Heat Pumps

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GREEN ENERGY CONSUMERS ALLIANCE

Agenda

- Introductions
- Heat pump basics
- Costs and incentives
- Design considerations
- Questions?

Green Energy Consumers: Heat Pump Program

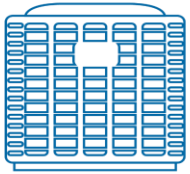
- Green Energy CONSUMERS Alliance
- Big transition to heating without fossil fuel combustion
- Helping energy consumers find trusted vendors and sound advice
- Moving the heat pump industry by educating consumers
- More details on our website:

https://info.greenenergyconsumers.org/abode

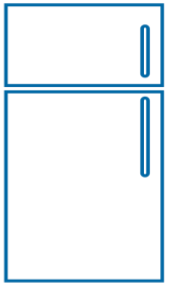
Heat pump basics

What is a heat pump?

Same technology as:



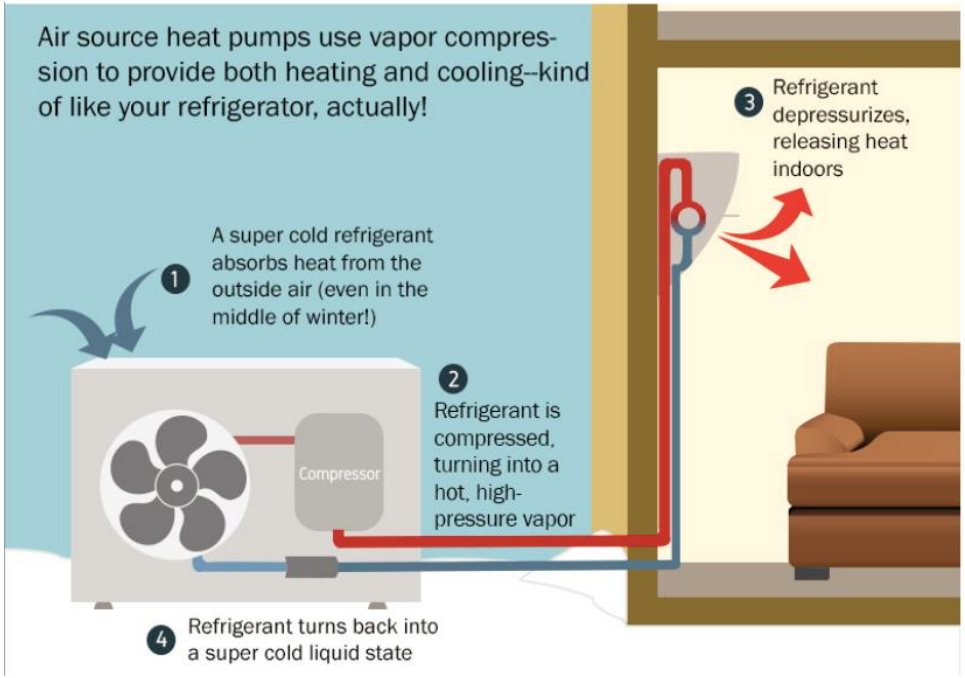
Air Conditioner



Refrigerator

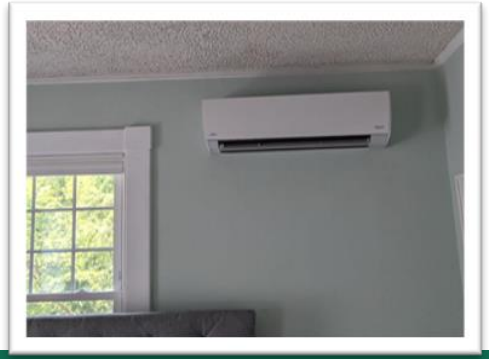
Heat pumps

- Efficient to very cold temps
- Varied forms
  - Ducted or ductless
  - Whole home or partial
  - Air-source or ground-source

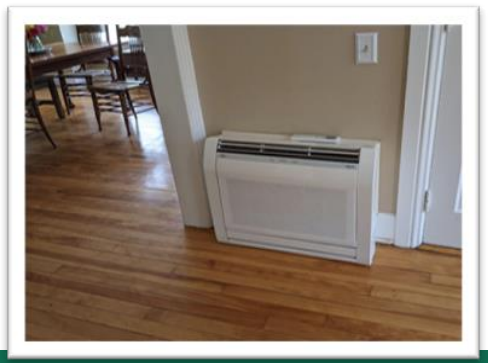


Ductless Indoor Variations (aka heads)

Wall Hung



Floor Mount

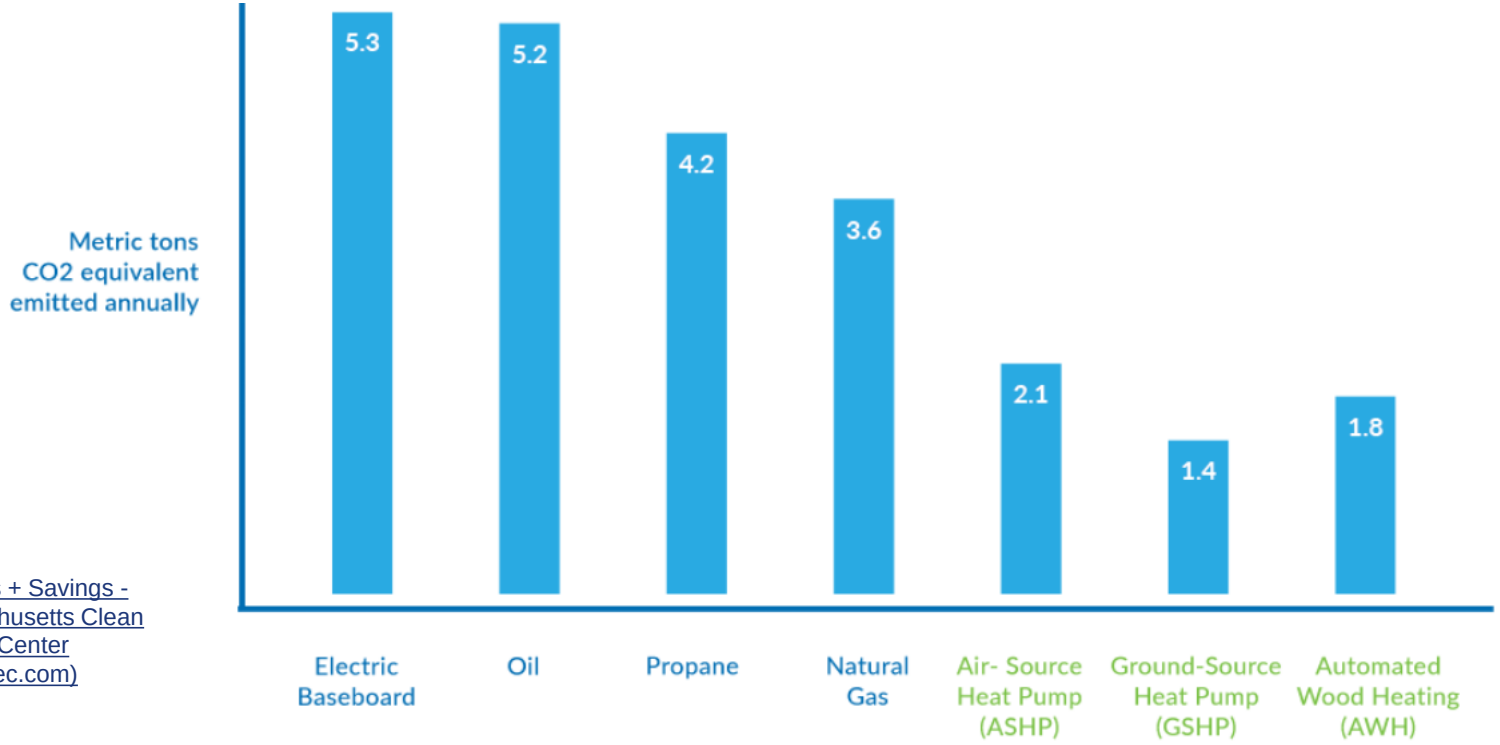


Ceiling Cassette

Outdoor Condensers Need Space

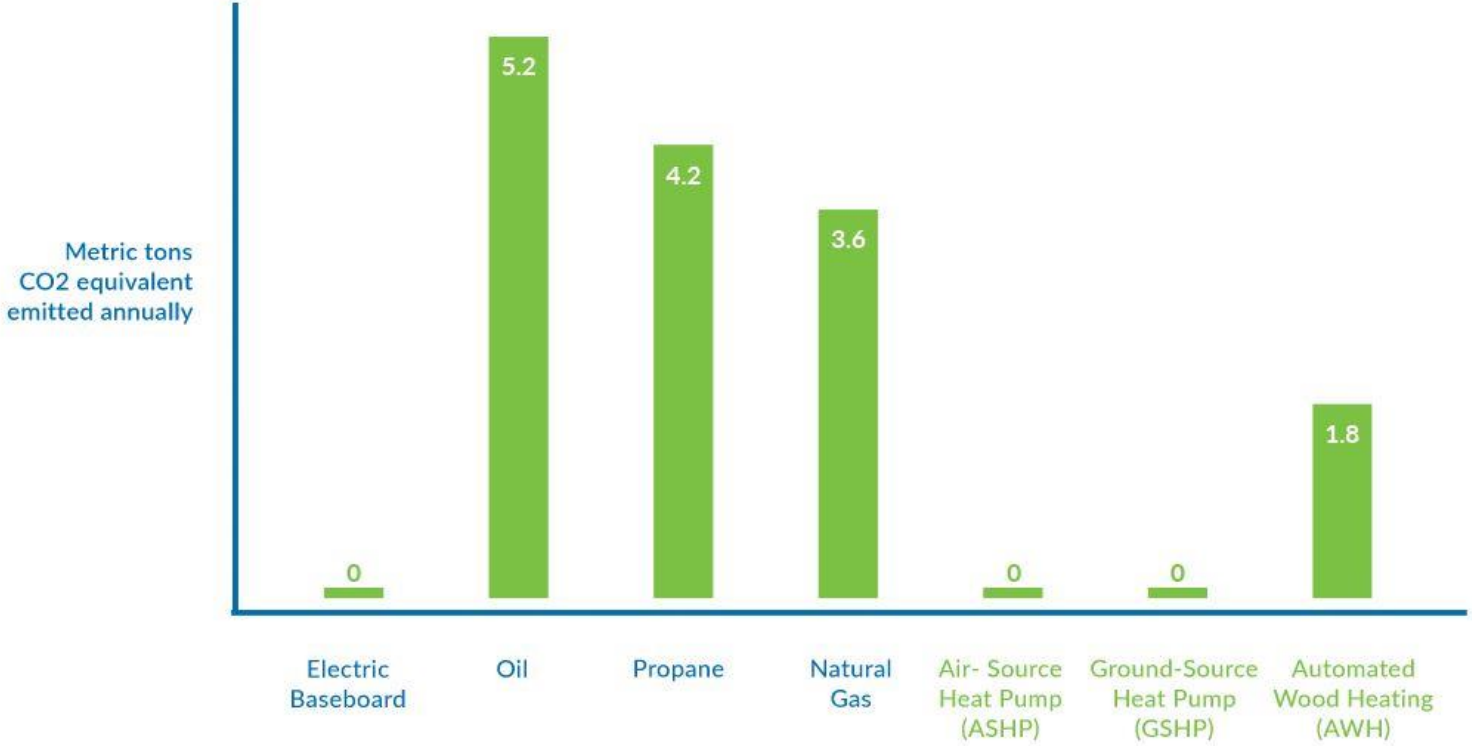
- Need free flow of air
- Must be off the ground to prevent ice build up
- Refrigerant line covered

GHG emissions with current electric grid



Benefits + Savings - Massachusetts Clean Energy Center (masscec.com)

GHG emissions with 100% clean electricity



Costs and incentives

Installation costs

- Rough ballpark: single head, ductless: $6,000
- Centrally ducted: $15 - $25K+
- Roughly comparable to fossil fuel heating + central air
- 200 amp electrical service likely needed
- 0% interest HEAT loan and incentives can offset much of your installation cost

Whole home rebate: Mass Save

- Completely replacing your fossil fuel heating
  - Fossil system may be left in place
- $10,000 per home – **regardless of system size**
- $16,000 for moderate-income
- Must get Home Energy Assessment first and,
- Weatherize first to reduce your heating needs

Heat pump with fossil fuel backup (MA)

Incentives for partial systems

- Depending on system size, up to $10,000
  - $1,250/ton (12,000 BTu)
  - ~ 400 - 800 SF/ton

Integrated controls for seamless transitions

- Thermostat connected to both systems
- Technician sets the switch-over point

Ground-source and air-to-water (MA)

- Whole home **ground-source** (aka geothermal) heat pumps: $15,000
  - More expensive installation costs due to site work on your property
  - More efficient than air-source

- Whole home air-to-water (aka **hydronic**) heat pumps: $10,000
  - Most applicable to radiant flooring
  - Very few experienced installers

Heat pump water heaters

- $750 rebate in MA
- $600 rebate in RI
- 2 - 3 times more efficient than electric resistance tanks
- Need adequate space for air exchange
- Electrical wiring – 240 volt circuit
- Condensate drain
- Makes space colder and dryer
- https://goclean.masscec.com/installers/

Federal tax credit

- Now up to $2,000 for heat pumps and HP water heaters
  - Must meet high standards for efficiency
- Smaller credits for electrical wiring upgrades, and other measures
- No lifetime cap so you can claim a new energy saving tax credit every year

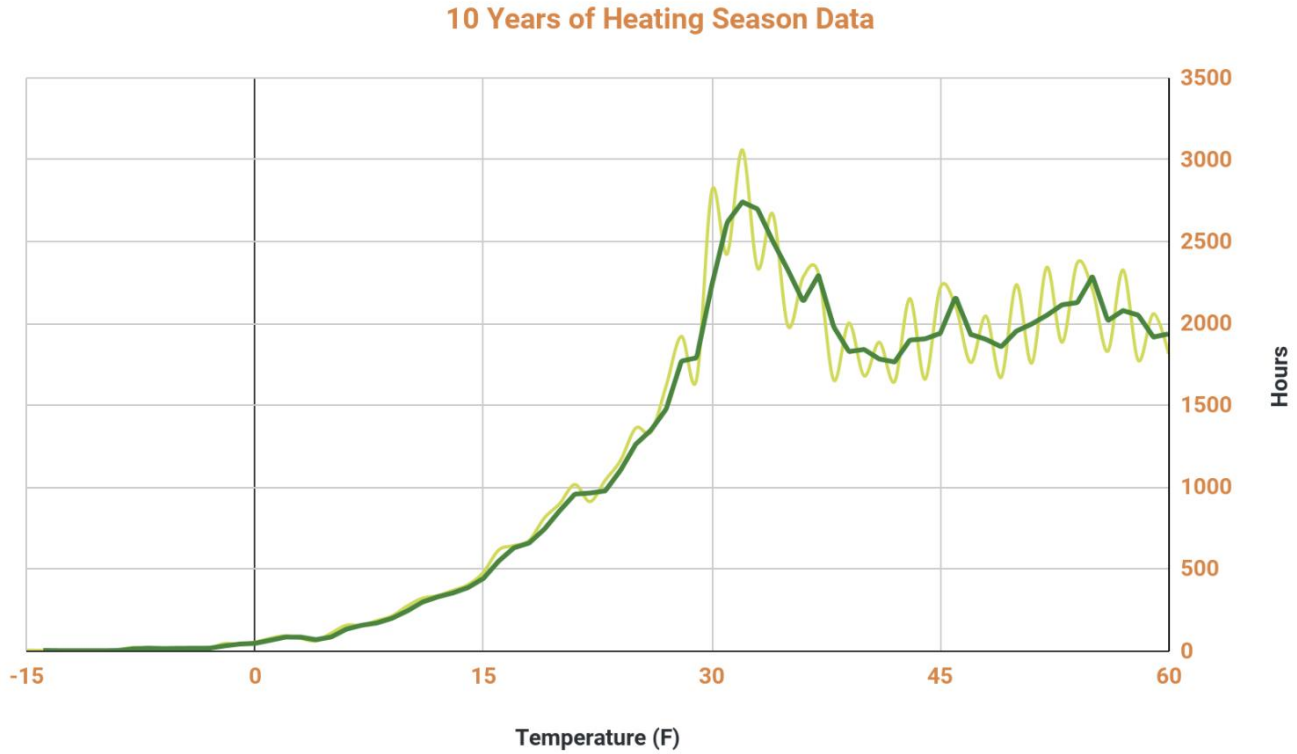
Federally-funded rebates … Nov. or later

- HOMES: For all income levels
  - based on projected energy savings
- HEEHRA: For incomes less than 150% of AMI
  - based on measures
  - In metro Boston, 150% AMI = $200K

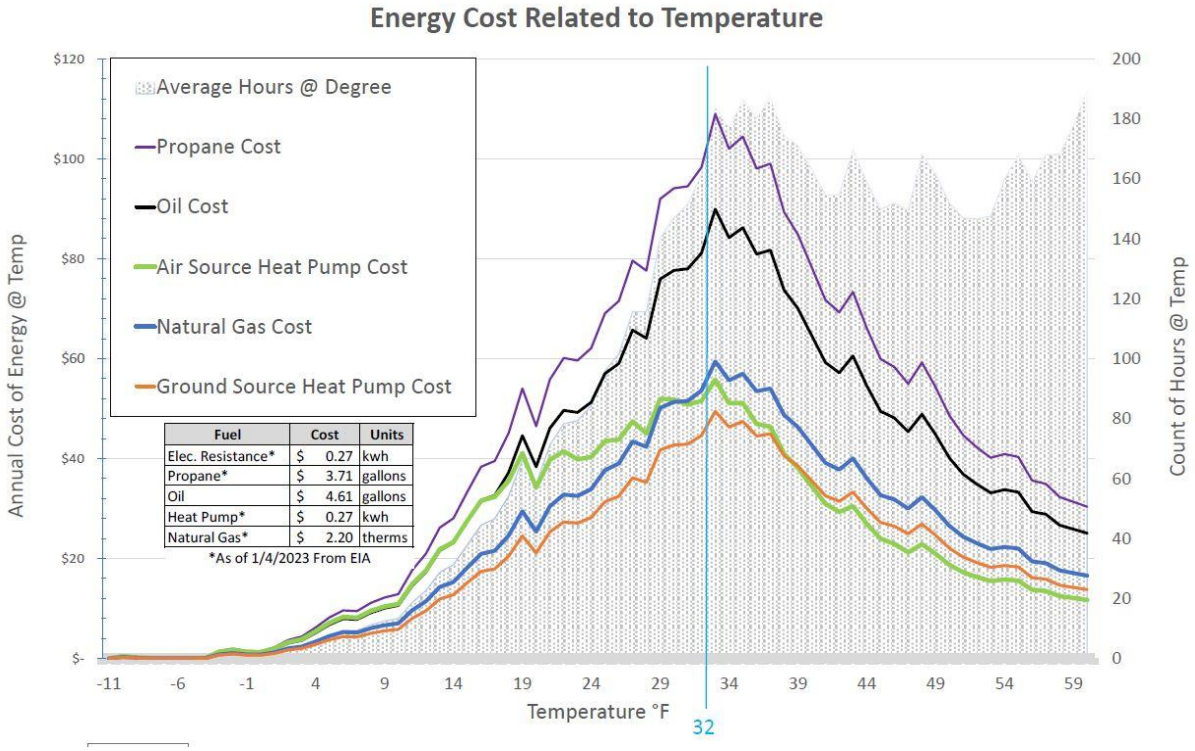
States must submit plan to feds before funds can be released

Operating Costs

- Efficiency, temperature and fuel cost determine operating cost
- 70 - 80% spent above 32F
- Heat pump lose efficiency as temperature drops



Operating Costs – with low electric rate



Fuel	Cost	Units
Elec. Resistance*	$ 0.27	kwh
Propane*	$ 3.71	gallons
Oil	$ 4.61	gallons
Heat Pump*	$ 0.27	kwh
Natural Gas*	$ 2.20	therms

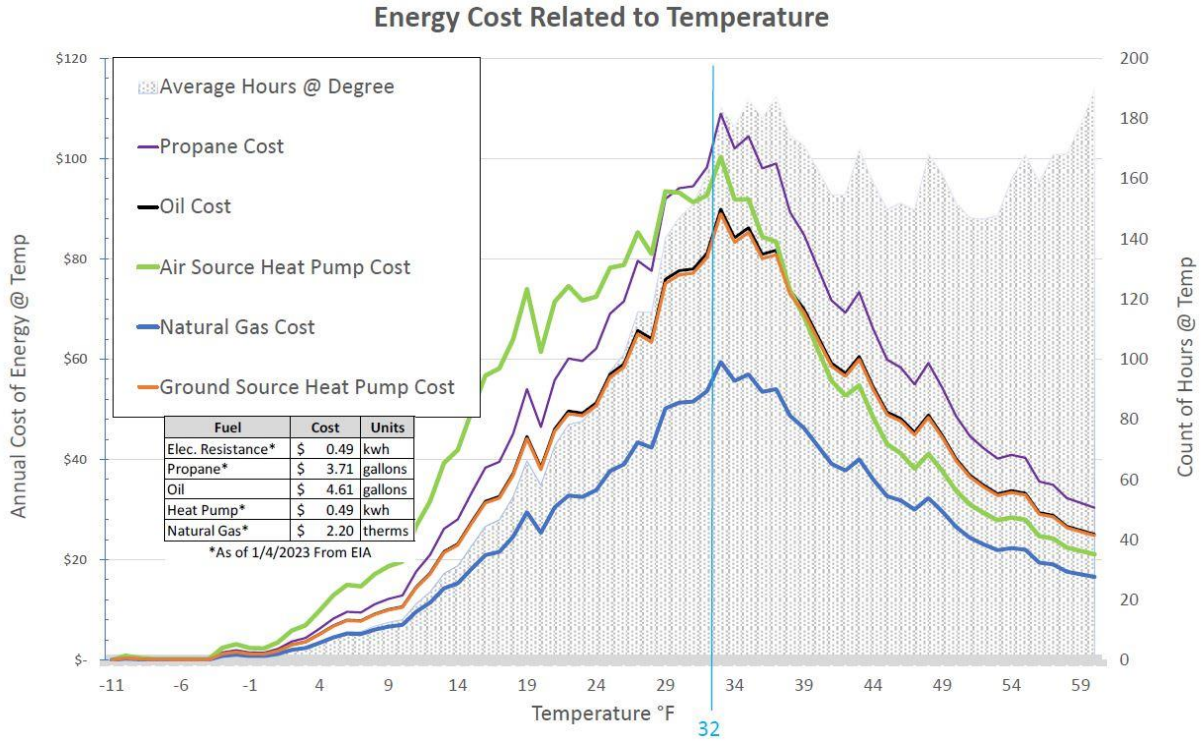
*As of 1/4/2023 From EIA

Lower your electric rate with

- municipal aggregation or
- Solar

You may have a lower rate if you have a municipal power company.

Operating Costs – with high electric rate



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- High electric rates and low gas rates make heat pumps more expensive to operate.
- Utility company rates change every 6 months.

Heat pump system design options

When home has ductwork:

...Furnace instead of boiler

- Hot air ductwork allows for relatively easy replacement of fossil fuel system with whole home fully ducted heat pump.

...Central air conditioning

- Heat pumps can replace central a/c
    - One piece of equipment could replace two
- Ductwork must be in good condition

When home lacks ductwork:

Heat pumps don’t produce hot enough water to easily replace boilers.

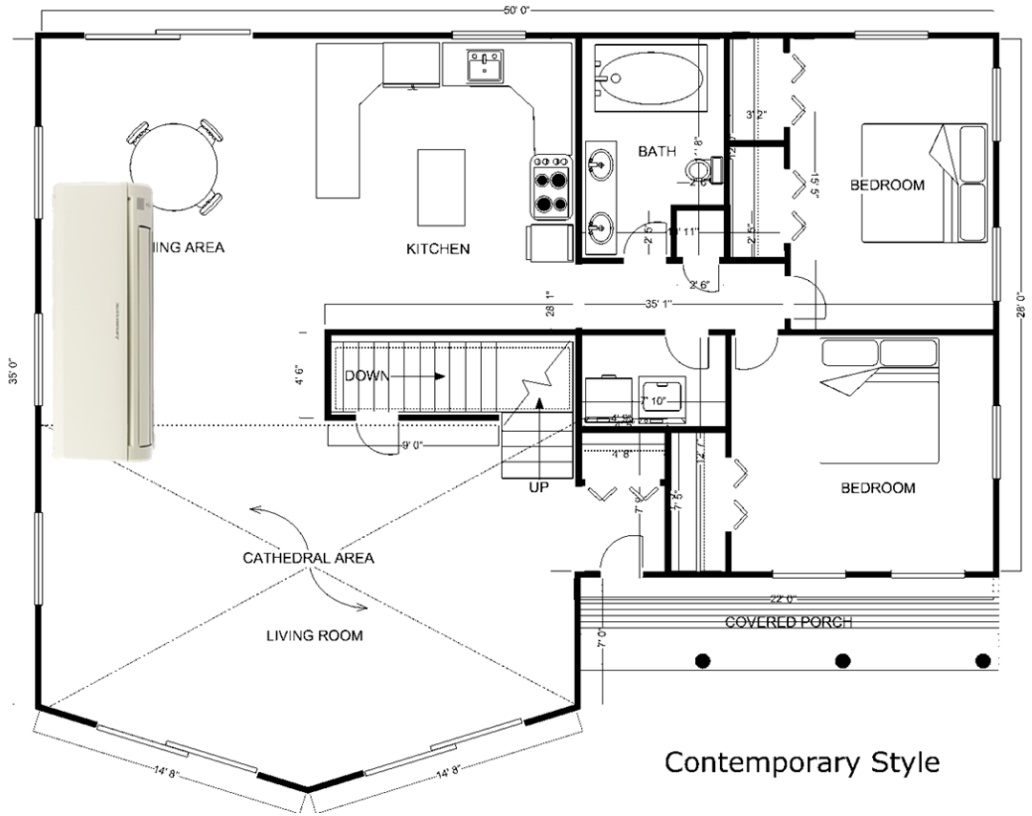
Ductless or mini-ducted systems

- Single head can serve a large open area
- Single zones or multi-zones
- Mini-ducted head to serve adjacent small rooms

In all cases, you’ll need space outside for condenser & snow protection

Sizing your system: *Matching your equipment to your heating needs*

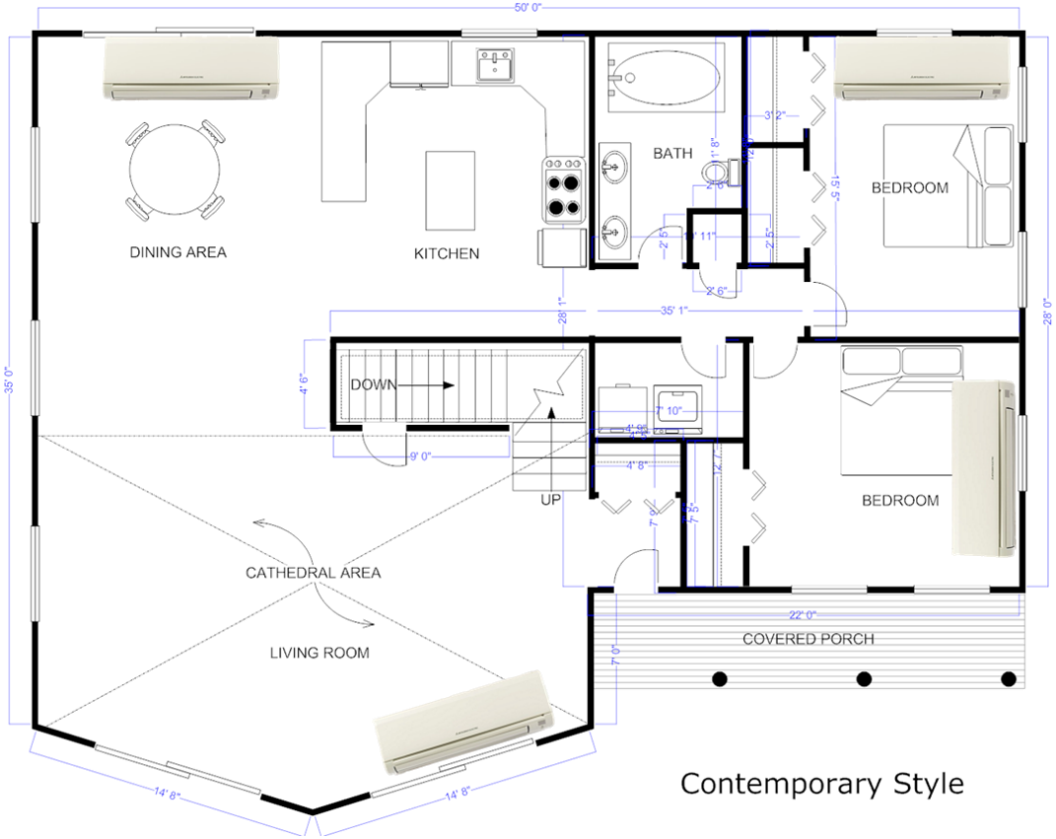
- MIght be fine for a partial displacment of fossil heat
- Or if you're used to heating with a wood stove



Contemporary Style

Too many heads in too small a space

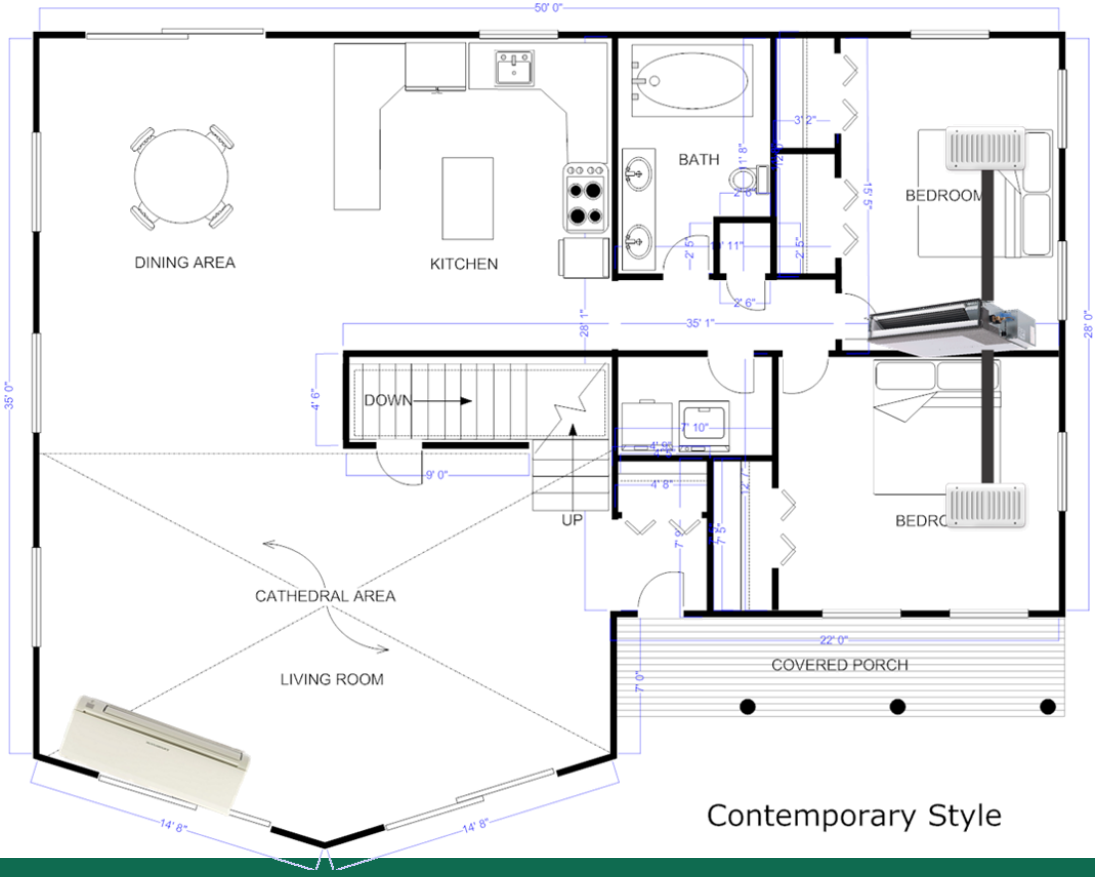
- Too much equipment will likely result in energy and performance issues.
- Heat pump systems are designed to run continuously
- On-off cycling is inefficient
- Cold and clammy in summer



Contemporary Style

Perfect mix: ductless and mini-ducted

- Mini-ducted units can help condition smaller rooms.
- Could be connected to two condensers or only one.
- Head can be up to 150 ft. from condenser.



Contemporary Style

Abode Energy Management

- Building science professionals
- Training contractors for Mass Save
- Quality control for Mass Save
- Program admins for numerous municipalities

"They're far more knowledgeable in the technology and application of the products, and *they're impartial*. I learned a great deal from them and it helped when it came time to talk to contractors. Got four quotes and some were very knowledgeable and some were not. Abode's expertise helped me ask the right questions."

JARROD READING

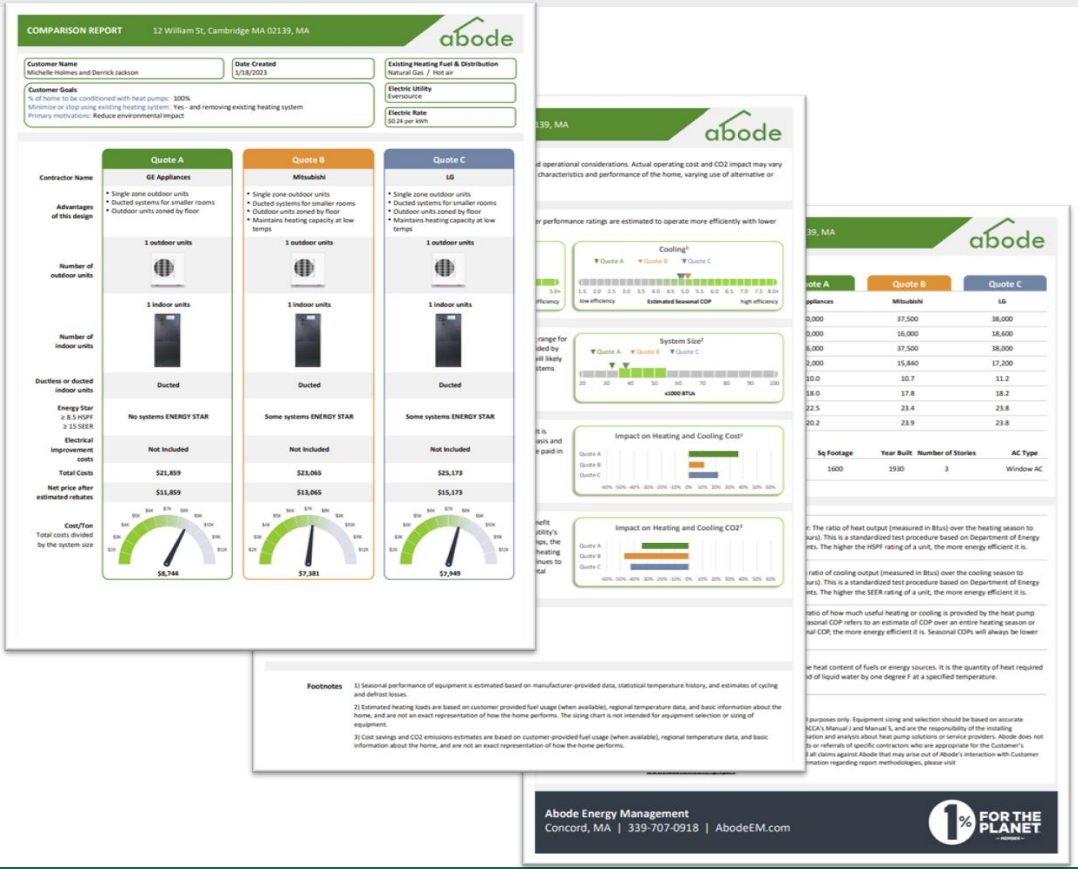
Abode services for Green Energy Consumers

- On-line portal to find **trusted heat pump installers** (free)
- Independent **quote comparison** ($75 – a 50% discount)
- Independent, virtual **consultations** with a building science expert ($150)
- More details on our website:

https://info.greenenergyconsumers.org/abode

Quote comparisons

- Side-by-side comparisons
- Multiple variables
- Clear explanations of technical information
- "Game changer" for consumers



Closing and questions

If you liked this webinar…

- **Update on the Federal Incentives for Electric Cars,** Weds, July 26 2023, 7:00pm
- **Ask a Solar Expert,** Tues., June 27, 7:30pm

- Register: greenenergyconsumers.org/events
- Find our recorded webinars on YouTube: youtube.com/MassEnergy/1982

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Mission

Speed the transition to a livable, safe, and low-carbon future

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Enable consumers to make green energy choices

Advocacy

Support climate action in Massachusetts and Rhode Island

Questions?

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