



Dispelling the Myths Surrounding Dual Fuel Air Source Heat Pump Systems

Do Heat Pumps Work in Northern Climates?

The simple answer is “yes.” When used and controlled properly, dual fuel heat pump systems can provide a home with comfortable and efficient heat during the shoulder seasons.

A dual fuel heating and cooling system uses an electric heat pump with a fossil fueled furnace. It is similar to an air conditioner and furnace combination, but the two parts are united to function as a single, all-weather system.

The furnace included in the dual fuel system can use any one of the common fuels—natural gas, propane, or oil—depending on what exists at the site or is preferred. Dual fuel systems are available in multiple sizes and can be sized to fit any home. Dual fuel systems offer end users an opportunity to choose the most economical fuel source for the current time of operation.

A split system has separate indoor and outdoor components like most central air-conditioning systems.



Source: 2004 EPRI Dual Fuel Heating & Cooling: A win-win for users and utilities.

ALTERNATE NAMES

- Dual-fuel system
- Dual-fuel heat pump
- Hybrid heat system
- Add-on heat pump
- Piggyback heat pump
- All-fuel system
- Best-fuel system



How Does A Dual Fuel System Work?



When providing cooling, a dual-fuel system functions like a conventional air conditioning system; using the heat pump to chill the air. When heating, both the heat pump and furnace have roles, depending on the outdoor temperature.

The heat pump serves as a heater by absorbing heat from outdoor air and transferring it indoors. All air, even cold winter air, contains a certain amount of heat. As the outdoor air passes over the outdoor coil, heat from that air is absorbed by the refrigerant contained inside the coil. This absorption of heat changes the refrigerant from a low-

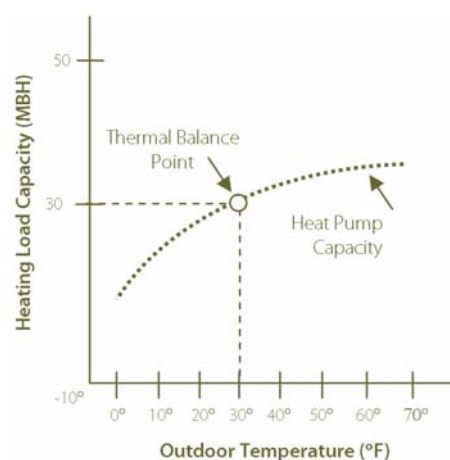
temperature liquid to a low-temperature, low-pressure vapor. The vapor then passes through a compressor where it is compressed into a high pressure, high-temperature vapor. The hot vapor then circulates into the indoor coil. As indoor air passes over the indoor coil, it absorbs heat from the coil. The warmed air is then redistributed through the duct system.

The heating capacity of a fossil fueled furnace is more or less independent of outdoor temperature, but its efficiency is higher at low outdoor temperatures because of less on/off cycling.

Conversely, the heating capacity and efficiency of an air-source heat pump are highest at mild outdoor temperatures and decrease as the outdoor temperature drops, until, at some point supplemental heat is required to keep the building warm. This is the heat pump's balance point temperature. In a conventional heat pump, the supplemental heat is provided by electric resistance strip heaters. In dual-fuel systems, the supplemental heat is provided by a furnace. Pairing the two technologies allows each to

operate at maximum efficiency.

Source: 2004 EPRI Dual Fuel Heating & Cooling: A win-win for users and utilities.



What is a balance point?

It is the temperature at which the heat pump has just enough capacity to keep the house warm, (typically 25 to 40°F).

-Office of Energy Efficiency and Renewable Energy, US Department of Energy

Let's Talk Comfort

Less on and off cycling

With a gas furnace/air source heat pump combination, equipment on/off cycling is minimized which greatly increases comfort. Fossil fueled furnaces are sized to keep a home warm in the most extreme cold. You get steady and efficient heat during colder weather plus quick recovery from day-night thermostat set back from the furnace.

But a furnace alone will do much on/off cycling during moderate outside temperatures, which is experienced as hot blasts from the registers followed by no heating at all. A heat pump will match your home's load in mild weather and cycle less at moderate temperatures, providing more constant heat flow during the shoulder seasons. Less on and off cycling of your furnace will also help to extend the life of that piece of equipment.

Comfortable & consistent Heat

Hot discharge air from a furnace causes stratification with cold air settling near the floor and hot air near the ceiling. Stratification contributes to heat trapping from room-to-room, causing some rooms to be too hot and

some to be too cold. The more moderate discharge air temperature of a heat pump produces less stratification and more uniform, consistent heat throughout the home.

Better humidity in the winter

The discharge air temperature of a heat pump at moderate outdoor temperatures is lower than that from a furnace (comfortably above skin temperature but not excessively hot). This results in a more pleasant relative humidity level, which is less drying to the skin.

The ideal combination

Better control of equipment run times and heat output are the key to maximizing comfort with forced air heating systems. Today's variable-speed, multi-stage furnaces in combination with an air source heat pump can deliver the most precise amount of heat to the space regardless of outside conditions.

Consider a two stage heat pump

Two stage heat pumps are ideal for northern



climates where we have higher heating demands and lower cooling demands. A two stage heat pump has the ability to operate at high speed when your home is in need of additional heating capacity or at low speed during the summer when you are in need of cooling and dehumidification.

Ask your heating contractor about two stage heat pump options.

Source: 2004 EPRI Dual Fuel Heating & Cooling: A win-win for users and utilities.

Ratings & Efficiencies

To understand the efficiency of a dual-fuel system, you must consider the efficiency rating of the furnace and the heat pump you choose.

AFUE Rating

The AFUE (Annual Fuel Utilization Efficiency) rating is the most widely used measure of a furnace's heating efficiency. It measures the amount of heat actually delivered to your house compared to the amount of fuel that you must supply to the furnace. Thus, a furnace that has an 80% AFUE rating converts 80% of the fuel that you supply to heat -- the other 20% is lost out of the chimney. High efficiency furnaces have AFUE ratings of up to 97% providing savings of up to 19% compared to systems with the minimum AFUE of 78%.

Heat pumps have much higher efficiency ratings as compared to furnaces because they use energy to "transfer" rather than "create" BTUs from scratch. Heat pumps are typically assigned three efficiency ratings, a SEER rating based on a unit's cooling efficiency, an HSPF rating based on a unit's seasonal heating efficiency and COP ratings at specific outdoor temperatures.

SEER Rating

The SEER (Seasonal Energy Efficiency Ratio) rating is used to identify the cooling efficiency of both traditional air conditioners and heat pumps. The SEER rating indicates how efficiently the unit utilizes electricity: the higher the rating, the less electricity the unit requires to cool a given area.

HSPF Rating

The HSPF (Heating Seasonal Performance Factor) rating is used to identify the heating efficiency of total electric heat pump systems: the higher the rating, the less electricity the heat pump uses to heat a given area. The HSPF rating is based on running a heat pump all year long vs. using the heat pump in combination with a gas furnace. Therefore, the HSPF rating is not applicable for use in dual fuel type applications.

COP (Coefficient of Performance)

COP is used as a measure of the steady state performance or energy efficiency of heating, cooling, and refrigeration appliances. The higher the COP, the more efficient the de-

vice. Many heat pumps have COP ratings of 3.0+, which means the system produces 3x's more energy than the system consumes.

COP is one of the most important factors when looking at heat pump efficiency as it takes into account efficiencies at specific temperatures when the heat pump is actually running.



Homeowner Testimonial - "... it's worth every penny."



"We save about 25 percent on propane. Our fuel supplier questioned if we were burning wood because of the reduced volume of fuel."

"We are retired farmers with a five bedroom home. We installed a Hybrid Heat system with an automatic air filter, furnace and heat pump. This system cost \$11,000 and was worth every penny."

We save about 25 percent on propane. Our fuel supplier questioned if we were burning wood because of the reduced volume of fuel. We like our heat system because of clean air, steady temperature and more even heat. It's hard to believe that heat can be drawn from 20 degree temperatures.

Our heat pump is wired directly to our main electric source and we haven't noticed any increase in our energy bill.

We have realized this system to be a cost saving measure and a valuable use of our natural resources, which should concern us all."

-William Hargulh - Waseca, MN

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Take Control of Your Heating Budget



A heat pump can provide the flexibility to choose the most economical fuel source based on current utility costs.

With today's rising uncertainty surrounding utility costs, homeowners nationwide are becoming more and more interested in finding the best, most economical solution for indoor heating and cooling.

Dual Fuel Gives You Flexibility

Dual fuel systems deliver exceptional performance by using a heating source that provides its most energy-efficient comfort during moderate heating conditions. As the temperature drops outside, the system automati-

cally switches to the second heating source when that becomes the most economical way to keep the family comfortable.

A dual fuel system offers the ability to set a balance point that tells the system when it's best to select electric heat and when it's time to switch to furnace operation. As utility rates change, this balance point can be adjusted to offer the most economical heating option.

What Impacts Natural Gas Prices

According to the Minnesota Blue Flame Gas Association, there are 3 primary factors that need to be taken into effect when forecasting natural gas prices; crude oil, weather and storage. These factors can significantly effect the price of heating your home.

Crude Oil

Oil prices tend to set a benchmark at which natural gas prices revolve around, especially during periods of high demand or supply disruption.

Storage

Basic supply and demand, the more natural

gas storage we have, the less pricing fluctuation we will experience.

Weather

Mild weather will typically help to maintain rather moderate natural gas prices. However cold weather or hurricanes can push prices to higher levels.

Choosing a dual fuel system is a long term decision. There will always be uncertainty in the cost of natural gas or electricity. However, when you choose a dual fuel system you have options. Take control of your heating budget!