

Builders pioneer geothermal: Mono County's first

By Leslie Willoughby
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It's cold, time to burn something. A white and distant star burns brightly in the night. Cool mountain air that felt refreshing in the evening has turned to thievery. It sucks comfort from a warm nose, surrounds the shoulders, and digs deep beneath the blankets. The wind sniffs around the edges of the windows.

In the Eastern Sierra we arise at 3 a.m. to dial up the propane, toss a chunk of Jeffrey pine on the embers or empty a bag of pellets into the hopper. As fuel prices climb, we may as well burn dollar bills.

Meanwhile, beneath the star, the snowy roof and floor, the earth itself holds heat (geothermal energy) that radiates from its molten interior, and it's almost free.

Geothermal ("geo" means earth; "thermal" means heat) energy heats local hot springs to bathtub temperatures, in the relatively rare case where the earth's molten material rises close to earth's surface.

Nevertheless, earth's heat is available, at much lower temperatures, everywhere in the U.S. Just a few degrees of the precious stuff (when boosted by compression) can be enough to heat a house.

Two homeowners in Mono County don't burn anything to stay warm. Instead, they are the first to mine geothermal energy. Mining earth's heat is as easy as extracting any other form of gold: dig a hole, bring it up, refine it, and then use it.

Earth heat in Lee Vining

Geothermal energy warms a house on Sagehen Meadows Road outside Lee Vining. General contractor Karl Seiberling of June Lake helped complete the house and explained how the closed-loop system works.

Loops of tubing were laid beneath the ground, just six feet down. A solution of ethylene glycol (anti-freeze and water, the liquid that keeps a car radiator from freezing) is pumped through the tubing.

The solution absorbs the 40-something degree, year-round geothermal energy from down below. Next, a pump brings the heated solution to the surface, where its heat warms some air.

The last step squeezes the heat out of the air. That compression raises the temperature of the air about 10 degrees, to 50 degrees or so.

That's not enough to toast the toes, but it's way warmer than the frigid surface air outside. It's enough heat to keep the pipes from freezing and to provide a kick-off point for comfort from the ground up, so to say.



Geothermally heated house, off the grid on Sagehen Meadows Road in Lee Vining. Submitted photo



House in June Lake, front, retrofitted to incorporate geothermal heating. Submitted photo

Photovoltaics power the system. "At today's local electric and propane rates," Seiberling said, "the system costs 28 cents of electricity to produce a dollar's worth of heat."

And in June Lake

An earth-heated house in June Lake has been in Robert Foster's family since 1985. And some things change, such as the \$12,000 annual propane bill.

"That bill had to go," said owner Foster, who rents out the house and sometimes lives in it himself. So he plugged some drafts, insulated and dug a hole.

Actually, he sank a 50-foot well. The fluid that comes up that tube is a familiar-sounding "40-something degrees" water.

He moved the heat to some air, compressed the air, and Voilà - warm house.

The story got more interesting when Foster's contractor tried to explain it to the June Lake Public Utility District and Mono County's building department and board of supervisors.

Foster's permit application for his geothermal system, something new in Mono County, required some fancy talking.

Reluctant approval and permits eventuated only after everyone understood the nature of Foster's open-loop system. The closed-loop system on Sagehen featured a continuous loop of tubing; however, Foster's system was open at the water intake.

After water cycles through the apparatus at the surface, it returns to

the depths through an opening at the other end of the tube. Although water is pumped up through a tube to the surface, the only thing that happens there, according to Foster, is taking some heat out of it. He said they "never touch or see it; we return every drop" directly to the depths, to wander where it may.

Foster said Rick Phelps of High Sierra Energy Foundation offered broad shoulders to lean on and research to support his case for permit approval. Foster said, "The vision that [Phelps] has for the Eastern Sierra is inspiring, out of the box, steps ahead."

Foster anticipates the permit process will be, "much easier for anyone else who wants to do this."

He even won approval from his wife. After the nosebleed years of

dehydrating, forced air heat, she now breathes freely.

Foster admits to frequenting the grid: fossil fuel is burning somewhere, pumping water and compressing air. Even so, he takes pride in having reduced his fossil footprint, a reduction that pays in dollars.

Imagine the grin in Foster's voice as he reported his January-to-January heating bill comparison. His former "well over \$3,000" bill diminished to \$900 for his first propane tank-free winter.

What about the cost of installation?

In Foster's case, that was a \$52,800 bill from his contractor (Sierra Air in Sparks, Nevada). That included heating a 5,300 square foot house to 68 degrees and providing supplemental heat for 180 gallons of constantly available hot water.

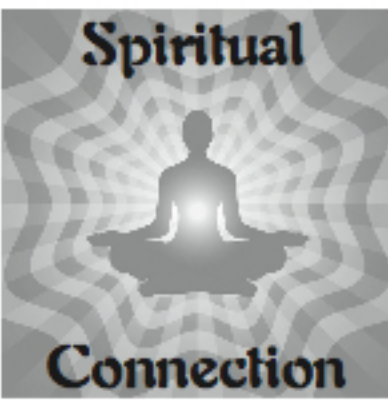
Oh, yes, remember to subtract a 30 percent federal tax credit for a not bad return on investment. Having pumped roughly \$8,000 in annual energy savings from the ground, Foster expects a 5-year payback.

Consider, too, that Foster probably needed to replace his 30-year-old heating system, anyway, whether he did so conventionally or not. He happened to be lucky, he said, that the big heating ducts in his old house provided a good fit for earth heat.

Everything ventured, nothing burned

The original owner of the house on Sagehen, Seiberling, Foster and Sierra Air can't claim all the credit for being geothermal early adapters. The technology has been warming homes by the tens of thousands throughout the United States, with its popularity burgeoning over the past 30 years.

Nevertheless, all those who took part in introducing the first two geothermal homes to Mono County certainly can be heralded as Mono County's earth heat ground breakers.



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