

# HEAT PUMPS - OVERVIEW

Last Updated: Thursday, September 17th, 2020, Created: Thursday, October 14th, 1999

Heat pumps do not create heat. They simply pump it from one place to another, either raising the temperature or lowering it in the process. It's much like a water pump: that doesn't create water, it just move it to wherever you need it. Heat pumps are valuable because it takes less energy to move heat from one place to another than to generate the same heat with a furnace. Heat pumps can deliver two to three times as much heat energy as they consume.

Your refrigerator is a heat pump: it pumps heat out of that box (that's why it gets cold in there) and dumps it via the coils behind (that's why it gets hot back there). The most common form of heat pump for home space heating is an air source heat pump that squeezes heat out of the outside air (if it can get colder, there's still heat out there) and delivers it at a higher temperature to your furnace duct. In the summer this same machine can be made to run backwards and suck the heat out of your furnace duct and dump it outside -- giving you central air conditioning.

The electric power companies love heat pumps that are tandem add-ons to fossil-fuel furnaces as they increase the demand for power during the mild seasons yet let the furnace take over completely when it gets very cold. Follow this article for details on Dual Energy and Tri-Energy systems that use heat pumps.

The long-term potential for heat pumps is tremendous (as they get technically more advanced and fossil-fuel prices move out of sight) as it is one heating device that relies primarily on "low-grade" heat sources (such as outdoor winter air) that are normally worthless but limitless. (Oil is a "high-grade" heat source that has limited availability and is expensive.) Today heat pumps are still expensive investments with questionable returns in many parts of the country.

To determine if a heat pump is a good investment, ask yourself three questions:

-- Do I need air conditioning: An air conditioning unit will cost you over \$3,000. If you buy a heat pump you can consider the cost of an air conditioner alone as being for the air conditioner and then calculate the payback for the heat pump on the basis of the remaining cost. If you can't make this "deduction" from the payback analysis, a heat pump is probably not a worthwhile investment anywhere in Canada.

-- How long are the spring and fall, and how mild are the winters? Heat pumps start losing effectiveness at 0 to -5 degrees C -- and often shut off at -15 degrees Celsius.

-- What is the alternative fuel cost in your area? Some remote areas can justify heat pumps simply because a little electricity is cheaper than bringing in a lot of bulky fuel.

If you decide to buy a heat pump:

-- Buy one made for Canada, one with an indoor compressor or a Scroll compressor. Cross border units not designated CSA for Canada will not have their warranties backed up by the manufacturers. They are not built the same for the Canadian climate as they are for the US.

-- Choose a well-established and reliable heating contractor for the technical calculations and installation. The machines are almost all good -- the difference in their performance stems from the quality of the installation.

## OPERATIONAL HEAT PUMP CONSIDERATIONS

Heat pumps are highly efficient when installed properly. The most popular is the air to air version used in domestic heating systems. For optimum efficiency and to prevent damage to the compressor heat pump capacity needs to match furnace or air-handler airflow capacity which for most domestic heating systems is 3 Tons. To ensure the indoor coil does not become clogged up with dust and debris a filter is installed in the air return duct near the furnace. In the last decade or so disposable air filters with different density have come to market. Classified in level of filtration (MERV) the filter not only progressively blocks out fine dust particles and allergens, but also restricts air flow critical for the

proper functioning of the heating appliances. Air filters that are too dense or clogged with dust lead to overheating and in case of a heat pump or central A/C unit to permanent compressor damage.

#### MANUFACTURER RATED EFFICIENCY, VERSUS OPERATIONAL EFFICIENCY

Using the car analogy again, it is a known fact that manufacturers fuel consumption ratings are always substantially better than the actual number in real life “stop and go” traffic.

The same holds true for heating appliances. If you are in the market for a new furnace or heat pump, industry jargons such as HSPF, AFUE and SEER pop up. Without going into detail, those are efficiency ratings, the higher the number the better the rating. And like cars, heating appliance manufacturers efficiency test conditions are controlled and do not reflect actual real-life operational conditions which always end up worse, in no small part because of heating appliance cycling.

It pays to be informed, manufactures go through all kinds of hoops to achieve the highest rating, such as multiple expansion valves, or an electronic ECM motor for two speed and variable speed compressor options. Making it more efficient but also more complex, expensive, and less reliable, especially in colder climates like ours.

While heating contractors invariably do recommend heating equipment with the highest ratings, these numbers come down substantially when controlled by a thermostat that is maintains set point by cycling the heating system.

#### **Keywords:**

Furnace, Investment, Alternative, Fuel, Energy Conservation, Heat Pump, Heating, Overview

**Article 892**

[www.joneakes.com](http://www.joneakes.com)