

“Going Green” with Geothermal Energy

by Ashley Murphy

In today's society, it seems everyone is becoming obsessed with "going green." The whole concept of saving money, saving energy, and saving the environment is taking hold of hundreds of people every year. There have been many "green" innovations over the past several years which include solar energy, wind turbines, and "green" electrically powered cars, just to name a few.

Another added to this list is geothermal energy. While geothermal energy isn't widely talked about, more and

more homes and commercial buildings are using geothermal, or geexchange, systems as a source of heating and cooling. The residential units can even supply the home with hot water, if it is equipped to do so.

Geexchange systems have been in use since the mid to late 1940s, but have just regained popularity over the past few years. Geothermal is derived from the Greek words "geo" meaning Earth and "thermos" meaning heat.

Geothermal energy isn't all geysers and hot springs. The whole concept of geothermal energy in everyday use is the installation of geothermal heat pumps that will transfer the heat and energy from the Earth to heat and cool homes and buildings. This is supposed to reduce the use and cost of energy and be more environmentally friendly.

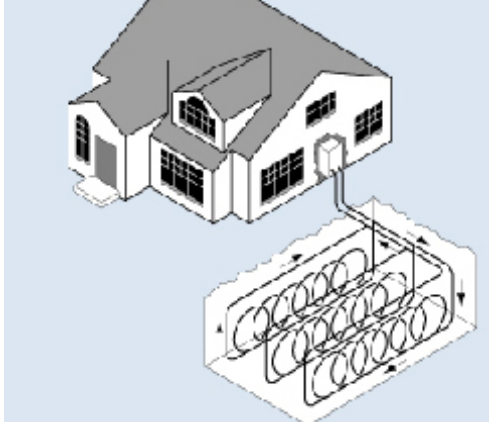
Just a few feet down under the Earth's surface, the temperatures range from 45°F to 75°F globally, depending on your location. These temperatures are constant and remain so throughout the year. Geexchange systems use this constant tempera-

ture to exchange or transfer heat to and from the ground.

All of the different types of geexchange systems use a series of underground pipes, or loops, that make this possible. There are several types of geexchange ground loop systems: open

Closed Loop Systems

Horizontal

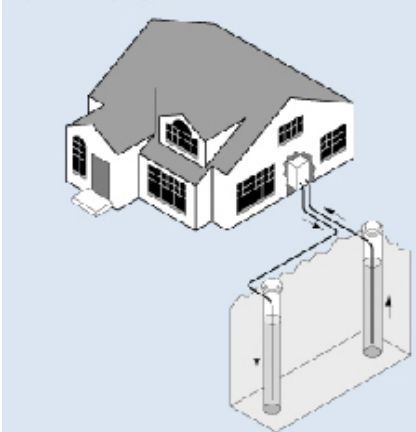


loop and closed loop systems. These then branch out and can be classified as a vertical, horizontal, or pond/lake system.

There are several factors that come into play when choosing the type of system to be used. Because the system requires under ground loops to run in the most efficient locations, the soil, rock type, and available land area all have to be considered before determining if a geexchange system can be installed.

The first, an open loop exchange system, was the most widely available of the systems from the 1940s

Open Loop Systems



to the 1980s, but has lost some of its popularity due to additional regulations and the need for clean water, and an abundant supply of it. This is needed to adequately run the open loop system, because it pumps

water directly from a well.

By pumping water directly from a ground well, more things are likely to go wrong with the open loop system, such as inadequate flow in the production well, pressure build-up in the injection well, pump failure, and excessive corrosion in the tube bundle of the heat pump.

A few of the problems can be corrected or delayed, but not without much monetary and time expenses. Maintenance would include chemical treatments, chlorination, back pumping the well, and in severe cases, reworking the well entirely on a regular basis.

Closed loop systems began to take on popularity in the 1980s with the horizontal, vertical, and pond/lake systems.

In the closed loop systems, a fluid is already set in the pipes and is continuously flowing through sets of closed loops pipes to transfer the heat, then the fluid flows through the heat pump to heat or cool air for the distribution system.

Horizontal closed loop systems are mainly for residential use, when land area is available. The volume of air in a residential home that will be heated and cooled is much smaller than that of a large office building, so fewer pipe loops are needed and can be placed, in most cases, in the allotted space. Installing a residential system consists of digging trenches and placing pipes four to six feet in the ground, just below the frost line.

The vertical loop system is often used in commercial buildings and schools, because of the land area that would be required for all of the piping needed to heat such large buildings. The interior setup is virtually

the same as that of the horizontal system, but the pipes are laid out to a different design.

Long runs of piping are needed to be able to heat and cool large commercial areas that a series of small holes, with a diameter of four inches, placed about twenty feet apart are drilled at depths ranging from 100 to 400 feet deep.

There are two pipes placed in each hole that are connected at the bottom with another piece of U-shaped piping to allow the continuous flow of heat transfer fluid. These systems can then be landscaped or

option to take for the lowest cost. The piping is run underground to where it will meet the coils that are to be

savings may look and sound good, it is important to do research, not only on the geothermal systems themselves, but also on the contractor you are considering to install them. Choosing the right people is important for many reasons. A contractor and the personnel he employs need to be well-trained and experienced in surveying and installing geothermal systems.

There are several problems that can occur before the unit is installed if the system analysis or design is flawed.

placed no less than eight feet under the surface of the water, to prevent freezing.

The cost of installing a geothermal system is steep, \$5,000 to \$20,000 for a typical house in the United States and up to \$500,000 or more for commercial buildings. While conventional HVAC units are much cheaper to install, the overall monthly savings for geothermal is significant, sometimes by up to almost half.

Many geothermal systems have been in use now for 25 years and some are even expected to last as many as 50 years. This, of course, will require regular maintenance to insure everything is running efficiently.

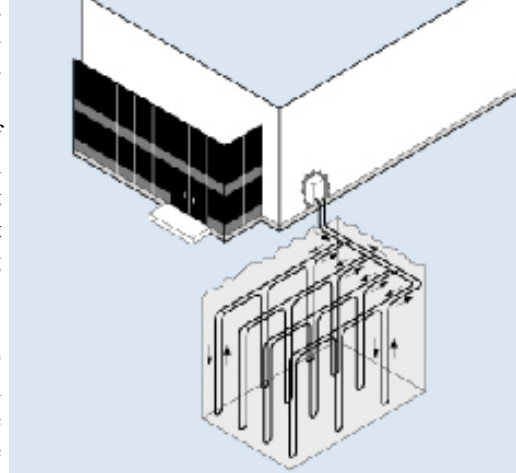
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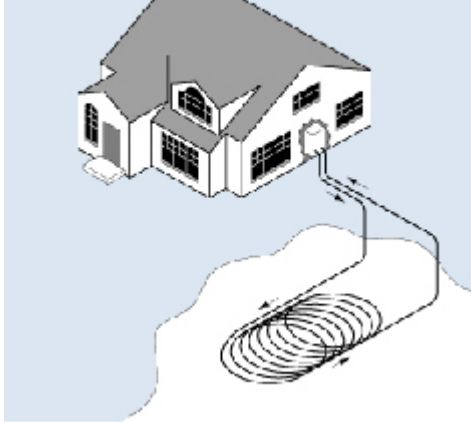
Closed Loop Systems

Vertical



Closed Loop Systems

Pond/Lake



paved over to hide the well field.

The last type of closed loop system requires a clean and adequately sized pond or lake. If you have access to such a water supply, then this may be the

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