



**HomeWorks**  
Energy

# Electrification and You

2023

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# Introduction

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Home energy efficiency is what we love to do at HomeWorks Energy and we want to meet neighbors like you wherever you are in your journey to make your home greener. Whether you just scheduled a Mass Save® Home Energy Assessment, already completed insulation upgrades, or are brand new to the energy efficiency scene, HomeWorks is here to help.

Our mission at HomeWorks Energy is to always provide our customers with the most accurate and relevant information so that you can make an informed decision about how you plan to heat and cool your home for years to come.

What exactly is electrification and how does it affect your home, wallet, and planet?

Don't worry – we'll dive into all these questions and more. Our hope is that you find the following information valuable and that you feel empowered and prepared to join the conversation about electrification.



# The Massachusetts 2022-2024 Energy Efficiency Plan

Did you know that the second biggest source of greenhouse gas (GHG) emissions in Massachusetts is the building sector? Yes, that includes residential homes like yours!

According to Northeast Energy Efficiency Partnerships (NEEP), “space and water heating make up over 90 percent of all direct carbon emissions from homes and buildings in the region.”

The urgency of the climate crisis and the way in which humans contribute to it is unquestionable, but the dedication of Massachusetts to energy efficiency remains inspiring and hopeful.

For 14 years in a row, Massachusetts has taken 1st or 2nd place in state energy efficiency in the U.S.<sup>9</sup> and the state’s continued commitment to “going green” is the driving force behind these sustainability accomplishments.

It comes as no surprise that the Massachusetts 2022-2024 Energy Efficiency Plan aligns with efforts to reach net zero GHG emissions by 2050.

This is where electrification (and you!) come into the picture. The reality is that unfortunately gas, oil, and propane systems will never be able to reach net zero emissions, no matter how efficient they are – not in the way a fully electric system can.

Even though there's a plan to vastly increase the percentage of electricity produced from renewable energy (instead of fossil fuels), the state needs help from Massachusetts residents like you to reach their 2050 goals. Without most buildings, vehicles, and other fossil fuel consumers switching to electricity, the plan has a high probability of falling short of its sustainability targets.

**For that reason, electrification has become a statewide priority over the next 3 years.**

So, how does this affect you? As Massachusetts approaches their 2050 target, HVAC systems powered by fossil fuels will become harder and harder to sustain for homeowners and renters.

The incentive programs for fossil fuel systems have already dropped significantly from 2021 to 2022 (with many of them cut altogether), while the rebates for whole-home and partial-home electrification have risen to \$10,000 for a complete conversion to electrification using heat pumps.

At HomeWorks Energy, we continually support our customers as they navigate home energy efficiency and it's our mission to help homeowners and renters like you think toward the future and make the best decisions for your home, your wallet, and the planet.

We want all our neighbors to have the right facts in hand as they approach the exciting opportunity to access the benefits that electrification and heat pumps can provide.





## What is a heat pump?

A heat pump is an energy-efficient alternative to traditional systems like furnaces and air conditioners. Advanced technology allows a heat pump to heat and cool your home with one system – all powered by electricity.

The three main types of heat pumps are air-source, water-source, and geothermal – using the heat from the air, water, or the ground outside your home (respectively) to condition your home.<sup>6</sup> An air-source heat pump (ASHP) is the most common type installed in Massachusetts homes and other states in our region.

When it comes down to it, heat pumps are by far the most efficient way to heat and cool your home through electricity and the most cost-effective alternative to fossil fuels.

# How does an air-source heat pump work?

A heat pump harvests heat energy.<sup>8</sup>

During winter months, a heat pump removes heat from the outside and pumps it inside your house to create a warm environment. That's right – there's heat available outside even on the coldest of days. According to NEEP, “everything that is warmer than outer space has heat energy in it, and heat pumps are able to push that energy into or out of your home.”<sup>8</sup>

During warmer months, a heat pump transfers heat from inside your house to the outside environment to keep it cool indoors.

A heat pump is pretty much an air conditioner that can work in reverse during the winter season, and it follows a similar process as a refrigerator (a refrigerator collects the heat inside the appliance and then moves it to the kitchen).<sup>4</sup>

The operations of a heat pump all happen with the use of refrigerant gases that are expanded and compressed inside the equipment.<sup>5</sup>

Because it requires less energy to transfer heat than it does to generate it, this makes a heat pump an efficient way to provide home comfort all year long, in a variety of environmental conditions.

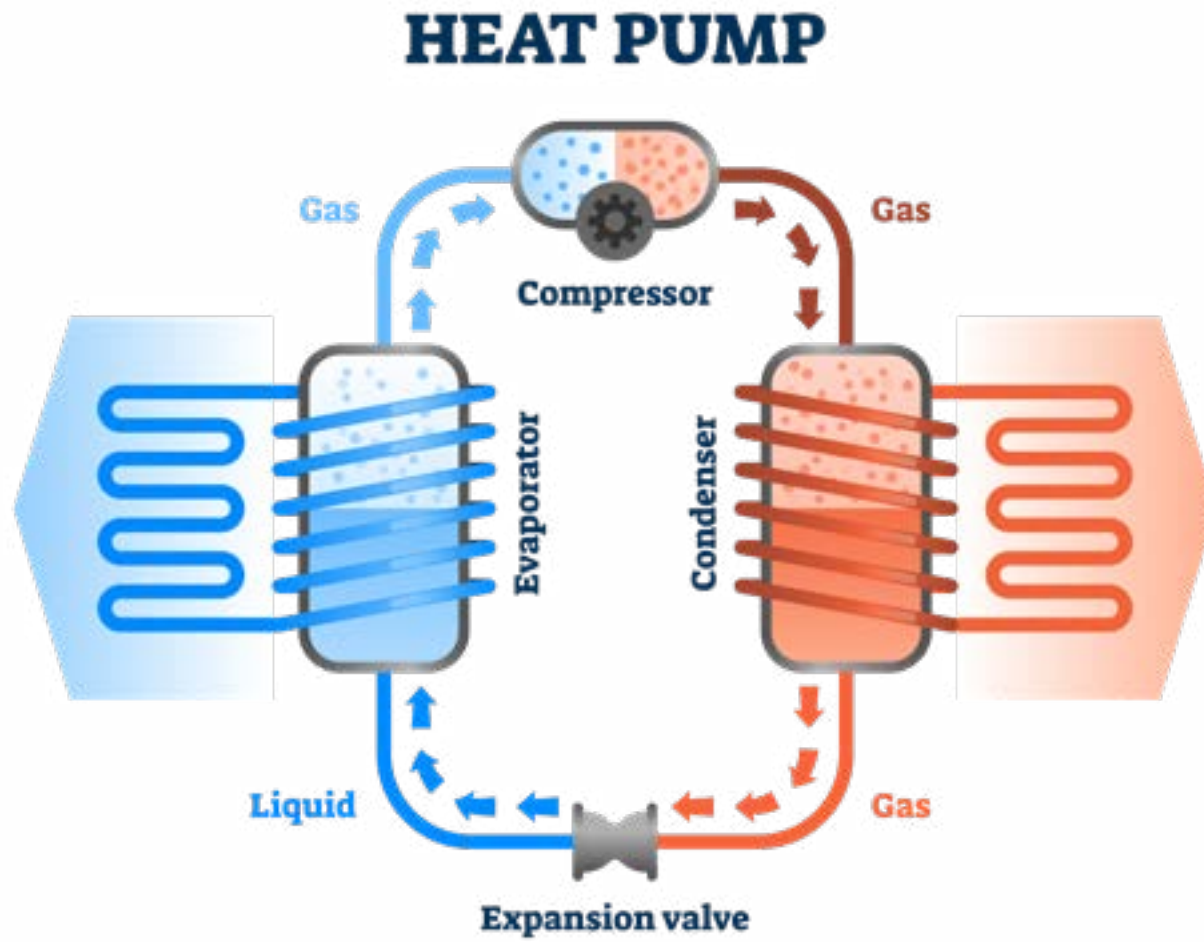
The motor and fans in heat pumps are designed to speed up or slow down depending on need, allowing heat pumps to provide just the right amount of heating and cooling without turning on



and off as the environment changes.<sup>8</sup>

According to the Natural Resources Defense Council (NRDC), “moving heat with electricity is several times more efficient (2-5x or better depending on the conditions) than making it by burning fuel.”<sup>5</sup>

Want to see the parts of a heat pump for yourself? [Click here](#) to watch a This Old House video that dives into the mechanics of a heat pump and the functionality of its parts.





# Is your home a good candidate for a heat pump?

One of the best things about heat pumps is their versatility. A variety of configurations exist to flexibly fit into any home, allowing an all-electric heat pump to perform efficiently in a wide range of circumstances. Your home would be a great candidate for a heat pump if any of the following apply.

- |   |  |
|---|--|
| <ul style="list-style-type: none"><li><input type="checkbox"/> I'm thinking about adding central AC to my home</li><li><input type="checkbox"/> I anticipate system failure in the near future and I'm already thinking about replacement</li><li><input type="checkbox"/> I want to take advantage of current Mass Save® rebates and 0% financing opportunities</li><li><input type="checkbox"/> I have hot water/electric heat baseboards or radiators</li><li><input type="checkbox"/> I want to heat or cool an addition on my home without ducts</li><li><input type="checkbox"/> I have one room with specific heating and cooling needs</li><li><input type="checkbox"/> My furnace is 12+ years old</li><li><input type="checkbox"/> My boiler is 20+ years old</li></ul> | <ul style="list-style-type: none"><li><input type="checkbox"/> I'm renovating my older house</li><li><input type="checkbox"/> My central air conditioner is 15+ years old</li><li><input type="checkbox"/> I'm building a new home and plan to have a duct system</li><li><input type="checkbox"/> I continue to waste money on system parts and repairs</li><li><input type="checkbox"/> My system is operating below 90% efficiency</li><li><input type="checkbox"/> I'm interested in solving home comfort issues with an all-in one solution</li><li><input type="checkbox"/> I'm concerned about indoor air quality</li><li><input type="checkbox"/> I currently use fossil fuels and I want to lower my carbon footprint</li></ul> |
|---|--|

We understand when our customers say that they want to get “just one more year” out of their current heating and cooling system, but when you can check off a couple of the boxes above, it's often more cost-effective to plan for replacement.

## Benefits of a Heat Pump

The benefits of electrification are undeniable. Here are some of the best things about a heat pump installation and how it can positively impact your home and the environment.

### A heat pump heats and cools

We're talking about comfort and convenience! With one system, you have the capability to heat and cool your home in a way that provides you energy savings all year long.

### You experience year-round comfort

One of the biggest myths about heat pumps is that they won't work during the New England winter.

In the 80s and 90s, this might have been the case, but with advancements in technology, heat pumps can produce plenty of heat when temperatures drop – even to -20 degrees Fahrenheit!

Heat pumps are proven to perform well in all climates, and according to the NRDC, one of the leaders in heat pump adoption is Maine, which is known for cold temperatures just like Massachusetts.<sup>5</sup>

### Heat pump efficiency is good for the environment

A heat pump runs on electricity which means



decreased greenhouse gas emissions! Heat pumps are one of the cleanest heating and cooling options available and unlike oil or gas, electricity gets cleaner and cleaner with every year that passes.<sup>8</sup>

According to the U.S. Department of Energy (DOE), “an air-source heat pump can deliver up to three times more heat energy to a home than the electrical energy it consumes.”<sup>7</sup>

Conventional heating systems that run on propane, oil, or gas generally have efficiencies between 80%-97%. Unfortunately, heating with fossil fuels will never reach 100% efficiency.<sup>9</sup>

If your carbon footprint is important to you, a heat pump is one of the best solutions on the market.<sup>8</sup>

### **It's affordable to operate**

Compared to heating and cooling with oil, propane, or electric baseboard (resistance), heat pumps allow you to save money on energy bills, say the sponsors of the Mass Save program.<sup>1</sup>

The U.S. DOE states that “today’s heat pump can reduce your electricity use for heating by approximately 50% compared to electric resistance heating such as furnaces and baseboard heaters.”<sup>6</sup>

When it comes to cooling your home, a heat pump’s efficiency is usually more than double that of window AC units and much more efficient than a typical central AC system.<sup>8</sup>

A NEEP study found that heat pumps installed in the Northeast experienced annual savings of “3,000 kWh (or \$459) when compared to electric resistance heaters, and 6,200 kWh (or \$948) when compared to oil systems. When displacing oil (i.e., the oil system remains, but operates less frequently), the average annual savings are nearly 3,000 kWh (or about \$300).”<sup>7</sup>

It’s important to remember that the true cost of a heat pump is the difference between its cost and what you would have spent on a new heating and cooling system like a furnace or central AC. Replacing your home’s system is inevitable, the question is simply when will it happen and what system will you choose?

## **You can take advantage of local incentives**

When we talk about affordability and savings, we can't leave the Mass Save program out of the conversation. Starting in 2022, Massachusetts residents could be eligible for up to \$10,000 for heat pump installations.

The Mass Save HEAT Loan is also available to use for the purchase of heat pumps, offering up to \$50,000 at 0% interest, for up to 7 years.

New federal tax credits from the Inflation Reduction Act can also be used, with up to \$2,000 available now for heat pumps.

## **It improves your home's air quality**

Heat pumps are great at filtering the air that you breathe while at home and they also dehumidify better than a typical air conditioner would, leading to increased comfort in warmer months.<sup>6</sup>

Heat pumps also remove worries about gas leaks and carbon monoxide poisoning, making your home a safer place to breathe and live.

## **There is flexibility with a heat pump installation**

A heat pump can be installed with or without ductwork and in a variety of combinations and configurations. You can utilize a heat pump for one room, multiple areas, or an entire home. Because of the customization that can be done, a Heating & Cooling Consultation is really the best way to visualize the options for your home and understand what you can accomplish with whole-home electrification.

## **Heat pump maintenance is simple**

Maintaining a heat pump is easy, especially with preventative maintenance plans available to ensure that your system continues to be high-performing year after year. If you change or clean your heat pump filters regularly, a heat pump should be a breeze to upkeep.



# Ducted or Ductless?

There are plenty of heat pump arrangements for homes with varying sizes and blueprints.

A **ducted** heat pump utilizes existing ductwork in your home to distribute conditioned air to your living spaces. A single air handler moves air through the ducts, dispersing air to the entire home.<sup>4</sup> This is a great option if your home already has a ventilation system or if you're constructing a new home with planned ductwork.

A **ductless** heat pump (**also called a mini-split heat pump or ductless mini-split**) operates without any ductwork. Ductless units are typically mounted high on a wall and connected to a single outdoor unit which requires a three-inch hole in the wall.<sup>7</sup> Narrow piping carries refrigerant to indoor units where conditioned air is delivered directly to the space where the indoor unit lives.<sup>4</sup>





# Sizing and load calculations

Your home's rooms and window dimensions must be measured to ensure an accurate and appropriate heat pump installation. In addition, your insulation will be evaluated. This will allow for a thorough calculation to be completed that can indicate how much heating and cooling your home needs to stay warm in the winter and cool in the summer. This is called your home's "heating and cooling loads."

Sizing is crucial with all heating and cooling systems and it's not any different with heat pumps. Bigger is not better and the wrong size can lead to inefficiencies, inconsistent comfort, and a shortened equipment lifespan.



## Heat pump efficiency performance ratings

All heat pumps have an EnergyGuide label that shows its heating and cooling efficiency performance rating.

### Heating Season Performance Factor (HSPF)

Heating efficiency of air-source heat pumps is reflected in its Heating Season Performance Factor (HSPF).

This is a measurement of the total heat provided to the conditioned space over an entire heating season, divided by the electrical energy consumed by the heat pump.

### Seasonal Energy Efficiency Ratio (SEER)

Cooling efficiency of air-source heat pumps is reflected in its Seasonal Energy Efficiency Ratio (SEER).

This is a measurement of the total heat removed from the conditioned space over an entire cooling season, divided by the electrical energy consumed by the heat pump.

Higher numbers represent higher efficiencies for both heating and cooling. The U.S. DOE recommends focusing on getting a heat pump with a high HSPF in colder climates like Massachusetts.<sup>7</sup>

## Heat pumps and weatherization

Updated insulation and air sealing are crucial for a heat pump to perform at its highest level of efficiency. If your home needs weatherization updates, we highly recommend the completion of these upgrades before installing a heat pump in your home. The Sponsors of the Mass Save program offer 75-100% off recommended insulation upgrades, plus you can access up to \$1,200 in federal tax credits through the Inflation Reduction Act.

The connection between heat pumps and weatherization should not be overlooked as you take the next steps to make your home more energy efficient.





## Conclusion

Air-source heat pump sales continue to rise year after year in the Northeast<sup>3</sup> and residents all over the state of Massachusetts are excited about electrifying their homes with energy-efficient heat pump technology.

At HomeWorks Energy, we're proud of our long-standing relationships with our customers and community and making homes more energy efficient is what we love to do.

We're the largest Home Performance Contractor in Massachusetts, leading the region in energy efficiency, and we've stopped more than 2.6 million tons of CO<sub>2</sub> from entering the atmosphere.

It's our goal to understand your energy efficiency challenges and it's our mission to make it easy, affordable, and achievable for you to live greener.

Because we're a Mass Save partner, you get access to the best energy efficiency rebates available in the state and we always work to get you the best deals on heating and cooling equipment. Simply put, we promise to be there if you need us - 10 days or 10 years from now.

Over the next 3 years we will be devoting even more time to educating our customers about reducing greenhouse gas emissions and the benefits that heat pumps can provide to residents across the state.

We know that electrification is the future and it's a privilege to be a part of the solution to a cleaner and greener tomorrow.



# Resources



## American Council for an Energy-Efficient Economy

[https://www.aceee.org/state-policy/scorecard?gclid=EAlaIqObChMlyrbtj7HS9QIVQYNbCh1iPQE-jEAAAYASAAEgKDqvD\\_BwE](https://www.aceee.org/state-policy/scorecard?gclid=EAlaIqObChMlyrbtj7HS9QIVQYNbCh1iPQE-jEAAAYASAAEgKDqvD_BwE) (9)

## Mass Save

<https://www.masssave.com/en/heatpump> (1)

## Natural Resources Defense Council

<https://www.nrdc.org/experts/alex-hillbrand/thinking-buying-air-conditioner-consider-heat-pump> (5)

## Northeast Energy Efficiency Partnerships

<https://neep.org/smart-efficient-low-carbon-building-energy-solutions/air-source-heat-pumps> (3)

[https://neep.org/sites/default/files/NEEP\\_ASHP\\_2016MTStrategy\\_Report\\_FINAL.pdf](https://neep.org/sites/default/files/NEEP_ASHP_2016MTStrategy_Report_FINAL.pdf) (4)

[https://neep.org/sites/default/files/resources/ASHP\\_buyingguide\\_5.pdf](https://neep.org/sites/default/files/resources/ASHP_buyingguide_5.pdf) (8)

## U.S. Department of Energy

<https://www.energy.gov/energysaver/heat-pump-systems> (6)

<https://www.energy.gov/energysaver/air-source-heat-pumps> (7)

