Heat will naturally move from something warm to something cool. A geothermal heat pump provides the necessary temperature link between the energy in the earth and the energy needs for a building—the entire process is simple.

Important components within a geothermal heat pump are:

- the compressor to change the temperature of the refrigerant
- a heat exchanger linked to the earth loop
- air or water coil to distribute the heat into the building

A geothermal heat pump will do all the heating and cooling of a building within one cabinet. It is an all-electric, clean, reliable, safe and economical system.

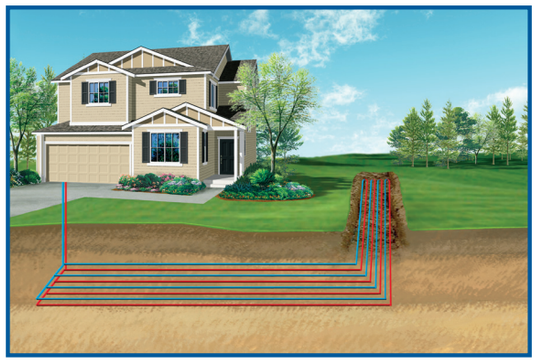
Lower Cost Hot Water

In the cooling season, the geothermal system removes heat from the space. Before this energy is moved to the ground loop, it can be used to provide domestic hot water. This means low-cost water heating in the summer and at substantially lower costs in the winter.

Geothermal System Loops

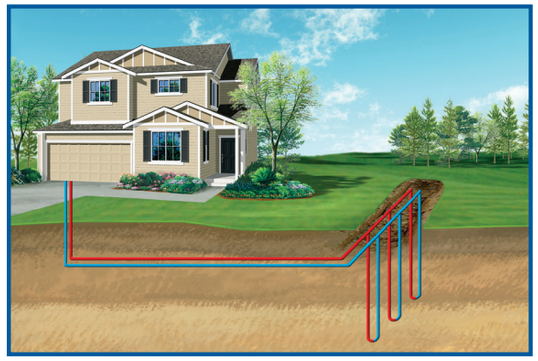
When a system is installed, tubing is installed underground in a loop configuration to give the fluid enough area to either absorb the heat from the ground (winter) or release heat from the home and cool before re-entering the building (summer). Loops can be installed horizontally or vertically, which makes a geothermal system ideal for nearly any lot. The method chosen will depend on the available land area and the soil and rock type at the installation site.

Horizontal Loops



Horizontal installations, when a trencher or backhoe can be used, are less expensive, but require more land area.

Vertical Loops



Vertical installations, where well drilling equipment is used, are generally more expensive, but are ideal where land area is limited.

Open Loop

An open loop system does not keep fluid in coils, but utilizes water for the heat transfer. The loop can be installed where an adequate supply of suitable well water is available and open discharge is feasible. Check state/local rules and regulations.

Commercial/Industrial Buildings

The Advantages:

- Lower operating costs
- High efficiency
- Less mechanical equipment space
- Reduced floor-to-floor height requirements
- Lowest life cycle cost
- Minimal maintenance
- Long lasting and reliable

In large commercial buildings, such as school and high-rise offices, the use of multiple geothermal systems allows commercial users to control the climate of each indoor area or zone of a building individually. Each classroom of a school, guest room of a hotel or room of an office building may have its own geothermal unit.

This design means extraordinary savings because the heat removed from the sunny side is transferred to the geothermal unit heating the shady side, reducing the demand on the earth loop.

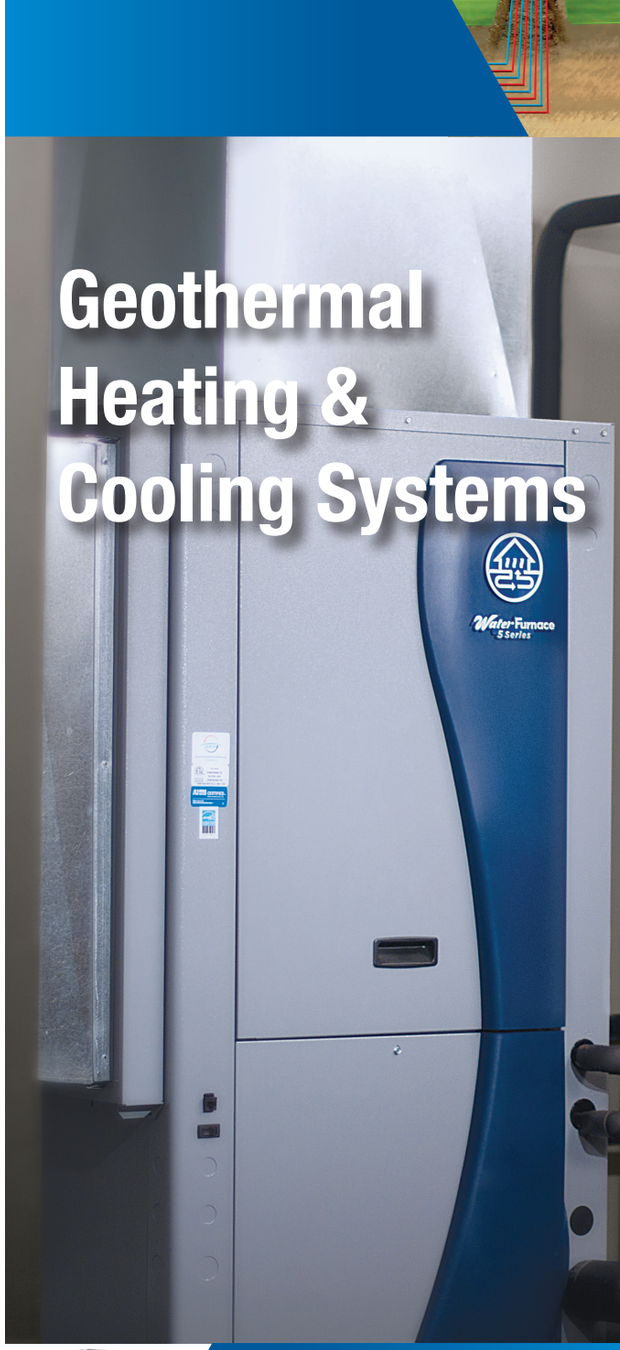
Resource: WI Geothermal Association (https://wisgeo.org)

People's Energy Cooperative
Your Touchstone Energy® Cooperative
(507) 367-7000 or (800) 214-2694
www.peoplesenergy.coop

Contact your local electric cooperative for more information about geothermal systems.

2021

Geothermal Heating & Cooling Systems



Geothermal Heat Pumps

A geothermal heat pump can be a highly efficient and cost effective opportunity for homes, schools and businesses.

Important considerations when choosing a heating and cooling system are comfort and economy. With a geothermal heat pump, you can have both. Geothermal systems can operate in any climate by tapping into the naturally stored energy of the earth. The systems utilize the earth's constant ground temperature six to eight feet below the surface (about 50 degrees Farenheit) to provide heating, cooling and hot water in a variety of applications.

Benefits

Comfort – Geothermal systems provide superior room comfort control delivered gently into a building.

Economical – Lower energy bills? Although more expensive to install, the energy savings will make-up the difference. Electricity is only needed for moving heat between your home and the ground.

***An ENERGY STAR certified geothermal heat pump:**

- is more than 45 percent more energy efficient than standard options
- Five-to 10-year payback
- Lower operating and maintenance costs

*According to www.Energy.gov

Environmentally Safe – Geothermal heat pumps are recognized by the Environmental Protection Agency (EPA) as the most environmentally friendly heating and cooling technology available. CO_2 emissions are significantly reduced. A geothermal heat pump has few moving parts to maintain and is indoors, where it is protected from weather extremes and abuse.

Clean – No flames, no flue, no odors – just safe, reliable operation.

Low Maintenance – Geothermal systems require little maintenance. Homeowners only need to change air filters. Businesses could eliminate expensive maintenance contracts or on-staff operators.

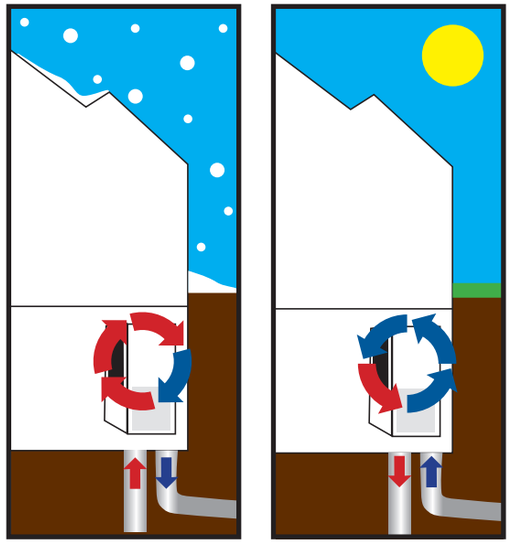
Efficient – Geothermal systems are more than four times as efficient as the most efficient fossil fuel furnace. Instead of burning a combustible fuel to make heat, geothermal systems move heat that already exists.

How a Geothermal System Works

The process is simple: Heat naturally moves toward cooler air. A geothermal heat pump provides a means for this natural heat transfer via fluid-filled coils.

A geothermal heat pump can provide 100 percent of your heating and cooling needs.

Six to eight feet below the surface, the ground temperature is a consistent 50 degrees. In the winter, the earth's heat is extracted via ground loop heat exchanger consisting of polyethylene pipes containing a water solution. The solution inside the pipes absorbs heat from the ground and, with a circulating pump, moves the solution into the dwelling's heat pump. Within the heat pump, a heat exchanger removes the heat from the water solution, concentrates the heat and then distributes the heat throughout the building.



Winter Summer

For cooling, the process is reversed. Excess heat from the building is removed by the heat pump and transferred into the earth via the fluid in the coils, which cools as it continues its loop. The cool fluid helps the system in cooling the dwelling.

Do these Systems Work in Our Region?

Yes. Since a geothermal system simply moves the earth's naturally stored underground heat into the building, the outside air temperature in the winter or summer does not affect the performance of a geothermal system.

The constant temperature of the earth provides all the needed energy to heat or cool your home or building. There are thousands of geothermal systems operating in homes, businesses and schools throughout the Midwest.

Check with the Cooperative or your tax advisor to learn of current incentives. Incentives on geothermal systems are typically higher than on conventional heating systems.

At times, people confuse geothermal systems with air source heat pumps. While both transfer energy, air source heat pumps try to remove heat from the outside air and there is simply not enough heat in that air during the winter in our region, although the technology is improving.

Inside a Geothermal Heat Pump

A geothermal heat pump enables heat to move naturally and is no more complicated than a refrigerator. The heat pump uses a basic refrigeration cycle to extract heat from the earth and move that heat into a building. In the summer, the refrigeration process is reversed to provide cooling.