

Geothermal Heat Pump Systems

What You Need to Know

Geothermal heat pump systems. Ground source heat pumps. GeoExchange. Whatever the name, this type of heating and cooling system has become popular for residential and commercial builders in recent years.

And why not? The U.S. Environmental Protection Agency stated these systems are the most efficient and comfortable heating and cooling technology available.

What follows are answers to common questions concerning the systems.

What is a geothermal heat pump system?

The system has a dual purpose: It does the job of a furnace and an air conditioner. Using a system of below-ground pipes called a loop, geothermal heat pump systems take advantage of the earth's constant temperatures just below its surface—a range of 45 to 65 degrees Fahrenheit.

In the heating season, a fluid in the loop collects heat from the earth or a body of water and transfers that heat to the building. The system then uses electronically driven compressors and heat exchangers to concentrate the heat and release it at a higher temperature into the building. Typically, duct fans then distribute the heat into various rooms.

The process is reversed in the cooling season, as the system removes the heat from the building and expels it back to the earth or a body of water.

Is there more than one type of system?

There are open, closed, and lake loop systems. An analysis should be conducted to see which system will work best for each project.

- **Open loop:** uses ground water to provide the means to absorb and reject heat. Most systems use a production well to deliver the water to the heat pump and another well to return water to the ground. These systems are ideal where ground water is plentiful.
- **Closed loop:** uses pipe in the ground to provide the heat exchange. The pipe can be installed horizontally where adequate space is available or vertically in a borehole. These systems are applicable for most locations and system sizes.
- **Lake loop:** uses a pipe submerged in a body of water to provide the heat exchange. These systems are common in warm climates.

Is this new technology?

No. The technology has been around for more than 20 years. Many homeowners and businesses have used the systems for much of that time.

Does it work well in extremely hot and extremely cold climates?

Yes, because it transfers heat to and from the earth, which remains at a relatively constant temperature. Therefore, it can be used in any part of the country.

Is it safe for the environment?

The fluid in the loop is either an environmentally safe antifreeze solution or ground water. In addition, the system uses little electricity, which in turn saves energy, and it doesn't burn fossil fuels, which reduces those emissions into the air.

Is it expensive?

Installing a geothermal heat pump system will cost more than installing a traditional furnace and air conditioner. However, the systems impact heating and cooling bills so much that the savings will equal the cost difference of the units within four to five years.

Where can I get more information?

For more information, visit the Web site of the National Ground Water Association, www.ngwa.org, and its site just for well owners, www.wellowner.org. You also can check with your local water well system contractor.



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