NAOHSM Show Issue

Phc News

plumbing & hydronic contractor news



What, no 'Old Faithful' in your back yard?

Geothermal: Not what many people think it is

T wo years ago, when "green" hadn't quite entered the mainstream vocabulary, and gas prices were hovering at \$2.00/gallon, Tom Shepherd sensed a looming energy crisis. He took out a home equity loan to pay for the installation of a geothermal heating and cooling system for their Indianapolis-area home on the assumption that energy rates would quickly outpace interest on the loan. He was right on the money.

Tom and his wife Cindy spent several months looking into the type of system best suited to their needs, interviewing installers and asking a lot of questions. An admitted "techno-junkie," Tom's job as a systems control technician for Honeywell became his trump card while he probed for answers.

With the help of Kris Kyler, Indiana Geothermal, a loop contractor and geothermal equipment distributor, Tom and Cindy settled on a four-ton (48,000 Btu) water-to-air geothermal system by ClimateMaster to heat and cool their 3,600-sq.-ft., five bedroom home. Their intent was for the new system to replace the 93% AFUE gas furnace and standard electric air conditioning system connected to it.

A year ago, with the "geo" loops tapping the earth's abundant energy through four 150-foot boreholes drilled down into the Shepherd's rather tight property, Kyler's firm installed the system with little fuss. "For the most part, it was a standard geothermal install," said Kyler. "And the benefit to the Shepherd's utility budget was immediate."

Now, while many of his neighbors helplessly watch their meters as their electric and gas utility bills soar high-



Four main forms of geothermal systems are (clockwise from upper left): **Horizontal Loops**, installed in areas where the soil conditions allow for economical excavation. Taking up more land area than any other loop type, they are used where space permits. Trenches are normally five feet deep. Normally, several hundred feet of trench is required.; pond loop; pump & dump; and vertical loop. **Lake Loops**, usually very economical to install. If a pond or lake at least 8 feet deep is available, lake loops can utilize the water (rather than soil) for heat transfer. Reduced installation costs are characteristic of this type of loop system. **Open Loop** installations that pump water from an underground aquifer through the geothermal unit and then discharge that water to a drainage ditch or pond. Discharging water to a pond or lake is considered ideal. **Vertical Loops**, used extensively where land area is limited. A pair of pipes with a special U-Bend assembly at the bottom are inserted into a bore hole that averages between 150 to 250 feet in depth per ton of equipment.

er, the Shepherds are enjoying record savings.

In 2006, the Shepherds paid \$3,620 (or \$302/mo.) for electricity — energy used for home heat, air conditioning, hot water for the house and to



Where space permits, the ground-loop method provides a convenient, economical means of installing a geothermal heating/cooling system.

heat a large, in-ground pool. During the 12-month period following the installation of their geothermal system, they paid \$2,400, or \$200 per month to accomplish the same thing (though Tom says it would be about \$100/month if they would eliminate pool heating). When compared to the average \$300 per month that his neighbors are paying for energy in homes of about the same size, a quick calculation reveals that Tom and Cindy are saving more than 65% for utility expenses.

"Indianapolis Power and Light added to the savings by dropping our kilowatt-per-hour rate from \$.0440 per KWH to .038 per KWH because we had installed the geothermal system," said Tom. "IPL also added a \$50 rebate, and we picked up another \$300 tax break on our federal taxes for the conversion."

"That played nicely into our overall savings on the loan," added Cindy. "With the rebate, the reduction in electrical rates and the overall savings with system efficiency, a substantial part of the loan payment is covered." "The traditional heating and air conditioning system that we had considered to be 'high efficiency' was terribly inefficient when compared to geo, and rather uncomfortable at that," added Tom. "Today, we have terrific comfort year-round and, with an expected seven-year payback on our investment in the geothermal installation, it's paying for itself."

Most small properties will do

There are still broad misconceptions about what a geothermal system is. The earliest systems tapped heat that comes from areas of geothermal activity through pits or fissures that actually push hot water onto the surface of the earth. But technology has vastly improved since then, permitting efficient geo-exchange from virtually any plot of land. A modern geothermal system harvests heat from the earth through a liquid transfer medium such as ground water or an earth-friendly antifreeze solution.

Although not yet familiar to everyone, ground-source heat pumps have (*Turn to Change your... page 92.*)

Change your mind about geothermal systems

(Continued from. page 90.)

been installed for more than three decades and are recognized as the most highly efficient heating and cooling systems available today. "Geothermal heat pump technology offers a renewable energy solution that's right for almost any home," said geothermal expert Gemma McKee Bartholomew, president, Air Brokers HVAC, and High Tech Homes, based in Branson, Mo. "Thermal energy of sufficient temperatures anywhere in the United States and Canada is harvested from the earth and transferred into buildings by a heat pump that provides heating and cooling."

Even if your customers have a small patch of land, chances are it's their best hedge against an energy crisis that creeps closer to home each day. Thermal energy is stored in the ground, ready to be used. "Newer technology extracts it with greater ease, with little disruption to the surrounding landscape, and at such high operating efficiencies it makes payback on the investment faster than ever before," added McKee

Geo-to-radiant? You bet!

SOME CALL IT a "geothermal boiler." What it is is a dream come true for die-hard hydronic pros and radiantready homeowners alike. ClimateMaster's new water-to-water geothermal system produces an unprecedented leaving water temperature 145°F, making ideal as a heat source for ultra-efficient radiant heat systems.

The new systems are currently available 4-ton (48,000 Btu) capacities (10kW) with ground loop efficiencies 25% higher than current units on the market. "Tranquility" heat pumps are rated for water loop heat pump, ground loop heat pump and ground water heat pump applications.

New scroll compressors within the Tranquility units make it possible to generate the high water temps, even at ground loop minimum temperatures. They are also among the quietest units one the market due to features such as a double-isolated compressor mounting, discharge and suction mufflers, and fully insulated compressor section. All Tranquility heat pumps systems use Earth-Pure (HFC-410A) zero ozone depletion refrigerant.

The new high-temp heat pumps are ideally suited to replace natural gas, propane or fuel oil boilers. Bartholomew.

A ground-source unit works like a conventional heat pump to cool a home in the summer, and heat it in the winter. The key difference between an air source heat pump and ground-source is that the groundsource unit harvests the stable and renewable heat from beneath the earth's surface. The equipment transfers virtually endless thermal energy (heat) from the earth into the home during the winter months and transfers excess heat from interior spaces into the earth where it's stored during the summer.

As a result, a ground-source unit saves energy, which reduces greenhouse gas emissions and can cut utility bills by up to 70%. And, very little maintenance is required. Surveys of ground-source owners conducted by the Geothermal Heat Pump Consortium show that they rank their systems higher in comfort than do the owners of other heating and cooling systems. More than 95% state that they would recommend ground-source to friends and family members.

Typically, geothermal systems provide service for up to 25 to 30 years, which is twice the life expectancy of air source heat pumps. This is because the stable heat source avoids thermal stresses to the compressor and the enclosed unit is out of the weather. And, it's green: no fossil fuel is burned by the system.

Energy is down there, and it's free

The Shepherd's geothermal system taps the earth's abundant energy in the most efficient means possible, through geothermal exchange. The system harvests heat directly from the earth, which maintains a constant temperature of about 51° F in Indianapolis. While air-source heat pumps rely on a wide range of ambient air temperatures, the earth's constant temperature provides a much more favorable source for heating and cooling.

From the variety of loop configurations available for a geothermal system, the Shepherds and Kyler chose the closed-loop borehole method, which disturbs the least amount of earth. For homes where ground space is limited, or especially for existing homes with mature landscaping, this configuration is ideal because all evidence of the drilling can be removed, and lines circulating fluids through the system are buried.

"Most geothermal systems operate at ranges of 300% to 400% efficiency. That means the systems supply three or four units of heat or cooling for every unit of electrical energy required to operate it," said Kyler, who's installed many types of geothermal heating and cooling systems for more than 20 years.

Water-source systems — a popular choice for many

"Only a small amount of electricity is needed to power geo systems," said Tony Landers, marketing director for ClimateMaster, the leading global manufacturer of water-source geothermal systems. "The rest of the process uses the free, clean and renewable energy that's tapped just below the earth's surface."

There are two basic types of watersource geo systems: open-loop and closed-loop. An open-loop system typically pumps water out of a deep well, extracts heat from it, and injects it back into another well, a pond or river.

An open-loop system tends to be more efficient because it simply pulls the heat out of a steady stream of water from deep in the ground. But

The closed-loop borehole method is ideal for homes where around space is

ideal for homes where ground space is limited or for existing homes with mature landscaping because it disturbs the least amount of earth.

ized pipe. Closed-loop systems can be trenched, "bedded" or drilled.

All-in-one system for low cost hot water

Geothermal heat pump systems do the work that typically requires two appliances — a heating system and an air conditioner. Many systems can



Calculations in this chart are based upon current utility costs for a typical home in the Midwest. A dealer can provide customized savings for a particular home.

open-loop systems are prohibited in many parts of the country because of water quality and water conservation concerns.

A closed-loop system uses a continuous loop of buried plastic tubing as a heat exchanger. The tubing is connected to the indoor heat pump to form a sealed, underground loop through which a glycol or alcohol antifreeze solution is circulated. Unlike an open-loop system that consumes water from a well, a closedloop system recirculates its heattransferring solution in the pressurprovide a third function, which is to heat a home's domestic water by one of two means: through integrated fulltime water preheating, or through "desuperheating."

• Integrated water heating (on demand) uses the heat pump system to heat water at any time of the year. Its first cost is higher, but it provides operating savings all year.

Because this water heating option has the full heat pump system capacity available to heat water, it can provide quicker recovery (going from

(Turn to Geothermal, page 110.)

RPA Annual Conference proclaims radiant heating has always been GREEN

LOVELAND, COLO. — The trade show aisles are filling up for the 2008 Radiant EXPO (REX), set to be held at the new Renaissance Hotel and Convention Center in Schaumburg, Ill., August 13-15.

Companies with new products displaying the latest in technology are signing up, along with many regulars bringing new and improved technologies to exhibit. REX is the show to attend for exposure to radiant related products, both hydronic and electric.

Booths featuring the full spectrum of radiant heating and cooling products and services will populate the exhibit hall with offerings for heated and cooled floors, walls and ceilings.

The latest addition this year is the

New Product Market Place pavilion at the center of the show floor. This area will feature the newest products and technology available in the industry.

The RPA's annual competition winners are featured in the System Showcase kiosk. Here you can view award winning systems and their specifications. If you are in the radiant industry, you will want to visit this area to see outstanding installation and design methods.

Hall of Fame

A Radiant Hall of Fame kiosk will be displayed on the REX show floor. The stories of outstanding individuals nominated as Radiant All-Stars and inducted into the 2008 Radiant Hall of Fame will be displayed along with their pictures. Special recognition and award presentations will be featured at the General Membership meeting on Thursday August 14.

Green Team presents seminars

This year's program for the Conference portion of the event will highlight how radiant has been "green" all along. Some of the industries' most knowledgeable and committed speakers will be presenting Thursday August 14; 8 a.m. -1 p.m.

The Green Team consist of some of the best experts in the industry who are assembling to provide a full slate of current seminars from "Simply Green-What Is It?" By John Siegenthaler;

Geothermal

(*Continued from page 92.*) cold to hot) than an electric resistance water heater.

• A desuperheater reclaims heat from the air conditioning cycle to heat water. Its first cost is lower. Savings are realized in the cooling season by transferring waste heat to a hot water storage tank.

Even in the heating mode the desu-

the earth as a source of building heat in the winter and as a place to "sink" or bury that heat in the summer. The final process of thermal exchange takes place in mechanical equipment that serves both heating and cooling needs for homes and commercial buildings alike.

In winter

During the heating cycle, a geothermal system uses the earth loop to pull heat from the ground. It then distributes the heat through a con-



Indirect domestic water heating is a snap with geothermal systems, either through "desuperheating" during air-conditioning season or full-time preheating during the rest of the year. Here two Bradford White indirect units handle the job.

perheater can provide pre-heating to the water heater, reducing the work required of the electric resistance elements. A desuperheater provides free water heating throughout the summer season, and typically reduces water heating costs from 40% to 60%, depending upon the amount of cooling required.

A geo system uses ground water or

ventional forced-air duct system, or through radiant heat tubing in the floor (see the "geo-to-radiant" sidebar, page 92).

In summer

In the cooling mode, a geothermal system air conditions interior spaces by reversing the process of thermal exchange. Instead of extracting heat from the ground loop, heat is pulled from inside a structure, moved back into the earth or used to preheat water in your hot water tank.

According to McKee Bartholomew, installation of a geothermal home comfort system is becoming simpler each year. Drilling bore holes, or excavating ground to insert PEX loops isn't very complicated. Either way, thermal transfer is achieved.

Geothermal systems work so much more efficient than air-source heat pumps because conventional heat pumps use the outdoor air as their heat source, or heat sink. And, typically, the air that's put to the task comes in at extreme temperatures: low in the winter and hot during the summer months, defeating operational efficiency. Further efficiency is lost because air has very low density and conducts heat poorly. It's no surprise that most people who have had experience with airto-air heat pumps grumble about the cost to operate them, and the lack of comfort.

Industry Sources:

Air Brokers HVAC, High Tech Homes Construction, LLC Ms. Gemma McKee Bartholomew 417/739-2185 www.hthconstruction.com Indiana Geothermal 317/291-2741, x. 408 www.indygeothermal.com Geothermal Resources Council www.geothermal.org Geothermal Heat Pump Consortium

www.geoexchange.org['] ClimateMaster, Inc. 800/299-9747 www.climatemaster.com "Electric Radiant" by George Royce; "Mod-Con Condensing – Shades of Green" by David Yates; to "Sunshine and Radiant" by Peter Biondo; and more. (*See page 122.*)

Featured speakers

John Siegenthaler (Siggy) and Robert Bean (The Bean), "Siggy and The Bean" will once again be the featured speaker team at the general session and luncheon on Thursday, Aug. 14, beginning at 11 a.m. This year they will be a tag team presenting "Green Heat To the Rescue."

Contractors, builders, designers, floor covering professionals, specifiers and other interested trades are all invited to attend this unique event. You can visit the REX trade show or attend the entire conference. For a full schedule of events, pricing, accommodations and registration, visit www.RPAconfer ence.com or call 800/660-7187.

American Water Heaters, Predators salute the troops

ASHLAND CITY, TENN. — American Water Heaters joined the Nashville Predators Foundation in recognizing local soldiers during the Predators' Salute the Troops Night.

"American Water Heaters is delighted by the opportunity to participate in this event and support our troops," stated Jason Rowell, American brand manager.

American's donation went towards purchasing tickets for troops stationed at Fort Campbell, Ky. Approximately 1,200 troops joined Predators fans at the Sommet Center and received recognition for their heroic efforts throughout the evening.

Kredich named new USGBC vice president

WASHINGTON — Veteran residential executive Nate Kredich has joined the U.S. Green Building Council (USGBC), stepping into the newly created role of vice president for residential market development, overseeing USGBC's LEED for Homes program.

Kredich said, "Homebuilders have an enormous opportunity for innovation and growth by becoming leaders in energy efficient, healthy, green building practices. USGBC has the tools and programs to help them do it."

Kredich spent five years with Creative Touch Interiors, a national turnkey provider of design center services to homebuilders. Kredich led the sale of CTI to The Home Depot in 2004. Kredich left the role of general manager, California & Nevada at the end of 2007.