MASSACHUSETTS CLEAN ENERGY CENTER®

OUR MISSION:

Accelerate the clean energy and climate solution innovation that is critical to meeting the Commonwealth's climate goals, advancing Massachusetts' position as an international climate leader while growing the state's clean energy economy.

Heat Pumps and Low & Moderate Income Households

Presented By: Meg Howard

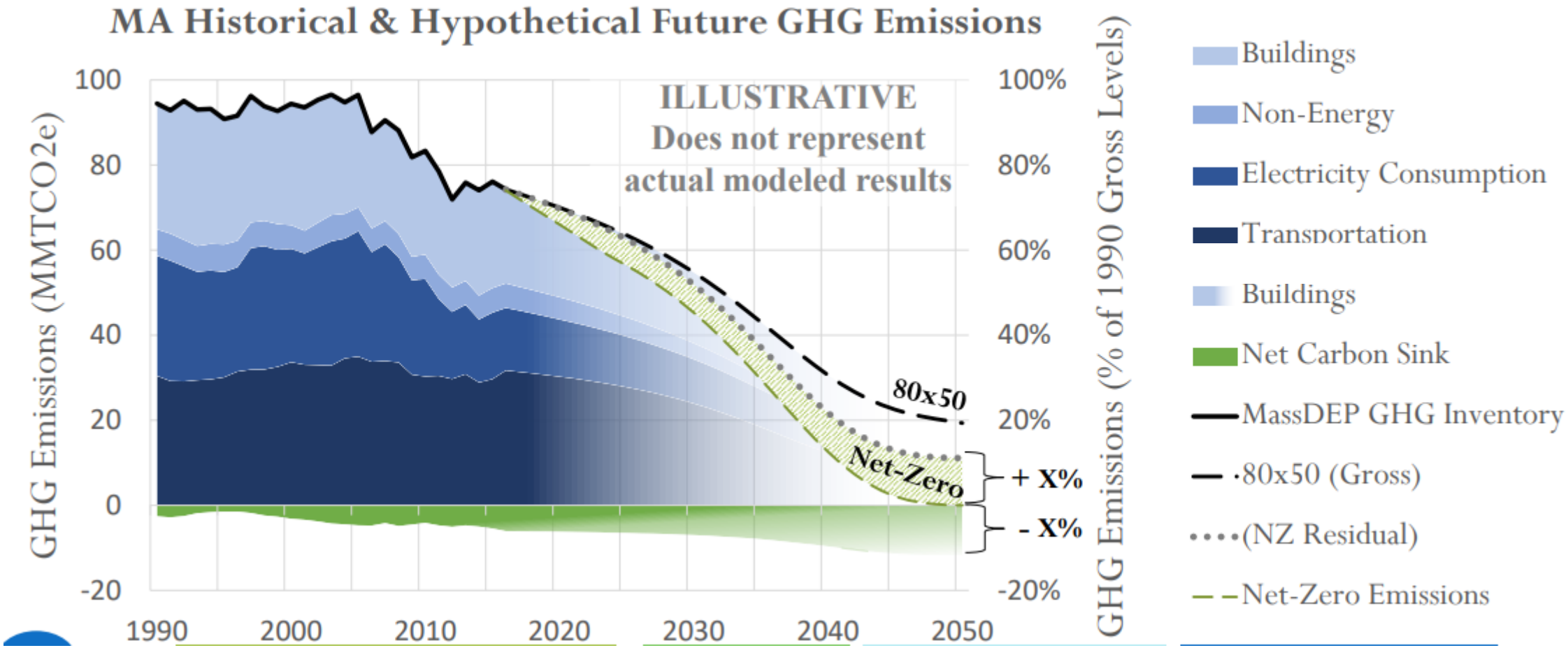
October 14, 2021

AGENDA

- Need to Electrify Buildings
- Heat Pump Overview
- Lesson's Learned from MassCEC's Heat Pump Efforts
- Heat Pumps and Low & Moderate Income Households

NEED TO ELECTRIFY BUILDINGS

GREENHOUSE GAS EMISSIONS IN MASSACHUSETTS ARE LEGALLY REQUIRED TO GO TO NET ZERO

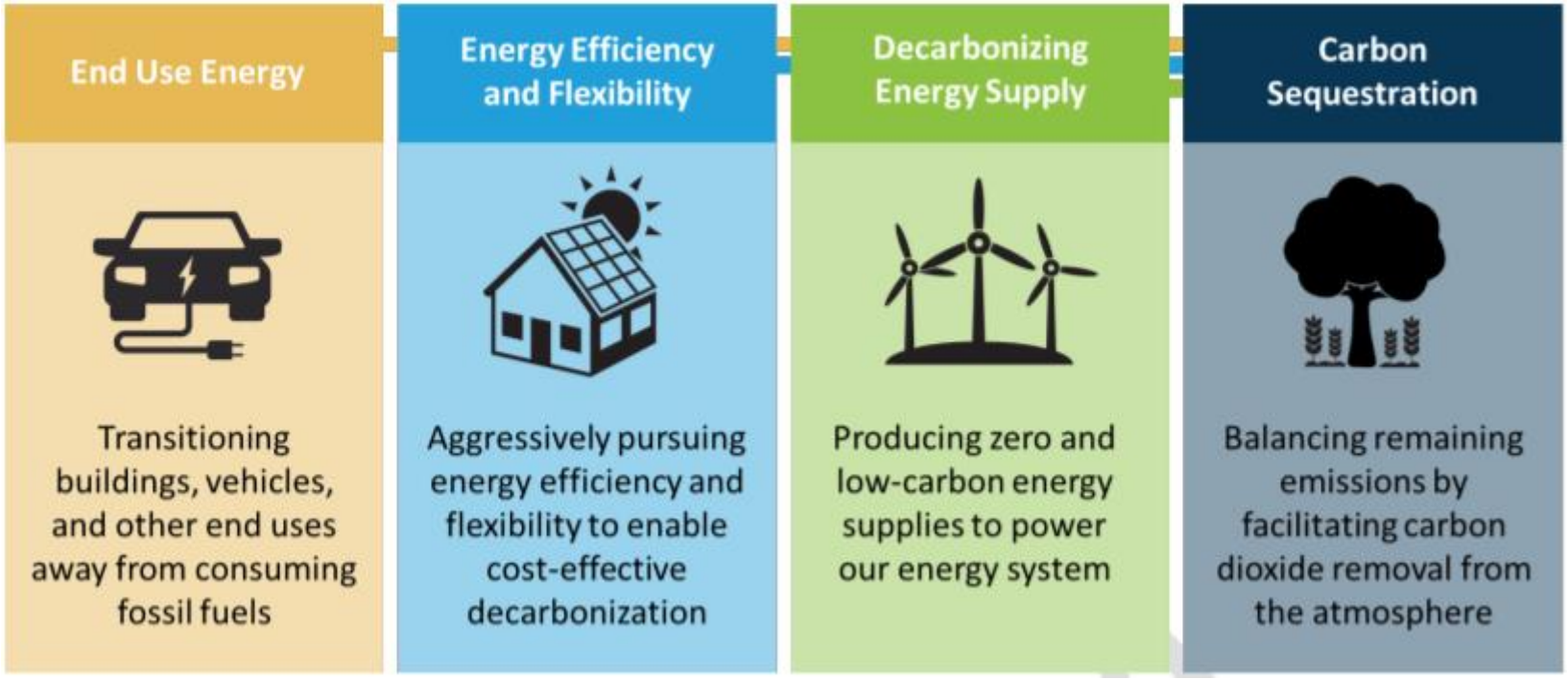


Source: EEA, March 2020 public meeting presentation

BUILDINGS: ENERGY, CARBON, AND MONEY

27%	**MA emissions from buildings' onsite fuels**
$2,500	**Annual household energy spending**
0% (net)	**2050 MA emissions target**
2.5 million	**Number of buildings in MA**

HOW WE GET FROM HERE TO THERE



Draft 2030 Clean Energy & Climate Plan:

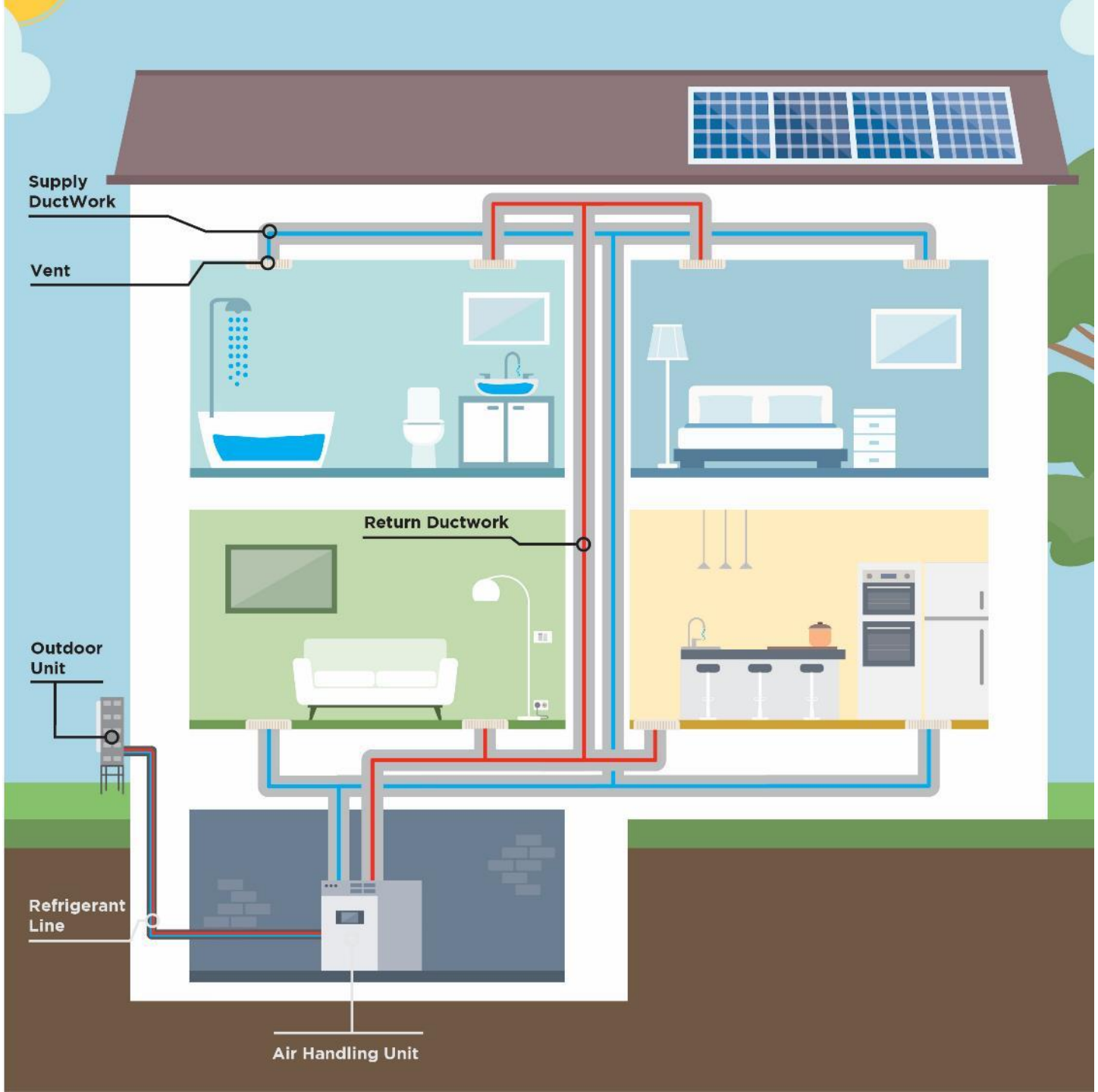
The number of buildings using natural gas, fuel oil, and propane for space and water heating must begin to steadily and permanently decline, and the deployment of heat pumps and building envelope improvements retrofits must become widespread.

HEAT PUMP BASICS

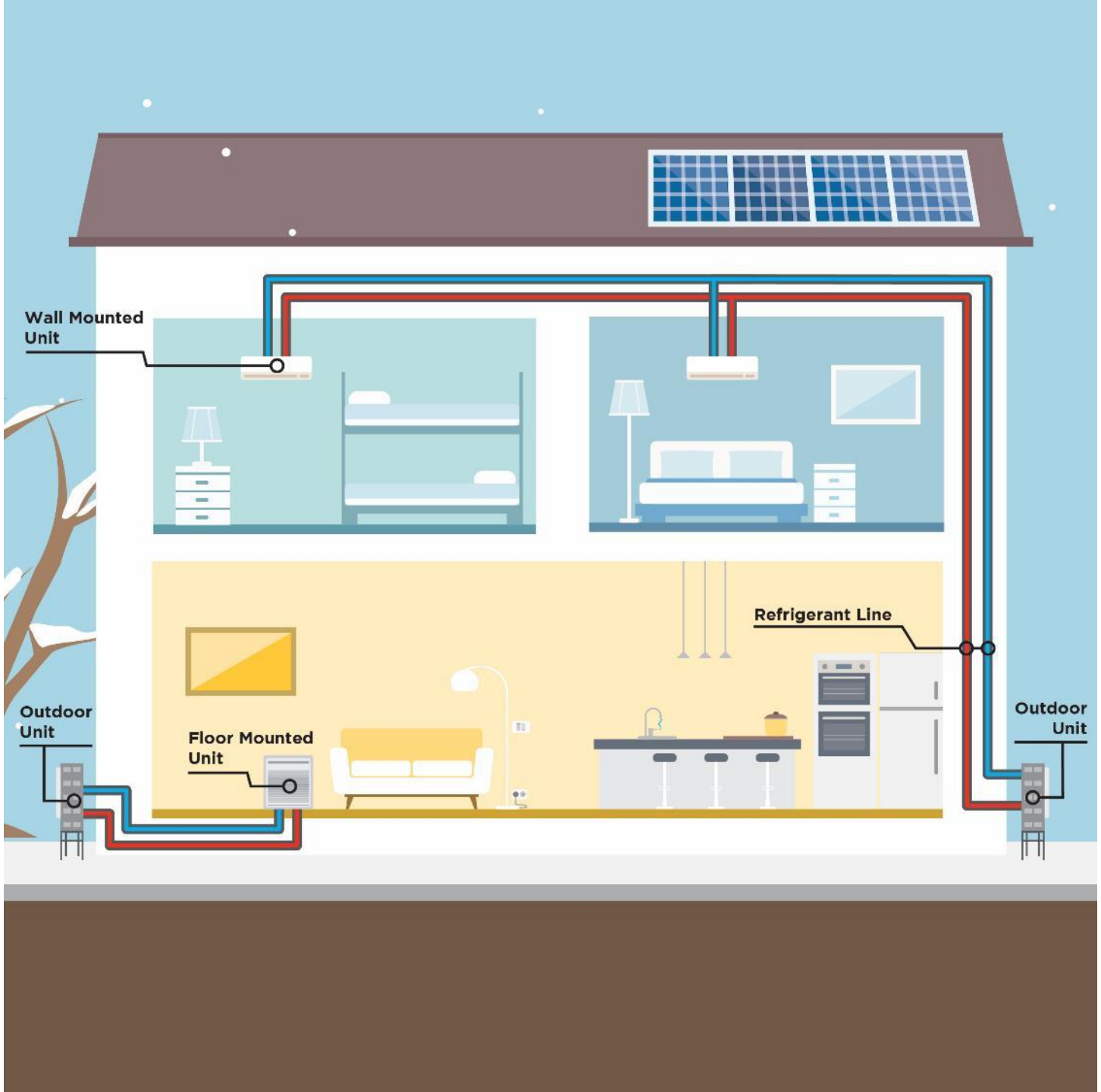
ELEVATOR PITCH

Heat pumps use a refrigerant loop to move heat between spaces. These systems can provide heating AND cooling. They’re like an air conditioner that can also work in reverse.

Centrally ducted



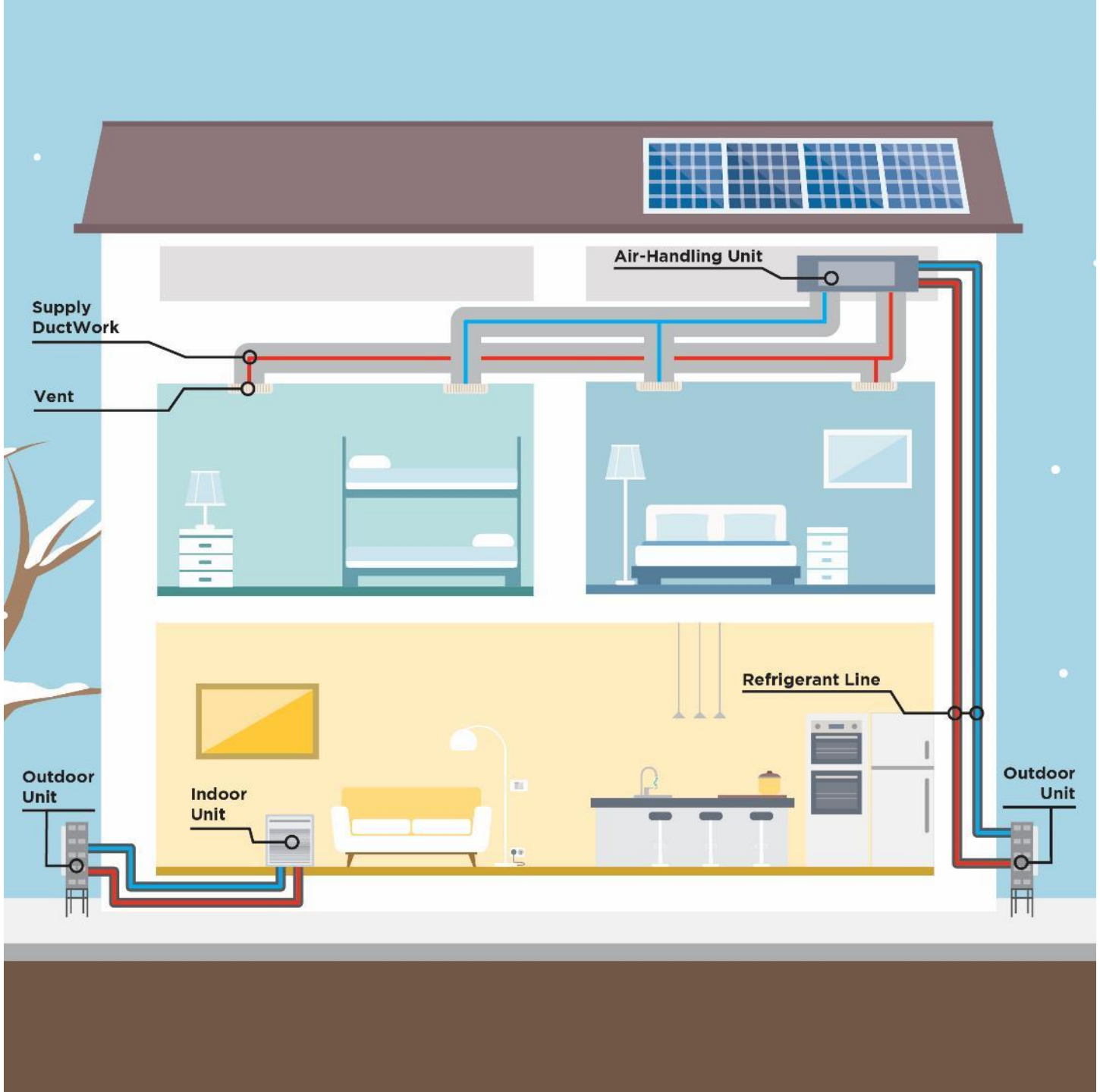
Ductless



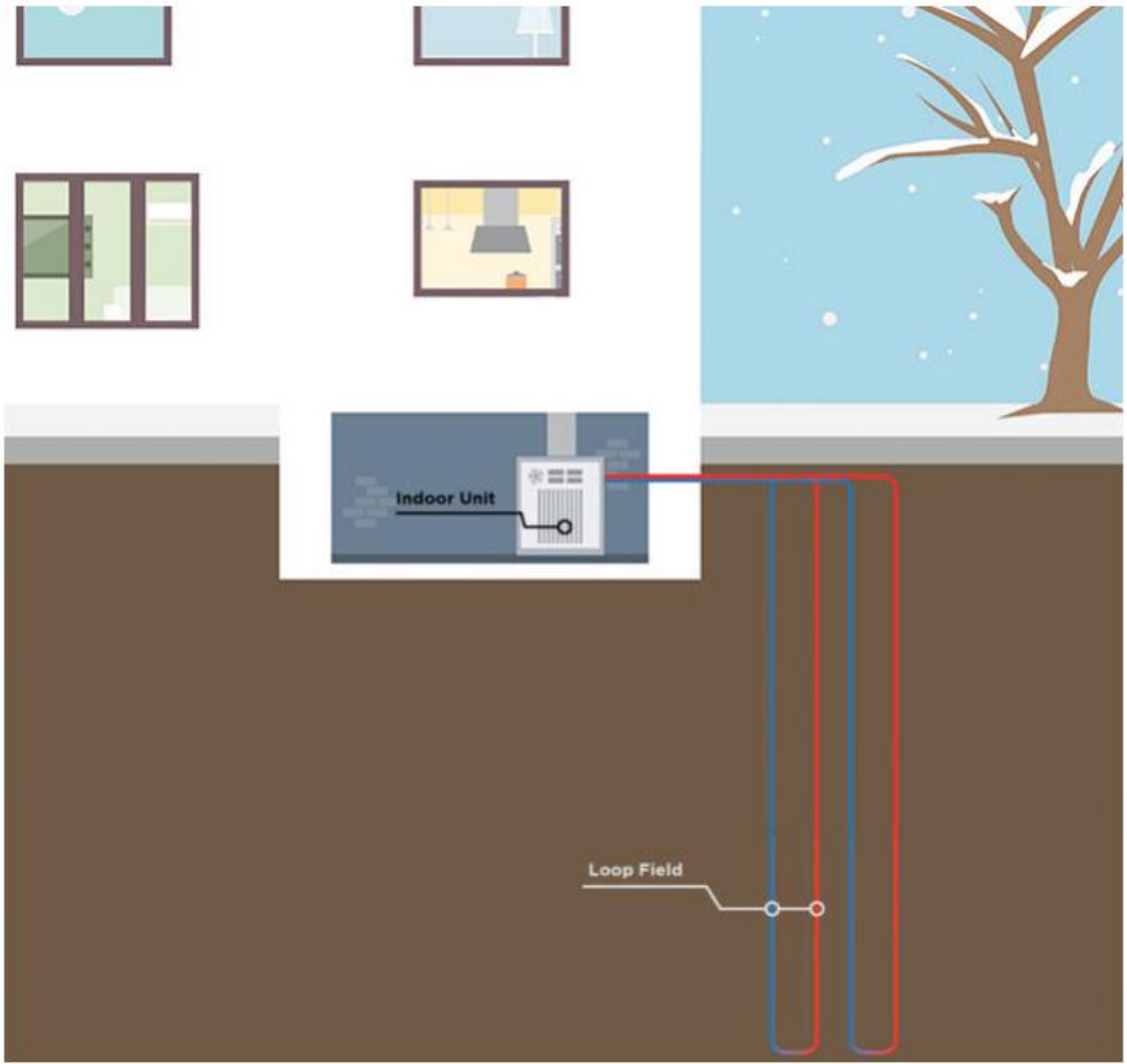
Single-head

Multi-head

Indoor Units: Mix of ductless & ducted

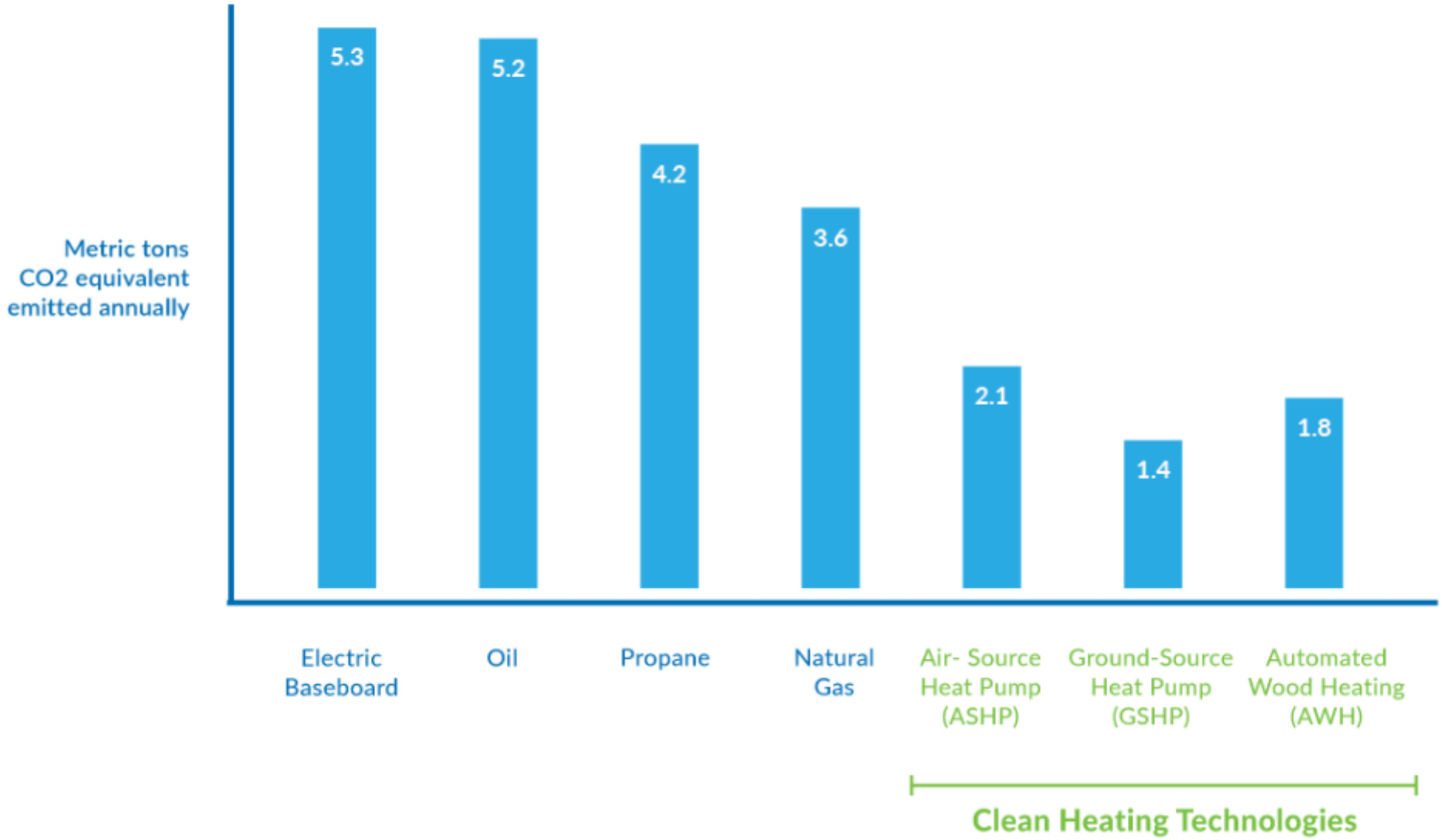


Ground-source heat pumps



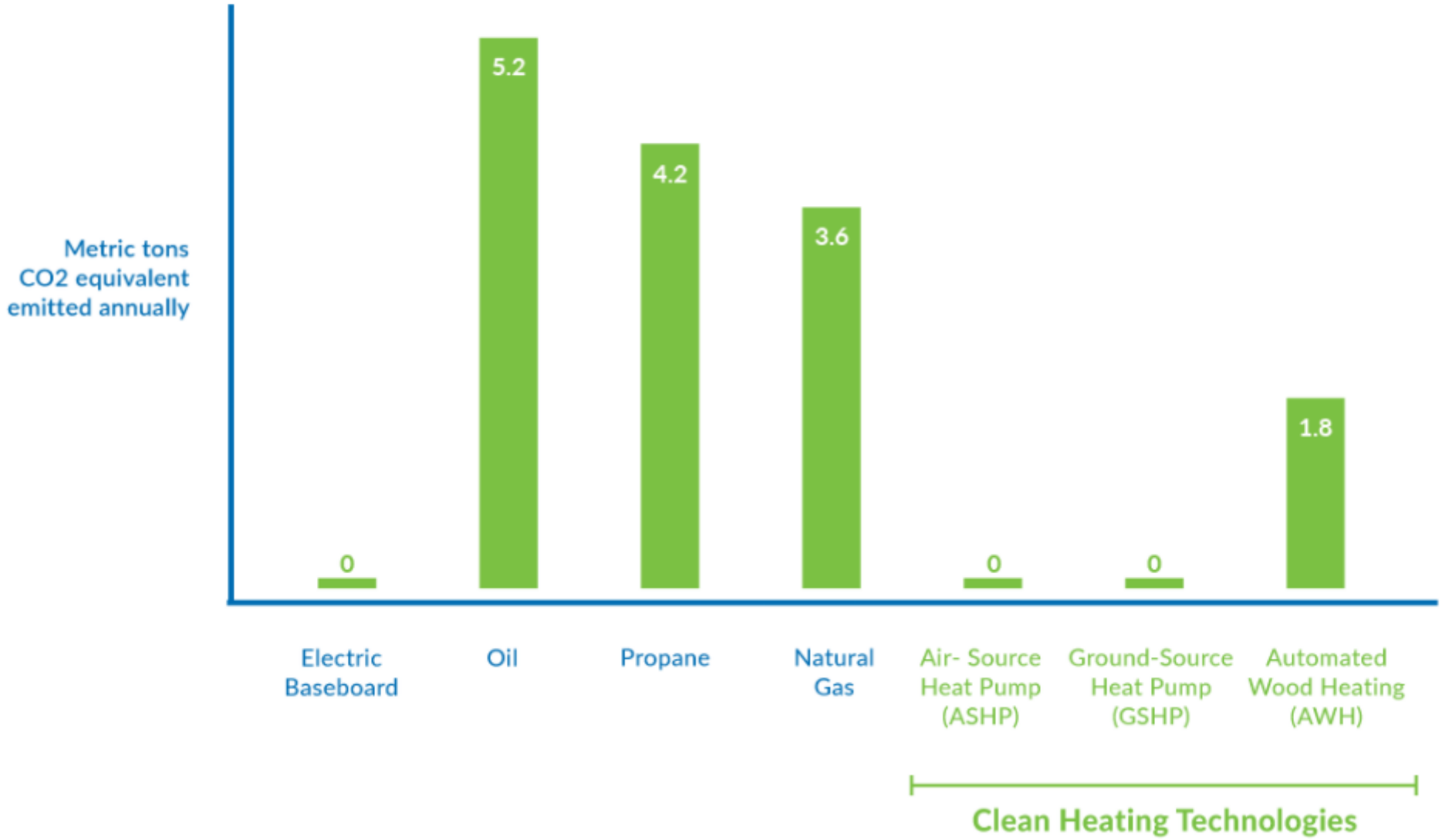
Greenhouse Gas (GHG) Emissions for Heating a Standard 2,000 SF Home

☑ 2020 Electricity Grid ☐ 100% Clean Electricity Grid



Greenhouse Gas (GHG) Emissions for Heating a Standard 2,000 SF Home

☐ 2020 Electricity Grid ☑ 100% Clean Electricity Grid



LESSON'S LEARNED FROM MASSCEC'S HEAT PUMP EFFORTS

HEAT PUMPS CAN BE STAND-ALONE HEATING SOLUTIONS IN MASSACHUSETTS

- ASHPs can now be used throughout the winter and they can serve as the sole heat source for a well-insulated home.
  - Consider all opportunities for efficieny and weatherization.
  - Take a thoughtful approach to system sizing
  - Make sure the outdoor unit is mounted above the snow-line and well protected.
- Demonstrated through MassCEC's Whole-Home Pilot (2019-2021), Affordable Clean Residential Energy (Ongoing), VRF incentive program (2017-2019), VRF in Public Housing (Ongoing)

CUSTOMER SATISFACTION

We surveyed pilot customers six months after project completion for our whole-home pilot.

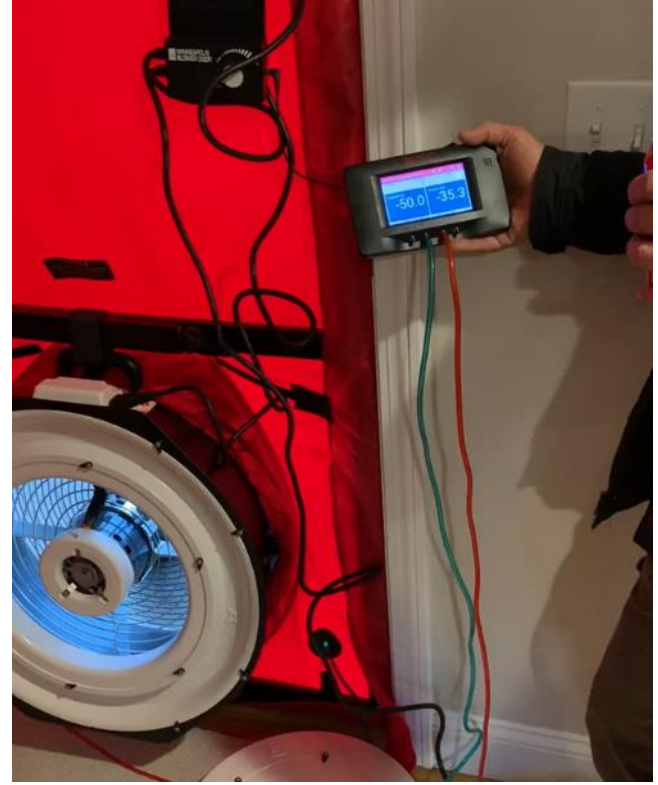
95% of respondents were somewhat or fully satisfied with the level of comfort for heating.

All respondents were somewhat or fully satisfied with the level of comfort for cooling.

LOOK FOR OPPORTUNITIES TO WEATHERIZE

With a better weatherized home, you can install a smaller heat pump (less upfront costs) that will cost less to run.

Need better solutions to get customers to do weatherization first and/or do both at the same time.



UPFRONT & OPERATING COSTS ARE A BARRIER TO ADOPTION

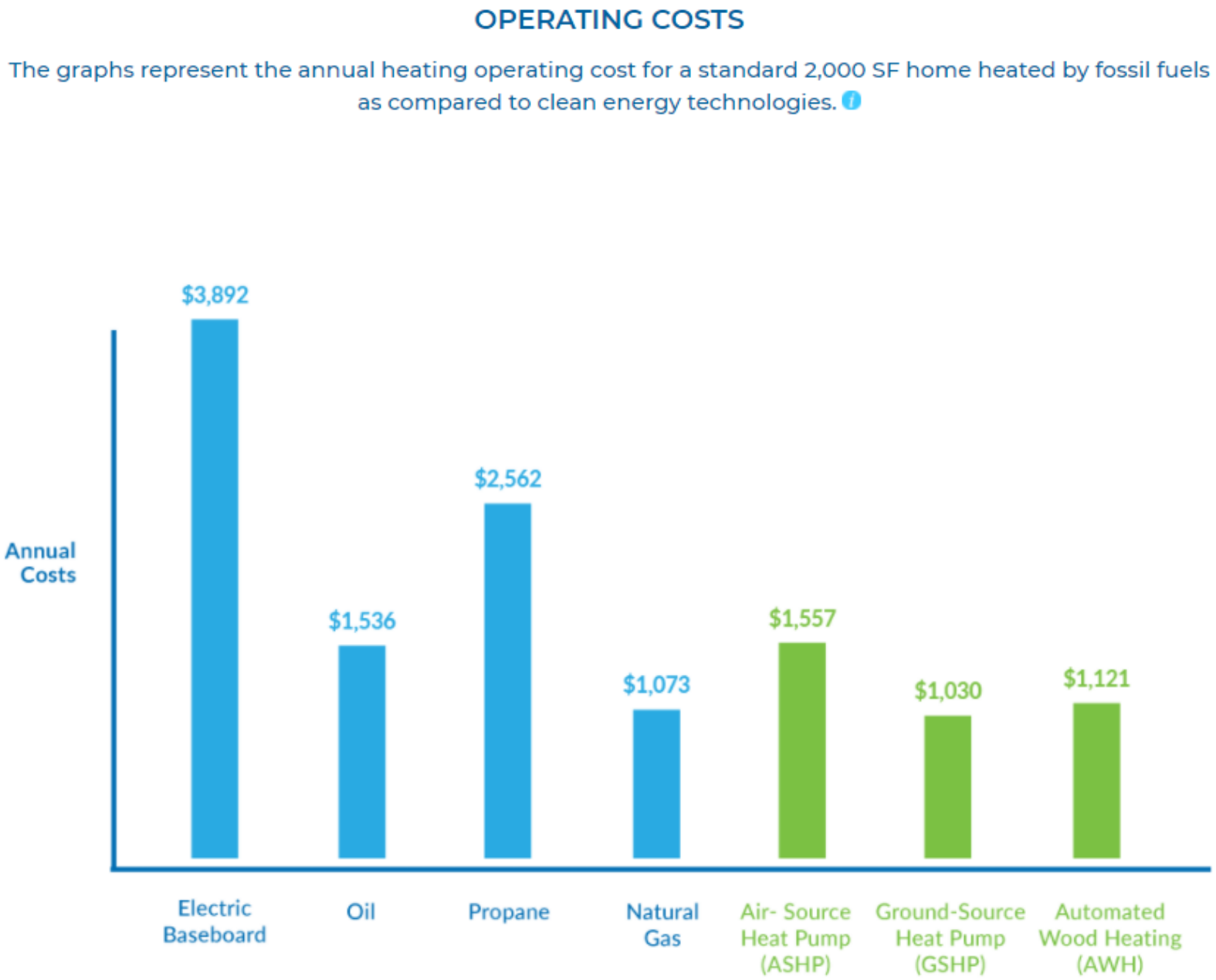
Whole Home Pilot median installed costs:

- Existing home retrofit: $20,000
- New construction: $14,000

Affordable Clean Residential Energy Program (ACRE) run by ABCD:

- Similar average costs
- ABCD is figuring out ways to reduce costs to $15-$18k for ductless &$12-$15k for ducted

Alternative approach: Solar Access: $7,700 for one to two compressors



Your mileage may vary!

Gas and heat pump costs may flip in 5 years or 10 years or this winter.

Short-term and mid- to long-term impacts on low-income communities is a key question facing policy makers.

WORKFORCE CHALLENGES & OPPORTUNITIES

Some heat pump installers are onboard with full electrification, but many are still not comfortable with best practices for full electrification.

HVAC workforce is generally aging and not very diverse.

Opportunity for bringing new, more diverse workers into this profession that is well paying and a possible pathway to small business ownership.

Expect to see more from MassCEC in this space!

HEAT PUMPS FOR LOW & MODERATE INCOME HOUSEHOLDS

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Install in new construction

- Upfront costs comparable with (or less than) other options
- Impacts of operating costs are mitigated by more efficient buildings

Strong contender for oil & propane retrofits

- Mass Save offers no-cost heat pump conversions for households with this heating fuels at the end of their life (through ABCD/CAP agencies) for households below <60% of state median income
- Mass Save's moderate income (60%-80% of state median income) are on track to go up significantly next year.

Proceed with consideration for natural gas retrofits (for now!)

- Weatherize to reduce utility costs
- Pair with solar PV
- Consider partial or supplemental systems (ideally designed with a full transition in mind)
- Consider other equity benefits: Access to cooling and long-term utility prices