

Energy Efficiency from the Ground Up

BY JAMES DULLEY

Dear Jim: My house needs a new heating and cooling system. I have thought about installing a geothermal heat pump for its efficiency and the tax credit. How efficient is one and how does it work? - Brandon D.

Dear Brandon:

Geothermal heat pumps are extremely energy efficient and generally yield the lowest utility bills of any residential heating and cooling systems available.

With the high cost of energy today and the available energy tax credit, installing a geothermal heat pump could make economic sense for some families.

A geothermal heat pump operates similarly to a standard heat pump except it exchanges heat with the ground instead of the outdoor air, essentially using renewable energy from the sun's rays that are stored as heat in the ground. The temperature of the outdoor air can vary 40 degrees or more from day to night and more than 100 degrees from the coldest winter night to the hottest summer day. In contrast, the temperature several feet below the ground surface varies relatively little.

In order to capture the heat energy from the ground (in the winter) or exhaust the heat during summer, a long pipe is usually buried in the ground. An antifreeze/water solution



A super-efficient geothermal heat pump shown with and without the front cover. Notice the large air cleaner and water fittings for also heating hot water.

WATER FURNACE

running through the pipe acts as the heat transfer medium. If there is a pond or wells which can be dug on your land, this water can run through the heat pump heat exchangers. All of the new models use earth-friendly R410A refrigerant instead of freon.

Since no outdoor condenser coils and fans are needed, the entire heat pump and all mechanical components are located in an indoor unit. It operates quietly and, with no outdoor fan or compressor, there is no noise to bother neighbors or your family at night. This also reduces wear and tear from constant exposure to outdoor weather (and playing children).

During winter in the heating mode, a geothermal heat pump can produce up to five dollars worth of heat for each dollar on your electric bills. Unlike standard heat pumps which lose efficiency and maximum heat output as the outdoor temperature drops, the efficiency and heat output from a geothermal heat pump remains relatively constant.

Moist ground has a huge thermal energy storage capacity so the amount of heat your system pulls out to warm your house all winter has little effect on the ground temperature. Some models can also be combined with solar systems

QUICK TIP

Looking for a new heating and cooling system? Ultra-efficient geothermal heat pumps qualify for a 2010 tax credit.

WHERE TO SHOP

The following companies offer efficient geothermal heat pump systems:

- ▶ Climate Master, 800-299-9747, www.climatemaster.com
- ▶ Econar GeoSystems, 800-432-6627, www.econar.com
- ▶ Florida Heat Pump, 954-776-5471, www.fhp-mfg.com
- ▶ Hydro-Temp, 800-382-3113, www.hydro-temp.com
- ▶ Water Furnace, 800-436-7283, www.waterfurnace.com

“Geothermal heat pumps are efficient and yield the lowest utility bills of any residential heating and cooling systems.”

to gain more free heat. The most efficient models use a two-stage compressor and variable-speed indoor blower for the best comfort.

During summer months, a regular heat pump or central air conditioner loses efficiency and cooling output when it is hotter outdoors. Unfortunately, this is when your house requires the greatest cooling capacity. Cooling efficiencies for geothermal units are as high as 30 EER (energy efficiency ratio). A standard heat pump or central air conditioner is typically less than half as efficient.

Another summertime advantage is free hot water when the geothermal heat pump is cooling your house. Instead of exhausting the waste heat to the outdoor air as a standard heat pump does, this waste heat is diverted to your water heater. This device is called a desuperheater and it is offered as a standard or optional feature on most geothermal heat pumps.

The initial cost of installing a geothermal heat pump is significantly more expensive than a standard air-to-air heat pump, and the final cost of the installation depends upon the type of ground loop needed and the topography of your land. But the federal energy tax credit, which provides a 30 percent tax credit covering the entire cost of installing a geothermal heat pump, does make the initial expense more affordable.

To qualify for the credit the efficiency of the unit must meet or exceed Energy Star requirements and be installed after Dec. 31, 2007 and before Dec. 31, 2016. Units installed in 2008 were subject to a \$2,000 cap on the credit, so if you have already installed one during 2008, you can amend your 2008 taxes and still take the credit.

For any units installed in 2009 through 2016, you can take advantage of the full 30 percent tax credit. File for the credit by completing the Renewable Energy Credits subsection on your tax return forms. No proof of purchase

is required; however, in case of an audit, keep a detailed invoice of your purchase. The contractor who sold and installed the product should list the purchase as a “Geothermal Heat Pump” on the invoice and that it “Exceeds requirements of Energy Star program currently in effect.” **KCL**

Have a question for Jim? Send inquiries to: James Dulley, Kansas Country Living, 6906 Royalgreen Dr., Cincinnati, OH 45244 or visit www.dulley.com.



This super-efficient geothermal heat pump has a two-stage compressor to better match the heating and cooling needs to that of the house.