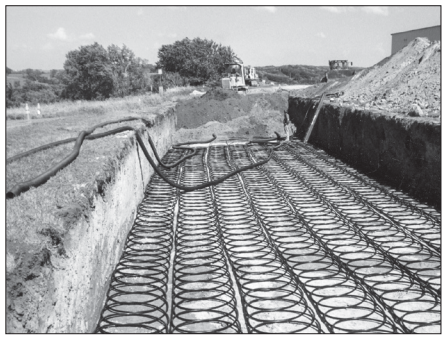
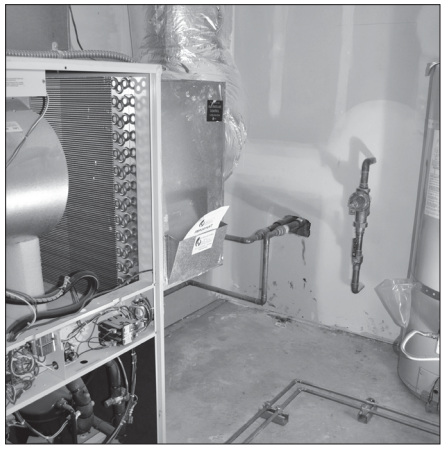
Is a Geothermal Heat Pump Right for You?



A horizontal loop field can be less expensive than vertical drilling, but requires more space, as shown at this electric co-op installation.

Photo courtesy of Federated Rural Electric Association



A geothermal heat pump is among the most efficient heating and cooling systems currently available.

Photo by Erin Stancik

To ask a question, send an email to **Patrick Keegan** at energytips@collaborativeefficiency.com.

Q: *I am planning to replace my current heating system with a geothermal heat pump. Is a geothermal heat pump a good choice for me?*

A: Space heating and cooling account for a large percentage of home energy use, so upgrading to a more efficient HVAC system is a great way to reduce your monthly energy bill. A geothermal heat pump, also known as a ground-source heat pump, is among the most efficient types of heating and cooling systems you can install in your home.

Even when it is extremely hot or cold outside, the temperature a few feet underground remains relatively moderate. A geothermal heat pump system uses this constant ground temperature to help heat and cool your home. As a result, geothermal heat pumps are quite efficient.

According to the U.S. Environmental Protection Agency, geothermal heat pumps use up to 44 percent less energy than traditional air-source heat pumps, and up to 72 percent less energy than electric resistance heaters combined with standard air conditioners.

A geothermal heat pump system is made up of three main components:

- The collector, or loop field, which is in the ground and cycles a liquid, such as antifreeze, through dense plastic tubing.
- The heat pump in your home.
- The duct system that distributes the heated or cooled air throughout your home.

During the winter, the collector absorbs the heat stored in the ground and the liquid carries that heat to the heat pump, which concentrates it and blows it into the duct work, warming your home. In the summer, the heat pump extracts heat from the home and transfers it to the cooler ground.

The collector that exchanges heating and cooling with the ground can be set up in one of three ways:

Horizontal system. Plastic tubing is placed in trenches 4 to 6 feet below ground. Because these systems may require up to 400 feet of trenches, it works well when a home or business has sufficient land.

Vertical system. If the site does not have sufficient acreage, a collector can be placed vertically. In this system, a drill digs 100 to 400 feet below the surface and places the tubing. This system can be more costly than a horizontal system, but has less impact on existing landscaping and can be used on smaller lots.

Pond system. If a home has access to a pond or lake, a pond system—also known as a water-source heat pump—may be possible. The loop field is connected to the heat pump and then placed at least 8 feet below the surface of the water. If a homeowner has access to a pond that is wide and deep enough, this option can be the cheapest.

Geothermal systems typically cost more than other heating systems because of the collector and the associated digging or drilling, but their high efficiency can help reduce the payback time.

The cost will vary based on new ductwork needs and the collector type you install, among other factors. However, there are incentives for installing qualified geothermal heat pumps. There is a 30 percent federal tax credit for installing an Energy Star-rated system before the end of 2016. If your system and installation cost $20,000, you could take $6,000 directly off your federal tax bill. Also, check for state tax incentives and rebates from your electric utility.

People building new homes should consider a geothermal heat pump because the system can be included in the mortgage.

Talk with a qualified energy auditor to evaluate the different heating and cooling options that are best for your home. ■

This column was co-written by Patrick Keegan and Amy Wheeless of Collaborative Efficiency. For more information on geothermal heat pumps, visit www.collaborativeefficiency.com/energytips.