

The efficient heat pump



KCP&L has worked hard to build one of the best reliability records in the industry, and we want to help you make the most of the energy we provide. That's why we offer information on the efficient heat pump. It's your best option for maximizing your home's year-round comfort and economy.



Comfort and Economy for All Seasons

Customize your home's heating and cooling with a heat pump to achieve year-round comfort and operating efficiencies that lower energy costs. With so many equipment and system options, you can design the perfect environment for your family and your budget.

An electric heat pump combines energy efficiency with a lifetime of clean, convenient and safe comfort. Whether you're building or buying a home or replacing an air conditioner, you owe it to yourself to install the best heating and cooling value—an electric heat pump.

Modern heat pumps offer better-than-ever comfort at lower-than-ever costs. Industry studies confirm that heat pumps save money and provide true comfort in all seasons, while also conserving natural resources.

Unlike a conventional furnace that "combusts" natural gas or propane inside your home, an electric heat pump acts as a heat transfer machine. In winter, it absorbs heat from either outside air or the ground, multiplies that heat and moves it into your home. In the summer, the heat pump works exactly like an

air conditioner, moving heat out of your home to cool it. Since a heat pump is powered by electricity, it's a good way to beat the high cost of heating with natural gas.

More importantly, a heat pump qualifies you for KCP&L's lower, eight-month winter space heat rate. Savings vary according to rates set by the state regulatory commissions. For more information about KCP&L's rates, please visit kcpl.com/heatpump.

Uniform Heating. A heat pump delivers more air, more often than other forced-air equipment. The result: Your heat pump will do a better job maintaining desired household temperatures, and temperature swings common with gas-fired systems will be eliminated.

Heat pump air supply temperatures range from 95 degrees to 110 degrees — some 20 to 35 degrees higher than room temperature. Air from registers may seem cooler than expected but temperatures throughout the room remain more constant. With other systems, air enters the room warmer but quickly collects near the ceiling. Since a heat pump delivers air closer to desired room temperatures, the air rises more slowly, making more heat available to people — not ceilings!

Cooling Comfort. In summer, a heat pump delivers cool, dehumidified comfort like any central air conditioner. And because newer models are highly efficient, they save you money on operating costs. That's especially true if you're replacing an older air conditioner.

Clean, Safe, Healthy. Instead of burning fossil fuel, heat pumps collect heat from the air or the ground. There are no flues, flames or exhaust pollutants, and no need for carbon monoxide sensors. And since no combustion occurs, the inside of your home stays cleaner, safer and healthier.

During operation, the system recirculates the air, filtering away dust and airborne particles, making air healthier for everyone, particularly those who suffer from allergies or asthma. Since heat pumps don't dry the air like furnaces, you'll reduce dry skin and dry throat problems in the winter and help protect fine wood furnishings.

Air Source Heat Pumps

Instead of creating heat, air source heat pumps transfer energy from the air. This quiet and efficient movement of heat into and out of your home naturally provides warmth and comfort.

There are two common types of air source heat pumps: all-electric and dual-fuel. Installation, operation and efficiencies vary from system to system.

All-Electric Air Source Heat Pump Systems.

These systems combine an air source heat pump with supplemental electric resistance heat. In summer, the heat pump works like a central air conditioner, removing heat and humidity from your home and moving it outside. In the winter, it reverses the process, absorbing heat from outside air, multiplying it and then transferring it inside.

Although winter temperatures feel cold to the skin, at zero degrees air contains 82 percent of the heat available when it's 100 degrees outside. Heat transfer occurs when the temperature of the refrigerant in the heat pump's outside coil is lower than the temperature of the outdoor air.

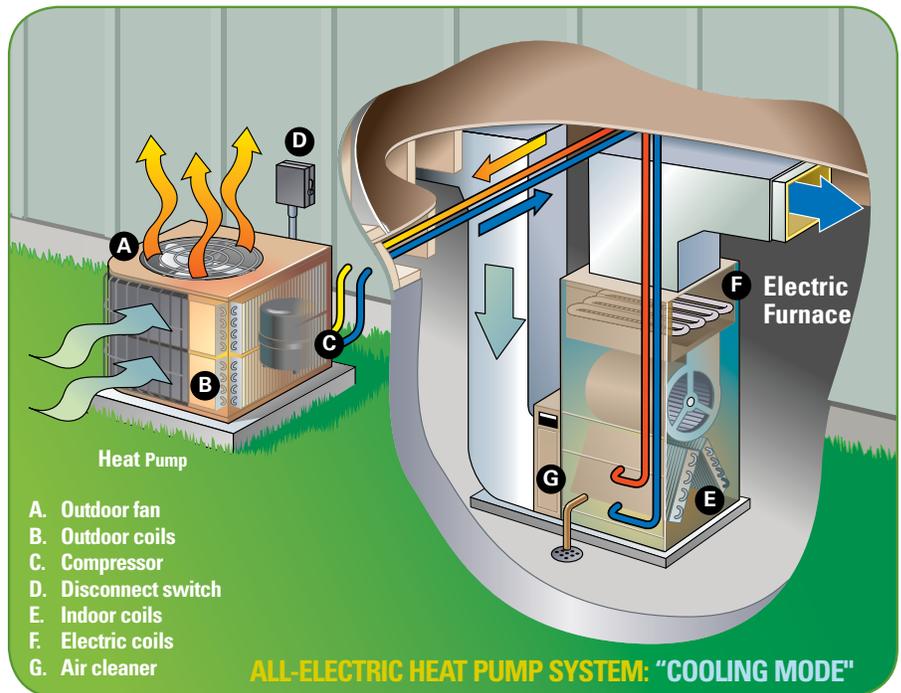
This region's climate is ideal for efficient and constant heat pump operation. In an average winter, over 85 percent of our heating hours occur when temperatures are above freezing. When temperatures drop to 30 degrees or lower, supplementary electric resistance coils add only what's needed to warm the air to your desired comfort level.

Dual-Fuel Air Source Heat Pump Systems.

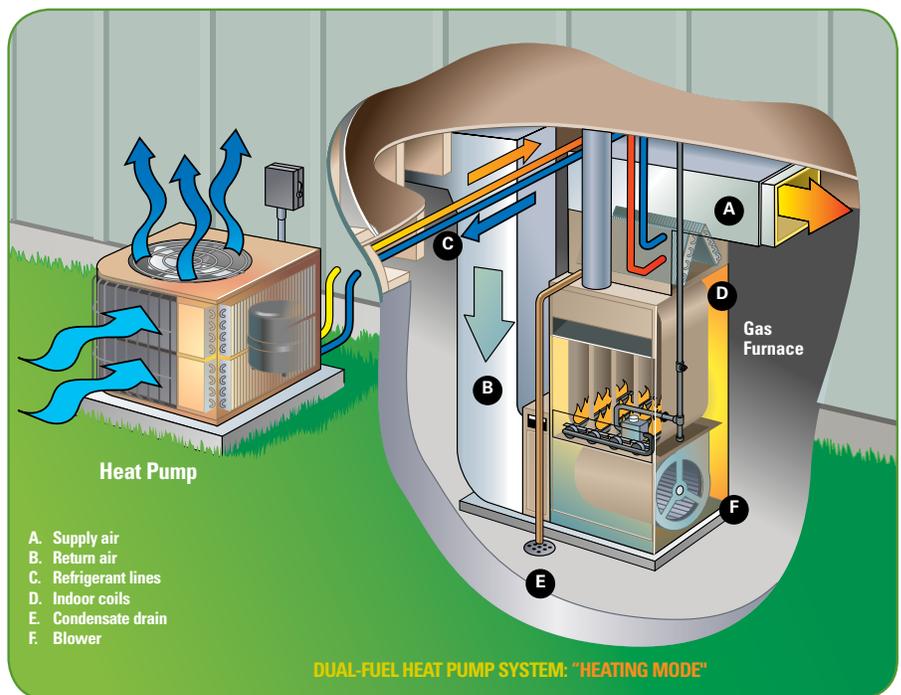
These systems pair a heat pump with a gas or propane furnace to provide back-up heating during extremely cold conditions. Dual-fuel systems take advantage of the efficiencies of both units. Heat pumps are most efficient in moderately cold weather down to about 30 degrees. Gas furnaces reach optimum efficiency in extreme cold. Working in tandem, the units take turns operating only at the temperatures where maximum efficiency is achieved. Many dual-fuel systems allow you to select the temperature at which the switching between units takes place. Usually that's when outdoor temperatures are around 30 degrees.

The heat pump connects to a furnace like a central air conditioner. Dual-fuel systems are ideal for new and existing homes, helping increase comfort and lower operating costs. Their combined efficiency makes them a leading choice of homeowners.

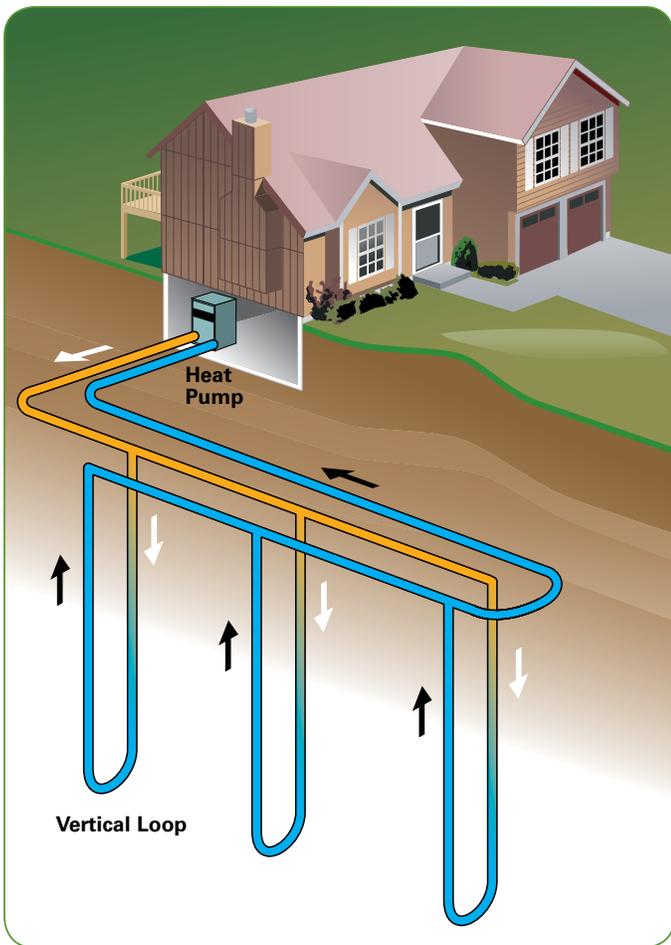
Remember, with a dual-fuel heat pump system, you have the option of selecting the most cost-effective heating source. Talk with your dealer about how to set your system controls take advantage of the best energy prices.



- A. Outdoor fan
- B. Outdoor coils
- C. Compressor
- D. Disconnect switch
- E. Indoor coils
- F. Electric coils
- G. Air cleaner



- A. Supply air
- B. Return air
- C. Refrigerant lines
- D. Indoor coils
- E. Condensate drain
- F. Blower



Geothermal heat pumps borrow stored solar heat from the Earth, giving it back as seasons change. It's a technology that saves the environment while it saves you money.

Geothermal Heat Pumps: Good for Your Budget and the Planet

Geothermal Heat Pump (GHP) systems, also called “ground source” heat pumps, work using a grid of high density polyethylene (HDPE) pipe buried beneath the surface. Known as a ground loop heat exchanger, the grid system connects to a high-efficiency heat pump located inside the home.

Water circulating through the ground loop absorbs the Earth's heat in the winter, where it is multiplied by the heat pump and transferred inside to heat the home - even when outside air is below freezing! In the summer, the system's operation reverses, removing heat from the home and transferring it to the ground loop and, in turn, back to the Earth. And, because ground temperatures typically remain constant between 55 and 65 degrees, these systems work much more efficiently than air source heat pumps.

Ground Loop Heat Exchangers.

Geothermal Heat Pump heat exchangers are available in either vertical or horizontal configurations. Their best layout depends on the available land and other features of the building lot. For example, **vertical** loops are more suitable for small areas, where there is rock or the terrain prohibits a **horizontal** system. Highly reliable HDPE plastic pipe is inserted vertically in 150- to 250-foot deep bored holes. In horizontal systems, HDPE piping is buried in 5- to 6-foot deep trenches across a wide area of land. Other horizontal configurations include **slinky** and **pond loops**.

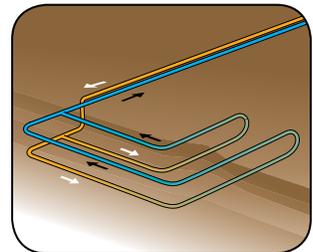
Another loop type is **direct exchange (DX)**. These systems use refrigerant copper tubing placed horizontally underground. As refrigerant from the heat pump's compressor is pumped through the DX loop, heat is transferred directly through the copper to the earth.

Domestic Water Heating.

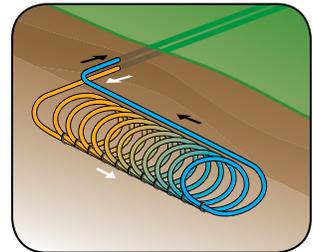
Most manufacturers incorporate a **“desuperheater”** heat exchanger option capable of providing up to 75 percent of your family's hot water needs — nearly free! A desuperheater is a small, auxiliary heat exchanger that uses superheated gases from the heat pump's compressor to heat water for domestic uses. This hot water then circulates through a pipe to the home's normal water heater tank or an added pre-heat tank. In summer, when the GHP system is in the cooling mode, the desuperheater simply uses excess heat that would otherwise be transferred to the ground loop.

More Benefits. The underlying advantage of GHP systems is their use of the Earth's renewable **“stored solar”** energy, which uses valuable natural resources to provide home comfort. In fact, the U.S. Department of Energy (DOE) and the Environmental Protection Agency (EPA) rate GHPs as the most efficient, environmentally friendly heating and cooling systems available today for residential and commercial buildings. And studies have demonstrated operation cost savings of up to 70 percent.

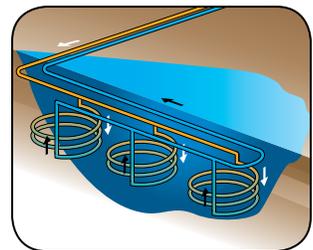
GHP systems are also highly reliable, require little maintenance, have no noisy outdoor equipment, and are built to last for decades. And since a GHP provides warmer conditioned air in the winter, up to 110 degrees, you'll stay more comfortable — even on the coldest days! A geothermal system is an investment that will add considerably to the value of your home.



Horizontal Loop



Slinky Loop



Pond Loop

Choosing Your Heat Pump

Heat pumps are adaptable to a wide variety of uses and needs. Whether building a new home or replacing your old system, let your need determine whether you choose an all-electric, dual-fuel or geothermal heat pump system.

When shopping for a heat pump, look for industry efficiency ratings commonly referred to as **SEER** and **HSPF**:

- **Seasonal Efficiency Energy Ratio (SEER)** is the rating used to distinguish the cooling efficiency of an air conditioner or heat pump. The higher the SEER rating, the more efficient the unit. Today, the minimum efficiency standard is 13 SEER. Multistage air source heat pumps are available up to 24 SEER. So for optimum summer savings, consider units rated 15 SEER or higher.
- **Heating Seasonal Performance Factor (HSPF)** is the efficiency rating used to identify the heating efficiency of an air source heat pump. HSPF ratings commonly range from 6.5 through 11. Again, the higher the number, the more efficient the system's heating will be.

Use industry standard SEER and HSPF ratings to compare various brands and models of heat pumps. And remember, higher numbers mean higher efficiency and lower operating costs.

Keep your system in top-shape with regular maintenance

Like other systems, heat pumps should receive periodic maintenance to ensure dependable, economic operation and long life. The maintenance schedule for heat pumps is similar to a central air conditioner. Inspect your system regularly. Keep filters clean and air passages and outdoor coils clear of obstructions, such as dirt, leaves, shrubbery and trash.

Look for the ENERGY STAR®



ENERGY STAR® is a government and industry partnership that offers consumers and businesses energy efficient product

labeling, making it easier to save money while protecting the environment for future generations. Labeling is provided on more than 50 product categories, including air source and geothermal heat pumps. To earn the ENERGY STAR label, heat pumps must meet strict energy efficiency guidelines established by the EPA and the DOE. ENERGY STAR units have higher SEER and HSPF ratings. This makes them about 12 percent more efficient than new standard models and up to 50 percent more efficient than what may be found in existing homes.

Need More Information?

You'll find additional heat pump information at www.kcpl.com/heatpump or any of these Web sites:

- **Air Conditioning Contractors of America:** www.acca.org
- **Air-Conditioning, Heating and Refrigeration Institute:** www.ahrinet.org
- **EPA Energy Star:** www.energystar.gov
- **Geothermal Heat Pump Consortium:** www.geoexchange.org
- **International Ground Source Heat Pump Association:** www.igshpa.okstate.edu
- **NATE:** www.natex.org
- **U.S. Department of Energy:** www.eere.energy.gov

How to Reach Us

KCP&L customer service representatives are available 24/7. Call or visit us online for more information

Kansas City..... (816) 471-5275

Toll-Free 1-888-471-5275

Online www.kcpl.com/heatpump