All About Air Source: How Innovative Air to Water Heat Pumps Differ from Geothermal

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When you're building or renovating a home, the HVAC equipment you choose can make a significant impact on two important areas: how much you enjoy your home; and how much you save on your utility bills. Choosing an efficient home heating option like an air source heat pump or geothermal heat pump will provide you with years of cost effective, comfortable heating without the unpredictable spikes in pricing and environmental impact associated with conventional heat sources.

Our brand new air-to-water heat pump was designed for homeowners who are keen to take advantage of our innovative technology but who require a simpler to install and less expensive alternative to geothermal heat pumps. Read on to discover the development, benefits and innovations unique to Nordic's Air-to-Water (ATW) Series heat pump including:

- Why our model has been designed by Maritime Geothermal's expert team specifically to withstand the demands of Canadian winters
- The science behind air source heat pumps
- What makes an air source heat pump different from a geothermal heat pump
- How Nordic's ATW Series will deliver returns that other manufacturers' products just can't offer.

How Do Air Source Heat Pumps Work?

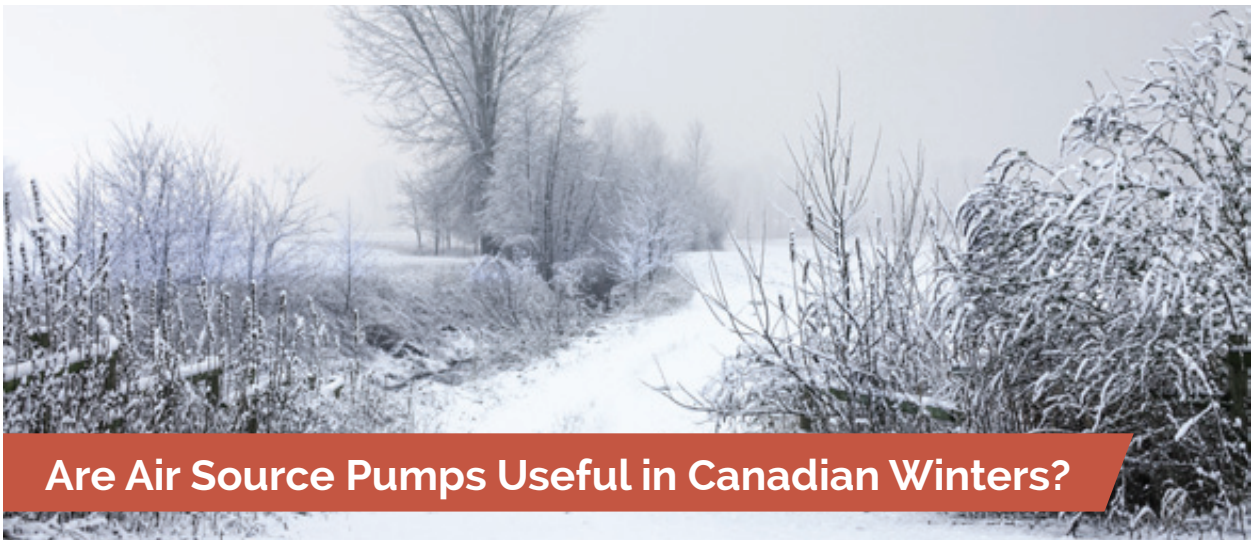
Air source heat pumps are not a new invention—in fact they work on the same simple laws of physics as other refrigeration devices like refrigerators and air conditioners have for decades. The most common type of air source heat pump is an air-to-air heat pump, so we'll use that in our example:

In the winter, a large volume of low temperature heat is picked up from the outdoor air and transferred via a heat exchanger to the refrigeration system inside the heat pump. The refrigerant absorbs the large volume of low temperature heat. This heat is then converted to a small volume of high temperature heat by the heat pump's compressor. The high temperature refrigerant is then passed over another air exchanger, which picks up the heat and transfers it into your home in the form of warm air. The now cool liquid refrigerant then makes another trip back outside to pick up more heat from the outdoor air, and the cycle continues whenever additional heat is required by the home.

To cool the home during the warm season, the process is reversed. The heat is captured from inside the home and then expelled outside. Since the heat has been removed from the indoor air, it will feel cold when it is blown back into the home.

This process of capturing heat from the outside air might sound counterintuitive, but it is a quite straightforward process that has been providing residents of Northern climates around the world with an economical and efficient way to heat and cool their homes for decades.

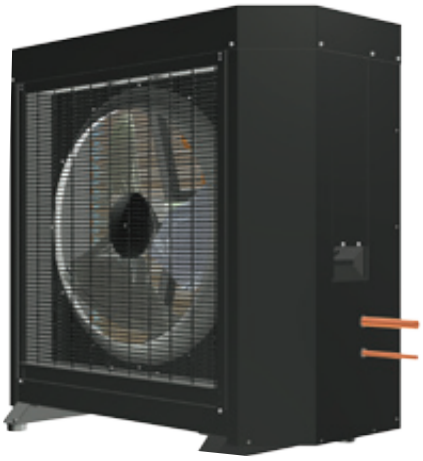
Nordic's ATW Series heat pumps use these fundamental principles, but have been designed to draw heat into the home even during extremely cold outdoor weather conditions. The heat is then distributed it into your home through radiant in-floor heating, instead of forced air like traditional air source heat pumps.



Are Air Source Pumps Useful in Canadian Winters?

At Maritime Geothermal, our engineers and product developers have spent months creating and perfecting an air source heat pump that addresses the needs of Canadians and residents of other cold, Northern climates. It was imperative that this renewable heating source remain efficient—even at temperatures as low as 5°F (-15°C). We're proud to say that with the development of the Nordic ATW series: **yes, air source heat pumps are cost-effective and powerful enough to excel in Canadian winters!**

How Did We Achieve this Result?

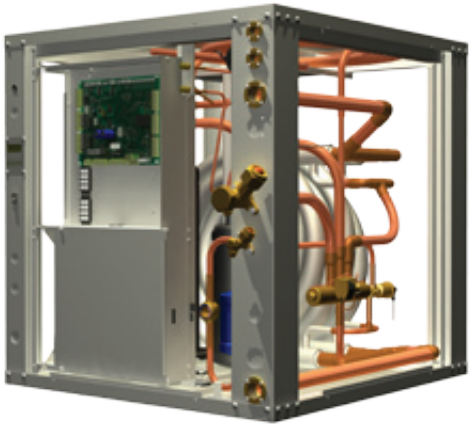


When we decided to create our own air source product, we knew it would have to draw on our innovative geothermal technology instead of a traditional air source design. It would also have to harness the heat available in the air more efficiently than other similar products, so that it can provide heat even in the coldest winter conditions.

The outdoor portion of the heat pump, the ACE unit, has been specifically developed to thrive in even the coldest Canadian winters. The design features an oversized air coil to allow the heat pump to successfully extract heat from the winter air in temperatures as low as -13°F (-25°C), while being highly efficient at cooling in hotter climates and warmer periods during the year. A unique feature of the Nordic ATW unit is the fact that the compressor resides in the indoor unit where it is protected from the adverse effects of refrigeration migration and cold weather starts. We

anticipate longer life and fewer service calls because of this feature. Only the air coil, electronic TXV and ECM style hub rotor fan reside in the outdoor unit. This approach renders the outdoor unit whisper quiet and highly unlikely to bother even the closest neighbours. The ATW unit even comes with several options for leg height to prevent it from resting on the snow-covered ground—even with several feet of snow accumulated. The outdoor unit was also specially designed to minimize ice build-up by eliminating the bottom pan under the air coil and it has an intelligent defrost system that uses real-time sensors to detect when defrosting is required, instead of using timers like other air source heat pumps. These features will make the ATW work better in cold weather and save you money compared to our competitors' offerings.

The suggestion that the indoor portion of the heat pump contain all the major electronics and components came directly from our many conversations with experienced air source heat pump installers and service people. Our innovative design keeps these important elements out of the cold and reduces general wear and tear on the machine. Thanks to its compact size, it can be installed in a mechanical room, attic or crawl space making it significantly more convenient to service during cold months.



Regardless of the temperature, our heat pumps will help satisfy your domestic hot water requirements through the desuperheater we've incorporated into the design—a feature that no other manufacturers have been able to integrate into their products. In the winter, your hot water will be heated with very high efficiency and during the cooling season you can enjoy free hot water.

How are Air Source Pumps Different from Geothermal?

There are four significant ways that air source and geothermal heat pumps differ: the heat source, the heat collector system, the distribution system and their efficiency rates.

Heat Source

The most obvious difference between air source heat pumps and geothermal heat pumps is the where they get their heat.

Air source heat pumps collect heat from the outside air, while geothermal heat pumps absorb heat from the ground. This process is more efficient to do in warmer months but is an increasingly less efficient process in the midst of Canadian winters—when there is less heat in the outdoor air to draw from and more coil defrosts are required.

Geothermal heat pumps collect the readily available and renewable heat that is available just underneath the surface of the earth, which has a consistent temperature regardless of season. No defrost cycle is required and the units maintain a relatively stable output.

Heat Collector System

The second critical difference is the heat collector system. With geothermal heat pump system, an antifreeze solution is circulated through pipes buried in the ground to either absorb the grounds' heat during the cold season, or expel the heat from your home during the warm season. In contrast, an air source heat pump draws its heat from the outdoor air instead.

With Nordic's ATW series, the fan is physically positioned outside the home where it operates as required throughout the year. Our air source pump design places the compressor indoors to extend its life by protecting it from harsh conditions.

Heat Distribution System

Another way you'll find that air source heat pumps and geothermal heat pumps differ slightly is the way that the heat is distributed. With Nordic's geothermal heat pumps, you can choose whether you'd like your heat to come from radiant in-floor heating or if you'd like both heating and cooling through air ducts.

Our ATW model delivers heating through a radiant in-floor system and can make chilled water that can be used for forced-air cooling if you install a hydronic air handler. Radiant in-floor heat is a very even and comfortable method of heating and is best suited for new builds where the piping can be installed during construction.

System Efficiencies

Both geothermal and air source heat pumps are significantly more efficient than other forms of heating and cooling like an oil furnace or electric baseboards. Geothermal heat pumps do have a slight advantage over air source heat pumps when it comes to average annual efficiency rates. As geothermal heat pumps can draw on a consistently warm source of heat in the ground, **they have a steady year round efficiency of approximately 400%**. This means that for every one (1) watt of electricity used to run the heat pump, it generates four (4) watts of heat energy for the home.

Air-to-air heat pumps do not draw on the same even source of heat and therefore do not have a consistent efficiency rate. Because air source heat pumps draw heat into the home from the outdoor air, fluctuations in temperature greatly impact how much work the heat pump has to do to draw that warmth inside. While air source heat pumps often have efficiencies reported as high as 290%, **once the drop in efficiency that occurs in colder months is accounted for, efficiencies are closer to 240%**. This means on average they generate 2.4 watts of heat energy for the home for every watt of electricity used to run the heat pump.

It's important to note that if your air source heat pump is properly sized and installed, you'll never be cold. In cases where it is simply too cold for air source heat pumps to draw heat from the outdoor air, an electric backup system will kick in so you won't ever run out of heat.

In contrast, electric baseboard heat has an annual fuel utilization efficiency rate of 100%, meaning that for every dollar spent, you'll get a dollar's worth in heat energy. When you consider that a newer model conventional oil furnace operates at 85% fuel utilization efficiency, offering $0.85 worth of heat energy for every $1 you spend on fuel, it's easy to understand how quickly you'll begin to see a return on your investment with a Nordic heat pump—regardless of whether you select an air or geothermal option.

System	Fuel Ultilization Efficiency Rate
Geothermal Heat Pump	400%
Air-Source Heat Pump	240%
Electric Baseboard Heat	100%
Oil Furnace	85%

Why Choose Nordic's Air-to-Water Series Heat Pump?

When Maritime Geothermal decided to create an air source heat pump, we didn't want to draw on what other manufacturers were producing. We wanted to design a product that was completely new and robust enough to offer residents of Northern climates something they previously didn't have access to: valuable efficiencies even in the coldest months of the year.

When you choose a Nordic ATW series heat pump, you'll be able to fill your home with even, comfortable and eco friendly heating and cooling.

Ready to Get Started?

Get a quote for your own Nordic® Heat Pump today! Call to **speak with one of our experts** or **find your local dealer** now.