A Treasure *in* Our Own Backyard

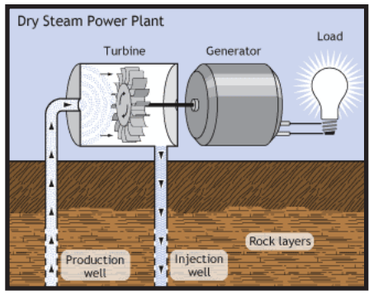
by PAUL RIDDLE

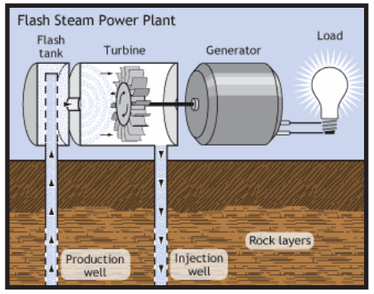
A Green Alford Home built by Greg Alford and his team of expert craftsmen.

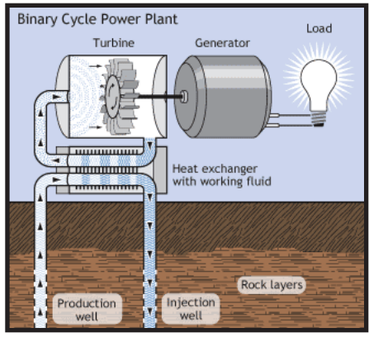
I was first introduced to geothermal energy by my old friend and rugby teammate, Mickey McGuire. It was 7 or 8 years ago and Mickey was helping out at the SMU Geothermal Lab. During a conversation he told me about geothermal, the Lab, and its annual conference. The main thing I remembered later from our conversation was him talking about getting energy from the earth with no emissions. That caught my attention.

Since that time ON Magazine/ Innovative Direct Media has supported our friends and the leaders of the SMU Geothermal Lab: David Blackwell, SMU's Hamilton professor of Geothermal Studies; and Maria Richards, Director of the SMU Geothermal Lab. David, Maria, and the rest of the Lab Staff and supporters have been leading the way for geothermal development and exploration here in the U.S.

Geothermal energy, for the layman, is simply heat from the earth that can be used as an energy source. Below the earth's crust there is a layer of hot and molten rock called magma where heat is continually produced, mostly from the decay of naturally radioactive materials such as uranium and potassium. The amount of heat within 10,000 meters of the Earth's surface contains 50,000 times more energy than all the oil and natural gas resources in the world. Imagine if we could tap these resources. They offer enormous potential for electricity production capacity. Recently, for the first time in 30 years, the USGS (US Geological Survey) conducted an assessment of U.S. geothermal resources and estimated that the Geothermal Resource could one day supply the equivalent of nearly all of our Nation's present electricity needs.







You may wonder how geothermal energy is captured and turned into electricity. There are 3 basic designs for geothermal power plants: dry steam, flash steam, and binary cycle. All 3 types of power plants pull hot water and steam from the ground, use it, and then return it as warm water to prolong the life of the heat source. Dry steam, the simplest design, has steam go directly through the turbine, then into a condenser where it's condensed into water. Flash steam, the 2nd system, uses very hot water that is depressurized or "flashed" into steam which can then be used to drive the turbine. Binary system, the 3rd approach, passes the hot water through a heat exchanger, where it heats a second liquid – such as isobutene – in a closed loop. The isobutene boils at a lower tempera-

Vertical, closed-loop geothermal heat pump system

ture than water, so it is more easily converted into steam to run the turbine.

The SMU Geothermal Lab also showed me that besides the large industrial energy applications for geothermal, in a way, every homeowner has a treasure in their own backyard - energy that is renewable and has no emissions. GHPs (Geothermal Heat Pump Systems) allow individual households to use the relatively constant temperature of the earth to heat and cool buildings plus provide domestic hot water. With about 70% of the total energy used being renewable from the ground, GHPs are among the most efficient heating and cooling technologies available and use significantly less energy than conventional systems.

While the technology has been in use since the late 1940s, GHPs currently account for little more than 2% of the total U.S. heating and cooling market. In 2010, in terms of value of equipment shipments, GHPs made up $372 million or 2.3% of our $16 billion heating, ventilation, and air conditioning (HVAC) market. Just imagine the implications for U.S. energy needs if the numbers were higher for Geothermal.

For a better understanding of how geothermal systems are faring in the North Texas residential housing market, we talked to local custom home builder and geothermal installer, Greg Alford of Alford Custom Homes. Greg was asked for his feedback to a series of questions:

At Alford Homes, our focus over the past two decades has been in the design and construction of homes with historic and architectural accuracy over a variety of styles from classic European-inspired estate-style properties to Hill Country and Lodge/Ranch designs. Prices for our custom homes range from about $500,000 to over $2 million, in some of the area's most notable neighborhoods including Dallas, Plano, Prosper, Fairview, Bluffview, Preston Hollow and the Park Cities.

How long have you been involved with geothermal installations and what first drew you to them?

We installed our first geothermal HVAC system over 20 years ago. A custom-home client had expressed interested in it and we were excited about getting involved with this clean, reliable and cost-effective new energy resource. So it was a win-win experience for all of us.

> "THE BIGGEST MISCONCEPTION ABOUT GEOTHERMAL *is that homeowners think it must be a complicated system. However, how it works is quite simple.*"

Where did you get your geothermal training? Classes? Best way to seek out information on?

Most of our early learning curve involved working with qualified HVAC contractors in the area. Now there is so much more knowledge available regarding the different types of geothermal systems available, that a simple search on the internet can inform and connect any homeowner or builder who wants to learn more.

Do you see an increasing amount of geothermal interest in this market?

Our upper-end market is definitely interested in investing in clean, renewable forms of energy for their homes. Often, though, the main obstacle to committing to a geothermal system seems to be the upfront cost commitment involved. .

What types of geothermal systems work well in North Texas?

In North Texas, we primarily use closed-loop systems with vertical wells – typically one well per ton of HVAC. There are open-loop systems and horizontal systems but I, personally, would not recommend them to our homeowners. Although they involve lower costs, our experience shows there is also a wider opportunity for problems. We have had good success with the vertical, closed-loop systems.

Do you find that geothermal works better for certain sizes or types of homes?

Typically the larger, more expensive homes are where we would use the geothermal systems, mainly due to the cost. The systems would work well for any size home but you must have a larger budget to allow for a geothermal system.

Are there advantages to incorporating geothermal into the original home design, as opposed to retrofitting it later?

Since we at Alford Homes are in the business of building new homes, I have not been involved in the actual retrofitting of systems. It seems that installing upfront would be a clear advantage. On a retrofit, all equipment needs to be replaced – including the ductwork if it's not metal. Then, you have to deal with landscaping, etc., in order to drill the wells. All in all, there would be additional expenses involved in a retrofit.

Do you find that people sometimes have misconceptions about geothermal?

The biggest misconception about geothermal is that homeowners think it must be a complicated system. However, how it works is quite simple. You are basically just storing energy in the ground through a series of closed loops. And the geothermal system works beautifully for both summer and winter applications.

What has been your most challenging or satisfying geothermal installation?

It is most satisfying when a new-home client is interested in environmental issues and asks about building with a clean, renewable form of energy. Being able to offer the geothermal option is great, since it is reliable, cost-effective, and reduces our need to import foreign oil.

What advice would you have for anyone thinking about incorporating a geothermal system into their home?

If you would like to have a super energy-efficient home and are willing to spend the dollars upfront, then I would definitely recommend a geothermal system. I would, however, have the client consider that the payback is not as quick as, say, a foam-encapsulated home. It can be a 10-15 year payback for a geothermal system vs. a 3-4 year payback for a foam-encapsulated design. Then, I always encourage my clients to think through the resale of their home. We quote an average of about 7 years that buyers typically live in a home. If there are two very similar homes for sale – both being great houses – but one is ultra-energy efficient and the other is not, then guess which one will sell?

Your company stays in touch with clients and has a well-deserved outstanding reputation for long-term customer satisfaction. What level of satisfaction are you seeing on the geothermal systems you have installed in the past?

At Alford Homes, our clients have had good experiences with the geothermal systems we have installed. We have used them for over 20 years now. The main benefit is savings for each year that the home is in existence that will be passed on from owner to owner. Utilities are not getting lower in cost and they will continue to rise from year to year.

Despite an uncertain economy, geothermal heat pump adoption is increasing in the U.S., with over 1 million geothermal or ground sourced heat pumps now being used in residential, commercial, and government buildings. Each year, U.S. homeowners install approximately 50,000 more geothermal heat pumps. American homeowners are clearly warming to the fact that green geothermal energy is available everywhere, literally in their own backyards, thanks to geothermal heat pumps. Compared to other sources of energy, geothermal energy in the US is only beginning to reach its potential.

I find it exciting that North Texans at the SMU Geothermal Lab, right here in our Metroplex, have been and continue to be extensively involved with advancing this important clean energy technology. To me, the Lab and its staff can be considered one of the treasures in our region's backyard.

For more information on the SMU Geothermal Lab, visit http://smu.edu/geothermal/.

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