

## How Do They Work?

Remember, a geothermal heat pump doesn't create heat by burning fuel, like a furnace does. Instead, in winter it collects the Earth's natural heat through a series of pipes, called a loop, installed below the surface of the ground or submersed in a pond or lake. Fluid circulates through the loop and carries the heat to the house. There, an electrically driven compressor and a heat exchanger concentrate the Earth's energy and release it inside the home at a higher temperature. Ductwork distributes the heat to different rooms.

In summer, the process is reversed. The underground loop draws excess heat from the house and allows it to be absorbed by the Earth. The system cools your home in the same way that a refrigerator keeps your food cool - by drawing heat from the interior, not by blowing in cold air.

The geothermal loop that is buried underground is typically made of high-density polyethylene, a tough plastic that is extraordinarily durable but which allows heat to pass through efficiently. When installers connect sections of pipe, they heat fuse the joints, making the connections stronger than the pipe itself. The fluid in the loop is water or an environmentally safe antifreeze solution that circulates through the pipes in a closed system.

Another type of geothermal system uses a loop of copper piping placed underground. When refrigerant is pumped through the loop, heat is transferred directly through the copper to the earth.

## Financing!



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## Geothermal Information Sheet



## What is Geothermal????

Heat pumps move heat from one place to another - from outside to inside a home, for example. That's why they're called "heat pumps."

All heat pumps have an outdoor unit (called a condenser) and an indoor unit (an evaporator coil).

A substance called a *refrigerant* carries the heat from one area to another. When compressed, it is a high temperature, high-pressure liquid. If it is allowed to expand, it turns into a low temperature, low pressure gas. The gas then absorbs heat.

In the winter the normal heat pump system extracts heat from outdoor air and transfers it inside where it is circulated through your home's ductwork by a fan.

Even cold air contains a great deal of heat; the temperature at which air no longer carries any heat is well below -200 degrees Fahrenheit. But the coldest temperature ever recorded in the lower 48 states was -70 degrees, recorded at Roger Pass, Montana on January 20, 1954. Obviously in such weather, a heat pump would have to work pretty hard to produce 68-degree temperatures inside your home.

That's why geothermal heat pumps are so efficient.

Geothermal heat pumps are similar to ordinary heat pumps, but instead of using heat found in outside air, they rely on the stable, even heat of the earth to provide heating, air conditioning and, in most cases, hot water.

That's the principle behind geothermal heat pumps. In the winter, they move the heat from the earth into your house. In the summer, they pull the heat from your home and discharge it into the ground.

## How Do They Compare?

Surveys taken by utilities have found that homeowners using geothermal heat pumps rate them highly when compared to conventional systems. Figures indicate that more than 95 percent of all geothermal heat pump owners would recommend a similar system to their friends and family.



### Cost

As a rule of thumb, a geothermal heat pump system costs about \$2,500 per ton of capacity. The typically sized home would use a three-ton unit costing roughly \$7,500. That initial cost is nearly twice the price of a regular heat pump system that would probably cost about \$4,000, with air conditioning.

You will have to, however, add the cost of **drilling** to this total amount. The final cost will depend on whether your system will drill vertically deep underground or will put the loops in a horizontal fashion a shorter distance below ground. The cost of drilling can run anywhere from \$10,000 to \$30,000, or more depending on the terrain and other local factors.

Added to an already built home an replacing an existing HVAC unit, an efficient geothermal system saves enough on utility bills that the investment can be recouped in five to ten years.

## Durability

Geothermal heat pumps are durable and require little maintenance. They have fewer mechanical components than other systems, and most of those components are underground, sheltered from the weather. The underground piping used in the system is often guaranteed to last 25 to 50 years and is virtually worry-free. The components inside the house are small and easily accessible for maintenance. Warm and cool air are distributed through ductwork, just as in a regular forced-air system.

Since geothermal systems have no outside condensing units like air conditioners, they are quieter to operate.

