

Geothermal Benefits

Geothermal Heat Pumps: Two important considerations when choosing a heating and cooling system are comfort and economics. 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 Fahrenheit*) to provide heating, cooling, and hot water in a variety of applications. The benefits include:

- **Comfort** – Geothermal systems provide superior room comfort control delivered gently into a building.
- **Economical** – 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.
- **Environmentally Safe** – Geothermal heat pumps are recognized by the Environmental Protection Agency (EPA) as the most environmentally friendly heating and cooling technology available.
- **Clean** – No flames, no flue, no odors – just safe, reliable operation.
- **Low Maintenance** – Geothermal systems require little maintenance.
- **Efficient** – Geothermal systems are the most efficient heating and cooling system. Instead of burning a combustible fuel to make heat, geothermal systems move heat that already exists.

Geothermal heating works by moving temperature-conducting fluid through an underground loop of pipes beneath or near your home.

This allows the fluid to collect the thermal energy deposited in the earth from the sun.



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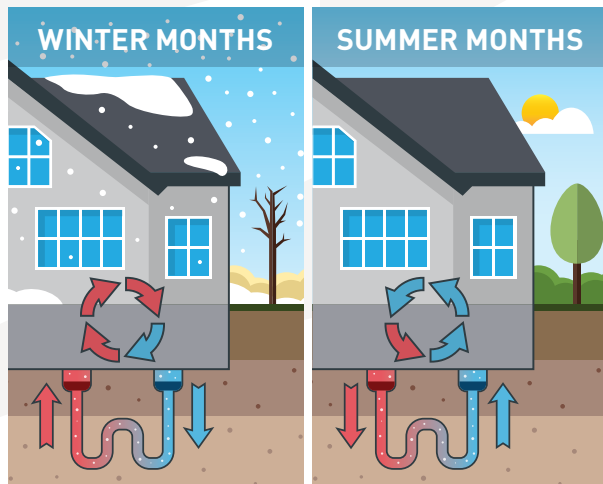
AN ENVIRONMENTALLY SAFE
*heating & cooling system that taps
into the stored energy of the earth.*

How It 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.

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 a 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.

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 the solution as it continues to loop. The cool fluid helps the system in cooling the dwelling.



Frequent Questions

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.

What's Inside a Geothermal Heat Pump?

A geothermal heat pump enables heat to move naturally like your home's 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.

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.

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.



More Information

Lower Cost Hot Water: In the summer, the geothermal system removes heat from the building. 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 substantially lower water heating costs in the winter.

Geothermal System Loops: When a system is installed, tubing is placed underground in a loop configuration to allow 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 site.

- **Horizontal Loops:** Horizontal installations can utilize a trencher or backhoe and are less expensive but require more land area.
- **Vertical Loops:** Vertical installations require well drilling equipment and are generally more expensive however 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.