**What You Should Know About Installing Geothermal Heating and Cooling Systems**

　　Energy-efficient and cost-effective geothermal heating and cooling system will save you money and the enviroment!

　　If you need a new HVAC system and would like one that is eco-friendly, you can always harness the energy of the Earth to heat and cool your home.

　　Geothermal heating and cooling systems are also known as geoexchange, geothermal, or ground source heating and cooling. But, they all are the same thing. So don’t be fazed if you hear any one of these terms used interchangeably. Geothermal heating and cooling systems use the natural constant, warm ground temperature of the Earth to warm and cool a home.

　　How geothermal heating and cooling systems work

　　Geothermal works so efficiently because once the ground gets to a certain depth, it remains a stable temperature — between 50 and 60 degrees Fahrenheit.

　　Small, serpentine pipes are laid into the ground, allowing heat to be transferred to and from your home. No heat is created. It is only transferred, so no fuel source is needed.

　　There are two parts to a geothermal heating and cooling system:

　　1.Heat Pump — the indoor component of the system.

　　2.Ground Loop — Water circulates in the underground piping system that connects to the heat pump.

　　The difference between an air-source heat pump and a geothermal heat pump

　　A geothermal heat pump differs from a traditional air-source heat pump. While both types of heat pumps work on a similar principle, a geothermal heat pump is far more energy-efficient to operate than a common air-source heat pump (ASHP). Geothermal heating and cooling systems can reduce energy use by a range of 25 percent – 50 percent compared to air source heat pumps.

　　Geothermal heat pumps reach high efficiencies of up to 300 percent – 600 percent, even during very cold winter temperatures. As with all heat pumps, geothermal heat pumps will both heat and cool a home, and some are even designed to supply hot water to the house.

　　Geothermal systems are available with two-speed compressors and variable fans, giving you better savings on energy and a more comfortable home environment. Compared to ASHPs, they are quieter, more durable, and require less maintenance. Also, how well they heat or cool is not tied to the temperature of the outside air.

　　The benefits of a geothermal heating and cooling system

　　Geothermal heating and cooling systems do double duty, keeping a house both cool and warm as needed. In the winter, the ground loop circulates water. This absorbs the heat from the earth and returns it to the heat pump, extracting the heat from the liquid and then distributing it throughout the home as heated air. When the heat is removed, the water is recirculated to gather more heat from the ground. The loop is warmer when it comes into the home than when it leaves and goes back to the earth since the heat has been removed.

　　Conversely, during the summer, the indoor heat pump takes the hot air from your home and removes it, leaving only the cool air. It then distributes the cooled air through the vents as a traditional air conditioning unit would. The warm air that was drawn from the home is then transferred back into the earth via the ground loop.

　　Types of geothermal heat pumps

　　There are four types of geothermal heat pumps that draw the heat to or from the ground and into your home. Three are closed-loop systems: horizontal, vertical, and pond or lake. The fourth type of system is the open-loop option.

　　The type of system you choose has to do with your state’s climate, your local soil conditions, amount of available land, and local geothermal installation costs

　　Closed-Loop Systems

　　Horizontal: This is usually the most cost-effective, especially where there is ample land. A horizontal closed-loop system is most often used in residential geothermal heating and cooling system installations. It requires a four feet deep trench.

　　Vertical: Generally used in larger scale geothermal systems like commercial buildings, where there is not a lot of lands, or the loops cannot be buried deeply and perhaps drilling into rock might be needed. Vertical loops use less land and disrupt less of the surrounding area, but they do tend to be more expensive.

　　Pond or Lake: If there is a sufficient nearby body of water, this can be the most cost-effective option. A supply line pipe runs underground from the building or home to the lake. It must coil in a circle at least eight feet below the surface to prevent the water from freezing. A pond or lake system can only be used in a water source that meets the criteria for minimum volume, depth, and quality.

　　Open-Loop System

　　An open-loop system uses a readily available source of water, like a well or surface body, as the heat exchange fluid that circulates through the geothermal heat pump system. Once it is done circulating, the water returns to the ground through the well, surface discharge, or a recharge well. This is only a viable option when you have an adequate supply of fairly clean water. Also, it must follow all local codes and regulations in regards to how you are legally able to discharge groundwater.

　　Environmentally Friendly and Cost-effective

　　A geothermal heat pump system is more expensive than installing an air-source system of the same heating and cooling capacity, but you will likely recoup costs in energy savings over the next 5–10 years.

　　The average cost of a geothermal heat pump system is about $2,500 per ton of capacity. So, if a home requires a 3-ton unit, then it would cost about $7,500, plus the cost of installation and drilling. To compare, an ASHP system with air conditioning would cost about $4,000; however, the higher energy costs could eventually add up to the larger expense of installing a geothermal heat pump. Furthermore, newly installed geothermal heat pump systems are eligible for a 30 percent federal tax credit.

　　Geothermal heat pump systems have an average lifespan of at least 20 years. The underground infrastructure itself has a life expectancy of 25–50 years.

　　Finding and hiring the most qualified geothermal heat pump installer for your home

　　Hiring a competent and highly qualified geothermal heating and cooling system’s contractor is key to getting the proper type of geothermal heat pump for your needs and getting the most out of your unit so you can enjoy it for many years to come.

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