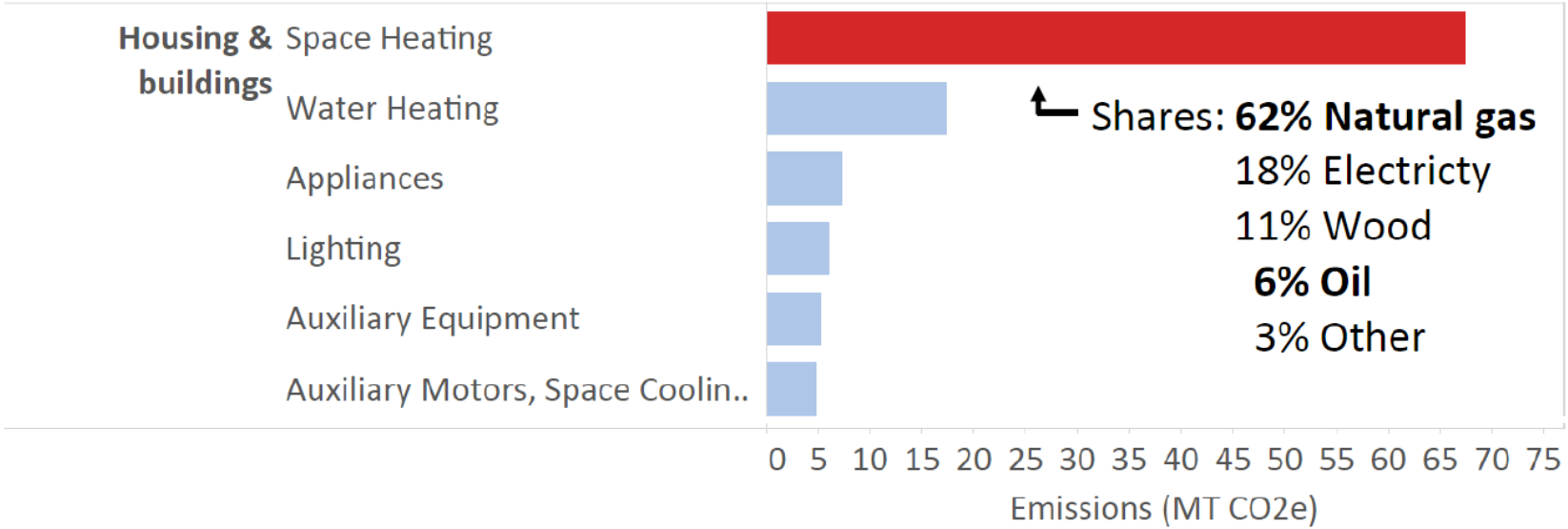
Carbon Emissions



TAF – Carbon Emissions Inventory, 2019 Edition

Carbon Pricing

Space heating is the single biggest energy end-use in Canada, and the second largest contributor to GHG emissions.



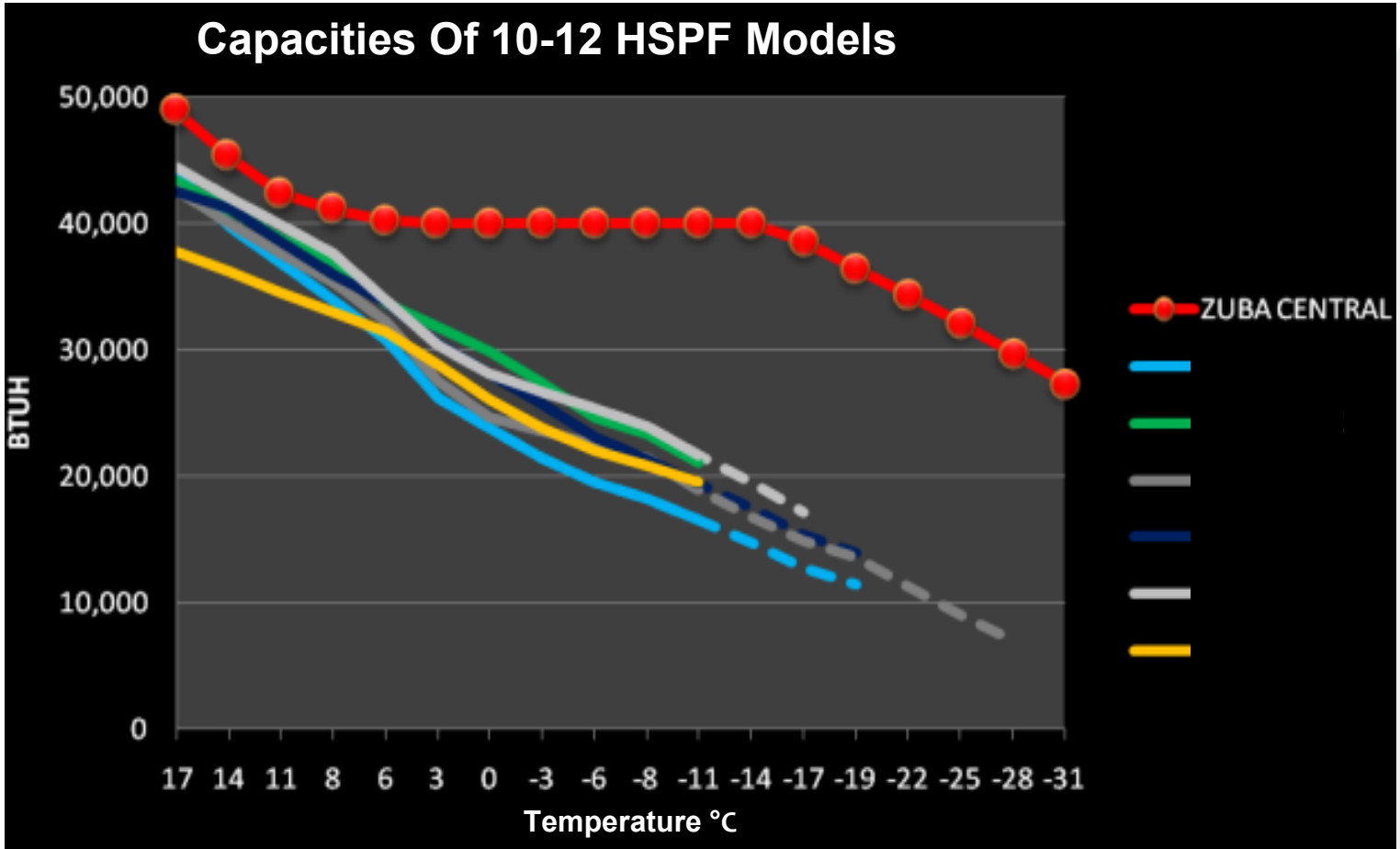
Canmet Energy Opportunities for Hybrid Systems, 2018

Products and Features

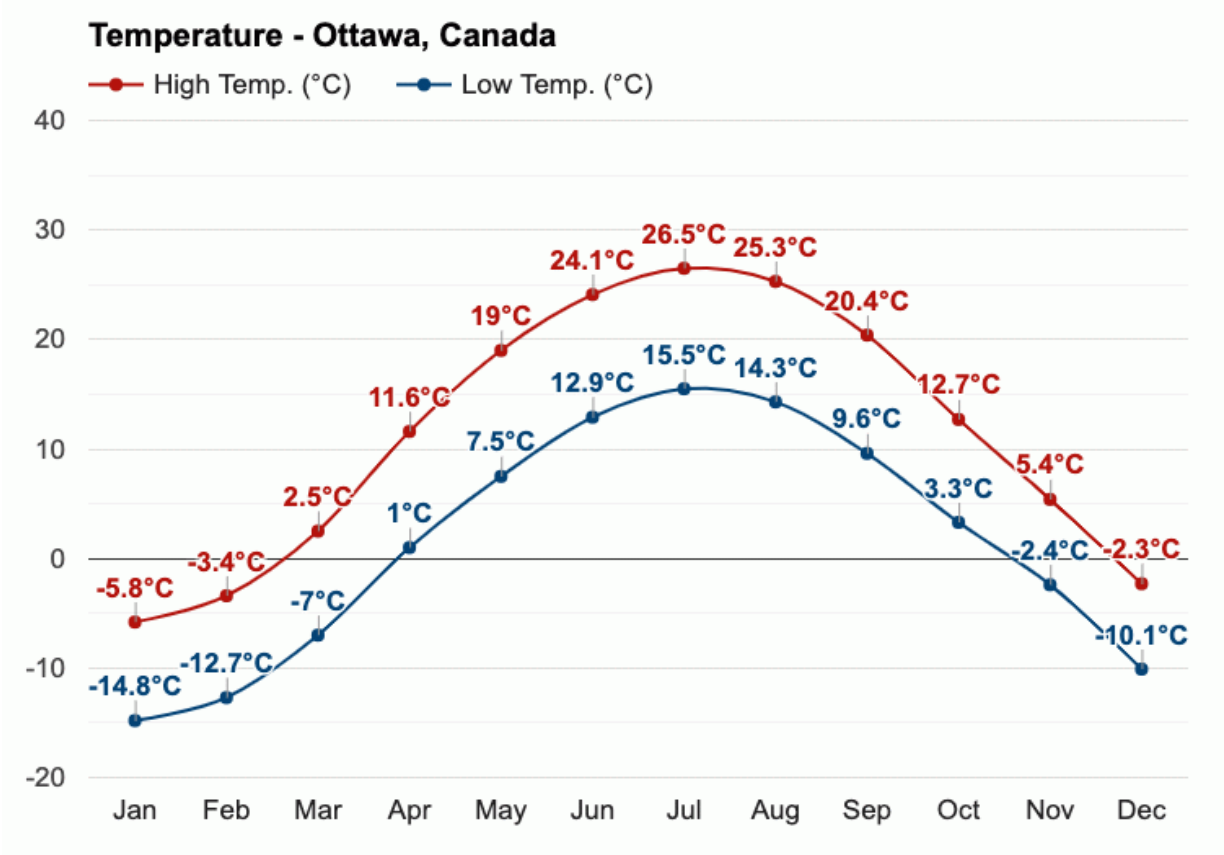
Low Ambient Heating ccASHP

- Maintains 100% of its heating output at outdoor temperatures at or below -15˚C
- 80% of its heating output at -25˚C
- Operates efficiently above a COP of 1 at outdoor temperatures as low as -30˚C

Low Ambient Heating



Low Ambient Heating



Ottawa Winter 2020 Average temperatures

Mr.SLIM M-Series Features & Benefits

Whisper Quiet Comfort
The Mr. Slim® M-Series includes whisper-quiet fans and compressors that work so silently you won't even notice they're on. Indoor units operate as low as 19 dB(A) and our outdoor units are some of the quietest in the industry.

Variable Compressor Speed Inverter (VCSi) Technology
Unlike conventional systems which only cycle between On and Off, VCSi systems detect changes in room temperature and readjust the compressor speed to provide high-speed heating and cooling as needed, resulting in energy and cost savings.

Hyper-Heat Inverter H2i™ Technology
Even when temperatures drop to -30°C* – a challenge for many competitive air-source heat pump systems – M-Series stays on the job, keeping the indoors at a comfortable and consistent level with ease.

Flexible Installation, Ducted or Ductless
Mr. Slim® M-Series was designed to have a wide array of applications and configurations. Ducted configurations can easily be implemented into existing ductwork, while ductless configurations are perfect for century homes, cottages, schools, commercial facilities, and more.

Single Zone and Multi-Zone Applications
Available in both single-zone and multi-zone applications, the Mr. Slim® M-Series can target tricky areas or address the individual comfort needs of multiple rooms, all within a single system.

*Includes tolerance. Units can operate in heating mode down to -30° C depending on model and conditions.

M - SERIES Newest Wall Mounted Model

FS Wall Mount H2i Heat Pump

- All Models Energy Star Qualified
- Hyper Heat at -25°C/-13°F
- **100% heating capacity down to -20C**
- 3D i-See Sensor
- Auto Change Over
- Base Pan Heater
- Powerful & Quiet Modes
- Smart Set Function
- Multi-Function Wireless Control
- Single – Split and Multi - Split system compatible
- Available Capacities: 6, 9, 12, 15 and 18K / BTU

Hyper Heat and Energy Star compliance depends on connected outdoor unit.

M - SERIES Ceiling Cassette Models

SLZ-KF 4 - Way Ceiling Cassette

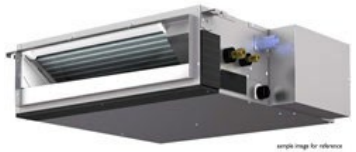
- Auto Changeover & LEV Control
- Auto Restart
- Base Pan Heater
- Built-in Drain Pump
- Low Ambient Heating at -20°C
- Single – Split and Multi - Split system compatible
- Cooling down to -10°C/+13°F
- Available Capacities: 9, 12, 15 & 18K BTU

MLZ-KP 1 - Way Ceiling Cassette

- Fits between 16 inch on center joists
- Auto Restart
- Built-in Drain Pump
- Low Ambient Heating at -20°C
- Hand Held Remote Control
- Single – Split and Multi - Split system compatible
- Cooling down to -10°C/+13°F
- Available Capacities: 9, 12 &18K BTU
- **Upcoming unit will be 6K BTU**

Hyper Heat and Energy Star compliance depends on connected outdoor unit.

M - SERIES Ducted Model



SEZ – KD Short Duct Run / Ceiling Concealed

- Auto Change Over & LEV Control
- Built –in Drain Pump
- Low Ambient Heating at -25°C with SUZ H2i OD unit
- Single – Split and Multi - Split system compatible
- Cooling down to -10°C/+13°F
- Available Capacities: 9, 12, 15 & 18K BTU

Multi – Position Air Handler SVZ-KP

- Up to 17.6 SEER
- Ducted Air Handler with ECM motor
- External Auxiliary Electric Heater optional
- Low Ambient Heating at -25°C with SUZ H2i OD unit
- Single – Split and Multi - Split system compatible
- Selectable external static pressure
- Available Capacities: 12,18, 24, 30 & 36K BTU

Hyper Heat and Energy Star compliance depends on connected outdoor unit.

M - SERIES Floor Mount Model

MFZ-KJ Floor Mount

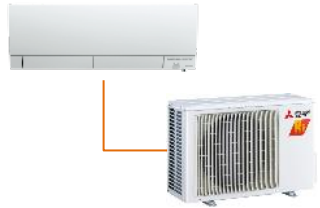
- Hyper Heating down to -25°C
- All models Energy Star Certified
- Auto Restart, Change Over & LEV Control
- Base Pan Heater
- Multi-Function Wireless Control
- Powerful & Quiet Mode
- Smart Set Function
- Single – Split and Multi - Split system compatible
- Cooling down to -10°C/+13°F
- Available Capacities: 9, 12, 15 & 18K / BTU

Hyper Heat and Energy Star compliance depends on connected outdoor unit.

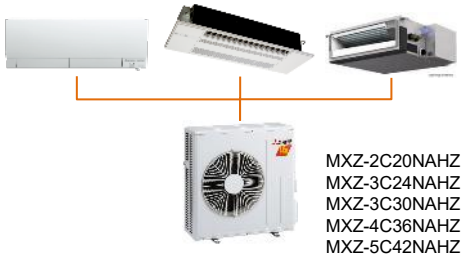
M - SERIES Connectivity

Three easy ways to connect heat pump and air conditioning systems for maximum flexibility with Hyper Heat and standard product lines

Single-Split 1:1 Applications



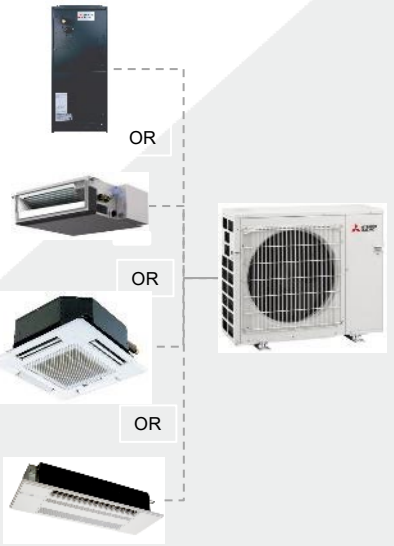
Multi-Split # :1 Applications



MXZ-2C20NAHZ
MXZ-3C24NAHZ
MXZ-3C30NAHZ
MXZ-4C36NAHZ
MXZ-5C42NAHZ
MXZ-8C48NAHZ

MXZ-2C20NA
MXZ-3C24NA
MXZ-3C30NA
MXZ-4C36NA
MXZ-5C42NA
MXZ-8C48NA

1:1 Universal SUZ Applications



Application of systems

Centrally Ducted Cold Climate System

- Zuba-Central - Series
  - Forced air cold climate Air Source Heat Pump
  - Available sizes 2.0, 2.5, 3.0, 3.5, 4.0 Ton
  - No back up heat required (when sized appropriately)

Multi Split Cold Climate System

- Zuba Multi-series
  - Multi split cold climate Air Source Heat Pump
  - Available sizes 1.67, 2.0, 2.5, 3.0, 3.5 and 4.0 Ton
  - No back up heat required (when sized correctly)

SEZ-KD09…18NA
PEAD-A12/18AA7

MLZ-KP09…18NA

SVZ-KP12..36NA

SLZ-KF09…18NA

Ceiling Recessed Unit

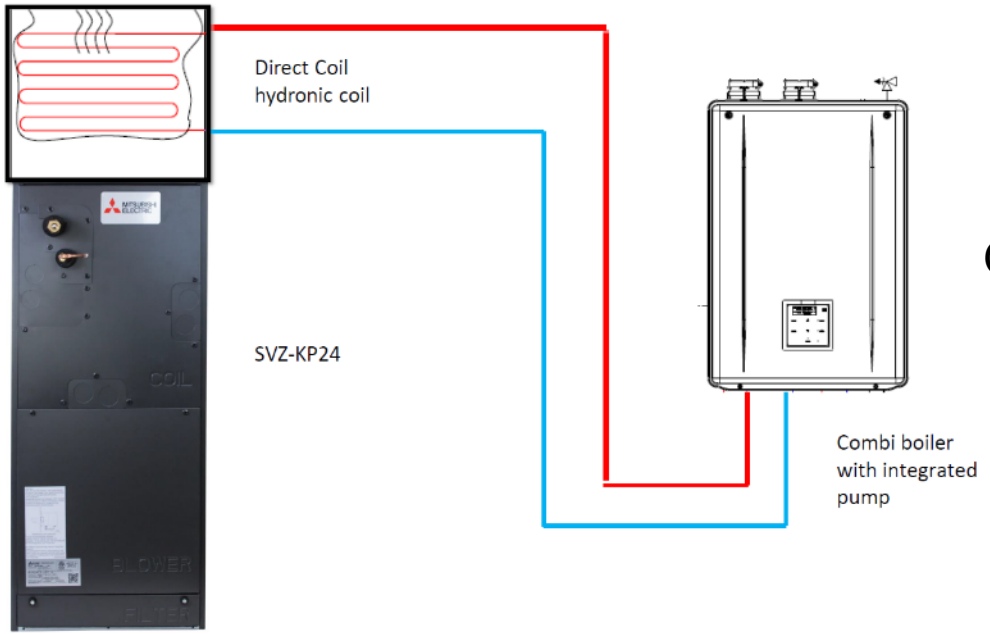
Floor Mounted Unit

Installation

- Long refrigerant pipe length to suit various installation locations (245ft. max total length, 100ft. max. height).
- Small footprint (a total min. installation depth of 20”)
- Very quiet operation 55dBA

Alternatives

Hybrid System



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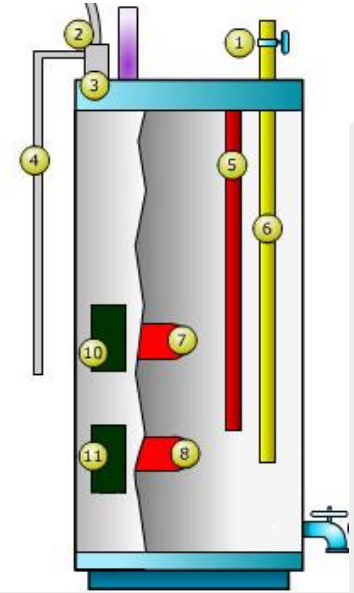
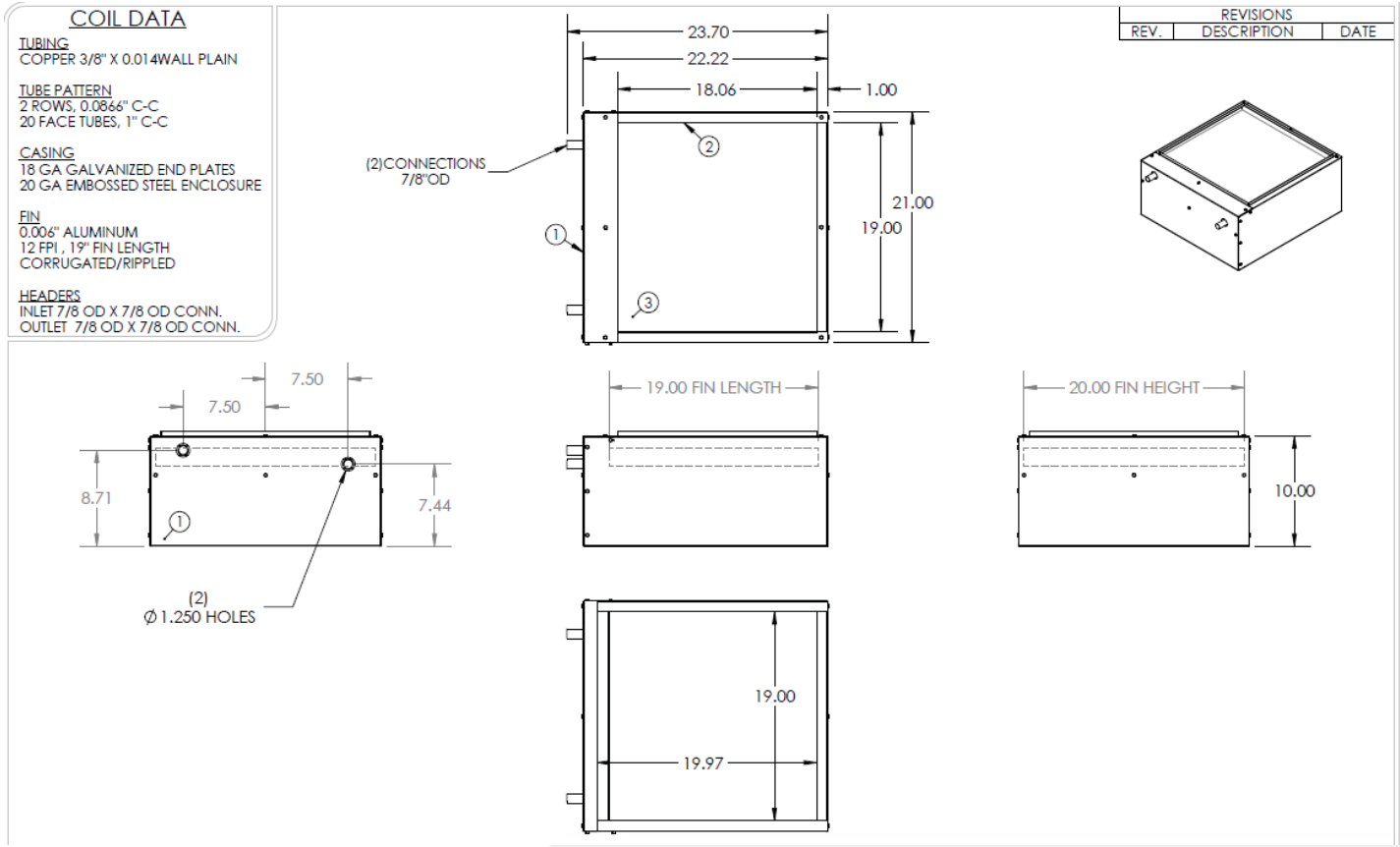


Hybrid System



Hybrid System

Coil Tag: AXQ093-C7 (140F EWT)
Coil Model Number: 3W-02-20.0-12-19.0-10
Item: 001, Coil Hand: Right

Physical Data

Number Of Coils	One (1)	Tube Diameter	3/8 1.00 x 0.866
Fin Height (Per Coil)	20.000"	Tube Turbulators	No
Fin Length (Per Coil)	19.000"	Tube Material	Copper - 0.014 Plain
Number Of Rows Deep	Two (2)	Fin Material	Aluminum 0.006
Circuit Ratio	0.5	Fin Style	Corrugated
Fins Per Inch	Twelve (12)	Connection Type	Sweat Copper
Supply Connection Size	0.875"	Coil Weight (Per Coil)[operating]	24 [28] LBS
Return Connection Size	0.875"	Coil Internal Volume (Per Coil)	0.490 gal
Header Material	Copper (L)	Casing Style	Standard
		Casing Material	Galvanized Steel 18 gauge

Air Data

Total Airflow (All Coils)	875 SCFM
Airflow (Per Coil)	875 SCFM
Face Velocity	332 FPM
Altitude	0.00 FT
Entering Dry Bulb	55.00 °F
Leaving Dry Bulb	102.50 °F
Air Pressure Drop	0.08" WG
Fouling Factor	0.0000 ft² °F h/Btu

Fluid Data

Fluid Type	Water
Glycol Ratio	0 %
Entering Fluid Temp	140.00 °F
Leaving Fluid Temp	121.57 °F
Fluid Flow Per Coil (Total)	5.00 GPM (5.00)
Tube Velocity	1.52 FPS
Fluid Pressure Drop	1.03' WG
Fouling Factor	0.0000 ft² °F h/Btu

Capacity

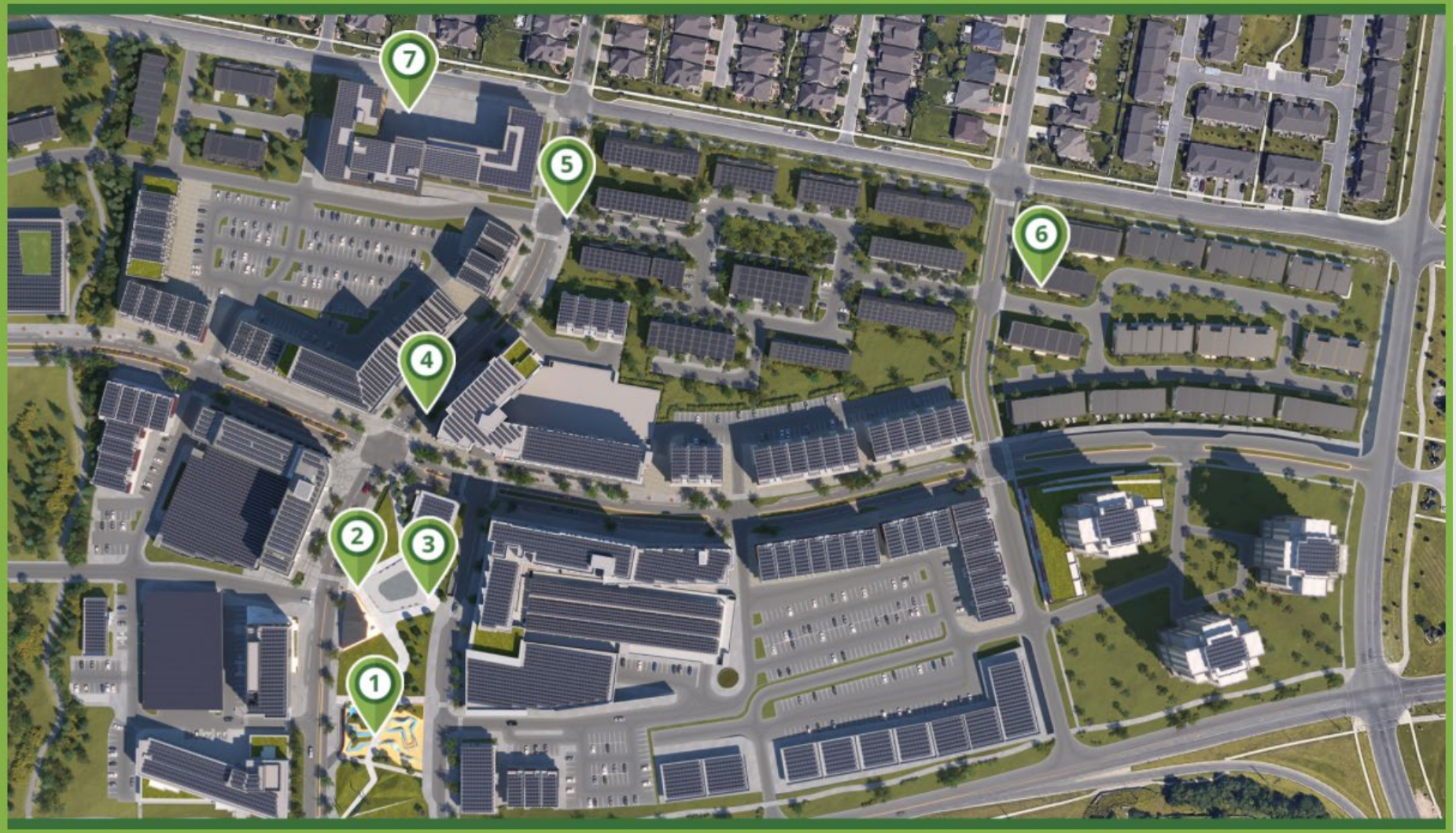
Capacity Per Coil (Total)	45.36 MBH (45.36)

Hybrid System

Enable heater comfort mode	1st	Heater OFF Inlet air temp. ≥ set temp. Heater ON Inlet air temp.< set temp. -1.8°F(1°C) · The fan will stop and the heater will turn off when [DEFROST] is displayed.  	2	1	○

Factory Setting.
No need to change.

Projects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Altare

MITSUBISHI ELECTRIC
Heating and Cooling

Altare

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Heating and Cooling

Altare

MITSUBISHI ELECTRIC
Heating and Cooling

300 Manor Rd, St Thomas

- Karwood Developments / Doug Tarry Homes
- 60 Suites across 2 buildings
- SVZ/SUZ 18,000 BTU cold climate units

Boivin House

Campbellford, ON

MITSUBISHI ELECTRIC
Heating and Cooling

The Challenge

Located in a rural community not serviced by natural gas, this 1,800 sq-ft bungalow was built in the early 1970s.The owners were paying upwards of $4000/ yr in heating costs. Their solution was to install a centrally ducted cold climate system. The transition to better technology has led to a 60% savings and has provided a seamless transition. According to the owners, the system has performed exceptionally well throughout the coldest days.

Boivin House

Campbellford, ON

3 Ton Zuba

Extended Warranty

At Mitsubishi Electric, we stand behind every product that bears our name.

That's why all City-Multi systems are backed by our standard 1-year parts and 7-year compressor warranty.

With the completion of our CM-01, Installation and Commissioning, contractors can receive a **5-year parts and 7-year compressor** warranty. In addition, they will be recognized as a Registered Level Contractor.

Then we take that protection to a whole new level.

With the completion of CM-02, Service and Trouble Shooting, we will upgrade contractors to an extended **10-year parts and 10-year compressor** warranty. Contractors will then be recognized as a Diamond Level Contractor

That's peace-of-mind, Mitsubishi Electric style.

For more information on training go to the link below:
https://cdn.agilitycms.com/mesca/pdfs-hvac/mem-201809-e-cm-training-brochure_en.pdf

*When installed by a Diamond Level Contractor

Thank You

Contact information

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