



Your Complete
Guide to

ENERGY EFFICIENT HEATING

— *with* —

DUCTLESS HVAC

Meeting Your
Heating Needs
with Flexible
& Efficient
Technology

MIKE CAPPuccio

Your Complete Guide to Energy Efficient Cooling with Ductless HVAC

*Stay Warm with Flexible and Efficient Ductless Technology While Reducing
Green House Gasses*

From the Desk of Michael Cappuccio

Since 1989, N.E.T.R. Inc. has been installing heating systems in Boston and its surrounding areas. In 2001, N.E.T.R. adopted ductless heating and cooling technology even though other HVAC providers did not see how this could be used in homes and businesses. However, over the past two decades, we've seen how this technology can benefit home and business owners. We believe in the efficiency of ductless technology and have a deep passion for not only helping Boston residents save money with ductless HVAC, but also achieve better comfort in their homes and businesses.

Our philosophy has been a complete dedication to our customers' needs. Over the years, this dedication has helped us to become one of the most respected names in heating, refrigeration, and cooling in New England. We are the largest ductless contractor in New England with hundreds and hundreds of ductless system installations in the region.

We hope this eBook gives you the opportunity to learn more about utilizing energy efficient ductless HVAC systems for your heating needs.

Michael Cappuccio

Table of Contents

Introduction.....3

What Is Ductless Heating?.....4

How Ductless Heating Works.....7

Can Ductless Heating Reduce Greenhouse Gases?.....9

Can I Heat My Home with a Heat Pump?.....11

Old Heat Pumps vs. New Heat Pumps.....13

Central Heating vs. Ductless HVAC Systems.....14

Wood & Pellet Burning Stoves vs. Ductless Heating.....17

Electric Heat vs. Ductless Heat.....20

Baseboard Heating vs. Ductless Heating.....22

Should You Add Ductless HVAC to Your Current Heating System?.....26

Heat Pumps & Solar Power.....28

Benefits of Ductless Heating.....30

What Does Ductless Heating Cost?.....33

Rebates and Cost Savings for Ductless Heating Systems.....35

Commercial Heating with Ductless HVAC.....36

25 Hot Heating Facts.....38

Conclusion.....40

About.....41

Introduction

Heating your home during New England's harsh winters can be done in a variety of ways: oil heat, electric baseboard heating, wood stoves, central heating, and ductless. How your home is heated depends largely on the original HVAC system that the house was built with.

Ductless heating can give wood stoves or baseboard heat a boost, or new homes can be built with a zoned ductless heating system to start. Ductless heating systems are extremely efficient and can save homeowners money while also lowering the environmental impact of utilizing a heating system.

Continue reading to find out about the differences between a variety of heating systems, including ductless, and how to determine if a ductless system is right for your heating needs.

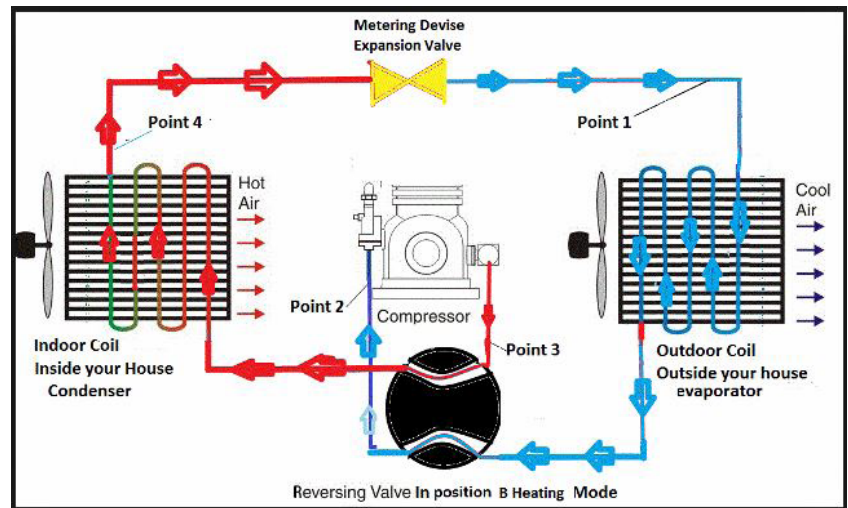


What is Ductless Heating?

At N.E.T.R., we get a lot of questions about ductless heating systems. To help you get a sense of the essentials, we've put together this look at the basics of these systems. Welcome to ductless 101.

The Components

Ductless units, also called mini-splits or air source heat pumps, consist of a handful of basic components, including an outdoor unit and multiple indoor units. A conduit runs between these two units and it holds a tube with refrigerant, electrical wires, and a drain for condensate. Finally, these units have remote controls, so you can adjust the settings, and they may also connect to software that lets you control the system.



Refrigerant

On a basic level, your heating system works like a circulatory system, pumping refrigerant instead of blood. As refrigerant moves through the system, it transfers heat from one area to another. The refrigerant takes the heat from the coils located in the outdoor unit and releases it into the inside coils, thereby helping warmth get into the indoor space.

Compressor

As the “heart,” the compressor pumps the refrigerant through the rest of the system. The compressor makes the outside coil act as an evaporator, while the indoor coil acts as the condenser; this is completely reversed from when the system is used to cool the indoor air. At this point, the refrigerant is a low-pressure liquid that has absorbed the hot air from the outside coil. The motor-driven compressor uses a piston to squeeze the refrigerant to increase its temperature and pressure, and that causes the refrigerant to turn into a hot, high-pressure liquid. Then, the refrigerant flows through the discharge line into the condenser. The heat is generated from the energy produced on the condenser coil.

Condenser and Expansion Valve

Once the hot refrigerant flows to the indoor condenser and the condenser fan pulls the cool indoor air into the unit. As it passes through the condenser, it is heated from the exterior coil. As the refrigerant changes temperature again, it turns from a high-pressure liquid to a low-pressure liquid, and it begins to move toward the expansion valve. As the pressurized liquid refrigerant is passed along, the expansion valve works to harness the pressure. Any heat molecules contained in the refrigerant are pushed out to heat the home.

Evaporator Coil

The evaporator coil is made of a conductive metal such as copper, aluminum, or steel. It is located inside of the home or business. Refrigerant moves through the evaporator coil, picking up the heat as it passes through.

No matter what type of heating system you have, the parts all need to work together to heat the room. Additionally, they must be regularly maintained to ensure your heating system continues to work as efficiently as possible. If you're not getting warm air, one of these parts may not be working properly and you should contact an HVAC technician as soon as possible.

Reversing Valve Assay

Critical for a heat pump's operation, a reversing valve assay is a type of valve that changes the direction of the refrigerant, and this feature allows heat pumps to both heat and cool a home or commercial building. When heating, the valve allows the refrigerant to take heat from the outside and move it inside, and to cool the space, the refrigerant does the same thing but carries the heat from the inside to the outside. This element gets controlled by a defrost control board or simply by the settings on the thermostat from heating to cooling in the home.

Ductless Unit Installation

Depending on your needs, you may have a single outdoor unit with a single indoor unit. That's perfect if you're trying to heat an addition, an attic, or a part of your home that isn't connected to your existing HVAC system. Alternatively, you may have one outdoor unit with multiple indoor units. A single outdoor unit can support up to eight indoor units, but for very large multi-unit commercial buildings or apartment blocks, you may need multiple outdoor units.

Installation of ductless units is very straight forward. A ductless professional helps you assess the number of indoor units you need and the right capacity for your outdoor unit. They will provide a Wrightsoft Manual J heat load calculation of your home to determine what system you need. Then, they install the outdoor unit, drill small holes in the walls to run the lines through, and connect the indoor unit. Indoor units are most often placed high up on a wall near the ceiling, but they can also be mounted on the floor or ceiling.

Best Locations for Ductless Systems

Ductless heating systems work in a variety of locations including the following:

- Home additions
- Attics
- Basements
- Entire Homes
- Office Buildings
- Retail Spaces
- Data Centers
- Gyms
- Restaurants
- Multi-Unit Commercial Buildings
- Apartment Buildings
- And More



Essentially, ductless heating units can work in nearly any residential or commercial space.

Efficiency Considerations

Thanks to zoned heating, ductless systems are instantly more efficient than traditional HVAC systems because you don't have to heat areas that aren't in use. You also never have to over-heat one area just to keep another area comfortable. With traditional HVAC systems, you often end up with areas that feel too cold or too warm because all the rooms are connected to a single thermostat, usually in a hallway or other central location of the home.

Ductless units are also designed to be more efficient, and they meet ENERGY STAR guidelines. These features help to reduce your energy bills, and they also reduce your carbon footprint because you end up using less energy. Additionally, if you have a ducted system, you always lose some warm air through the ducts, and that drives up your overall energy usage and costs. Simply removing the ducts makes these units more efficient.

How Ductless Heating Works

There are many ways to configure this modern and versatile system for all your comfort needs. Highly efficient and effective, a ductless system is the ideal primary heating solution for your home or business in New England. Additionally, ductless systems can be integrated into an existing system to perform as a second source of heat.

Ductless splits, or air source heat pumps, pump warmed refrigerant directly to the wall or ceiling-mounted air-handling unit, and each unit has its own wireless electronic temperature control system. You can also elect to have wall-mounted thermostats in each space.

How Ductless Functions in a Single-Room Application

1. The indoor unit uses refrigerant to warm air and quietly pushes the warmed air to where you need it in your living space. The cold air is pushed over a warm coil with the use of a fan in the air handling unit.

2. Refrigerant and electrical lines connect the outdoor unit to the indoor unit through a 3" opening in the exterior wall. These lines are usually installed in what is called a line hide. This is a type of rubber or plastic tubing that the lines are hidden inside. It's most often black or white to blend with the exterior of the home. Hides keep lines protected from the weather and add a streamlined look to the home.

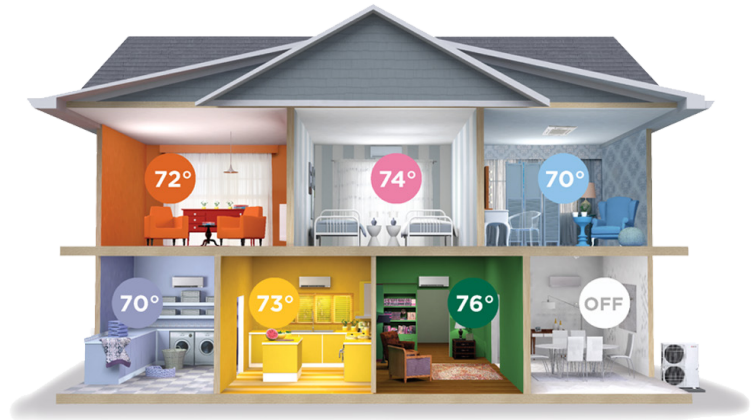
3. The outdoor unit's state-of-the-art heat pump warms the refrigerant and sends it back inside to the air handler, which continuously monitors the room for changes in temperature and sends the air to the areas of the room that need it.



You Can Warm a Single Zone or Multiple Zones, but What's the Difference?

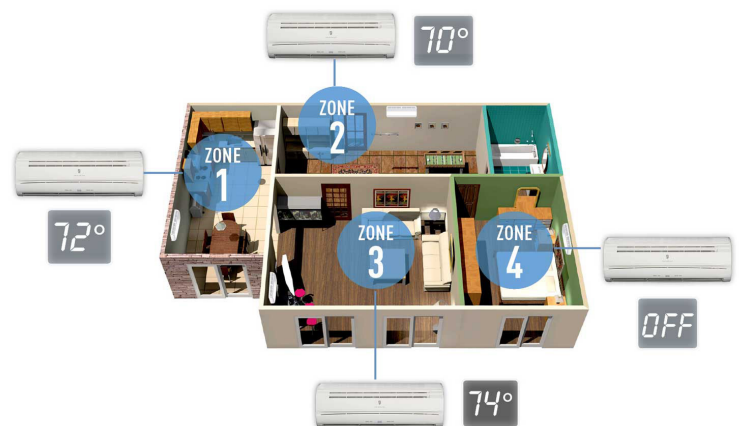
Single Zone

Ductless is a perfect solution for homes with problem rooms that just never feel comfortable. You know, a great room with a high ceiling, or large glass exposure. A sunroom or addition. Even a converted attic, or a remodeled room over a garage. Ductless systems allow you to pinpoint the area of your home you want to heat, which always takes some of the load off your existing HVAC system, saving you money.



Multi-Zone

With a ductless system it's easy to choose exactly how much you want to warm each room or zone of your home to accommodate your family's preferences and lifestyle. Does dad like it cool and mom like it warmer? Kids off to school and spending most of your time in two or three rooms? With a ductless solution, you can eliminate energy use in the rooms you're not using or design a climate in your home based on the factors that make you and your home unique.



Other things in your home are zoned as well, although you might not think of them that way. Your lighting and your faucets, for example, are zoned. To get lighting in your living room, you don't turn on a master lighting system that lights the whole house. You simply turn on the light in the living room. When you turn on your kitchen faucet to wash dishes, the faucets in the bathroom don't also come on – water only goes to the faucet that you're using. With a ductless system, heating only goes to the room you're using in the same way. Alternatively, you can turn down heating in rooms that you're not using. This is particularly effective for rooms not in use at night or while you're at work for the day.

Can Ductless Heating Reduce Greenhouse Gases?



Electric vehicles, solar panels, home battery packs, and turning to renewable energy sources such as wind and solar is key to reducing greenhouse gas emissions, but heat pumps can also play a significant role in this process. By switching to heat pumps, commercial and residential buildings reduce their demand for energy, and when the electricity to power heat pumps comes from renewable sources, that helps to further decarbonization efforts even more.

Heating and Greenhouse Gasses

In Massachusetts, commercial buildings are responsible for generating more greenhouse gasses than residential buildings or industrial facilities, and this pattern is consistent all over the country. For example, in New York City, 42% of greenhouse gasses come from commercial buildings, and a lot of that is tied to heating because most furnaces and boilers run on fossil fuels which produce a lot of greenhouse gases.

Benefits of Electric Heat Pumps

Switching to electric heat pumps reduces the amount of energy needed to heat a building. Generally, gas furnaces produce less than one unit of heat for each unit of energy consumed, but heat pumps produce two to four units of heat for every unit of energy consumed. Compared to furnaces or baseboard heating, heat pumps cut energy consumption in half over the course of the equipment's lifetime, and they can reduce carbon emissions by 46% to 54%.

On top of that, heat pumps run on electricity, and if the electricity is sourced from renewable energy, that helps further decarbonization efforts, and Massachusetts is already making this shift. In 2017, the state produced less than 4% of its energy from coal and more than two-thirds from natural gas. Solar and wind are also producing more electricity — the state had 1,867 megawatts of solar photovoltaic capacity in the beginning of 2018, and that number is still rising.

Shifting from Fossil Fuels to Heat Pumps

The Rocky Mountain Institute reports that eliminating the burning of fossil fuels is the most effective way to reduce greenhouse gasses by 75% or more, and many homeowners are already making this change. In 2006, 36% of homes in Massachusetts used fuel oil for heating space and water, but by 2016, only 27% of homes relied on fuel oil for their heating needs.

In New York, the governor is committed to improving energy efficiency and reducing the carbon footprint of the state's residents, and as part of those efforts, he has set a target of meeting at least 25% of the state's heating needs with heat pumps.

Dealing with Increased Electrical Demand

As commercial buildings, households, and businesses make the change to heat pumps, the demand for electricity is going to increase. In most areas, the electrical grid can only handle about as much energy as homes and businesses use to run their air conditioners during the hottest part of the summer. To prepare for this change, energy companies need to harness wind, bring more renewable energy to the grid.

Charging elevated carbon pricing rates can also help to encourage people and businesses to start using heat pumps. Electrical companies should create new rates to manage increased demand, and they should encourage customers to consume electricity during off peak hours. Basically, to ensure the change to heat pumps is cost effective and has the largest impact on greenhouse gas emissions, electricity needs to become cheaper and greener over the next 20 years.



Can I Heat My Home with a Heat Pump?

Air source heat pumps move heat from colder areas to warmer areas. During the winter, they find heat from the outside and bring it into your home, and during the summer, they work in reverse, taking the heat out of your home and putting it outside. When talking about heat pumps, people generally focus on their efficiency, flexibility, and easy installation process. If you've heard about the vast benefits of these systems, you may be wondering if you can heat your home with a heat pump.

In most cases, the answer is yes. To help you decide if a heat pump is right for your situation, here are some points to consider.

Climate

Early generations of heat pumps worked best in temperate climates. As a result, heat pumps had a wide presence throughout the southern states, but in northern areas, they generally tended to augment other types of heating systems, like gas furnaces, electric baseboard heaters, and wood-burning stoves. In recent years, however, advances in technology meant that heat pumps work efficiently in cold climates as well.

In particular, cold climate heat pumps feature exclusive inverter technology that stays efficient in temps as low as -13 degrees Fahrenheit. As a result, you can now enjoy the savings, efficiency, and comfort offered by a heat pump even if you live in Massachusetts or other areas of the Atlantic seaboard. Even if you don't augment your heat pump with another heating source, this new technology ensures your home can still feel warm and comfortable, without you needing to spend a lot of money on home heating.

Efficiency

Once you determine that a heat pump works in your climate, you need to start thinking about efficiency. Heat pump efficiency is expressed with a Seasonal Energy Efficiency Ratio (SEER) rating. This is the same measurement you use when talking about air conditioner efficiency, and it can range from seven to 25 and potentially even higher. The higher the SEER value is, the more efficient your heat pump is.

Heat pumps are more efficient than other heating options because they don't generate heat. Instead, they simply move heat that already exists from one area to another. According to the U.S. Department of Energy, heat pumps can cut the amount of electricity you need to heat your home in half, compared to electric resistance heating methods like baseboard heaters.

Cost

When determining if a heat pump is right for your home, you also need to think about cost. Your HVAC contractor can help you assess the potential cost of running a heat pump compared to what you're spending for your current heating methods. If you're thinking about augmenting your current heating system with a heat pump, they can also help you crunch the numbers or show you case studies of other homes so that you estimate how much you might save.

Like other heating options, heat pumps require an upfront investment, and you should compare the cost of a new heat pump with other heating systems. However, in Massachusetts, you can qualify for a variety of rebates that can help to offset the initial cost of upgrading to a heat pump. Designed to encourage homeowners to make efficient heating options, the rebates are offered by Mass Save, and they change annually.



Logistics

In some cases, you can connect a heat pump to a ducted heating system, but you can also choose a mini split which consists of an outdoor compressor connected by conduit to several indoor air handling units. With most single-family homes, you place the compressor outside the home, and it takes up about the same amount of space as a standard air conditioner. For commercial properties, you have different options including putting the outdoor unit on the roof or choosing a slim unit that can be placed on a windowsill.

Mini splits are ideal when you want to add heat to an area that is not connected to your ducted heating system, but they can also heat an entire home or even a multi-unit commercial building. Additionally, there are also reverse cycle chillers which are a special type of heat pump that can be integrated with radiant floor heating systems. On a logistical level, there is a heat pump that can work for nearly every type of home or business.

Old Heat Pumps vs. New Heat Pumps

To improve the efficiency of your current heating system and to save money on heating costs, you may want to add a heat pump. There are a few different ways to use a heat pump to augment your existing heating system, and the right option varies based on your situation and your heating objectives. Here are some of the potential ways you may want to integrate a heat pump.

Bring Heat to New Spaces

A mini-split ductless heat pump offers the perfect solution if you want to heat or cool a room that is not connected to your central heating system. Heat pumps can also bring heat to areas that aren't reached by your wood burning stove. This includes attics, basements, new home additions, and other spaces. If you want to bring heat to a new space, a contractor can install a compressor outside your home and connect it to an indoor air handling unit located in the space where you want more heat.



Create Heating Zones

In some situations, your current heating system may reach every area in your home. However, if you only use part of your home, you may want to put an air handling unit connected to a heat pump in the part of your home that you use the most. This way, you can use the heat pump to provide efficient electrical heating and cooling in just that area, and you don't have to worry about heating or cooling the rest of your home. If you ever need to heat or cool all your home, you can simply revert to your old system.

Embrace a Hybrid System

With a hybrid system, you add a heat pump to your existing home heating system, and you also install integrated controls. The integrated controls automatically switch between the heat pump and your current heating system, based on temperatures you have selected.

For instance, air source heat pumps work very efficiently in temps down to -10 degrees Fahrenheit, but at 20 degrees Fahrenheit, we recommend switching over manually to your other heating method to avoid taxing your ductless system.

A hybrid heating system can save you between 30 and 50% on your heating bills, and in Massachusetts, you may be able to get a rebate to help cover the cost of installing integrated controls.

Connect to Ductwork

If your existing furnace is connected to ductwork, you can hook a new heat pump to the ducts. In this scenario, the heat pump still takes heat from the outside and releases it into your home, but it pushes the heat through the ductwork. This option eliminates the need for indoor air handling units.

However, if you don't want to connect to existing ductwork for any reason, you can rely on the ductless nature of most heat pumps. With this option, you connect the outdoor condenser to several indoor air handling units, and the system carries refrigerant through small flexible piping that runs from the outdoor unit to the indoor units.

Whether you opt for ducted, ductless, or mixed ducted, the system still works in the same way. The heat pump provides most of your heating needs, and your existing heating method kicks in as needed to maintain warmth and efficiency on very cold days.



Central Heating vs. Ductless HVAC Systems

What is Central Heating?

There are two types of central heating units: Split systems and packaged units.

Split Systems

With a split-system central heater, the indoor unit holds the evaporator and heat exchange and has a furnace that runs on gas, while the outdoor unit houses the compressor and condenser.

Packaged Units

With a packaged unit, all components are housed together. The air conditioning and the furnace are in the unit that goes outside the building. The supply and return run from the cabinet to vents that are spread throughout the building, and fans blow hot or cold air through the ducts.

How Ductless Systems Differ

Ductless systems also feature indoor and outdoor components. One outdoor unit can work with multiple indoor units which is perfect for most situations, but to heat a large multistory commercial building, you may need more than one outdoor unit. Unlike central HVAC units, ductless systems don't have ducts. They move refrigerant between the indoor and outdoor units using small tubing that runs through the walls or ceiling cavities, and warm air blows out of the indoor units, rather than out of vents connected to ducts.



Ductless System vs. Central Heating: Pros and Cons

Here are the most important factors to consider when evaluating the benefits of a ductless system over central heating.

- **Design Flexibility.** With ductless systems, the outdoor unit is small and can be placed in a range of positions such as on the roof, on a ledge, or next to the building. Indoor units come in multiple designs to work with your decor, and you have a lot of flexibility on where to place the units. In contrast, with central HVAC systems, you have limited options on where the vents can go.
- **Energy Savings.** With a ductless system, if you decide that you don't need to use a room on a certain day, you can turn off the warmed air. This provides significant energy savings. Beyond that, ductless systems operate more efficiently than their central heating counterparts. As air travels through ductwork, it tends to seep into other areas of the building. A central HVAC system can result in energy losses of nearly 30%. With a ductless system, there is no ductwork involved, so the problems of leaks and wasted warm air are eliminated completely.
- **Compressor Technology.** This means that the speed of the compressor varies based on the temperature in the room. That gets the room to its target temperatures faster, but it also boosts efficiency, saving you money on heating. On top of that, compressor technology keeps your room at a consistent temperature all year round.
- **Easy Installation.** The absence of ductwork makes ductless heating systems relatively fast and easy to install. There is no need to tear down walls or do major renovations, and most contractors can handle small installations in a day or so. For large installations with multiple indoor and outdoor units, you can even opt to do the installation in zones so that you don't have to shut down all your operations.
- **Cost.** If you don't have existing ductwork, the cost of ductless is considerably less expensive than putting in a central heating system. In cases, where the ductwork is already in place, however, ductless heating systems may be slightly more expensive than just buying a new central HVAC system. However, installation is only the first cost to consider. You should also consider energy efficiency, and in most cases, ductless systems are cheaper to run long-term. Beyond that, you never have to worry about cleaning the ducts when you have a ductless system, and that adds to the overall savings.

Wood and Pellet Burning Stoves vs. Ductless Heating

A ductless heating and cooling system helps you save energy compared to a system that relies on ductwork — on average, homeowners lose 25% of their energy just through the ductwork alone. However, not everyone is choosing between a ductless system and a traditional forced air system. Some consumers are trying to decide if they should opt for a ductless system or a wood or pellet-burning stove.

So, how does going ductless compare with wood or pellet-burning stoves? Here's what you need to consider.

The Need for Backup Heat Sources

In the 1970s and 80s, the early generation of ductless heating units, or heat pumps as they are also called, were not that efficient. In fact, people in very cold climates often needed a backup heating source, and many people choose to combine a ductless system with a wood or pellet burning stove. Now, however, that is not the case.

The current generation of ductless heating and cooling systems come in a wide range of models with a variety of capacities. There are “all-climate” ductless units (also called cold climate air source heat pumps) that work even when temperatures fall below -30 degrees Fahrenheit. With ductless systems, you can keep an entire home warm in cold climates, and if desired, you can even heat and cool a large multi-unit commercial space.

That's simply not possible with a wood or pellet-burning stove. Most people who have a wood or pellet-burning stove also have to invest in other heating options. They may need space heaters for areas where the stove doesn't reach, or they may need central heating for the days when they run out of pellets or can't tend to their wood burning stoves.

Efficiency of Wood Burning Stoves

Because they move heat rather than generate it, heat pumps use far less electricity than most other heating options. In fact, heat pumps can create more energy than they consume in electricity. Pellet and wood-burning stoves can be efficient, but there are a lot of variables to take into consideration.



If the stove doesn't heat the whole home, you will need to waste energy on other heating sources. On the other hand, if your stove heats the whole home, it usually overheats the room that it is in, and you may find yourself opening windows and wasting energy that way. Additionally, if you don't live near a reliable source of wood, transporting the wood also takes energy.

Purchase Price

Depending on the size of system you buy and how many ductless units you purchase, the costs can vary. When comparing the cost of a ductless unit with a wood-burning stove, it's important to consider the purchase price, but don't let sticker shock deter you from looking closely at the operating costs. It's also important to remember that with ductless technology, you're also getting air conditioning, so be sure to factor in those costs as well.

Operating Costs

According to Efficiency Maine, a non-profit organization focused on energy efficiency education and advocacy in Maine and the Northeast, the cost of using pellets to heat a 1,500 square foot home is about \$2,000 per year, while running an EPA-certified wood-burning stove costs about \$1,500 per year. However, if you have a ductless heater, the annual operating cost is well below \$1,350. That amounts to a savings of \$150 to \$650 each year to heat your home. Note that if you have a used or inefficient pellet or wood-burning stove, these numbers may be higher, and if you have a larger home, the savings will be more dramatic.

Placement of Ductless vs. Wood Stoves

You can put ductless systems in spaces such as home additions, garage apartments, sunrooms, or remodeled sheds that aren't connected to your ductwork, but you can also use pellet or wood-burning stoves in these spaces. That said, you can also use ductless units throughout your entire home.

Ductless systems come in a huge range of styles that work with any decor. In all cases, these units are small and discreet, and they don't have a large footprint. In contrast, stoves need a chunk of space in your home. With wood-burning stoves, you also must account for accessories such as pokers and wood piles.

Installation of Wood Stoves vs. Ductless

Both heating stoves and ductless heat pumps don't require ductwork. That makes installation simple in both situations. However, the hole you have to put in for a wood burner is considerably larger than the small hole you need for a ductless unit.

Versatility of Wood Burning & Pellet Stoves

While pellet and wood-burning stoves only offer heating, ductless units can handle both heating and cooling. With a ductless unit, a heat pump uses refrigerant to move heat from one place to another. Then, during warm times of the year, the process is reversed — the heat pump moves heat from inside the home to the outside.

Other Eco Considerations

In addition to energy efficiency, you may want to think about how other elements of these two choices affect the environment. Unless you buy pellets in bulk, you are going to accumulate many, many plastic bags with a pellet-burning stove. With wood-burning stoves, you can find trees that are grown sustainably — that's where the trees are harvested at the same rate that they grow. However, depending on your location and the type of wood you want to burn, that's not always possible.

Additionally, you need to consider indoor air quality. Wood smoke contains hundreds of chemical compounds that contribute to adverse health. In fact, in many urban and rural areas, wood smoke is a major contributor to air pollution. For this reason, some towns and cities restrict wood burning when local air quality reaches dangerous levels. This doesn't even consider the dust, bark, and wood chips.

Convenience of Ductless Heating

You can find pellet-burning stoves that feed themselves automatically, but with a wood-burning stove, you need to tend the fire. That's not convenient. Additionally, you must find space to store pellets and cords of cut wood. On top of that, you must clean chimneys, lug around heavy bags of pellets, cut down or buy firewood, and clean up messes around the wood stove.

With a ductless system, you can set it and forget it. Many systems also come with software that lets you set different controls for each individual unit of the system. It's a lot easier to simply push the "power on" button on a ductless unit than filling a wood stove and maintaining a chimney and vent. Ductless technology also offers air conditioning, meaning your single unit can serve both purposes instead of having separate systems for heating and cooling your home.

Lifespan of Ductless vs. Wood Stoves

In many cases, ductless units installed in the 1970s and 80s are still going strong today, but as a rule of thumb, most units are designed to last about 20 years. Pellet and wood-burning stoves can last longer, but if you hold onto them too long, you will likely miss important efficiency upgrades. However, it's important that they're cleaned regularly; if you don't, your wood stove likely won't last but a few years.

Electric Heating vs. Ductless Systems

When you are investing in a new heating system for your home or office, you have several different options. Two of the most popular options are ductless systems and electric baseboard heaters. If you're trying to choose between these two systems, check out how they compare in a few key areas.



Zone Controls

Both baseboard heaters and ductless heating units can feature zone controls. You can attach a thermostat to each of your baseboard heaters, just as you can connect separate thermostats and remotes to the indoor air handling units that come with your ductless heating system. Thanks to the zone set up, both electric baseboard heaters and ductless heating can work in a home addition, an attic, or similar areas, but they can also work in large buildings full of a variety of units and lots of floor space. Although baseboard electric heaters and ductless systems match up well in this category, they have a lot of differences in other categories.

Combined Heating and Cooling

With electric heating, you only get the heating. You don't get the benefits of cooling unless you install a separate air conditioning system, and because there's no central system to tap into, you either must put in an HVAC system with ductwork or you must set up separate wall units in each individual room of your home or commercial building.

In contrast, when you opt for a ductless system, you can put in units that handle both heating and cooling. In fact, ductless units first became popular for their cooling capabilities, and it's only in relatively recent years that homeowners in cold climates have been turning to these systems for their heating needs as well. Note that the heat pumps associated with ductless systems can provide heating in temperatures as low as -13° F.

Energy Efficiency

Electric heat is one of the costliest ways to heat your home; it's akin to leaving a toaster oven on all day.

Baseboard electric heating can be an efficient way to heat your home, but to work correctly, these units usually need to be installed on walls underneath windows. In this position, they can combat the cold air that comes through the window.

According to the Department of Energy, ductless systems can reduce your electricity usage by 50% compared to baseboard heaters. Unfortunately, baseboard heaters often tend to be installed incorrectly, and as a result, they lose heat between the unit and the wall. If your baseboard heaters are installed incorrectly, these numbers may be even higher, and your savings may be more pronounced.



Safety Factors

In this area, ductless systems and electric heaters are fairly comparable. Neither system burns fuel internally, and by extension, you don't have to worry about explosions or the risk of carbon monoxide poisoning. You also don't have to deal with leaky radiators or the chance that something may catch fire if it gets too close to the electric heater.

Installation Considerations

With baseboard heaters, you have a very limited option on where to install them. They must be by a window along the floor. In contrast, if you opt for a ductless system with a heat pump, you get a lot more flexibility on where you install the indoor units.

Ductless systems feature an outdoor unit with one or more indoor air handling units. Often, the indoor units are installed near the ceiling along the top of an exterior wall, but you can also choose floor units that mount down low, units that are flush with the ceiling, or units that hang suspended from the ceiling. The ceiling units can come with multiple outlets, so you can control where the hot air goes in your room.

No Ducts

Although the most popular electric heaters are baseboard heaters which don't have ductwork, there are a few electric forced air heaters that connect to ductwork. Unfortunately, ducts also lose hot air. If the ducts are in your attic or under your floor, the warm air escapes into these unused spaces, and it doesn't get to your living areas. That drives up your bills and promotes inefficiency. This pattern never happens with a ducted system, so you don't have to worry about losing heat in that way.

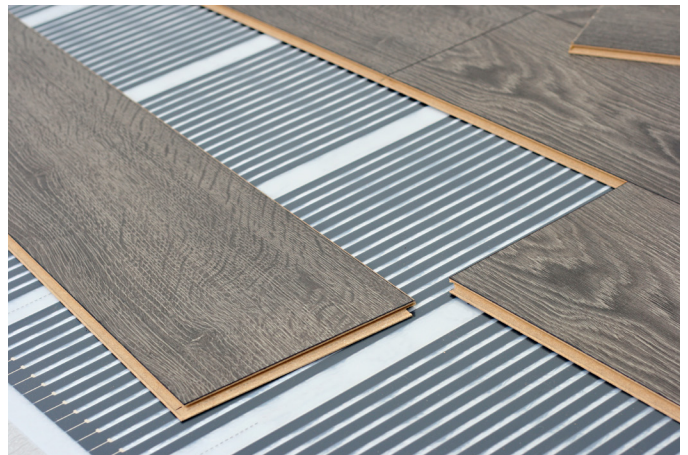
Baseboard Heating Versus Ductless Heating Systems

Baseboard heating has been around for decades in the United States and has been a popular choice for heating New England homes. Air source heat pumps have been installed in American homes since the 1960s and are quickly becoming a preferred heating option for homeowners. Here's what you need to consider when comparing these two options.

Baseboard Heating Basics

Baseboard heaters are usually installed beneath windows so the rising warm air from the heater will counteract the cold air coming through the window. They must be properly fitted with the wall or there can be considerable loss of air, making this a potentially expensive way to heat a home. There are two main types of baseboard heaters:

- **Electric:** The most popular baseboard heaters are electric. These systems house their heating elements in metal pipes, and each baseboard heater is paired with its own thermostat.
- **Hot Water:** There are also hydronic or hot water baseboard heaters. These radiant heat systems use a centralized boiler to heat water. Then, the water circulates through a system of pipes to the baseboard radiators. These systems are very durable and require very little maintenance, but they are slow to heat up. Depending on the system you select, they can be fueled by natural gas, propane, or oil.
- **Radiant Floor Heat:** With radiant floor heating, water from a boiler or hot water heater runs through plastic tubes embedded into the floor. In some cases, a geothermal heat pump which draws heat from the ground can heat up the water. Then, the water warms the floor which radiates heat to the rest of the house.



Baseboard Heating Pros and Cons

When deciding between baseboard heaters and ductless systems, remember that baseboard heaters are hot to the touch. That can present a danger for children or pets, and they also impact furniture and curtain placement. Most importantly, you need to be sure that you never drop or leave anything on these radiators, lest it become a fire hazard. Beyond that, here is a brief look at some of the pros and cons of baseboard heating:

Advantages

- Energy efficient
- Usually quiet with no fans or blowers
- Durable
- Requires very little maintenance

It's important to note that although electric baseboard heaters are quiet, radiator baseboard heaters can be noisy as the water and air moves through them.

Disadvantages

- Requires unobstructed placement
- Needs proximity to a window to work properly
- Often runs the length of a wall, creating challenges with furniture placement
- Slow to heat
- Poor at regulating temperatures in areas such as basements and attics
- Cannot be reversed to provide cooling
- Creates a dry heat which can lead to dry throats, itchy eyes, and even bloody noses
- After periods of disuse, may emit a burning smell caused by the accumulation of dust within the unit

Heat Pump Essentials

Like refrigerators and air-conditioning units, a heat pump uses refrigerant to move heat from one place to another, and most of these units are reversible. During the winter, they capture heat from the outside air, compress it, and move it inside the house. During the summer, they move heat from inside the home to the outdoors.

Heat pumps were quite expensive when they first arrived on the market, but the prices have become much more affordable as the systems have been perfected. When these systems first came onto the U.S. market, they would only heat down to about 35 degrees Fahrenheit, so a back-up heat source was necessary. The early heat pumps were typically paired with an electric heater in the duct work, which was a very costly installation.

Heat pumps are usually powered by electricity, but natural gas models are also available as a back-up. Because heat pumps do not require ducts, they are also called ductless heaters, and they are extremely energy efficient and very quiet. These are the two main designs:

- **Ground-Loop Geothermal Systems:** Initially, these were the most popular heat pumps. They used pipes that looped through the ground and extracted heat from the earth. Many people still turn to these systems when they want in-ground heating.
- **Mini-Split Systems:** Mini-splits are extremely versatile ductless systems that absorb heat from the air and are also referred to as air source heat pumps. These systems consist of a small, wall-mounted indoor air handling unit and an outside compressor. These units are connected by tubing that runs through a very small hole in the wall. This creates less air leakage than you get with most baseboard heaters.



Ductless Heating Pros and Cons

According to the U.S. Department of Energy, moving heat, rather than generating heat means heat pumps can provide up to four times the amount of energy they consume in electricity. Additionally, because there is no combustion (which is the process that makes heat in many conventional heating systems), there are no indoor pollutants such as carbon monoxide. Here's a closer look at the pros and cons.

Advantages

- Offers both heating and cooling in a single unit
- Uses about 50% less electricity than baseboard heaters
- Doesn't require placement near windows
- Provides fast, even heat
- Zone technology provides precise temperature control for every room of your home
- Fans are much quieter than those used in forced-air systems
- Inverter-driven compressors offer even more savings and less wear and tear on the compressor
- Individual rooms can be turned on or off to meet your heating or cooling needs
- Available in various sizes to match your home's heating and cooling load
- Single outdoor condenser can support up to four individual room units
- Filters can be washed, eliminating the cost of replacements every 3 months
- Easy installation can be completed in just one day

Disadvantages

- Costs more upfront but helps to save money and energy in the long run
- Requires you to clean the filters once a month
- The units come in 'cold climate' and 'hot climate' heat pumps

Should You Add Ductless HVAC to Your Current Heating System?

Home and business owners can experience a variety of different challenges with their heating and cooling systems. The solutions are just as varied as the problems; but in many cases, the right solution may be to augment your current heating method with ductless.

Wondering if a ductless mini split is the right answer for your home or commercial property? If you want to do any of the following, a ductless heating and cooling system can help.

Do you want to:

Bring Heat to Cold Areas of Your Home

Unfortunately, a lot of heating systems struggle to evenly heat a home or commercial property. If you have central heating, the duct work may not extend into your basement, attic, or garage. If you want to spend more time in those places, you'll need to extend it, which can take a lot of time and construction work. Alternatively, you can simplify the process by opting for a ductless system. Ductless systems are also perfect for home or office additions.

If you use a wood or pellet burning stove to heat your home, you may have several areas that don't feel warm enough. Often, you have to choose between excessive heat in the room with the wood burning stove or overly cold temperatures in the other parts of your home. A ductless system helps you find the right balance. You can use your wood burning stove to heat most of your home. Then, you can augment with a ductless system in the parts of your home that aren't near the wood burner.

Reduce Work Related to Wood Burning Stoves

Heating your home with a fireplace, a wood burning stove, or a pellet furnace can feel nice, but these heating methods can also be messy and time consuming. Depending on your set up, you may have to find or even chop down firewood. You may have to carry huge bags of pellets, clean out ash, deal with excess dust, or take care of other annoyances. You also need a lot of space to store pellets or logs.

Often, this type of heating only works if you're at home every day and you like tending a fire. To make your life easier, you may want to augment your home heating with a ductless HVAC system. Then, you can use wood or pellets as desired, but when you're not up for dealing with those challenges, you can simply turn on your ductless units.



Avoid Removal Costs

Tired of your old heating solution, but don't want to deal with the construction mess, time, and effort associated with removing that system? Then, you may want to opt for simply adding ductless units to augment your current heat source. It's also a good idea to leave your back up heating system in place for particularly harsh New England winters. You can leave old radiators, baseboard heaters, fireplaces, and other heating equipment in your home, and your ductless heating installation expert can easily work around those elements.

Improve Efficiency

Unfortunately, many home heating solutions aren't that efficient. Central heating, for example, can cause homes to lose heat easily. As the warm air moves through the ducts in attics or crawl spaces, heat leaks out of the ducts, unnecessarily warming those unused areas. Baseboard heaters are notorious for being inexpertly installed under windows in a way that allows the heat to seep out of the window or out of the wall around the radiator. Old systems, in general, tend to be inefficient.

If you want to improve the efficiency of your residential or commercial heating system, you may want to make the switch to a ductless system. A ductless heating and cooling professional can help you assess your current efficiency levels and find out how much you might save by switching to ductless.

Turn Off Heat to Some Areas

In some cases, you may want to invest in a ductless HVAC system so that you can turn off the heat in some parts of your home or commercial property. If you have rooms or even entire floors that you don't use, heating those areas may be a waste of money and resources. In these situations, you may want to switch to ductless mini splits so you can only heat the rooms you need to.

Heat Pumps & Solar Power



Heat pumps run on electricity, which tends to be significantly less expensive than heating oil or propane. Since heat pumps move heat rather than generate it, they also require less electricity than other electric heating and cooling equipment. To enhance these savings even further, you can utilize solar energy as an energy-efficient complement to your heat pump.

Costs of Solar Energy

Many areas offer lower rates for solar powered energy, and that can lead to savings when you power your heat pump with sunlight. For instance, if you pay 9 cents per kilowatt hour (kWh) for solar electricity, that equates to \$11 per million British thermal units (BTUs) or roughly \$1,023 to heat a typical home for the year. In contrast, if you pay 14 cents/kWh for electricity from the grid, that is about \$18 per million BTUs and \$1,706 to heat a typical home for the year.

By switching to solar in this scenario, you reduce your home heating costs by close to 40%. Note these are sample numbers, and to find the exact savings in your situation, you should contact your energy provider about their rates.

Solar Options

If you decide to go with solar power for your heat pump, you have a couple different options. With an off-grid solar system, you harness the sun's energy, and you store it in batteries attached to your system. This setup can work perfectly in some situations, but it requires you to invest more money upfront and maintain the batteries, so the system works properly.

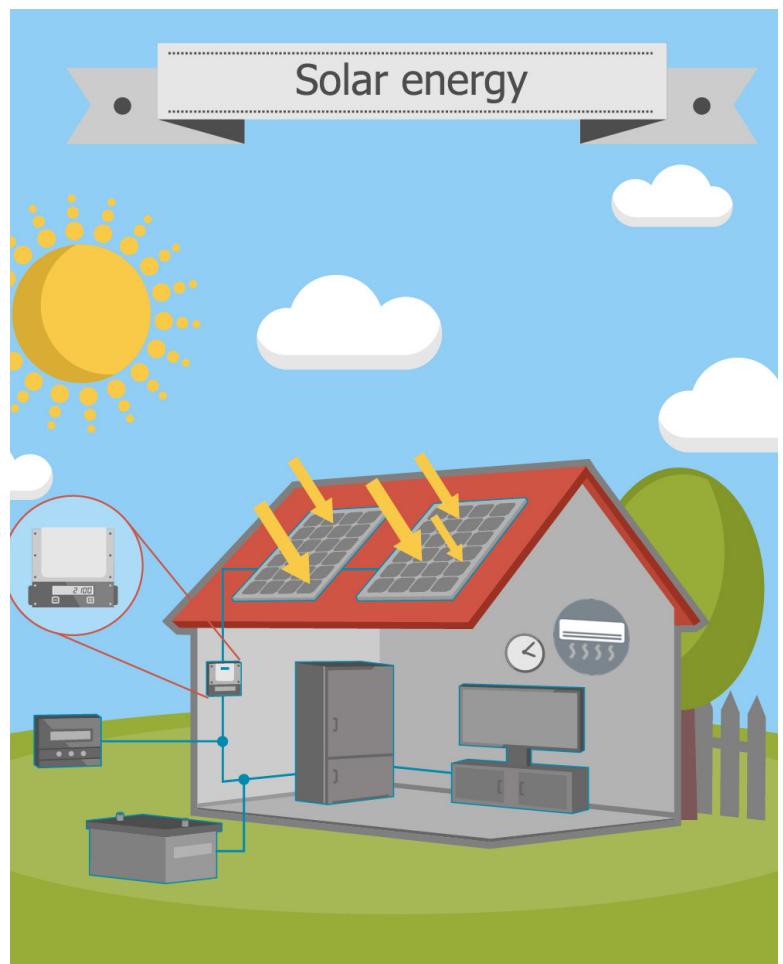
Alternatively, the most common option for homeowners who want to embrace solar power is a grid-tied system. With this set-up, you collect solar energy which you share with the grid, and you don't have to worry about buying or maintaining batteries. In most cases, you end up collecting a lot of energy in the summer when the sun is shining brightly. Then, you bank that energy with your electrical provider and use it to power your heat pump during the winter.

Essentially, the tiered-grid set up is like cutting firewood during the summer to use in the winter — but the solar panels do the work for you.

Best Applications for Solar Heat Pumps

If you currently use oil or propane to heat your home, a solar powered heat pump is the perfect back up system. You can rely on the heat pump for most of your heating needs, but if temps dip too low, you can turn to your existing heating system. In most cases, you never even have to use the backup heating method, as new heat pumps can run efficiently in temps down to -10 degrees Fahrenheit and lower.

Heat pumps coupled with solar systems are also ideal for new construction homes. You save money by choosing a heat pump over a traditional heating system, and you can use the savings to cover the cost of installing a solar system. Then, you can enjoy a home that practically takes care of its own energy needs.



14 Benefits of Ductless Heating

Ductless heating systems have been around since the 1970s, but they've only recently started becoming popular. These systems offer a lot of advantages compared to traditional heating methods like central ductwork, and their innovative designs offer key benefits to owners of both residential and commercial properties.

1. Easy Installation

The absence of ducts makes these units easier to install than traditional HVAC systems. The set-up consists of an outdoor unit along with one or more indoor air handlers. Flexible piping runs between these units to carry electricity and refrigerant and installing that is relatively noninvasive and hassle free. The contractor just needs to add a few small and discreet holes.

2. Small Footprint

Generally, the outdoor unit with a ductless system has a relatively small footprint, especially compared to many traditional HVAC systems. You can place these units on the roof, in small alleyways, or sometimes even on ledges. The indoor air handling units are also relatively small and discreet, allowing them to fit easily in a range of environments.

3. Great for Additions

If certain areas of your home aren't connected to your central heating system, you can easily meet your heating needs by installing a ductless system in these areas. A single unit is ideal for additions, attics, basements, and similar spaces.

4. Scalability

Heating an extra room is just the beginning. Ductless units can be scaled to meet your needs. You can use them to heat your entire home, business property, or even a multiunit commercial building.

5. Zoned Heating

When you install multiple ductless units in a large building, you gain the ability to heat all these areas separately. If you're not using a certain area, you can adjust the heat to keep your costs low. Similarly, if a certain area needs more heating, you can turn it up in those areas without making the other areas in your building uncomfortable.

6. Individual Controls

You can control each zone of your ductless system from a central controller, but you can also control each unit individually with its own remote. Feeling a little too cold while working or watching TV? Simply grab the remote and turn up the heating with getting up.

7. Zoned Installation

In addition to controlling the temperatures separately, you can also install these units zone by zone. In a busy commercial space, this allows you to minimize disruption. This approach to installation also allows you to spread out the total cost over a longer time period.

8. Syncs with Building Management Software

To run multiple units in a commercial or apartment building, you need the right software. The CITY MULTI whole building system comes with software to help you manage multiple indoor units from a single controller. You can also put the controls in your tenants' hands but set parameters so that they don't overuse the system. Most importantly, you can sync this software with your building management system.

9. Ability to Track Usage by Zones

You can also track usage by zones. That helps with calculating what your tenants owe for heating, and it's also a useful way to track how your energy consumption for heating varies from area to area.

10. Energy Savings

Whether you put a ductless system into a home or commercial building, you will likely notice energy savings. On average, these systems use 40% less energy for heating than ducted systems.

11. Quiet Operation

In addition to being energy efficient, ductless units are also quiet. The indoor units make about as much noise as wind rustling trees, and even the largest outdoor units make less noise than the average dishwasher.

12. Improves Indoor Air Quality

With a ductless system, you don't have to worry about dust or allergens building up in the ducts and then blowing out into your living or working space, and of course, you don't have to pay for cleaning your ducts either. Additionally, ductless systems feature multi-stage filtration systems that help to remove pollutants and small particulates from your air, giving your indoor air quality a boost.

13. Design Flexibility

With a ductless system, you have a lot of options. As indicated above, you can put ductless systems in both commercial and residential units. When you select your indoor handling unit, you can also choose from a variety of designs, and you can also locate your indoor unit in a variety of places on the wall or ceiling.

14. High-Quality Manufacturing

When you choose a ductless system from a quality company, you also ensure that you get quality parts. That helps to reduce breakdowns and keep the system running longer.



What Does Ductless Heating Cost?

Here in the Greater Boston area, ductless heating in a single zone configuration, fully installed and ready to turn on starts at \$2,800, and the price goes up from there depending on several factors.

Buyer Beware

You may have found websites that claim it costs \$1,867 to purchase a new ductless mini-split and \$159 to have it professionally installed. As you can imagine, that price is not only the cheapest, least efficient unit on the market, but beware of allowing a contractor charging that little for labor into your home. Proceed with caution.

Installation Cost

The financial incentives associated with ductless technology have made it one of the fastest growing home comfort solutions for residential heating system replacements. The price of a ductless system is determined by four primary factors:

- The size of the unit
- The type of unit
- The number of areas (or zones) being conditioned
- The degree of difficulty of the installation (How far the indoor and outdoor units are from each other, the construction of the outer wall to be drilled to carry the line sets, etc.)

Single Zone Ductless Installation

Professional installation of the most basic, or single zone, configuration (consisting of one wall unit and condenser) will cost between \$2,800 and \$4,500. This layout is ideal for many kinds of applications like conditioning the air in a sunroom, garage, attic, and some smaller homes.

Multi-Zone Ductless Installation

Some New England homeowners need only one ductless unit, while other applications are better served by two to eight units. It all depends on the layout of the home and what works best for you. A two to three zone ductless system typically runs between \$7,500 and \$12,000. A four to eight zone system can run from \$15,000 to \$25,000. We can run as many as eight indoor units with a single outdoor condenser, and we can come back to add indoor units later if you want to have your system designed for future expansion as budgets allow.



Is Ductless a Good Value for My Money?

At first glance, the cost of a ductless HVAC system can seem steep; however, the benefits in energy efficiency will save you a lot in the long run. Since there are no ducts, you don't waste energy through leaky ductwork. Typical forced air systems experience duct losses equivalent to about 20% of the system's energy consumption.

Often, it's over 30%. Ductless systems are also less expensive to maintain than traditional systems. When you add in attractive rebate programs and 0% payment plans, ductless solutions wind up shaking out as a net cost savings to most homeowners.

A multi-zone configuration comes with an additional energy saving benefit. You can control the temperature independently in every room where an air handler is installed. So, if you're not using a room, you won't have to keep it as warm the same as the rest of the house.

Rebates and Cost Savings for Ductless Heating Systems

Massachusetts oil and gas companies, including Berkshire Gas, Blackstone Gas Company, Cape Light Compact, Columbia Gas of Massachusetts, Eversource, Liberty Utilities, National Grid, and Until have collaborated to make energy efficient upgrades available to communities, businesses, and residents in Massachusetts. The group offers a wide range of training programs, information, incentives, services, and rebates.

The rebate program is funded by a service charge on customers' energy bills, and it is administered by electric and gas sponsors that work closely with the Massachusetts Department of Energy Resources. The goal is to help residents of Massachusetts save energy and money. This collaboration has helped Massachusetts become the most energy efficient state in the nation according to the American Council for an Energy Efficient Economy (ACEEE).

The Early Heating and Cooling Replacement program has very specific qualification requirements, but the rebates are much higher. To qualify, you must also have a home site visit to assess eligibility, but for the early air conditioner or heat pump rebates, you can schedule an appointment with an AC Check Trained Contractor instead of working directly with Mass Save.

Applying for these rebates is easy. You can either go online to www.masssave.com/rebates and fill out the online form, or you can download the mail-in form. The form is simple to fill out. You need your personal info and energy account info, and you may also need to upload supporting documentation. Generally, it takes approximately six to eight weeks to process your application. Make sure your form is filled out to avoid any delays in processing.

We can help you with this process! We've helped hundreds of residents all over the greater Boston area take advantage of this free money to make the transition to super-efficient ductless heating. Not only are there state rebates available, manufacturer rebates may also be available at certain times of the year.



Commercial Heating with Ductless HVAC

Dubbed the big brother of the mini-split ductless unit, the CITY MULTI is a ductless HVAC system made by Ductless HVAC and designed for large commercial buildings. The intelligent system is fully customizable — you get to choose the number and style of indoor units you need, and once the system is installed, you can control each zone separately. Beyond that, the system offers superior, consistent heating, quiet operation, and a wide range of additional benefits.

Basic Components

This commercial HVAC system consists of a network of variable refrigerant flow zoning (VRFZ) technology along with the advanced CITY MULTI Controls Network (CMNC). The system consists of the following components:

- One outdoor unit can support up to 32 indoor units
- A main controller (typically, a branch circuit (BC) controller for the R-2 series and a manifold for the Y-series units)
- Zone controllers
- Software

Superior Heating

The CITY MULTI system perfectly balances energy efficiency with distributing the necessary amount of capacity between the indoor units. In fact, the capacity of the R-2 Series can be up to 150% of the capacity of the outdoor unit due to the load diversity of the different zones and the system's ability to heat and cool at the same time.

Installation

The CITY MULTI whole building system doesn't need ducts. Instead, it uses refrigerant lines, which give a lot of design flexibility; this system can work with both new and existing buildings. You don't have to compromise ceiling height with ductwork and the installation process is a lot simpler.

The lightweight outdoor unit boasts a small footprint for easy placement on roofs, in tight alleyways, on ledges, and or in other small spots. Additionally, the indoor units come in a variety of styles including wall-mounted, floor-mounted, ceiling-concealed, suspended, or recessed to work with almost any design objectives.



Thanks to the system's modular design, it can be installed zone by zone. That means you don't have to shut down the whole building for installation, and you don't even have to convert the whole building all at once.

Zone Heating

With zone heating, you can control each area separately, which promotes efficiency and helps you lower the bills in your building. To make this possible, each indoor unit has an electronic expansion valve. That allows the area to get the exact amount of heating that it needs.

With the G-50A controller, you can manage up to 50 indoor units from a single controller. Using TG-2000 software or a Local Area Network (LAN) and Internet Explorer, you can manage up to 40 G-50A controllers from a single location, which allows you to control up to 2,000 individual units at once. For total control of your whole building, you can sync the CITY MULTI system to your Building Management System (BMS) using LonWorks® or BACnet®.

If you have residential or business tenants, you can let them manage their own zones, and you can set parameters to prevent misuse. With the TG-2000 software, you can also monitor the usage of individual units and generate bills for each tenant.

Quiet Systems

Ideal for schools, libraries, offices, recording studios, and multiple other spaces, CITY MULTI indoor units operate at about 24 decibels on low to 47 decibels on high. That's about the same noise level as a whisper or rustling tree leaves. The outdoor unit operates at about 56 decibels, which is about as loud as an electric toothbrush or a dishwasher from the next room.

Healthy Ventilation

Often overlooked, the ventilation component of HVAC systems is critical to indoor air quality. With the CITY MULTI, Lossnay Energy Recovery Ventilators (ERVs) bring in outside air and manage energy recovery. That makes your building a healthier overall environment. On top of that, you don't have to worry about dust or debris building up in the ductwork and potentially degrading indoor air quality.

Easy Maintenance

Owning the system is also designed to be relatively worry-free with easy maintenance. With ductless systems, you don't have to clean any ducts. Additionally, the outdoor unit has a diagnostic display, and the four-digit fault code makes it easy to troubleshoot potential issues. We can also set you up with a service program, where our technicians come to your facility and perform routine maintenance to keep the system running as efficiently as possible and to help you avoid emergency HVAC repairs.

25 Hot Heating Facts

When the winter wind comes in, light bedding gets replaced with heavier, warm clothing comes out of the attic, and heaters are turned on for the season. Before you dial in warm temps on your thermostat, take some time to brush up on your heating knowledge with these 25 hot heating facts.

1. After the fall of the Roman Empire, people heated their homes by insulating them with clay and straw to trap the heat generated by the hearth. This practice marked the first use of chimneys.
2. Warm molecules move faster than cold molecules. As a result, you can create heat by rubbing two cold items together and speeding up their molecules.
3. Up to the 1800s, most Americans used fireplaces to heat their homes.
4. In 1741, Ben Franklin developed the Franklin stove which slowed the escape of fireplace heat up the flue and tried to keep as much heat as possible in the home.
5. In the early 19th century, Lord Kelvin's research on thermodynamics focused on moving heat from colder bodies to warmer ones, arguably laying the foundation for the future invention of heat pumps.
6. While fireplaces were the most popular option for English settlers, German settlers turned to cast iron stoves which were a more effective way to create radiant heat.
7. As coal became more popular, so too did cast iron stoves.
8. In 1816, the Massachusetts Medical College became the first building in America to have central heat.
9. In 1863, Thomas Edison invented the electric heater and changed home heating forever.
10. Out on the plains, settlers were using buffalo chips (dried buffalo manure) to heat their homes. At various times, dry dung fuel has been used to create heat around the world.
11. One of the first private homes to enjoy central heating, the Biltmore Estate was owned by the Vanderbilts. The 175,000 square foot home used three boilers that held 20,000 gallons of water and required about 500 tons of coal per year. On top of that, the house had 65 fireplaces for extra heat.
12. Developed in the mid-1930s, early forced air heating systems burned coal to produce heat and then used electric fans to blow the heat through the homes.
13. Ducted systems can lose over 30% of their heating energy if the ducts travel through uninsulated spaces or are overly long and windy.

14. After accidentally burning his hand on some pipes in his freezer, Robert C. Webber decided to bury copper tubing in the ground and run freon gas through the tubes, creating the first ground source heat pump of the modern era.
15. The Romans used to heat their floors by positioning stone slabs over heat sources such as fires.
16. The hottest natural temperature ever recorded was 134.1 degrees Fahrenheit in the aptly named Furnace Creek Ranch in California's Death Valley desert. The previous record, set in Libya, was disqualified due to the temperature being taken over asphalt.
17. Excessively high temperatures increase mistakes and reduce productivity. At 75 degrees, productivity decreases by 3%, and when temps increase to 105 degrees, productivity dwindles by 79%.
18. Cold temps also affect workers. Errors jump by 44% when indoor temperatures fall to 68 degrees, and at overly cool temperatures, productivity is half the rate it is at 77 degrees.
19. The electric thermostat was invented in 1886.
20. Used to starting and tending their own fires, American homeowners were initially reluctant to automate their home heating process, but the trend caught on over time.
21. According to one survey, 42% of Americans have a programmable thermostat, but the majority aren't sure how to make the most of that technology.
22. Over half of U.S. homes use natural gas for their home heating, but fuel sources vary from region to region.
23. In the South, most homes use electric heat, with natural gas taking second place. In the West and Midwest, most homes use natural gas followed by electric. In the Northeast, natural gas is the most popular, then heating oil, and electricity falls in third place.
24. The world has more demand for heating than cooling, but the demand should become relatively even over the next decade as the need to cool certain foods and medications increases around the world.
25. Worldwide, the energy used for heating is expected to fall by 2030 due to the increased efficiency of modern heating methods.

Conclusion

For years, central HVAC systems were the default option, but recently, the popularity of ductless systems has surged. Ductless systems are popular in homes that don't have ductwork, but due to the efficiency of these systems, people are also choosing to replace their ducted systems with ductless options.

N.E.T.R., Inc. provides expert ductless system installation, repair, and maintenance to homes and businesses throughout the greater Boston area. When you work with us, we'll make sure that you get a heating system that will deliver the level of temperature control, energy efficiency, and other features you need.



About



N.E.T.R., Inc. is guided by our principles. We demonstrate an unwavering dedication to our customers' complete satisfaction. We are here for our customers before, during, and after the installation process.

N.E.T.R., Inc. is committed to providing reliable cooling and heating solutions for our customers. To accomplish this, we work closely with our customers to understand their very specific needs.

Our trained comfort consultant arrives on time and is seriously prepared to help solve each and every heating problem our customers may have.

N.E.T.R., Inc.

Mailing Address

N.E.T.R., Inc.

85 Flagship Drive, Suite E

North Andover, MA 01845

N.E.T.R. INC.
AIR CONDITIONING & REFRIGERATION

www.netrinc.com

N.E.T.R. Inc.