

# Energy Efficient Homes

Your Guide to

**GREEN  
SAVINGS**

tips for every home  
remodel,  
classic  
or new

sustainable living  
a green  
community

award-  
winning  
homes



10 Easy Steps to  
**A HEALTHY HOME**

# A Look Inside Geothermal Installation

When one couple decided to build a log home in Wisconsin, they knew it was going to take a lot to heat and cool the 7,102-square-foot abode. Aside from the lure of a federal tax cut, the homeowners quickly became interested in the idea of geothermal heating and cooling, thanks to its long-term energy saving qualities. In conjunction with the geothermal, they also opted for in-floor heating, an efficient alternative to traditional forced-air systems.

To install the system, the couple worked with Mike Nenahlo, project manager at Wisconsin Log Homes in Green Bay, Wisconsin. They had plenty of property to work with, so they went with a horizontal closed-loop system, where the pipes are laid out in a plane parallel to the ground surface. They also used the “slinky” style of loops, which allows for more piping to fit in a shorter area, cutting down on installation costs and making horizontal installation possible in areas where it would not be with conventional horizontal installation.



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1. To heat over 7,000 square feet, the homeowners knew that a geothermal system would save them money over the long term.
2. The Wisconsin Log Homes design team used a horizontal slinky loop system to allow more pipe without taking up as much property.
- 3 & 4. Inside the home, there are pipes that lead to all of the in-floor heating zones. Each pipe carries water to a specific part of the house from the panel and then circulates back to it.
5. The homeowners also incorporated in-floor heat as an alternative to less efficient forced-air heating systems.
6. Although the home is very high-tech thanks to its geothermal system, it still maintains its traditional log-home look.

## Solar Hot Water vs. Geothermal

For several years now, I've heated my household water with a moderate array of evacuated-tube solar hot-water collectors, plumbed inline with an on-demand propane water heater. So it would seem only natural that I would likewise advocate heating the entire home the same way — with solar hot-water collectors plumbed to supplement a gas- or oil-fired boiler. However, unless you plan on living off-grid where electricity becomes a precious commodity, my advice is to go with a geothermal heating and cooling system. There are two big reasons.

**BIG REASON #1:** It just doesn't make sense to invest heavily in a technology that will be useful only during the time of year when it's least effective. Whether you install flat-plate collectors or evacuated tubes, their performance drops whenever the mercury takes a dive. And when the heavy clouds roll in, solar collectors enter into a somnolent state and hibernate — just when you really need them. A geothermal system, on the other hand, doesn't care whether it's warm or cold, sunny or overcast. You have to admire that kind of indifference in a system.

There's also summertime to consider. For a geothermal system, summer cooling is child's play; just run it backwards. It's a trick that doesn't work with a solar hot-water system. But at least with solar you'll get virtually free domestic hot water, right? A geothermal system can do that, too, with the addition of a de-super water heater. A de-super-heater extracts extra heat from the refrigerant in its gas stage and transfers that heat to water circulating between the de-super-heater and your hot water tank, so that the hot water tank uses little or no energy when the heat pump is in cooling mode. The heat you extract from the air can be used to heat your water.

**BIG REASON #2:** To be truly effective, solar hot-water heating systems require lots and lots of collectors (unlike a domestic hot-water system, which takes only a few). Where are you going to put them all? The most likely answer is on the roof, but a sizable system can easily take up every inch of your home's south-facing roof, and you may need to beef it up to support all that extra weight. You'll also have to find a place for a hot-water storage tank, which can hold several hundred gallons in a large system. Contrast this with a geothermal system; except for the heat exchanger, it's all but invisible.

I have friends with both types of systems. Those heating their homes with solar hot water are proud of their systems, and they should be. But they often lament how much money they have to shell out for supplemental propane. Those using geothermal heating and cooling, by contrast, are continually amazed by how little money they have to spend heating and cooling their homes: just a few bucks for electricity to run the pumps. Maybe that's why the Environmental Protection Agency calls geothermal systems “the most energy-efficient, environmentally clean and cost-effective space-conditioning systems available.”

—Rex A. Ewing