An Ocean Front Retrofit
Ton for Ton  The Most Durable, Reliable, & Economical Pond Loop

Ready 2 Drop 4-Ton Loop - Just Fuse & Use
30 Years Manufacturing Experience

www.geohyperloop.com • 407-831-2223 • CVC56887
CONTENTS

DEPARTMENTS
4 Geo Outlook Staff
6 Manager’s Forum
8 Advisory Council
44 Product Showcase
46 Earth Insights

FEATURES
10 Cover Story: An Ocean Front Retrofit
By Megan Radford

18 Missouri S&T Replaces Coal Plant with Geothermal
By BreAnna Morris

24 Makeover Wins with Energy Efficiency
By Janet F. Reeder

30 Rural Electric Cooperatives at Front of Energy Efficiency Effort
By Janet F. Reeder

34 Georgia Fire House Remodel Gains Geothermal
By Linda Allen

40 Indy Hosts IGSHPA’s 25th Anniversary Conference
By BreAnna Morris

10 An Ocean Front Retrofit

18 Missouri S&T Replaces Coal Plant with Geothermal
SMART, SIMPLE, PROVEN!

THE ORIGINAL “POND LOOP IN A PACKAGE”
UNMATCHED IN PERFORMANCE AND QUALITY

Contractor’s choice, world-wide, for renewable energy exchange with geothermal heat pumps or water cooled refrigeration.

www.theslimjim.com
888-277-2932
NOTES FROM IGSHPA
By Roshan Revankar
Training Program Manager: IGSHPA

Geothermal Growth

IGSHPA has been nurturing the growth of ground source heat pump users globally. This was widely evident at our 25th Annual conference in Indianapolis, as more and more international attendees were present at both training and conference. IGSHPA thus has been the focal point for manufacturers, installers and users to interact on a common platform.

This issue of geo-outlook features ground source retrofits that have been successfully installed. With huge savings and reduced energy usage, these stories reiterate why the designers called this a smart approach. Reading them will certainly answer a novice question, “will this work?” Also with growing trends to have near net-zero housing, ground source has been shown as a “must have” for home air-conditioning and domestic hot water supply.

IGSHPA documents stories pertaining to ground source heat pump performance. So if you are a user and noticed a change in your utility bill, feel free to share some of it with us. We will write it up and feature your story in our upcoming issues.
Geo-Trio™ multi-position geothermal heating and cooling system.

The Geo-Trio’s A-Coil, Blower, and Compressor are each self contained allowing for multiple configurations.

- Fewer SKU’s with more product offering
- Ideal for retrofitting air to air systems
- Backed by a tradition of Bard reliability

The advantages of the Geo-Trio just stack up. Visit www.bardhvac.com to learn more!

Bard Manufacturing Company, Inc.
1914 Randolph Drive
Bryan, Ohio, USA 43506-0607
419.636.1194 • www.bardhvac.com
International Ground Source Heat Pump Association Advisory Council
Jack Henrich, Bergerson-Caswell Group
Chairman
Greg Wells, Jackson & Sons Drilling
Vice Chairman
Phil Schoen, Geo-Enterprises, Inc.
Secretary

Trey Austin, Geo-Energy Services LLC
Barney Camponeschi, Performance Pipe
Randy Chambers, OG&E
David Dinse, Tennessee Valley Authority
Dan Ellis, ClimateMaster
Ted Striplin, McElroy Manufacturing, Inc.
John Kelly, GHPC
Eve London, Trane
Chris Smith, FHP Bosch Group
When you need HDPE products and services for your GEO project...

You should know that ISCO is your best source for a full line of in-stock and fabricated products. With stocking and fabrication locations nationwide and in Canada, we’re one call away for:

- HDPE pipe, fittings and U-Bends
- ISCO Circuit Maker Geothermal Vaults
- Custom fabricated headers and manifolds
- McElroy fusion equipment sales, rental, refurbish & servicing
- Complete supply of grout products
- Expert advice and consultation

The more you know...

ISCO INDUSTRIES

Make the call.
1-800-345-ISCO

www.isco-pipe.com
"The caliber of engineering, design and installation – it’s incredible. It’s awe-inspiring," mechanical contractor Greg Miscally said of the homes.
Located in the beautiful Amelia Island Plantation, just northeast of Jacksonville, Fla., this 16,000 sq. ft. ocean front home is nestled on 63,000 sq. ft. of land. The property, with a large pool and a guest house under construction, is heated and cooled by geothermal technology.
Homeowners Eric and Suzanne Prockow saw the many benefits of installing a geothermal system. Due to the home’s beach location, corrosion prevention and the longevity of equipment in the coastal environment were major factors in the Prockows’ decision. “Regular air conditioning condensers sit outside and need replacing every few years due to rust,” Mr. Prockow said.

It was also appealing that the homeowners would not have to hear or see any mechanical equipment – there would be nothing in the way of the ocean views. These things, combined with energy efficiency and a need for comfort, led the Prockows to their answer: geothermal was the way to go.

“It’s always good to go green when you can,” Mr. Prockow said. “I like the high quality performance it provides and the great technology that drives it.”

The Main House

Indoor Environmental Solutions, Inc. (IES) served as the mechanical engineer for the main house and guest house, designing the initial geothermal system and the retrofit. IES engineers Steven Griffin and KrishnaDas Achath performed load calculations for the main home that included special considerations such as an entertainment load of 100 people, a substantial kitchen load, and a 72 degree cooling set point. Coordinating with mechanical contractor Environmental Air Conditioning Services (EACS) and well contractor Partridge Well Drilling Co. (PWDC), IES had a hand in everything from ductwork routing, outside air...
and dehumidification configuration requirements, hydraulic calculations and much more.

Completed in late 2010, the main home featured 15 heat pumps, for a total of 28 tons, on the condensed water loop prior to the guest house inclusion. This included 11 high-efficiency ClimateMaster TTS series water-source heat pumps for the house itself, one ClimateMaster water-to-water heat pump to supply domestic hot water, two Aquacal water-to-water heat pumps to heat the swimming pool, and one water-cooled unit for the wine cellar.

IES also remained involved after the main home was completed. “We continued to make sure that the pumps and the VFDs were optimized, and that the geothermal system was operating in response to the need of the heat pumps,” Achath said.

The homeowners were able to take advantage of even more energy savings because of the way the system was designed. “The engineers designed it where the geothermal system not only controls the air conditioning, but also the pool heaters and domestic hot water use,” mechanical contractor Greg Miscally of EACS said. The extra energy savings are due to these heat extracting features, which help naturally lower the closed-loop temperature.

**Guest House Retrofit**

Nearly two years after the completion of the main house, the Prockows envisioned a guest house, which would connect to the main house via a breezeway – and they wanted it to be incorporated into the existing geothermal system. With a completion date of April 2013, construction is well under way for this 5,000 sq. ft. addition to the property.

As a first step to retrofit the existing system, IES requested that the homeowner allow for expansion of the main house’s existing control system. The main controller was upgraded to track which units operate simultaneously so that the air conditioning load could be studied during the design months. IES was able to track each heat pump’s usage remotely via SentryLogic, a web-based interface developed by the controls contractor. Over the two-week monitoring period, 72 percent diversity was confirmed, meaning the peak connected tons were 72 percent of the total heat pump tonnage that the groundwater system is designed for.

This level of diversity served as a key component, allowing the new design to retain the existing groundwater wells and associated well pumps, as well as the variable frequency drives (VFDs). Six new ClimateMaster High Efficiency heat pumps were added to the guest house, which totaled 14 tons.
These heat pumps were ordered with desuperheaters to provide free hot water to the guest house. The pool heat pump configuration was also modified. It was changed from series to parallel and water flow rates were lowered to reduce the pressure drop through the pool heat pump loop – meaning the pump head requirement lowered, as well.

One set of condensing water supply and return lines exited the main mechanical room. These were routed underground to the guest house via the mechanical crawlspace under the breezeway, referred to as the Orangerie, which connects both houses. The biggest obstacle of the retrofit was finding enough indoor space in the guest house basement to house the units. The architecture of the home prevented all of the units from being located together in the basement of the guest house. Therefore, three units were placed in the second floor attic of the guest house that protects the house with a waterproof membrane. “Ideally, we would not like to run water through the house,” Achath said. “It was inevitable due to long refrigerant line lengths, forcing us to install units in the attic.”

This called for construction similar to a shower pan to be specifically constructed in the attic, within which the water-source heat pumps were installed. The shower pan is in place to prevent a potential water leak from damaging the home.

“This geothermal system is highly efficient and away from the corrosive environment,” Achath said. “It also has triple the life expectancy and utilizes the abundant resource in the Floridan aquifer. In short, it’s a perfect marriage of peace and comfort for the homeowners, and engineering excellence.”

Various pipe sizes were used throughout the system, with the largest pipe being 4 inches in diameter, and the smallest being one-half inch. Most piping details, such as the hosekit, were identical to the main house.

An additional differential pressure transducer was installed in the guest house so that the closed loop pumping could be regulated appropriately and would therefore maintain required flow to the guest house attic.

There were some changes required in the mechanical room of the main house, as well. The number of plates in the plate-and-frame heat exchanger went up from 52 to 80. The variable speed pump for the closed-loop circuit had to be upsized to 3 hp, and the VFDs for the pump were upgraded, as well. The air separator also had to be upsized, but the existing expansion tank was retained.

Possibly the most critical component of this project is its state-of-the-art control system installed by Facility Automation Solutions. The control system receives and processes signals from the heat pump, the differential pressure transducer, the condensing water supply temperature, as well as signals to and from the condenser pump and well pump VFDs. The control system also monitors outside air conditions, the heat pump run status, failure alarm systems, and more.

“This not only enables a smooth commissioning process, but also allows monitoring of critical points – the loop water temperatures, pump run time and energy consumption, etc.,” Achath said. Having the remote monitoring

Decorative grilles in the ground floor wine cellar were custom-made to the owners’ aesthetic requirements.

A true combination of beauty and brains, the property is "a perfect marriage of peace and comfort for the homeowners, and engineering excellence," engineer KrishnaDas Achath said.
feature enabled IES to fine tune system operation and achieve ultimate optimization.

“The Prockows have nothing shy of a commercial management system,” Miscally said. “They have the best of the best. I can look online at any time to see how things are running and if there are any issues that need to be addressed.”

**Together as One**

The existing open-loop system accommodated retrofits to the heat exchanger and the condenser pumps, allowing an additional 50 percent more cooling capacity to be included. Originally, the geothermal system on the main house totaled 28 tons. With the addition of the guest home, 14 more tons were added for a total of 42 for the entire property.

“They’ve got a system that fits the caliber and quality of the home,” Miscally said. “As far as the system goes, you could not have built anything more efficient than the way the engineer designed it.”

IES is monitoring energy consumption via a remotely accessible graphic system. Although there is no historical data to compare the new home and its still-under-construction guest house, it is expected that the water source heat pump operation will be substantially more efficient as the conventional air-cooled equipment. As for the domestic hot water and pool heating, the geothermal units are 400-500 percent more efficient than gas or electric. The homeowners were also able to take advantage of a 30 percent federal tax credit, available to those...
who install geothermal systems.

“I’ve been in the trade for 22 years and I’ve seen a lot of commercial and residential projects,” Miscally said. “The caliber of engineering, design and installation – it’s incredible. It’s awe-inspiring.”

### Sidebar: The Team

**Mechanical Engineer:** Indoor Environmental Solutions, Inc.
Jacksonville, FL, Tel: 904-384-9354

**Mechanical Contractor:** Environmental Air Conditioning Services, Inc.
Jacksonville, FL, Tel: 904-279-0030

**Well Contractor:** Partridge Well Drilling Co.
Orange Park, FL, Tel: 904-269-1333

**Controls Contractor:** Facility Automation Solutions
Jacksonville, FL, Tel: 904-394-7926

**General Contractor for Guest House:**
C.F. Knight, Inc.
Jacksonville, FL, Tel: 904-387-6148
Take an online virtual tour and see why the GeoVault® is the best in the industry.

The GeoVault features:
• Anti-buoyant, leak-resistant design
• H20 traffic-load rated as built
• Safety features including fresh air ventilation and lights
• Link-Seal® pipe penetrations

Log on to www.ghpgeovault.com and step inside to get a 360-degree view of the GeoVault, a complete turnkey vault and manifold, by GHP Systems, Inc.

We lead the way in designing and manufacturing proprietary wellfield products such as:

**GeoManifold**
Custom-Fabricated HDPE Commercial Manifold
A custom-fabricated HDPE commercial manifold, factory-built to your exact specifications by experienced heat fusion certified personnel.
www.ghpgeomanifold.com

**GeoHeader**
Factory-Built, Prefabricated Infield Extended Header
A factory-built, prefabricated infield extended header that eliminates the hassles of field building, reduces installation time and cost and increases system reliability.
www.ghpgeoheader.com

GHP Systems, Inc.
Commercial Geothermal Manufacturing and Supplies
888-447-7757

Take a virtual tour, get a quote or more information at www.ghpsystems.com
MISSOURI S&T REPLACES COAL PLANT WITH GEOTHERMAL

BY BREANNA MORRIS

Work on 640 boreholes at 440-feet and 420-feet got started in late spring and allowed for completion of 268 wells while Missouri S&T was out of session.

(Photo by B.A. Rupert, Missouri S&T)
With increased interest in geothermal, universities all over the United States are looking to take advantage of this energy-efficient and progressive technology.

The Missouri University of Science and Technology in Rolla, Missouri, will build a comprehensive geothermal system to service 15 of its campus buildings as well as the campus chilled-water system, which serves much of the university. Geothermal will replace the current coal-powered system built in 1945. The school hopes to reduce its energy bills by half as well as decrease its carbon footprint by 25,000 metric tons per year and cut its water usage by 10 percent, or nearly eight million gallons per year.

Initial savings are projected at more than $1 million in energy and operational costs annually with an expected
growth to $2.8 million annually in future years. The new system will also eliminate close to $26 million in deferred maintenance costs for the aging coal plant. Those costs include the replacement of boilers, steam lines and other antiquated infrastructure. The system will allow energy to be stored in and reclaimed from well fields around campus. The project will be funded through the sale of $32.4 million in revenue bonds, approved by the university’s curators in November 2010. The university plans to repay the debt over 30 years through savings from the project.

Ted Ruth, director of design and construction management for Missouri S&T, explains details regarding the project.

“The bottom line of the project is that the campus is installing a geothermal loop that will provide heating and cooling to 15 of our buildings on campus to replace our current coal-fired boiler plant,” Ruth said.

In deciding what kind of HVAC system to include in the upgrade, the Department of Facilities Operation researched and discussed several options.

“We did research on alternative opportunities over the last several years. The idea was to provide background information and evaluations for an energy source and evaluate our use of coal. We started looking into a geothermal application because it’s becoming more popular. We also looked at natural gas. Geothermal, in our opinion, became the appropriate application. Facilities Operation decided geothermal was the right choice for Missouri S&T,” Ruth said.

Once the team decided on geothermal, more research, planning and designing began in earnest.

“When the funding was approved, then we went in and reconfirmed – we spent about nine months confirming the project and the programming. We found it to be beneficial to continue research and planning,” Ruth said.

The project has encountered few problems, but Ruth describes some smaller issues.

“Problem is a big word. There have been challenges. We’ve run into unexpected issues below ground. We’ve had some water underground, but other than that, it’s gone fairly smoothly. Normal logistics issues are always to be expected,” Ruth said.

Construction Manager at Risk, Dwight Davis from J.E. Dunn Construction, explains some of the other unusual challenges the project has encountered underground.

“Probably the most unique thing we’ve run into is the geology. The well fields are 20-foot spacing with varying geology under the ground. We’ve run into aquifers, gravel and all different kinds of rock. The drillers have done a good job dealing with it. In this part of Missouri, there is not a lot of consistency in the ground,” Davis said.

Ground was broken on April 17 of this year with a
ceremonial golden drill and the requisite local dignitaries. This summer provided the first opportunity for major construction, but the project is still in early phases.

“We just recently started drilling wells and hired a construction manager. We took advantage of the summer by doing the major drilling when school was out. We completed 268 wells out of 640 total,” Ruth said.

The 640 boreholes have two sets of depths, 440-feet and 420-feet. There will also be some horizontal branch piping to connect the vertical wells. The well piping is 1¼ inch thick, and the refrigerant is R 134 A. McClure Engineering Associates is the designer. Some other subcontractors have worked with McClure and with J.E. Dunn Construction for part of the drilling and design work.

“It’s kind of interesting; the campus had some existing chillers that will be utilized. But we bought nine new chillers; there are three in each plant, in two sizes. The larger chillers have a heating capacity of 2,500-mbh and a cooling capacity of 150 tons. The smaller units have a heating capacity of 1,300-mbh and a cooling capacity of 75 tons,” Davis said.

There were no other major alternative energy systems used, but the overall design of the new system capitalizes on existing resources to produce the most energy at the lowest cost.

“I think it is a really smart approach — the way McClure Engineering designed the system. The university will use the system the majority of the year, so the approach to the design is unique in that they intentionally made the size of the geothermal system to work in tandem under peak loading times with the existing mechanical equipment,” Davis said.

The bulk of the work on the project right now involves planning and designing the details of the system to power the campus. Pipes will eventually be installed in the 640 wells and connected to create closed geothermal loops. Water will be circulated through the loops from three geothermal plants, two of which will be housed in existing buildings and the third will be in a new chemical and biological engineering building.
Working on the drilling in the summer with school out was a plus for the project. Workers with Durbin Geothermal moved the project along in spite of aquifers, gravel and different rock in the overall geology of the site.

(Photoby B.A. Rupert, Missouri S&T)

“There will be those three regional plants to provide heating and cooling to the majority of the buildings. We should finish designing in October, and then bid it out. Major construction will start in December or January. It’s projected to be completed in June 2014,” Ruth said.

Renee Earley, Civil Engineering graduate student at Missouri S&T, commented that the construction hasn’t inhibited pedestrian traffic flow on campus.

“They have done a good job with the geothermal project in terms of staying within the construction site boundaries. The parking lots, grassy areas and any more frequently traversed parts of campus were mostly completed during the summer when fewer people were here. All of the work so far has been on the edges of campus, which is nice because they have not needed to restrict which campus sidewalks are open,” Earley said.

“It’s been a great project for us, and everyone out here has been a good part of the team all the way from the university staff to the sub-contractors,” Davis said.
Trenching for the pipe for the geothermal system was done by Rood Heating and Air Conditioning from Russellville, Arkansas.

(Photo by Gary Bean, The Electric Cooperatives of Arkansas)
A Palestine, Arkansas family has become the fifth in as many years to win a $50,000 Energy Efficiency Makeover in the Electric Cooperative of Arkansas Energy Efficiency Makeover Contest. Lee and Berthella Thomas made a special effort to enter the contest this year after missing the deadline for last year’s contest. Berthella Thomas says she was interested in the makeover when she read about it because her home’s windows needed replaced and an addition to the home is difficult to heat and cool.

The Electric Cooperatives of Arkansas (ECA) have long promoted energy efficiency. A commitment to community and energy education led them to devise the makeover contest as a way to also expand that outreach.

The Energy Efficiency Makeover Contest has become a major focal point of the ECAs effort to educate members and the general public about energy efficiency. Although the project awards the energy makeover to only one family each year, the project is designed to have a much broader impact. The entire makeover is documented and shared in a number of ways. Arkansas Living Magazine, the monthly publication of ECA always features the annual home makeover and family and the ECA website carries photos and weekly updates on each project.

The Thomas family, members of Woodruff Electric Cooperative, knew in August that they were contest semi-finalists and would receive a General Electric GeoSpring Hybrid water heater given to semi-finalists. To be eligible for the contest, applicants had to be members in good standing with one of Arkansas’ 17 electric distribution cooperatives and have all-electric homes. The contest was announced in May and drew applications from nearly 2,000 electric co-op members across the state. After review by co-op staff, 17 semi-finalists, one from each electric distribution cooperative were selected. Then four homes were chosen as finalists.
After conducting energy audits and site visits on each of those homes, a committee reviewed results and selected the winner.

Brett Curry, residential energy marketing manager for the Electric Cooperatives of Arkansas, performed the comprehensive energy audit in the Thomas’s 1,800-square-foot single-story home. Built as a 1,150-square-foot home in the early 1950s, the home had a garage and breezeway enclosed 30 years later for more space. Curry’s energy audit of the house showed a very high level of air infiltration.

A blower door test was also done, followed by thermal imaging with an infrared camera to spot other problem areas in the home’s envelope and insulation. Those tests showed that the house measured a rate of nearly 70 percent natural air exchange per hour, meaning that 70 percent of the air within the home exchanged with outside air every hour. Energy efficient homes have an air exchange between 20 to 30 percent per hour.

Curry said little or no thermal boundary existed in the home. Sidewalls of the original structure were not insulated. And even though the attic had some rock wool and cellulose insulation, both were improperly installed and were inadequate for Arkansas’ climate.

“The air leakage is related to older construction methods, poor windows, inadequate and improperly installed insulation and other building envelope penetrations,” Curry said. The makeover goal, Curry says, is to install the latest in energy efficiency components to allow the family to experience a higher level of comfort in their home and realize significant savings on their electric bill. According to Curry, the average electric cooperative member uses around 1,100 kilowatt-hours of electricity per month. He said the Thomas home was averaging nearly 1,900 kilowatt-hours per month.

To change that picture and increase the family’s comfort, the makeover crew set to work in mid-August. The home had to be sealed from all of the air infiltration for the new energy measures to be effective. The makeover’s first week would make a dramatic change for the good.

Tommy Gracy, owner of Building Performance Solutions, Inc., from Mountain Home, Arkansas, brought his crew in to install open-cell foam in the attic. Roof decking, rafters and gable ends were coated with Demilec Sealection 500 spray foam insulation, to create an “attic encapsulation,” a technique Curry says is beginning to catch on across the country. He says that foamed attics in the previous makeover
Total Service Company workers drilled four 210-foot bore holes with 20 foot spacing in the home’s front yard.

(Photo by Gary Bean, The Electric Cooperatives of Arkansas)
projects seldom reach a temperature of more than 10 degrees higher than the conditioned air space.

To insulate existing sidewalls, BPSi drilled small access holes into the brick mortar and installed a product called RetroFoam. Derived from organic materials, RetroFoam insulated the sidewalls from the ground level to the top plate where it joined the encapsulated attic to provide a moisture barrier, a thermal barrier and air barrier. “Since RetroFoam can be installed from the outside it is not intrusive,” Curry says. “No tearing out walls, or moving furniture and no interior cleanup.”

As the crews working on the makeover home tightened up the home’s envelope and decreased air infiltration, relative humidity within the home increased. Original auditing had shown humidity was already high at nearly 70 percent. And that was with the air conditioner running. To head off indoor air quality issues, makeover crews installed 80 CFM exhaust fans in the bathrooms. The GE Hybrid water heater will also remove moisture from latent heat as it works to provide hot water. The new Water Furnace Envision Series 5 HVAC system will also assist in managing a consistent comfortable relative humidity level year round.

Also during week one, Chris Burnley, regional manager with GE Appliance Division, helped lead the energy efficiency charge by supplying the latest Energy Star appliances for the kitchen and laundry area. Energy Star appliances incorporate the latest energy saving features and use up to 30 percent less energy than older appliances. The Thomas’s appliances were well over 20 years old.

Fred Danforth and his crew from Total Service Company located in Pontotoc, Mississippi, arrived on the project site early in the second week to do the geothermal heat exchange work. Danforth’s bunch drilled four 210-foot bore holes spaced 20 feet apart and installed loops in front of the home. Danforth and Total Service work in a 16 state area and are kept busy putting in geothermal loops.

The older package model HVAC system was located on the southwest corner of the house, a counterproductive location in direct sunlight with no shade. Reflective temperatures from the brick wall were in excess of 140 degrees from noon to late afternoon in the summer.

Rood Heating and Air Conditioning from Russellville, Arkansas, under Eddie Rood, did the fusion of the borefield loops and manifolds. Rood also installed the Water Furnace Envision heat pump recommended by area Water Furnace representative Don Brown, and tied it to the GE GeoSpring Hybrid water heater. AECC has posted a YouTube video to show geothermal installation details and a host of other products and technologies used on the makeover homes at their site www.aecc.com under their Energy Efficiency Home Makeover tab.

The GE GeoSpring Hybrid water heater, an ultra efficient model projected by the Department of Energy to save approximately $325 annually, was installed for the Thomas family by Rood. The electric GE GeoSpring has an Energy Factor (EF) of 2.4. Plus the domestic hot water feature from the geothermal heating and cooling system will preheat inbound water to the water heater. This desuperheater feature on the Water Furnace Envision geothermal system will capture some of the exhaust BTUs being removed from the house while in the air-conditioning mode and distribute them into the water heater. This process is more efficient than standard natural gas, propane or electric resistance heating.

A “duct blaster” test showed 300-cubic-feet-per minute air leakage from the ductwork. Visual inspection showed ductwork disconnected in several locations and missing insulation in many areas. Ducting to the addition was not installed correctly. Rood Heating and Air Conditioning reattached, sealed and insulated the entire existing duct system. They also added a new properly-sized and sealed ductwork system within the encapsulated attic to supply the addition on the north end of the home.

The windows Berthella Thomas hoped for started showing up during the second week with Mark Barr and his guys. WeatherBarr windows from Harry G. Barr Company of Fort Smith, Arkansas, with a U-factor of .30, replaced the single-paned wooden framed windows originally put in the home. The vinyl frame, low-E glass, Argon gas filled WeatherBarr units are high-efficiency rated and carry a Solar Heat Gain Coefficient (SHGC) of .22. Low-E coating on the glass will reflect or absorb the sun’s radiant heat. Makeover crews also addressed several problems with entry doors by adding high-quality weather stripping and adjusting latches and strike plates for a proper seal.

Volunteers from both Woodruff and Ozarks Electric Cooperative attacked caulking and sealing duties using more
than 70 tubes of silicone-based acrylic caulking and 24 cans of foam sealant. Their efforts in concert with the other infiltration correction measures helped to give the makeover home an air-infiltration reduction of 33 percent.

Crews also finished the work the Thomas’s had started by replacing any remaining incandescent lighting throughout the home with compact fluorescent and LED bulbs.

A typical range of concerns and difficulties were encountered during the 2012 $50,000 Energy Efficiency Makeover, including a lost day with concern over the Labor Day weekend Hurricane Isaac storm, and drilling through an aquifer. The makeover crews accomplished their goals and gave the Thomas family a comfortable and affordable energy efficient home.

Curry says the 2011 Energy Efficiency Makeover home’s electric bills are averaging $65 monthly.
RURAL ELECTRIC COOPERATIVES AT FRONT OF ENERGY EFFICIENCY EFFORT

By Janet F. Reeder

Rural electric cooperatives across America have always worked on behalf of their members, as consumer-owned, not-for-profit utilities accountable to their membership. Saving customer members energy costs while promoting energy conservation has always been their goal, and it continues to be a win-win for the cooperatives and for their members.

Touchstone Energy® Cooperatives, the branding program for many of the National Rural Electric Cooperative Association (NRECA) co-ops, launched the only utility-driven national efficiency campaign, “Together We Save,” in 2009. This invaluable and successful national program has been supported with hundreds of TV spots, scripts, print ads, web banners and other materials to promote efficiency.

“When tax credits that reduce system costs are combined with the energy savings of ground-source heat pumps, it makes a good thing even better for our members,” Shedd said.
TogetherWeSave.com, the centerpiece of the campaign, provides an interactive energy audit feature and a library of energy-saving how-to videos.

Touchstone Energy® Director of Residential and Commercial Energy Programs, Alan Shedd, sees the impact of their programs. Shedd says there has been increased awareness and interest in ground-source heat pumps with electric cooperative members due to the federal tax credits offered.

NRECA and Touchstone Energy® have traditionally supported their member cooperatives drive to promote energy efficiency as a way to lower both energy usage and member costs.

“When tax credits that reduce system costs are combined with the energy savings of ground-source heat pumps, it makes a good thing even better for our members,” Shedd said. “That kind of cost savings makes it effective. Of course, co-ops have been involved in promoting ground-source heat pumps for a long time,” Shedd said.

“Ground-source heat pumps are important to us for many reasons. We have a long history of involvement with the technology, a history that includes our research organization, the Cooperative Research Network (CRN),” Shedd said.

CRN’s predecessor, the Rural Electric Research (RER) organization partnered with the Electric Power Research Institute (EPRI), IGSHPA and Oklahoma State University to develop the 1997 publication of a 100-page informative booklet titled Geothermal Heat Pumps: Introductory Guide.

“Our role is to help our members get reliable electricity at a good and fair cost. What we realized obviously, was that efficiency and controlling demand is good business,” Shedd says. “Ground-source heat pumps are a good fit there, because they are energy efficient. And they don’t have the high demand impacts that air-source heat pumps have in winter as well as in summer.” Shedd says that there are dozens of electric cooperatives that are offering their members energy incentive programs that include rebates for geothermal heat pumps.

Delta-Montrose Electric Association (DMEA) in Colorado has addressed one of the key barriers to more aggressive deployment by dealing with up-front costs. “They have been at it for a long time,” Shedd says. “They are an innovator and one of the first co-ops that started their own subsidiary doing loop installation and leasing geothermal.”

DMEA has an established geothermal loop tariff. The co-op installs, owns, and maintains the loops for residential geothermal systems, charging its members an affordable monthly fee for the service on their bill. This arrangement cut the upfront costs by half.

The utility has financed this infrastructure investment using a combination of state funds and a new funding program available through the Rural Utility Service (RUS) at the United States Department of Agriculture (USDA).

“That has been an interesting success story,” Shedd says. “There are other co-ops that are picking up on that idea.” Eastern Illini Electric Cooperative in Paxton, Illinois, is another example Shedd mentions. “They have closed in on a ten percent penetration rate for geothermal systems. There are more than 1,000 geothermal systems in the co-op’s service territory and the membership number is 11,000,” he says. Members of Eastern Illini Electric Cooperative who have switched to geothermal have also held open houses to help the cooperative staff acquaint and educate others about the benefits of upgrading current heating systems to ultra-efficient geothermal systems.

In 2011, Central Electric Power Cooperative based in Columbia, S.C, received a $740,000 USDA Rural Economic Development Loan to underwrite 100 residential loans for an energy efficiency research pilot over the next year. Lindsey Smith with Electric Cooperatives of South Carolina (ECSC) will administer the loan program. Smith says he

“If there is some mechanism, low-interest loans with on-bill financing, so it makes it easy for the member to pay for it and implement it,” Shedd said, “it would be so much more likely that something would get done.”
“These days, energy improvement investments are probably one of the best returns on your money compared to bonds and stocks and other investments,” Shedd says.

hopes the research will help South Carolina co-ops learn more about available contractors in the state, what it will take to get more members to participate in such a program and whether a large-scale effort could help postpone the need for new generation.

Western Farmers Electric Cooperative (WFEC), a generation and transmission cooperative began their Energy Efficiency Rebate Program (EERP) in 2010 with a goal of educating members about advanced equipment and technologies to more efficiently heat and cool their homes. The WFEC website reports an investment of more than $1.2 million in rebates in the program that continues to evolve as results are evaluated.

With headquarters in Anadarko, Oklahoma, WFEC provides essential electric service to 23 member cooperatives primarily in Oklahoma and New Mexico, with some service territories in Texas and Kansas.

Initially the EERP focus for HVAC energy efficiency was on both ground-source heat pumps and air-source heat pumps that met specified efficiency ratings. WFEC’s experience with the program has led them to continue exploring more ways to increase geothermal installations after seeing an average reduction in capacity of 0.65 kW per ton rebated. Their website states that geothermal is “clearly where WFEC gets the biggest bang for it’s buck.”

Representatives from eight distribution cooperatives and members of WFEC’s marketing staff recently attended a geothermal heat pump workshop conducted at the GeoRanch facility near New Waverly, Texas. Hosted by ClimateMaster and several other industry-related companies, the workshop gave attendees important lectures and hands-on demonstrations by field professionals at nine different learning stations located throughout the site. Oklahoma co-op attendees also toured the recently completed Asia Society Texas Center project in Houston, and learned about the 40,000-square-foot building’s heat exchange system comprised of 117 boreholes drilled 250-foot deep beneath an adjacent parking lot.

There are many earlier pioneers in the cooperative effort to promote energy conservation. Arkansas Electric Cooperative Corporation (AECC) arranged to insulate homes for members to help them save on energy costs long before private companies had begun that energy efficient work. As early as 1977, a new cooperative called the Energy Conservation Electric Cooperative Corporation (ECECC) was created to promote the use of insulation in member homes.

In the 1980s, as the work of the ECECC progressed, the promotion of energy efficient appliances, especially heat pumps and water heaters, was aided through the use of electric cooperative rebates. See the story in this issue about Electric Cooperatives of Arkansas’ 2012 $50,000 Energy Efficiency Makeover that included installation of a geothermal heat pump system for this year’s winner.

Cheaper energy prices in the 1990s caused the public’s march toward energy efficiency to largely wane as electric rates leveled out. Stable rates, however, did not detract from the cooperatives’ commitment to energy efficiency assistance to their members. Sustaining their rebate programs and adding energy savings tips by service representatives and home inspections for air infiltration and other energy issues became common practices by electric cooperatives across the country.

The cooperative belief is that energy efficiency,
conservation and demand-response can help lower consumers energy costs, shift peak demand, bridge the gap in the power generation building cycle, meet power supply goals and maintain positive member consumer relationships. "It helps us control costs and it helps us deliver energy at a good rate," Shedd adds.

Today, according to NRECA, 96 percent of electric cooperatives nationwide operate an efficiency program. Seventy percent of cooperatives offer financial incentives to promote greater efficiency. And 73 percent of cooperatives plan on significantly expanding existing efficiency programs in the next two years.

"There are dozens of co-ops that are offering incentive programs," Shedd says. "It is really up to the individual co-ops to decide what incentives and programs to offer in their locale."

Shedd said NRECA has been following ongoing legislative efforts that would allow on-bill financing of energy efficiency improvements for rural electric cooperative members.

"Central Electric Power Cooperative is doing a pilot on that," he said.

"Even with everyone realizing that ground-source heat pumps are well worth it from the life-cycle cost standpoint, there is always the first cost hurdle," Shedd said. "If there is some mechanism, low-interest loans with on-bill financing, so it makes it easy for the member to pay for it and implement it, it would be so much more likely that something would get done," he says.

"The idea is that the savings from installing the measures, offset the costs. Basically, you get a more efficient system at no cost, or even some additional savings on a monthly basis to the member," Shedd said.

"These days, energy improvement investments are probably one of the best returns on your money compared to bonds and stocks and other investments," he says.

The Department of Energy estimates that aggressive deployment of geothermal heat pumps could reduce the projected need for an additional 218-gigawatts (GW) of generation capacity by 91 to 105-GW over the next 30 years.
Decatur, Georgia Fire Station 1 is back in service after a major renovation that included the addition of geothermal technology. The first geo installation in city facilities, the city hopes to gain LEED® certification at gold or platinum.

(Photo courtesy of Hugh Saxon, Deputy City Manager, City of Decatur)
Georgia
Fire House
Remodel Gains Geothermal

By Linda Allen

After fifty-four years of service to the City of Decatur, Georgia, it was time for an upgrade for Fire Station No. 1. More than just a cosmetic facelift, the station underwent major structural reconfiguration and added several green features as part of a citywide effort to practice and encourage sustainable living.

Fire Station No. 1 is one of two stations that serve Decatur, population 20,000. It was originally constructed in 1958 using a mid-20th century modern or international design. A state-of-the-art facility for its time, it featured an attached training tower, classroom, hose dryers and space for multiple fire engines and a ladder truck.

The station's condition and historic significance determined the city's decision to renovate instead of build new. “The exterior was good. All structural components were well-built, and the station is located in a local historic district,” said Peggy Merriss, City Manager. The renovation maintained architecturally significant features like the original fire bell, displayed on a brick pedestal in front of the building, the fire pole, which is no longer used, and the training tower.

Geothermal leads the list of sustainable features that will qualify the facility for LEED certification at gold
Fire Station No. 1 is the first geothermal installation in city facilities. “Since 2007, the City of Decatur has been committed to long-term financially-sustainable practices. All new construction and renovation of city facilities must meet LEED standards,” said Merriss.

The project design required energy saving components for a diverse multiuse facility ranging from living quarters and administrative offices to training areas and storage and maintenance of emergency vehicles and hazardous materials. A priority was to provide a comfortable environment for station occupants that was also the most cost-effective and energy-efficient.

Geothermal was chosen because of its potential long-term energy and financial savings. The existing station site was also adequate for the well field.

Andrews, Hammock and Powell, Inc. (AH&P), of Macon, Georgia, designed the closed loop vertical system. Founded in 1988, the consulting engineering firm specializes in testing services to ensure a quality installation and client satisfaction. AH&P is one of a small number of firms that owns, operates and maintains a testing rig for Thermal Conductivity Testing (TCT). The firm is also involved in research of next generation geothermal applications, Borehole and Aquifer Thermal Energy
When it comes time to cook meals or enjoy some needed relaxation, the remodeled interior of the firehouse provides for the fire station’s crew in a comfortable manner.  

( Photo courtesy of Hugh Saxon, Deputy City Manager, City of Decatur )

Storage (BTEs and ATEs) for the Department of Defense.

Chuck Hammock, founding partner and IGSHPA-Certified Geothermal Designer, explained that AH&P conducted TCT on the project site to learn the properties of the geology as a base to design and size the geothermal system. TCTs inject heat at a constant rate into the ground for 36 to 48 hours through a deep bore hole. Data is monitored to determine the thermal conductivity of the formation, undisturbed formation temperature and estimated thermal diffusivity. “Results showed a good conductivity number of 1.74 BTU/(hr-ft-°F) with a starting point temperature of 64.3 °F. HVAC systems in Georgia are cooling most of the year, so this indicated a good heat sink,” said Hammock.

The TCT also provided drillers a glimpse of the geology they would be working with and identified any potential problems. Using this data, AH&P designed the well field with ten wells at 500 feet deep. The test well at 400 feet is included as part of the ten wells.

The installation uses split-system, single-stage GHPs. Total tonnage is 168 tons, using four units: two at 2.75 tons and two units at 5.67 tons for 6,234 square feet of conditioned space in the 10,708 square foot facility. Four Carrier heat pumps circulate a mixture of water and 10 to 20 percent glycol through HDPE pipes. Horizontal diameter pipe measures 1½ inches and vertical diameter is 1¼ inches.

The design of the station renovation focused on energy

Drill Smarter

Drill faster, cheaper, smarter with Sonic Drill Corporation’s award-winning, patented drilling technology. Put it to work on your next project to heat up profits and cool down costs. It’s the perfect choice for geothermal installations, environmental investigations and mineral explorations.

• Drill 3-5X faster (depending on conditions).
• Drill, case, loop and grout in one step for geothermal projects.
• Collect continuous, undisturbed core samples to 300 ft.
• Drill using water or air (depending on conditions).
• Produce up to 70% less mess, lower your site clean-up costs.
• Various rig sizes (some fit in a 20’ shipping container to drastically reduce shipping costs).

SONIC DRILL CORPORATION  
Suite 190, 119 N. Commercial Street, Bellingham, WA 98225  
1.604.792.2000 (ext 104) or 1.604.306.3135  
www.sonic-drill.com
savings. TCT results were also used to create a 30-year energy model based on building energy loads. “The design of the geothermal system was to balance heat pulled out of the ground with heat injected in-ground long-term so the system does not thermally alter the ground over a long period of time,” said Hammock.

“Total energy savings (per energy model) are 43 percent cost savings over a traditionally designed building. It is hard to break out the geothermal savings only since the building was designed and modeled using several energy savings measures that interact on a whole building basis. However, the geothermal system is most likely the biggest savings component,” said Hugh Saxon, Deputy City Manager.

Fire Station No.1 is a 24/7/365 day continuous occupancy facility. Eight employees make up the daily shifts. More than 30 additional visitors access the facility for services, training and seminars each month. Saxon anticipates the continuous occupancy will reduce the return on investment period.

Fire Chief, Toni Washington, said interior space was gutted and reprogrammed for better efficiency and function. Offices were swapped from one side of the building to the other, and the kitchen and day room were moved to the front of the building to allow more natural light. Additional improvements included masonry repair, replacement of roof, windows, overhead doors and interior finishes. The renovated station now houses three pumpers, one ladder and water truck, one air and light truck and one rescue vehicle.

Because fire stations are typically heavy water consumers, the renovation also features water conservation systems including a solar hot water heater, which provides 71 percent of hot water needs. A grey water system collects and treats water from showers and lavatories for toilets. A 5,000-gallon below grade cistern collects rainwater from roof surfaces to use primarily for washing the trucks. With these features, the
A weight room and off street sleeping quarters were also part of rework of the building’s structure.

(city anticipate a 30 percent reduction in water usage.

After 14 months of construction, with her employees located in three separate facilities, Washington and her crew are happy to be home again and pleased with the livability and usability of the station. “We went from dorm style to eight individual sleeping pods with four restrooms. There are a weight room and a green roof for recreation and relaxation. It’s good for our morale,” she said.

As of this writing, Fire Station No. 1 has been back in service only about four months, so it’s too early to have a record of energy costs. Washington said her department is enjoying living and working in a sustainable facility, and they encourage others in the community to adopt sustainable building and living practices.

With long-term energy and financial savings in place, City Manager Merriss is confident Fire Station No. 1 will provide Decatur with another fifty years of quality service.

Available 24 hours a day! 7 days a week!

GEO-Depot.com

Your lowest price source for Grundfos pumps, replacement cartridges, and accessories.

Contact us for more details:
Telephone: 800.994.0428 Email: info@geo-depot.com
Indy Hosts IGSHPA’s 25th Anniversary Conference
By BreAnna Morris

No national racing events took place in Indianapolis, Indiana, October 1-4, but the International Ground Source Heat Pump Association held its annual conference at the downtown Indianapolis Convention Center in the Indy 500 city.

Every year, IGSHPA hosts a technical conference and exposition featuring the latest technology in the geothermal industry. This October marked the 25th year of the event. Drillers, contractors, manufacturers, distributors, and geothermal industry leaders from all over the world attended the 2012 conference. This annual conference is the nation’s largest and oldest convention dedicated to the ground source heat pump industry.

IGSHPA hosts accredited geothermal driller and installer workshops throughout the year at its headquarters in Stillwater, Oklahoma. Each year they provide the same training courses before the conference starts in its destination city. This year, the driller and installer training was October 1-2, while the conference began October 3 and concluded October 4.

Distance Learning Coordinator Gerald McClain said the instructors for the driller and installer training workshops came from all over the United States to teach at the conference.

“The training that we provide at the conference is the same course material from the training in Stillwater, but the people taking the course at the conference have a neat opportunity to learn from some of the best instructors from all over the United States – from Minnesota, from the East Coast; people come from all over,” McClain said. “It’s the perfect storm of people to come in and do a really great job.”

Training Program Manager Roshan Revankar has already begun working on next year’s conference training workshops.

“This year, the conference went smoothly,” Revankar said. “The classrooms, the seminars, and the expo were all really close together, which made it easy on all of the participants. I’m hoping it’s the same for next year. We held three courses: the Accredited Installers course, the Accredited Drillers course, and the Certified Geoexchange Designer course. Next year, we should have the same three courses, and we’re expecting larger class sizes. We are still working on increasing enrollment in the OSHA training for next year.”

Participants in the conference accreditation received excellent instruction.

“I was overly impressed with the instructors that we had this year,” McClain said. “They were all very good. The installers training specifically – we had about eight different instructors for that class with all kinds of experience. This is some of the best instruction people could really get at a
training session. That’s why our conference is so special; the training that we provide brings in the best instructors.”

IGSHPA Executive Director Dr. Jim Bose has attended every conference for the past 25 years.

“This was the biggest and the best in quality and quantity,” Bose said. “We had an outstanding week. We learned a lot, we had really good committee meetings, and everybody seemed to be in good spirits. We’re expecting a bigger program next year in Las Vegas.”

In addition to the training courses, the days leading up to the conference included meetings where IGSHPA members have the opportunity to serve on a committee within the association. The committee meetings are a way for members to help IGSHPA operations such as marketing, membership, and standards to run smoothly.

“People who would like to serve on these committees are invited to contact IGSHPA to say which committee they want to join, and we would love to have them,” Bose said.

The conference started with the kick-off, opening session at 8 a.m. Wednesday. Dr. Bose and members of the advisory council gave reports and updates regarding membership and training aspects of IGSHPA. Following the welcoming remarks and updates, Michael Mansuetti, president of Robert Bosch LLC gave the keynote presentation, “Invented for Life,” where he reflected on geothermal technology.

“As consumers seek to find the most environmentally-friendly solution to heat their homes or office buildings in the winter and to cool them in the summer, perhaps the greenest solution of all is right outside their door and just a few hundred feet below them,” Mansuetti said.

“Our industry has one of the best kept secrets,” Mansuetti continued. “If the average consumer understood the power of consistency and longevity of this technology overall, our share of the HVAC market would substantially increase. If consumers knew that by installing a geothermal system, they could save immediately up to 70 percent on their energy bill, they would appreciate that being green can also mean saving money. If consumers put into context that while an upfront investment for a geothermal system is a bit higher than a traditional HVAC system, but they realize that they could achieve a payback in just five to seven years that can last up to 50 years, our jobs would be much simpler. Our challenge would then be, quite frankly, ‘How do we meet the demand?’”

After the opening session, the exhibition opened and meetings commenced. The exhibit hall housed 83 exhibitors including three media partners, and the technical conference held more than 20 workshops and presentations featuring a
variety of industry-related topics such as health and safety on jobsites as well as updates from the past year. Other educational seminars discussed new industry technology, best practices, installation techniques, design issues, equipment performance information, and research and marketing. The conference hosted cutting-edge ground source heat pump products and technology, including information on opportunities to expand the market.

Being the largest and oldest conference dedicated to the geothermal industry, this event provides a unique opportunity to network with other professionals in the industry. The expo hall showcased exciting innovations and creative displays including full-sized drilling rigs and miniature jobsite simulations.

Josh List, the Commercial Project Manager and Safety Director of Indiana Geothermal showcased in the exhibit hall.

“The networking at this conference is amazing in that we can get with drillers, and we can get with anyone in the geothermal industry and talk with them,” List said. “Really, everybody in the geothermal business works together. We are dependent on each other. At some point, we will work for them, and at some point they will work for us, and yet all the time we are competing and promoting the industry together. But as far as the networking facilitation of this conference, it’s just amazing.”

Several exhibitors have already registered their booths for next year’s conference which will convene in Las Vegas October 9 and 10. For more information regarding the 2013 conference, visit www.igshpaconference.com.
Geothermal Sure Clip
Geothermal Sure Clip LLC

Take 35% out of your geothermal fields.
With Double U-bends.
Geothermal Sure Clip LLC introduces the
“Quad Bone”. The Quad Bone makes the
double U-bend quick and simple. Just clip
one over the tremie, snap your U-bend
pipes in place and send it down. Quad
Bones are to be used with traditional HDPE
U-bends. This will keep the costs way down
and still allow for the huge cost savings of
around 35%. The sure clips have a unique
ribbed construction that will stop any tremie
pipe from hanging up on the clip and
dislodging it from the U-bend pipes.

Geothermal Sure Clip LLC
WWW.GeothermalSureClip.com
WWW.GeoDogBones.com

Earn the certification that
matters to your customers!
Become a Certified
Vertical Closed Loop Driller.

NGWA’s Certified Vertical Closed
Loop Driller—CVCLD—designation
demonstrates you’ve taken extra
steps to make sure you’re at the
top of the industry when it
comes to the construction of closed loop well systems
for ground source heat pump applications.

A CVCLD means you:
• Have at least two years’ industry experience
• Understand the need to protect the groundwater
  resource
• Passed a 75-question closed-book exam
• Participate in continuing education on an
  annual basis.

For the details on how you can earn your CVCLD,
visit NGWA.org or call NGWA customer service at
800 551.7379 (614 898.7791).
Finally, Dependable Year Round Performance

LIMA-1
Engineered In-Water Exchanger
Heating & Cooling

www.limnion.com
800.584.4944
We need independent, third-party research on vertical GHEX technologies – not inventor/originator/manufacturer testing and the sometimes erroneous performance that has been provided in the past. I strongly suggest that going forward, any testing be against a baseline technology – typically a single U-bend in a vertical borehole with a known diameter and depth. This test for heat rejection/extraction must be based on controlled heating and cooling loads and run time profiles that are clearly defined and identical for every GHEX technology tested (the first point of comparison). This will, in turn, provide realistic data that can be reliably incorporated into GHEX design programming, as well as provider’s marketing materials.

These tests must determine how various GHEX technologies perform in the same size (diameter and depth) borehole with the same, if any ground water impact. Testing differing technologies in boreholes of varying depths and diameters is not a valid test – the playing field isn’t level and who knows what impact ground water might have on the test – especially with depth variations. Some may say they can get more cost-effective performance from a smaller diameter hole – WHO CARES if the smaller diameter hole CAN’T BE UNIVERSALLY USED. Perhaps the test hole should be 6” in diameter because you can drill a 6” hole in any soil and a 6” hammer is more efficient than smaller diameter hammers – its a logical diameter that can be used anywhere on the planet – the second point of comparison.

The same can be said for backfill. Only grouts that meet IGSHPA standards (no gravel pack) are to be considered, and the same grout product, mixture, and thermal conductivity is to be used in the borehole of each technology tested. Varying grout thermal conductivity values, as well as the previously mentioned borehole diameter and depth variations is counterproductive. Grout thermal conductivity values are well known and the impact or lack thereof of various grouts is well defined. A typical grout thermal conductivity value, say 0.9 or 1.0 should be arbitrarily selected and identified as the grout to be used in all future tests – the third point of comparison.

The same can be said for ground thermal conductivity. Testing boreholes using emerging vertical GHEX technologies that use different diameters, different depths, different grouts, and thermal conductivity values that are different enough to be meaningful is unproductive when it comes to providing accurate performance data as compared to other technologies – the GHEX thermal conductivities at test sites need to be uniform – the fourth point of comparison.

So, let’s see what we have – fixed heating and cooling loads with fixed heat rejection/extraction run times, as well as identical borehole diameter, borehole depth, grout, and thermal conductivity. That leaves only the emerging technologies – let the chips fall where they may. This way, IGSHPA could have a uniform way of evaluating a ground heat exchanger technology’s performance when all things are equal – and the potential to rank GHEX heat exchange performance; something like the comparison data resulting from fixed rating condition testing of GSHP equipment – a realistic basis for competitive comparison of ground heat exchanger technologies.

Now the big question – how do we do it? Artificial loads and run time parameters can be created without using structures – especially multiple occupied and uncontrolled structures. Grout can be selected. Any thermal conductivity at a testing site could be used. That leaves two items – the borehole and the GHEX technology to be tested. Is a steel-cased, 6” ID borehole or boreholes that are 200’-300’ deep and plugged at the bottom reasonable test boreholes? Is it reasonable to think that this borehole or boreholes could have casing(s) set into the earth throughout its entire length, be tested for thermal conductivity and then have that thermal conductivity reevaluated/reverified over time as testing continues into the future? Is it reasonable to set the GHEX to be tested in this borehole and then grout it and perform the tests? Is it reasonable to think that the various GHEX technologies could be installed in the very similar (identical preferred) holes, tested, and then removed so another technology could be tested at a later date – over and over again with varying technologies to insure performance capability of all technologies? Is it reasonable to charge for and require this testing to qualify for some type of GHEX performance rating seal or qualification?

Just a thought…..

Mr. Rawlings has more than 30 years experience in the geothermal industry. He is a Certified GeoExchange Designer (CGD) and an IGSHPA Accredited Installer and Trainer.
COMPONENTS FOR GEOTHERMAL HEAT PUMP SYSTEMS
GeoCal™ Distribution manifold with shut-off and balancing valves
- Eliminate fusion welding labor and equipment
- Allows for individual earthloop isolation and balancing for lower pumping costs and greater system efficiency
- Simplify individual circuit filling and purging
- GeoGrip™ couplings make earthloop installations completely free of fusion joints
- Inside or outside vault installations

THE GEO ENERGY WE WALK ON.

CALEFFI GEO

Hydronic Solutions

www.caleffi.us · Milwaukee, WI · 414-238-2360
Future of Energy?
It’s right under your feet.

The Bosch Geothermal TA Series has been awarded ENERGY STAR® Most Efficient Designation for 2011 – the first and only complete geothermal line in the industry to meet such criteria. Add the industry leading TA Series to your business portfolio today. To learn more about our products, lead generation tools, marketing support and loyalty programs visit BoschWayToGrow.com.