



Green Heating and Cooling for Your Home

Bob Zogg
HeatSmart Alliance

March 22, 2022

The HeatSmart Alliance

***Mission:** Reduce greenhouse gas emissions by accelerating the adoption of energy-efficient heat pumps in MA homes and buildings*

- **Applications:** Home heating and cooling, water heating
- All-volunteer organization
- Participants from 28 MA communities (over 280,000 households), and growing
- **Approach:** Educate / Coach / Collaborate

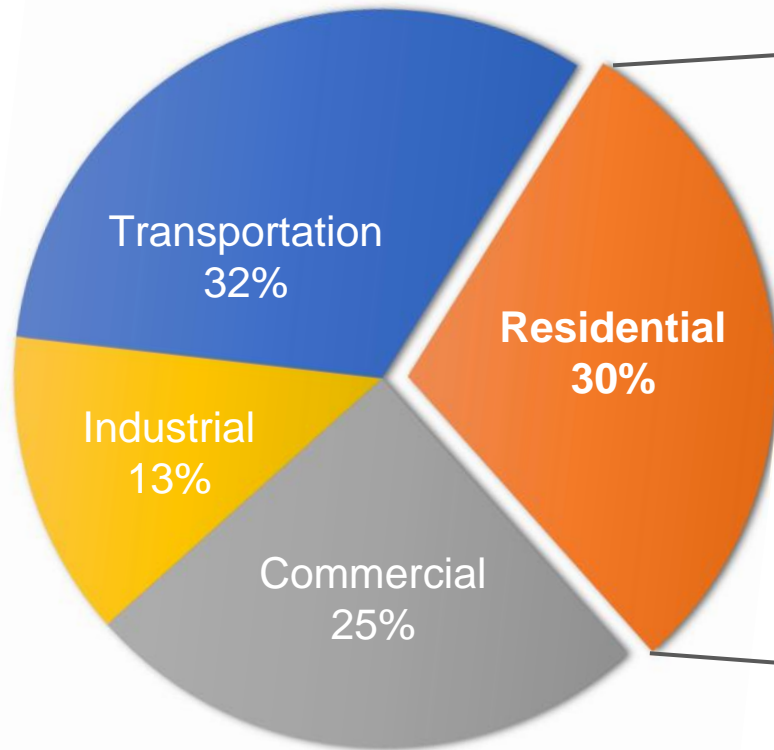
The Alliance does not accept donations or referral fees from installers or manufacturers



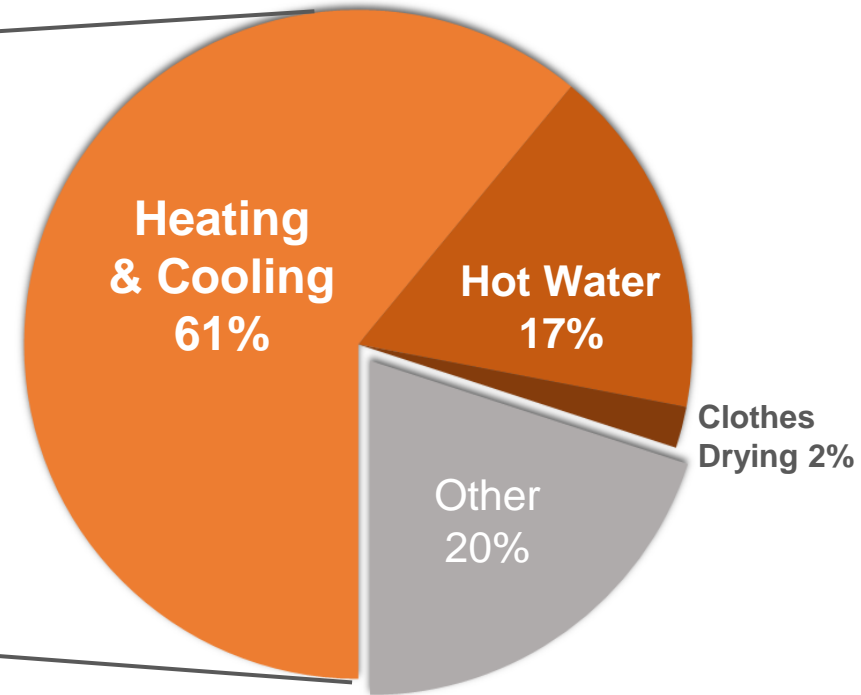
Why Heat Pumps?

Home Heating and Cooling Matters...

New England Energy Use*



Average Home Energy Use*

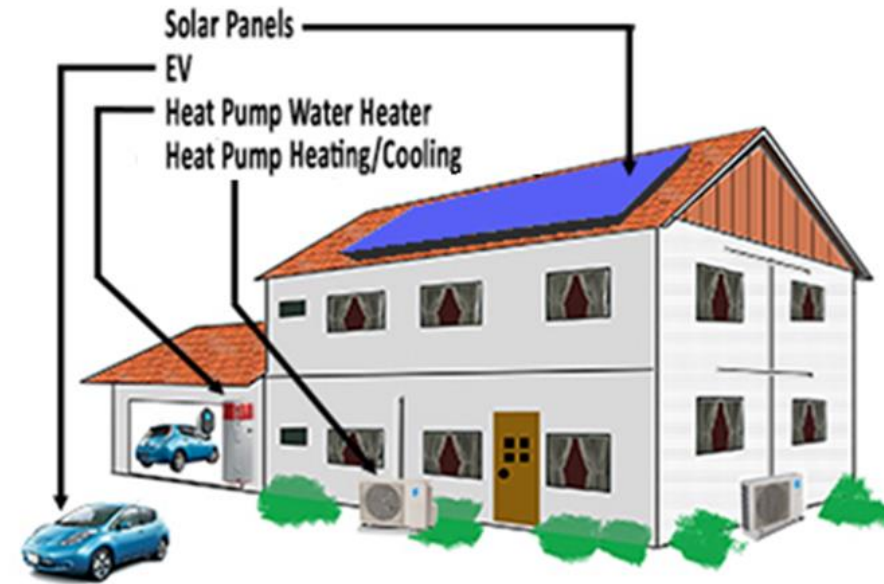


About 80% of home energy needs can be handled by heat pumps

* Source: U.S. Energy Information Administration, <https://www.eia.gov>

Path to Home Decarbonization

1. Weatherize
– *insulate, air seal*
2. Electrify
3. Shift to renewable electricity



Renewable electricity ↑

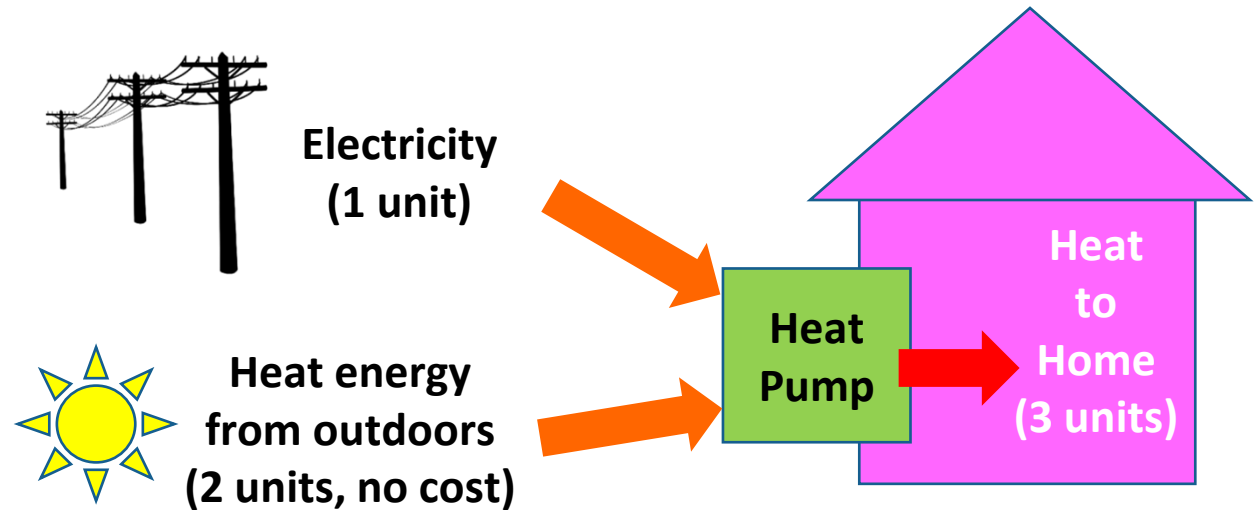


Insulation photo courtesy of NEEP



What's a heat pump?

- Moves (pumps) heat from a **cooler** place to a **warmer** place
- Refrigerators, dehumidifiers, and air conditioners are **heat pumps**
- Available for:
 - Home **heating** and **cooling**
 - **Water heating**
 - Clothes drying
 - Pool heating



Benefits of Heat Pumps in MA Homes

- Superior ***year-round comfort*** (summer and winter)
- ***Substantial reduction*** in greenhouse gas emissions
- **Energy-cost savings**
 - Modest vs. fuel oil
 - Significant vs. propane or electric baseboards
- ***A safer home*** (no risk of carbon monoxide or explosion)

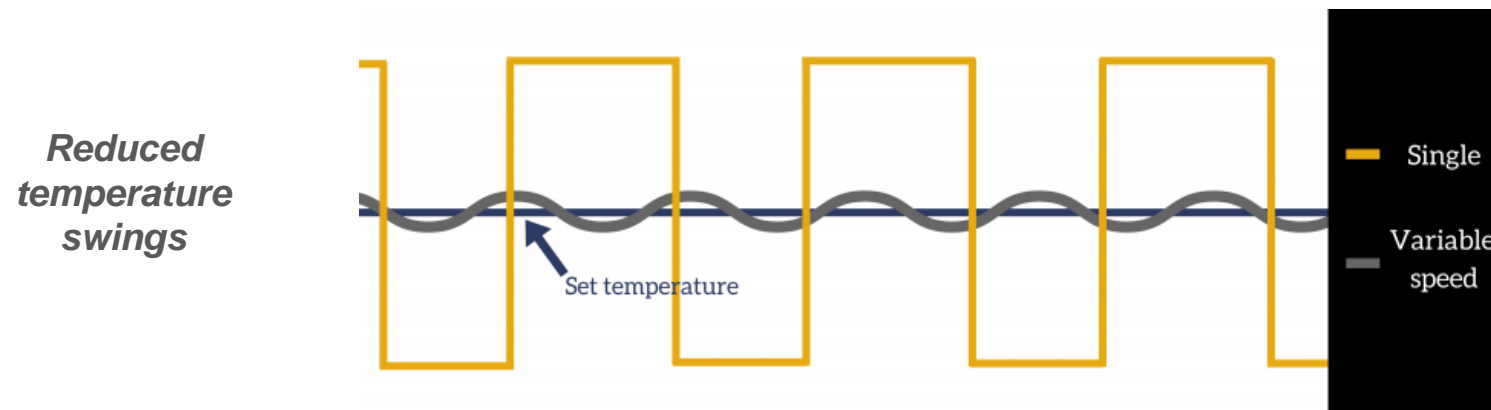
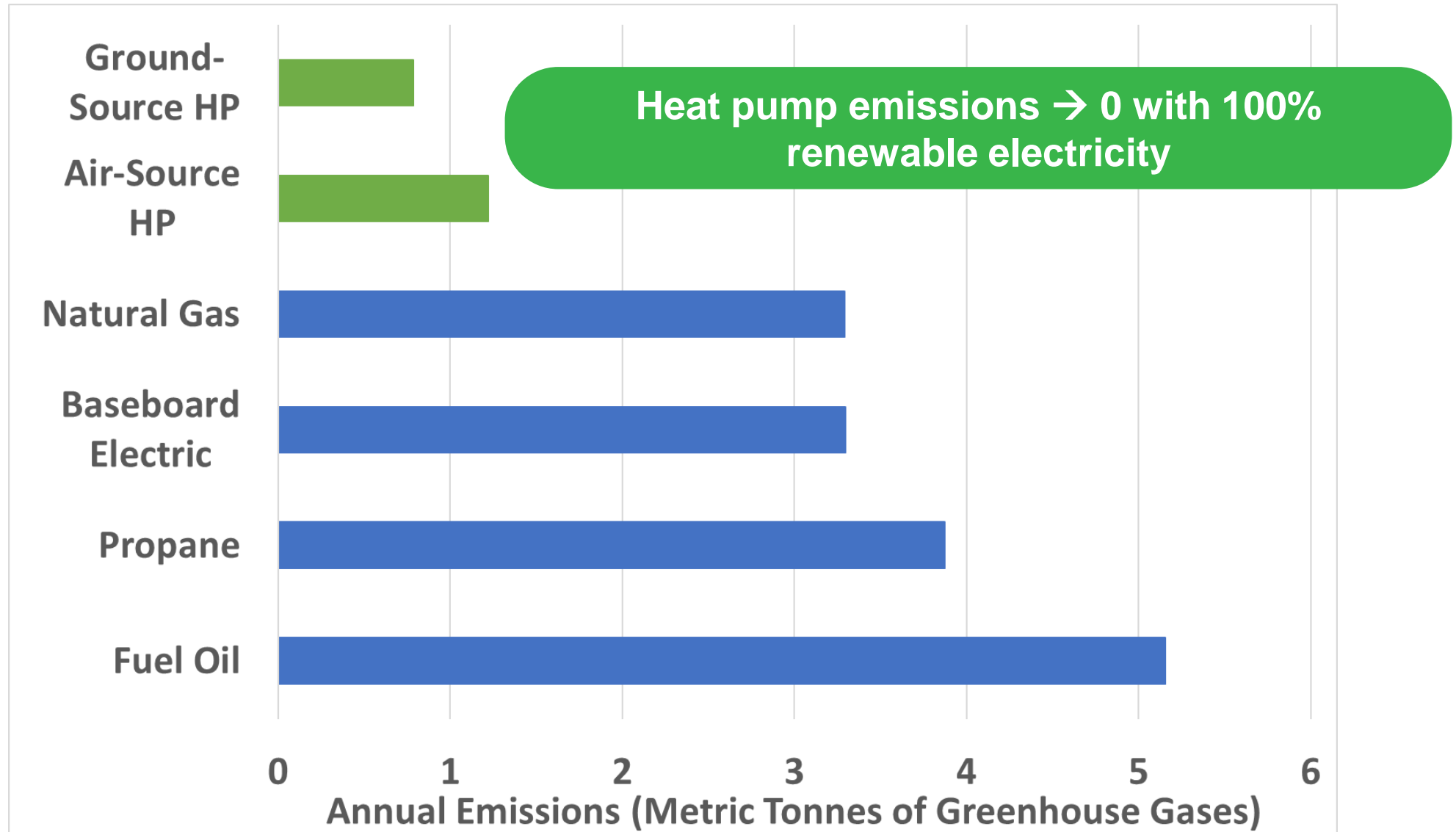


Illustration courtesy of NEEP

How Much Emissions Reduction?

2,000 sf home
Typical
construction



Notes:

- Based on projected grid emissions (2022 – 2040) for New England
- High-efficiency, new equipment
- Metric Tonne = 2,205 lb.

Which Type of Heat Pump is Right for Your Home?

Every Home is Unique

What is Your Existing Heat Distribution Type?

Hydronic (Hot Water or Steam)

Forced-Air



Boiler



Baseboards



Steam Radiators

Also, Radiant Floors



Furnace

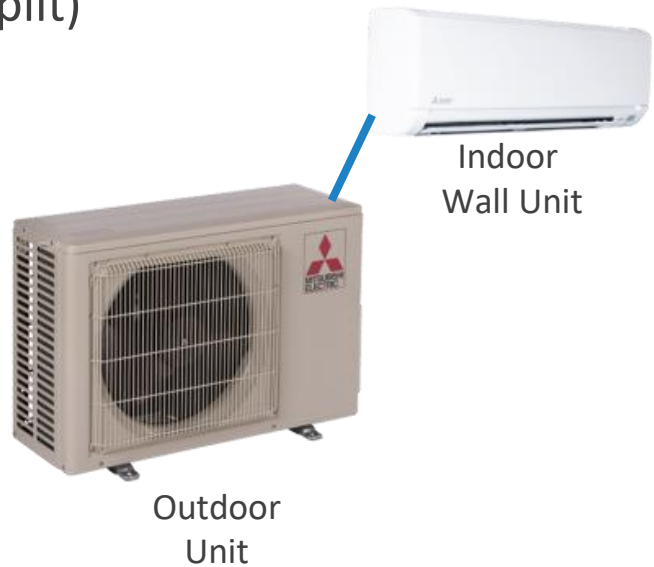


Supply and Return Vents,
floor- or wall-mounted

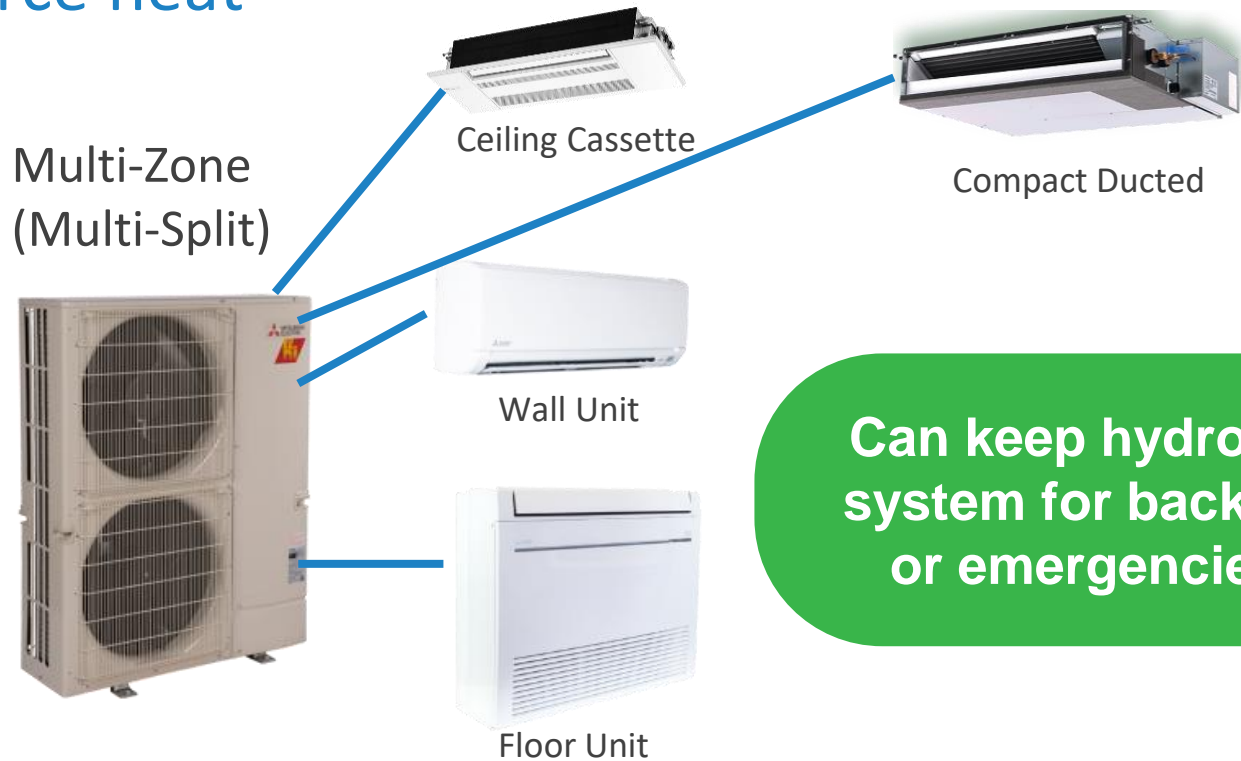
Heat-pump options for hydronic distribution

Ductless “mini-split” air-source heat pumps (ASHPs)

Single-Zone
(Mini-Split)



Multi-Zone
(Multi-Split)



Can keep hydronic system for back-up or emergencies

Air-to-water heat pumps

- **Use hydronic distribution**—modified for lower water temperatures
- Often good match for radiant floor heating
- Cooling requires special convectors, condensate drains, and pipe insulation

Most photos courtesy of NEEP.
No brand endorsement intended.

Heat-pump options for forced-air distribution

Central air-source heat pump (ASHP)

Ground-source heat pump (GSHP)

Partial
electrification
option



Indoor Unit (with Furnace)

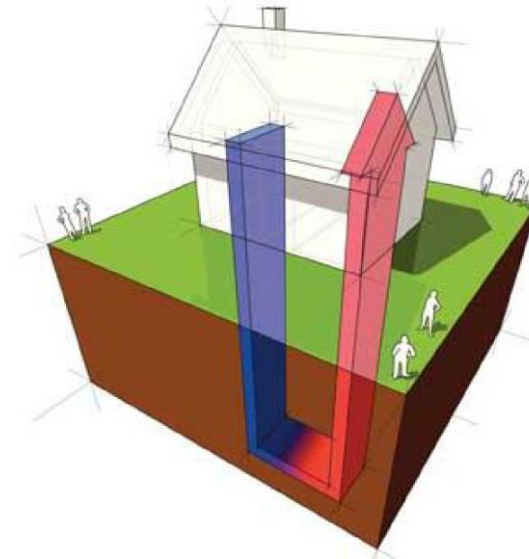


Outdoor Unit
- looks like central AC

Complete
electrification
option



Indoor Unit (with Resistance Heaters)



Complete
electrification



**Existing ducting must be adequately sized,
insulated, and sealed**

Heat-pump option for domestic hot water

Heat-Pump (*aka* Hybrid) Water Heaters

- Over 60% savings on energy / carbon emissions
- Fast payback compared to conventional electric
- Installed by plumbers



*Photos courtesy of manufacturers.
No brand endorsement intended.*

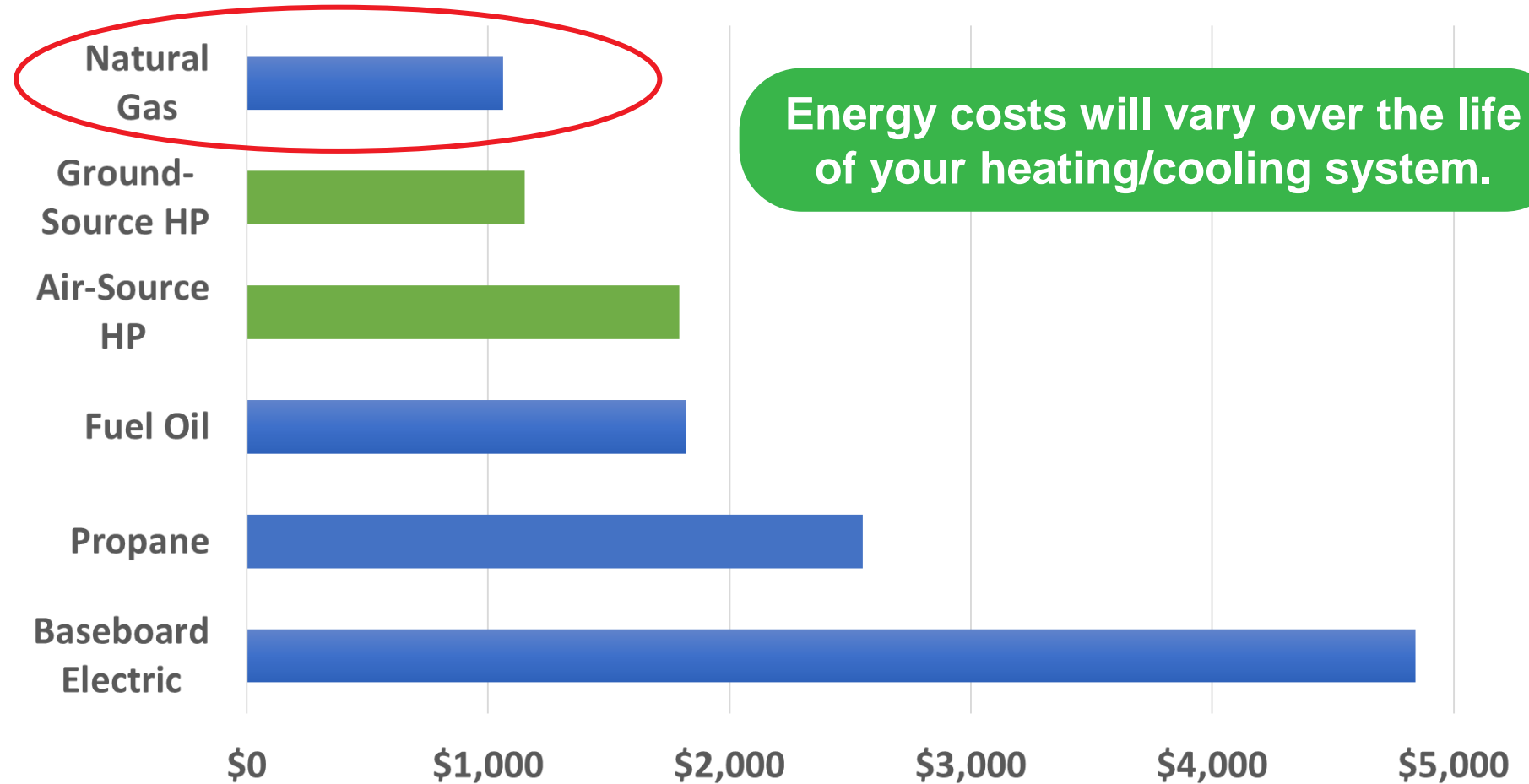
How Much Will It Cost?

Annual Energy Costs for Home Heating

2,000 sf home
Typical construction

Notes:

- Q1/Q2 2022 Eversource eastern-MA electric-heating rate (28 cents/kWh)
- 2021/2022 MA-average winter fuel costs
- High-efficiency new equipment



Financial Analysis

- Look at first-cost ***difference***—heat pump vs. conventional equipment
 - Include ***both*** heating ***and*** cooling equipment
- Include incentives (rebates, loans, tax credits)
- Consider:
 - Assigning a price to carbon emissions
 - Possible increase in home resale value
 - Value of comfort improvements
- Accept the uncertainties about future energy costs

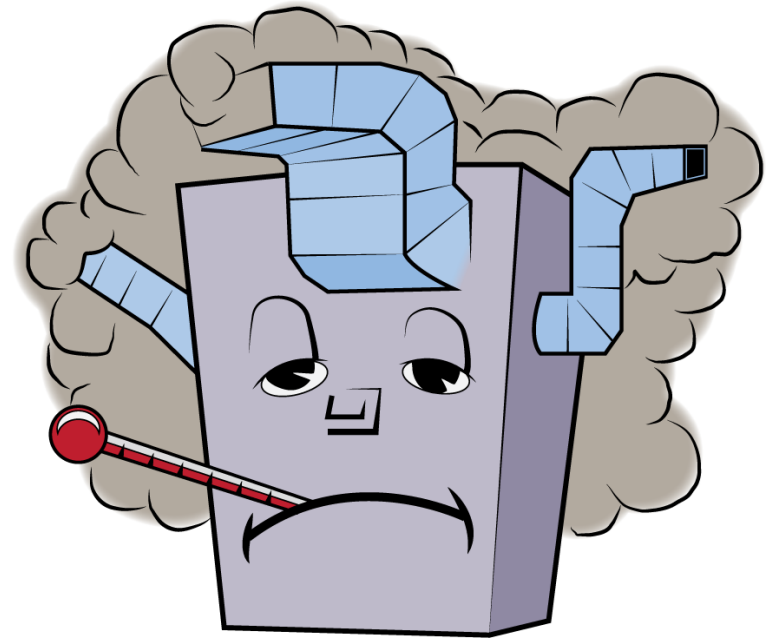


Your Action Plan

Plan ahead — don't wait for failure

Convert to a heat pump when...

- Current equipment is aging:
 - Heating OR cooling equipment over 15 years old
 - Water heater over 7 – 10 years old
 - Don't wait until system fails and replacement becomes urgent
- Adding AC to a home that doesn't have it yet
 - Heat pumps provide efficient heating **and** cooling
- Planning an addition, major renovation, or a new home
 - A heat pump can provide **100%** of heating and cooling needs



How do I get started?

- Get informed
 - Visit <http://heatsmartalliance.org/>
- Get a free home energy assessment
 - *Weatherize to the extent practical*
- Get help from a community heating coach (as available)
- Get quotes from heating/cooling installers
 - *Every home is unique – you'll learn from each installer*
 - *Consider all factors (equipment offered, installer reputation, and cost)*



Questions?

Contact Us:

HeatSmartAlliance.org