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YOUR GUIDE TO

Air-Source Heat Pumps

AIR-SOURCE HEAT PUMPS: Four Reasons to Switch

1. LOWER GREENHOUSE GAS EMISSIONS
2. COST COMPETITIVE
3. ALL-IN-ONE COMFORT
4. VERSATILE

Air-source heat pumps are efficient heating and cooling systems that can keep your home at a comfortable temperature all year round.

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Air-Source Heat Pumps (ASHP)

Air-Source Heat Pumps (ASHP)

Technology Overview

Air-Source Heat Pumps are heating and cooling systems that move heat into a home in the winter and draw heat out of the home in the summer. Instead of burning fossil fuels, they operate on the same principle as your refrigerator: using a refrigerant cycle, powered by electricity, to move heat and to keep your home at a comfortable temperature year round. They are much more efficient than electric resistance (electric baseboard) heating and also provide highly efficient air conditioning.

Outdoor Unit

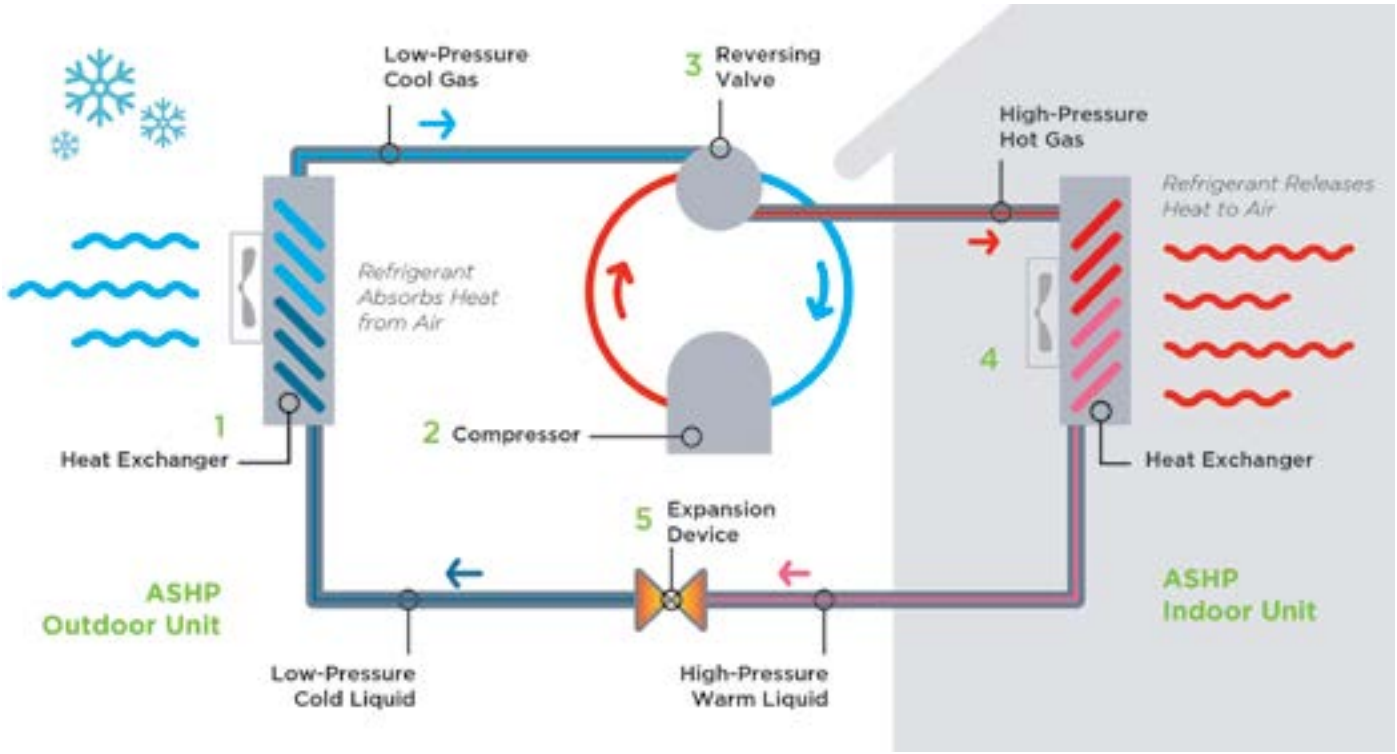
Indoor Unit

Air-source heat pump systems feature an outdoor unit (containing a compressor, reversing valve, heat exchanger and expansion device) connected to one or more indoor units by small refrigerant piping. The refrigerant is a substance with properties that enable it to easily absorb and release heat.

AIR-SOURCE HEAT PUMPS (ASHP)

The Technology

ASHP
Winter Mode

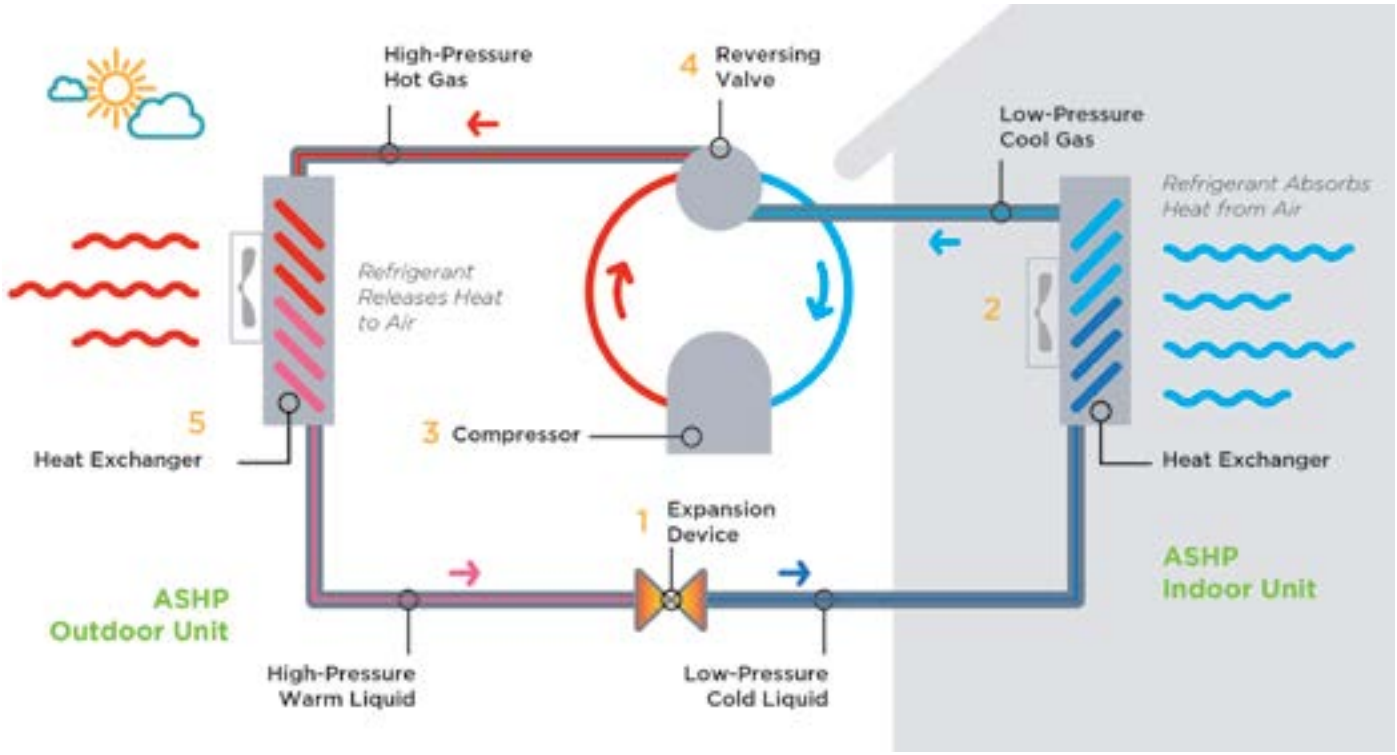


In the winter, very cold, low-pressure refrigerant absorbs heat from the outside air at the outdoor unit's heat exchanger **(1)**. (Yes, even sub-zero outdoor air has heat in it!) The refrigerant then flows to the air-source heat pump's compressor **(2)**, which mechanically pressurizes the refrigerant, causing it to heat up. The reversing valve **(3)** directs the hot refrigerant to flow to an indoor heat-exchanger where the refrigerant transfers its heat to the indoor air **(4)**. No longer hot, the refrigerant then passes through an expansion device **(5)**, which makes it very cold. Because it is now colder than the outdoor temperature, the refrigerant can again absorb heat from the outdoor air to begin the cycle again **(1)**.

AIR-SOURCE HEAT PUMPS (ASHP)

The Technology

ASHP
Summer Mode



In the summer months, the process is reversed. The refrigerant passes through the expansion device, which makes it very cold **(1).** The cold refrigerant absorbs heat from air inside the home at the indoor heat exchanger **(2)**, cooling down the interior. Once outside, the warmed refrigerant goes through the compressor **(3)**, which pressurizes and heats it up further. This time, the reversing valve **(4)** directs the hot refrigerant to the outdoor heat exchanger. Because the refrigerant is now hotter than the outside temperature, it gives up its heat to the outdoor air **(5)**, much the way a conventional air-conditioning system works.

In cold climates, like Massachusetts', high efficiency, **cold-climate air-source heat pumps** can provide 100% of a home's heating and cooling needs. Two common myths are that air-source heat pumps cannot heat when temperatures are below freezing and that they cannot heat homes without a backup heating source. In fact, cold-climate air-source heat pumps provide heating below freezing temperatures and do not require a backup in well-insulated homes. Not all heat pumps available for sale in Massachusetts are specifically designed to perform well on the coldest winter days. This guide focuses on the installation of cold-climate air-source heat pumps. To find air-source heat pumps that are certified as cold climate heat pumps, look at NEEP's Cold Climate Air Source Heat Pump List.

AIR-SOURCE HEAT PUMPS (ASHP)

The Technology

AIR-SOURCE HEAT PUMPS ARE VERSATILE

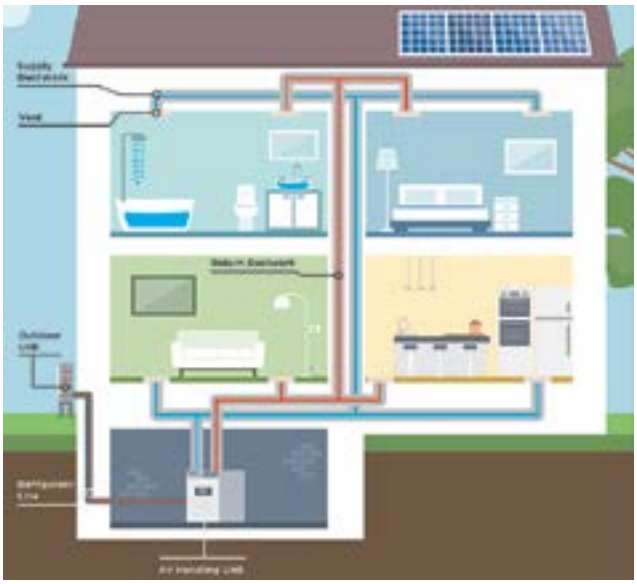
Air-Source Heat Pumps use three types of systems to distribute heating and cooling:

- **Ducted**
- **Ductless** (single-zone or multi-zone)
- **Combination of ducted and ductless system**

There are two main system types of air-source heat pumps: ducted or ductless.

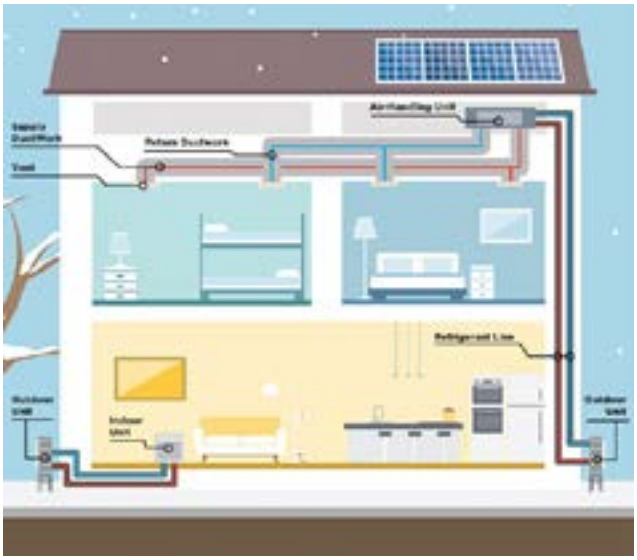
- **Ducted** systems have an outdoor unit (similar to a central air conditioner), which is connected to an indoor air-handling unit that connects to the home's ductwork. Ducted systems can work well for homes that already have ducts or where the homeowner is planning to install ducts. A version of ducted systems known as "compact-ducted" uses much smaller air handlers that usually serve two to four rooms.
- **Ductless** systems (including "mini-splits") have an outdoor unit which is connected to one or more indoor units (or "heads") by small copper refrigerant pipes. Each head typically serves one room or area of a house. Ductless heads can be mounted on a wall, mounted to the floor, or embedded in the ceiling. Ductless systems are a great option for houses that have no existing ductwork.

Homes can be outfitted with a combination of ducted and ductless systems for a custom configuration that meets a home's needs. This approach can be especially useful when building an addition; if the original part of a home already has ductwork, and the ductwork can't easily be extended to the addition, homeowners can choose to install a ductless system in the addition, and also consider a ducted system for the rest of the home.



Air-Source Ducted System

Air-Source Ductless System



Mix of Compact-Ducted and Ductless System

ASHPs run on electricity instead of burning fossil fuels, to heat and cool your home, reducing your home's greenhouse gas emissions.

- **Single-zone system** pairs one outdoor unit with one indoor unit. That indoor unit can either be a ducted system that would heat multiple rooms in a home, or a ductless indoor unit (or "head"), that would heat one zone in a home (typically one room or an open living space).
- **Multi-zone system** features an outdoor unit paired with a combination of indoor heads to create multiple indoor zones. Multi-zone outdoor units can be connected to serve a mix of ducted and/or ductless indoor units. You can also achieve multiple zones in your home by installing two or more single-zone systems.

Optional Integration with Existing Heating System

While cold-climate air-source heat pumps are capable of providing 100% of a home's heating needs, homeowners may opt to keep their existing heating system in place. In these cases, the operation of new air-source heat pumps can be integrated with the existing system. Depending on the heat pump configuration, there may be multiple thermostats, or "integrated controls" (i.e., one thermostat to handle both devices), that manage both the heat pump(s) and the existing heating system. This will help minimize the use of your existing system while maximizing the use of your heat pump to get maximum savings and comfort. Homeowners should talk to an installer about which configuration is right for them. If the existing heating system is left in place, homeowners should make sure that the installer leaves clear instructions about how to operate the two heating systems together.

Further Resources: Some of the information in this guide is taken from the Northeast Energy Efficiency's *Air Source Heat Pump Buying Guide*, available at: https://neep.org/air-source-heat-pump-buying-guide.

AIR-TO-WATER HEAT PUMPS

Air-to-water heat pumps work similarly to other air-source heat pumps except that they use water, instead of air, in the distribution system. This means that instead of blowing hot air in the winter to provide heat, air-to-water heat pumps heat up water in a radiator or in baseboard heating that provides heating to a home.

Air-to-water heat pumps can require fewer interior refrigerant piping connections but, because the hot water is delivered at a lower temperature than with a boiler, they can require upgrades of existing radiators and baseboards.

Unlike typical air-source heat pumps, air-to-water heat pumps have the potential to heat domestic hot water, and they can provide cooling if they are connected to a cooling system that can use chilled water, like a hydronic fan coil.

Air-to-water heat pumps are not widely available in the United States at this time, but there is growing interest in the technology.

For more information visit:
energystar.gov

AIR-SOURCE HEAT PUMPS (ASHP)

Are Air-Source Heat Pumps a Good Fit For My Home?

If you answer yes to ANY of the following questions, then ASHPs may be a good fit for your home.

☐ **Do you want to reduce your home's greenhouse gas emissions?**

ASHPs run on electricity instead of burning fossil fuels to heat and cool your home, reducing your home's greenhouse gas emissions.

☐ **Do you currently heat your home with oil, propane, or electric resistance?**

With today's energy prices, heating your home with ASHPs instead of oil, propane, or electric resistance will lower your heating operating expenses.

☐ **Do you want to add air conditioning to your home?**

ASHPs are a great option for adding air conditioning while upgrading your old, inefficient heating system at the same time! For homes without existing ductwork for central air-conditioning, ductless heat pumps can provide heating and cooling to the entire home without the expense and disruption of installing ductwork. As a bonus, you get a new heating system too!

☐ **Do you want to replace your current central air conditioning system?**

ASHPs can upgrade your old, inefficient central air-conditioning system. For homes with existing ductwork, a ducted ASHP may be able to use your existing ducts, although you should talk to an installer about whether your existing ductwork needs any upgrades to accommodate a heat pump. The additional cost of installing a heat pump (instead of just an air conditioning unit) may be covered by incentives and will provide your home with a new heating system.

☐ **Do you currently have a hot air heating system (i.e., furnace) that is old or inefficient?**

Ductwork for hot air systems can be paired with a central air-source heat pump, although you should talk to an installer about whether your existing ductwork needs any upgrades to accommodate a heat pump.

☐ **Are there parts of your home that are not adequately heated or cooled by your existing system?**

ASHPs are a flexible solution that can be designed to ensure comfortable conditions in your entire home or parts of your home that were never comfortable before. For example, the flexibility in design allows for homes with ducts to reuse the ducts if desired, while also adding a ductless unit or two for problem areas. Ductless ASHPs can provide zonal control from each indoor unit, so you can keep different parts of your home at different temperatures based on your preferences. For homes with radiators, ductless units can provide heating and cooling without the need to install ductwork, although a mini-duct solution may be a good way to heat and cool some adjacent smaller rooms like upstairs bedrooms. Talk to your installer about your goals for your home, and they should be able to design a system to help meet those goals.

☐ **Do you have an open concept house?**

Homes with larger open spaces and fewer individual rooms can reduce the number of indoor units needed to heat and cool the entire home, bringing down the cost of an ASHP installation.

☐ **Do you have photovoltaic solar panels on your roof?**

ASHPs run on electricity. If you already have PV panels on your roof that are generating more electricity than your home is currently consuming, then you can use the electricity from your existing solar panels to run your heat pump, decreasing or even eliminating your heating and cooling operating expenses.

☐ **Is your house weatherized (i.e., well-insulated and air-sealed)?**

Weatherized homes require less energy to heat and maintain more even temperatures throughout the home, which will allow ASHPs to heat or cool your entire home with less capacity and fewer indoor heads, reducing the cost of installing ASHPs in your home and lowering the operating cost.

Case Studies

Nia with her floor mounted indoor unit.

Mattapan resident Nia has cut her average electric bill in half since replacing her electric baseboards and window air-conditioners with air-source heat pumps: "Wow, it blew my mind. Normally the bill is anywhere from $400 to $500, and it was more like $200, I was like, 'Let me look at that again!'"

Peter from Berlin, MA installed air-source heat pumps for his family's home: "I reviewed different options for an alternative heating source instead of my current electric heat. It would have been extremely costly to add a fossil fuel system with furnace, plumbing, and ductwork. The heat pumps provide whisper-quiet cooling in the summer and heating in the winter. I'm easily saving hundreds of dollars every year compared to my electric heat. My return-on-investment will be short, my house will be comfortable, and my carbon footprint is reduced. Easily one of the best things I've done for my home."

Peter with an indoor wall mounted unit.

Photo of the back of James' house in Hyde Park.

With increasing concerns about climate change, moving away from a fossil fuel-based heating system was an important decision for James in Hyde Park, Boston. Once his natural gas boiler needed replacement, James installed an air-source heat pump system for his home. Now James heats his entire 120-year-old Victorian home with an air-source heat pump system. According to James, he wants to do his part to reduce climate change and fossil fuel usage.

AIR-SOURCE HEAT PUMPS (ASHP)

Benefits of Cold-Climate ASHPs

COST

- Lowest up-front installation cost of any low-carbon heating or cooling solution.
- Cost-competitive to operate compared to oil, propane, or electric resistance heat

FLEXIBILITY & FUNCTION

- Provides both heating and cooling in a single, efficient system
- Can be ductless or ducted, depending on what works better for your home
- Ductless indoor units can be floor-, ceiling-, or wall-mounted
- Operates efficiently in cold-climate regions, like Massachusetts
- Cold-climate air-source heat pumps can be the sole source of heating and cooling in a well-insulated home
- Adaptable for many situations. Air-source heat pumps can:
  - Fully replace your existing heating system
  - Integrate with your existing system
  - Supplement your existing system

COMFORT

- Easy to configure for zone-by-zone temperature control
- Provides air conditioning without sacrificing the use of the window
- Indoor units are much quieter than window air conditioners
- Outdoor units are typically much quieter than a traditional central air conditioning (AC) outdoor unit

GREENHOUSE GAS EMISSIONS

- Lower greenhouse gas impact than fossil fuels with today's standard electric grid mix – and the grid is getting greener over time
- Potential for zero greenhouse gas impacts when paired with solar PV or 100% renewable electricity

Cost

ESTIMATED COST

The cost to install an air-source heat pump in your home will depend on the specific characteristics of the building, how much of your home's heating and cooling you want to cover with your heat pump system, the kind of system and the features you choose, and your installer. Before incentives, a single-head ductless heat pump costs around $5,000, including installation. Whole-home replacement systems will start at $15,000 and can range up to $25,000 or more, depending on the home.

- **Ductless:** Larger homes and homes with more rooms or zones will have higher costs. Conversely, small homes or homes that are very well insulated can use smaller heat pump systems and will see lower costs.
- **Ducted or centralized:** Costs increase depending on the size of the home and the degree of ductwork modification required. Ductwork modifications can increase the project costs significantly. Conversely, homes that already have ductwork that is suitable for heat pumps offer some of the most cost-effective whole-home heat pump opportunities.

Homes that have less than 200-amp electrical service will likely incur additional costs for upgrading the electrical service to accommodate an air-source heat pump system.

As you consider the upfront cost, keep in mind that operating costs (i.e., your monthly energy bills) for air-source heat pumps tend to be substantially lower than typical costs for oil, propane, or electric baseboard heating systems. Well-sealed and insulated homes will have even lower heating costs, and installation costs in these homes will be lower because smaller equipment will be adequate to provide the heating. By installing air-source heat pumps, you will also be adding a very efficient cooling system.

The cost to install a brand-new heat pump shouldn't be evaluated only on the dollar savings for heating and cooling your home; increasing comfort, greenhouse gas savings, and other benefits should also be considered. Other factors can reduce costs and encourage you to install air-source heat pumps:

- If your existing heating system is more than 10 years old, consider replacing it with a heat pump before it fails. The true cost to install the heat pump is the difference between the full cost of installing the air-source heat pump and what you would have spent on a new boiler or furnace.
- If you're considering installing or replacing an air conditioner, providing heating as well as cooling will only add incrementally to the cost and may be offset by incentives.

AIR-SOURCE HEAT PUMPS (ASHP)

Incentives & Financing

INCENTIVES

Incentives are available to homeowners in Massachusetts wishing to upgrade their heating and cooling system to air-source heat pumps. Depending on your electric provider, you may be eligible for different incentive programs.

- **Mass Save® Electric Heating and Cooling Rebate:** If you are located in Mass Save® territory, you may be eligible for a $10,000 rebate to install a whole-home, cold climate air-source heat pump system. Rebates based on equipment size are also offered for Mass Save® residents who install heat pumps to supplement an existing heating system or in just a small section of their home. The rebate ranges from $1,250 to $10,000 and requires installation of integrated controls in homes with oil, propane, or natural gas back-up. Integrated controls automatically switch between a heat pump and fossil fuel heating system at a pre-set temperature, minimizing the use of a boiler or furnace while maximizing the use of a cold-climate heat pump to provide optimal savings and comfort. There is a $1,500 rebate for integrated controls.
  - If you are served by a municipal electric company, visit your electric provider's webpage to see if they offer incentives for cold-climate air-source heat pumps.
- **Massachusetts Alternative Energy Certificates (AECs)**: AECs (worth anywhere from $3-12 each) are provided to homeowners installing air source heat pumps depending on the square footage of the home, the level of home insulation/efficiency, and whether the existing fossil fuel heating system was removed. Homeowners apply for AEC credits after their air-source heat pump system is installed. A 2,000 square foot whole-home system could receive around 100 AECs, worth approximately $300-$1,200. See the Department of Energy Resources (DOER) website for more information on AECs.

FINANCING

- **Mass Save®** If you are located in Mass Save® territory, then eligible air-source heat pumps and associated electric upgrades can be financed through a **Mass Save® HEAT Loan**. These loans offer up to $25,000 at 0% interest over terms of up to 7 years. If unsure whether you are eligible for Mass Save® incentives, check on the **Mass Save® website**.
  - If you are not eligible for Mass Save® incentives, check with your local municipal electricity provider to see if they have any financing options available for clean energy systems.

**Please note that the value of an AEC is subject to market conditions and that the value listed here may be different than the current market price.*

AIR-SOURCE HEAT PUMPS (ASHP)

Efficiency First

Taking steps to air-seal and insulate your home will ensure that it is ready for your new air-source heat pump system and will help reduce overall energy consumption. A tighter, more insulated home will not only save you money on operating costs and reduce your carbon emissions throughout the year, it may also allow you to buy smaller, less expensive equipment in the first place.

There are a few ways to increase your home's efficiency and reduce its heating and cooling load.

- **Air sealing:** Ensuring there are as few gaps as possible for indoor air to escape and outdoor air to get in. Air leakage can represent up to 40% of space-conditioning costs in a leaky building. Weatherization professionals will focus on sealing leaks hidden in the attic, garage, or between floors. Air sealing often involves re-sealing windows, replacing broken or jammed vents, and replacing the rubber seals around door frames. Experienced professionals will know the common culprits of air leakage to target, but a professional assessment of hidden leaks using a blower door to pressure-test the house is the best way to find leaks in your house.
- **Insulation:** Adding insulation slows heat transfer through the building envelope (i.e., walls, roof, floors); heat transfer is the leading cause of heat loss in the winter. Working with a professional contractor to improve roof, wall, and floor insulation can considerably lower heat transfer, improving your home's efficiency. Many insulation contractors are trained to air-seal before insulating, when it's much easier to do.
- **Ductwork Upgrades:** If your home utilizes a centralized heating or cooling unit with ducts outside of the conditioned space of the home (i.e., in an attic, basement, garage, or crawlspace), sealing and insulating the ducts can significantly improve the overall efficiency of your system by ensuring that more of the heated or cooled air gets delivered to where it is needed.

Mass Save® or your gas or electricity provider may provide a no-cost assessment to identify efficiency opportunities for your home and incentives to help pay for the upfront cost of insulating and air-sealing.

Making the Switch

1. **Confirm that air-source heat pumps are the right fit for your home and your home clean energy priorities.**

2. **Understand the costs and plan how you will finance the project.** Check out the Cost and Incentives & Financing section to understand the typical costs to install air-source heat pumps.

3. **Contact installers.** MassCEC recommends contacting at least three installers to learn more about installing air-source heat pumps in your home. Installers may also give multiple quotes for different installation or unit configurations so you can understand all your options. Visit our **Find An Installer Near You** page for a list of installers. Referrals from family, friends, or neighbors are another great way to find installers.

4. **Prepare your home.** If necessary, take preliminary measures to get your home ready for a new heating system, such as upgrading your electrical service (if necessary) or completing any weatherization work recommended in your home energy assessment, such as sealing air leaks, or installing insulation. If you are planning to improve the weatherization of your home, make sure your installer is aware so that they take the reduced heating and cooling needs of your home into account when designing your air-source heat pump option(s).

5. **Install air-source heat pumps**. Talk to your installer about how long installation will take. Air-source heat pump installations typically take between 3 days and 2 weeks, depending on home size and system complexity.

AIR-SOURCE HEAT PUMPS (ASHP)

How Can I Prepare for an Air-Source Heat Pump Installation?

Determine whether your home has adequate electrical service for an ASHP and make an upgrade if necessary.

How many amps of electrical service does your home have? If your home has less than 200 amp electrical service, talk to an ASHP installer about whether you may need to upgrade your electrical service to accommodate an ASHP system. Check out **this site** for instructions on how to determine the amperage of your home's electric service. **This Old House** also has a helpful video that shows what an electrician will do to upgrade your electric meter and panel. Upgrading your home's electrical service is a good investment if you might install an electric vehicle charger or other new electrical appliances in the future. This upgrade typically takes one day to complete, and usually costs around $2,000 to $3,000, which may include fees and permitting from your local permitting agency. Upgrading your home's electrical service requires a licensed electrician who will coordinate with your electric utility and your local permitting agency.

Think about where you would like to place the outdoor and indoor units.

OUTDOOR UNIT PLACEMENT:

- **Size and Location:** Each ASHP outdoor unit takes up a few square feet of space. Exact sizing depends on the capacity of the heat pump and how many outdoor units you install. Outdoor units for central or multi-head heat pumps typically have a footprint that is twice as large as conventional air-conditioning-only units; they are sometimes slimmer, but taller, than air-conditioning only units. Single-zone outdoor units take up less space, but you may need more of them to heat your whole home. Think about any landscaping changes that may need to occur to facilitate unit placement. It's good to avoid proximity to walkways or other areas where meltwater from the unit might freeze and create a slippery path. The top of the outdoor unit may reach up to 6 feet above the ground once it is mounted off the ground to keep it from being buried in the snow. Choose an outdoor area where the unit will not block a window or door.

- **Air Flow:** ASHPs run most efficiently when the outdoor units have access to unobstructed air flow. For this reason, ASHPs cannot be placed in front of each other. If you are considering landscaping around the outdoor units to reduce their visibility, make sure sufficient space is left around the unit for air to circulate.

- **Roof Drip Line:** Avoid installing the outdoor unit directly under any drip line from the roof or other overhang that would subject it to falling snowmelt, ice, or rain runoff. If this is unavoidable, plan to install a drip cap or shield above the unit.

- **Condo or Homeowner Association:** If you are part of a condo association or homeowners association, find out whether you need to obtain permission to place units outdoors.

- **Noise and vibrations:** Outdoor units are typically much quieter than an old air conditioner, so many homeowners are comfortable with having these outdoor units near a yard or patio. You may want to talk to your installer about the potential for noise or vibrations if you choose to mount the outdoor units directly on the wall of your home. Many homeowners find this to be a great option. If you are sensitive to noise or vibrations, you may want to avoid having the outdoor unit mounted outside a sensitive space like a bedroom. Alternatively, you could ask your installer about vibration dampening brackets or opt for a ground-mounted stand instead of wall-mounted brackets.

- **Accessibility:** Make sure that the outdoor unit is accessible for maintenance, ideally with a nearby electrical outlet for any maintenance equipment.

How Can I Prepare for an Air-Source Heat Pump Installation?

DUCTLESS INDOOR UNIT PLACEMENT OPTIONS:

Wall Mounted

Wall-mounted units are typically about three feet wide and one feet tall. Ideally, they should be installed at least 6 inches below the ceiling to allow for air circulation. Installing these units on an exterior wall simplifies the connection to the outdoor unit and to the drain for the condensate water that results from dehumidification in the summer. Consider the rooms in which you would like to place the units and where on the wall they would be installed.

Ceiling Mounted

These indoor units are popular with homeowners who who want to conserve wall space. Because heat rises, ceiling mounted units are most efficient in rooms with ceiling heights of 8 feet or less. Homes use a refrigerant line, instead of ductwork, to provide heating and cooling with ductless ceiling mounted units.

Floor Mounted

These units work efficiently when they have access to unobstructed air flow, similar to traditional radiators. Floor units are around two feet tall, between two and three feet wide, and 8 inches deep. If considering floor units, make sure you have an unobstructed floor space. Floor units can be a great option for heating, as heat rises naturally. If you are removing your old, cast-iron radiators as part of your project, you could install these floor-mounted units where the old radiators used to be.

DUCTED INDOOR UNIT PLACEMENT OPTIONS:

Air Vents

Air vents connect to an indoor air-handling unit that connects to ductwork in your home. Some ducted heat pumps can be installed in conjunction with a new or existing furnace to provide heating and cooling for most of the year before switching to the furnace during the coldest parts of the winter. Other ducted heat pumps operate as the home's only source of heating and cooling with an in-unit electric resistance back-up heat source.

Questions to Ask Your Installer

During your conversation with installers, consider asking the following questions:

CONFIGURATION

Did you perform a heat load calculation to determine the sizing of the system?

Many installers size systems using general rules and their experience. If you are installing an air-source heat pump to serve as your primary or only source of heat, it is important that the system be well designed; a heat load calculation for your specific home is an important tool in selecting the right equipment.

Where will you mount the outdoor unit(s) and how? Will exterior piping be visible? If so, what type of covering will you use?

Make sure you understand and are comfortable with the location of the outdoor units. If there will be exterior piping on your house, installers have different options to cover it up so that it looks like a downspout.

QUESTIONS TO ASK YOUR INSTALLER (CONT.)

What type of indoor units do you recommend, where will they be located, and why?

Make sure you understand where the indoor units will be placed and whether this matches your goals for your heat pump project and how you use the space.

How will the controls and thermostat be set up?

Ask your installer to explain the thermostat and controls for your system. This is especially important if your installer is putting in integrated controls that operate your heat pump system and a backup heating source together. Additionally, many wall-mounted ductless units have the thermostat in the heat pump indoor unit; a separate thermostat installed at chest height would more accurately sense the temperature in the living space.

COST

What is the installation price and what incentives may be available? Who will apply for these incentives?

Make sure that you understand upfront who will apply for any incentives that you are pursuing and when you need to apply (before vs. after installation).

QUESTIONS TO ASK YOUR INSTALLER (CONT.)

Aside from annual electricity costs, what other annual costs can I expect (such as regular maintenance or parts)?

MassCEC suggests that you have your heat pumps inspected and cleaned every one to two years. Ask if your contractor performs routine maintenance or if they have someone that they recommend.

TIMING

How far in advance can we plan the installation and how long does the installation take?

Be sure to communicate if you have particular time constraints and get a sense when your installer will be available to do the installation. Summer is the busiest time of the year for air-source heat pump installers and many installers have some delays during the summer season.

What should I do to prepare for the installation?

Make sure you understand from your installer if there is anything you need to do to prepare to have them working in your home.

QUESTIONS TO ASK YOUR INSTALLER (CONT.)

QUALITY ASSURANCE

Do you provide a warranty for the systems you install? What are the different warranty options?

Make sure you understand what is covered by any warranty offered by your contractor (i.e., equipment, labor, or both).

Have you participated in manufacturer training for the systems you would install, and can you provide references from previous customers?

As with any home improvement project, it is important to ensure that your installer has the right training and a good track record with past customers.

Will you hire subcontractors to complete portions of the project? If so, what will they do? What are the names of these companies and how long have you worked with them?

Many air-source heat pump installers sub-contract the electrical work. Some will even allow the homeowner to select their own electrician.

QUESTIONS TO ASK YOUR INSTALLER (CONT.)

Will you provide training for me on how to properly operate and maintain the system (i.e., thermostat settings, cleaning air filters)?

Air-source heat pumps are relatively simple to operate, but there are a few differences compared to other heating systems, and your installer should be a good educational resource.

AIR-SOURCE HEAT PUMPS (ASHP)

Getting the Most From Your New System

OPERATION

- Air-source heat pumps work most efficiently when you keep your thermostat at a comfortable temperature consistently, even overnight and when you are at work or away for a day or two. Unlike fossil fuel heating, temperature setbacks are not recommended.
- Continue to use your heat pump in very cold weather. If you feel like your house is not getting enough heat, turn up the temperature on your thermostat and consider setting the air flow at the highest setting. Properly sized and installed cold-climate air-source heat pumps can heat homes when the outdoor temperature is well below zero.
- If you are using your existing heating system as a backup, use it only when needed. If you do not have integrated controls that automatically coordinate the operation of the two heating systems, turn the thermostat for your existing system down a few degrees lower than the usual setting to ensure that your air-source heat pumps are your primary heating source. If you feel that your heat pumps are not providing enough heat on very cold days, turn up the backup heat slightly.
- For more information, see NEEP's guide on **Getting The Most Out of Your Heat Pump**

HOMEOWNER MAINTENANCE

- To keep your units operating efficiently, clean or replace indoor air filters every 1-6 months, depending on how dirty they are. Check out **INsource Renewables' video** on how to clean your air filters. The primary filters can be washed in the sink or cleaned with a vacuum cleaner; some optional filters, like deodorization filters, may need replacing over time.
- Keep leaves, debris, snow, and ice away from the outdoor units.
- Trim back any plants or bushes that are encroaching on the heat pump.
- Make sure the airflow is unrestricted around both the outdoor and indoor units.

PROFESSIONAL MAINTENANCE

- Schedule a maintenance check with your air-source heat pump installer every 1-2 years (or at the installer's recommended interval) to make sure that everything is running smoothly.
- Check on your system at least once per season to make sure there is no obvious damage, like mold, ice buildup, or indicator lights turned on. If there is damage to your heat pump, schedule a maintenance check with an installer to make sure your air-source heat pump is working properly.
- If doing home renovations after installing an air-source heat pump, be extra careful to make sure that equipment and refrigerant lines are not disturbed, which could cause a leak.

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