Geothermal No Problem in Smaller Oregon Homes

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Northern California Retrofit Cuts Energy Costs in Half
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You can feel the momentum starting to shift to the “all hands on deck” mentality as we draw near to the IGSHPA Conference. We are now in the conference season. The conference planning committee has been and continues to be the high energy component of our overall efforts to improve member benefits. Please make every effort to be at this year’s conference Oct 6-8 in Kansas City. We will be launching a new inspector’s course which is aimed at improving the consistent quality of GSHP designs and installs. Our conference facility is set to greatly enhance your overall experience by having everything under one roof. We hope to see you there.

This issue of GeoOutlook, features articles on residential installs. It has been mentioned that once you get by the “energy geeks”, residential is a hard sell to the masses based upon the myths and fears of GSHP technology that fill the void of understanding. Among the myths and fears are “my lot is too small” or “I do not want to be the only one using a new technology” or “I don’t have the right type of soil”. The articles for this edition address these issues head on. Our future training, advocacy and marketing must also address these issues to move residential into the mainstream.

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Bill Martin is Long Time Promoter of Energy Conservation

By Janet F. Reeder

Bill Martin has been interested in energy related issues for all of his professional life. Starting with a Bachelor’s degree in Forest Watershed Management from Utah State University, and a later Master’s in Renewable Natural Resources from the University of Nevada, he has had the educational background to take that interest in many directions.

As an educator himself, Martin spent 35 years as both an instructor and a division chair at Feather River College, a two-year community college in Quincy, California. As the Division Chair of the Vocational/Technical Division, Martin was responsible for 13 disciplines, nine of which were vocational. His responsibilities also included budget development, curriculum, staffing, academic scheduling, instructor supervision and marketing.

Martin’s experience promoting energy efficiency goes back to the early 1980s when he was involved in a radio program called “Energy Tip of the Day,” and also was featured in an August 1981 issue of the Sacramento Bee newspaper in an article headlined, “Stirring up Solar in the Sierra.” As a radio guest on a number of other shows, Martin shared tips with consumers on how to purchase home solar systems.

When he first started his business, Martin Energetics in 1979, he sold and installed solar equipment, consulted on home design, energy systems and energy regulations. He also did energy training, thermal design calculations and media promotion in energy conservation. He operated the business through 1984, and then re-established it in 2011.

One of his early consulting projects was working with an architect on heat load, solar gain, life cycle cost analysis and solar heat design for Mountain View Manor, a 46-unit passive solar housing project for Plumas County Senior Carl Orio and Bill Martin visit at the Las Vegas IGSHPA Conference.

(Photo by Janet F. Reeder/IGSHPA)
When Martin became interested in ground-source heat pumps after re-establishing Martin Energetics in 2011, he came to IGSHPA headquarters in Stillwater, Oklahoma, and became a certified ground-source heat pump installer in March of 2012. Around that same time, Martin was building a new home that would become the test bed for everything he already knew and things he was yet learning about energy conservation. He quickly determined to take all measures required to allow the all-electric home to become a zero net energy residence. He is completely dedicated to this goal, and after methodical effort and record keeping on his part, believes that he will attain ZNE by the end of 2015.

Martin has a sizeable group of followers who have coached, cheered and greatly benefited from knowledge attained in his ZNE pursuit. He has routinely kept anyone interested informed through regular updates in both the measures taken toward the ZNE goal and the results of each of those measures.

In 2013, at the IGSHPA Las Vegas conference, Martin presented on regulatory factors in California impacting geothermal heat pumps. He became Chair of the Board of the California Geothermal Heat Pump Association (CalGeo) in early 2014. Martin became President of CalGeo in April of 2015.

He admits that his strongest desire is still to become the biggest promoter of geothermal technology in California.

If you are interested in contacting Martin or seeing some of his collected data about his home, you can do so by checking out his web site at MartinEnergetics.com.

Citizens, Inc. Martin consulted on solar system design at Feather River College’s Vocational Education building, a project that used a passively heated Trombe wall system. He also became one of only 12 college instructors in California chosen to teach new Title-24 energy conservation building regulations. Martin also contracted to produce a number of one-day seminars in California’s Title-24 energy conservation building regulations for sheet metal and air conditioning contractors.

Martin has lengthy experience and credentials in training and auditing work. He went on to become the contractor for the California Energy Commission, where he designed and operated the Local Energy Action Program (LEAP) in Plumas, Lassen, and Sierra Counties, with four regional utility companies promoting energy conservation, local weatherization, training, equipment sales, coordination with merchants, schools and chambers of commerce.

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Geothermal No Problem in Smaller Oregon Homes

By Janet F. Reeder

Directional drilling allowed the Mankowskie property to use a horizontal system for geothermal.

(Photo courtesy of Geonomic Developments Inc.)
Eric Mankowskie thought that geothermal heat was the deep earth heat used in Iceland and other unusually cold areas. He had never heard of ground-source heat pumps.

When the Mankowskies moved into an older home in Portland, Oregon, in 2004, they were introduced to a fossil-fuel burning, inefficient and costly, but common heating source.

“IT had an oil heater which I knew nothing about.” Mankowskie said. “It was the first home I had been in that used oil to heat. And I really didn’t like that,” he says. Both the environmental and the political consequences of using oil were troublesome to him. Like a growing number of people in the Pacific Northwest, he had a genuine interest in sustainability.

Several years after he and his wife had settled into the small home, they learned about a special group-buying plan for solar power using PV panels. They took advantage of that to install a 3.2 kW system. Portland General Electric, their local power company, sent them a magazine about green power at about the same time. One of the magazine articles really struck Mankowskie.

“It highlighted a geothermal project,” Mankowskie said. “That was the first exposure I had to the technology.” Mankowskie says he didn’t know anyone who had geothermal.

“I didn’t think that it would work at first. But an angle in the article talked about smaller lots and geothermal systems that made it seem like maybe there was a way to do it for us,” he said.

For the most part, owners of smaller homes have been left out of the energy efficiency bonanza afforded by installing ground-source heat pump systems. They don’t always fare well when you...

A small area was needed for the completed drilling of four ground loops and the connection to the heat pump in the basement.

(Photo courtesy of Geonomic Developments Inc.)
put a pencil to the return on investment for the expected energy savings. They also usually lack sufficient lot size for the ground heat exchange installation.

But two partners who have worked to include that smaller home market in the vicinity are doing well. Nicholas Mitchell and Nicholas Cabianca, co-owners of Geonomic Developments Inc., located in Portland, are dedicated to finding ways to install geothermal systems in their area. While they do commercial projects as well as new residential installations, they have also been able to focus on retrofitting Portland’s older homes.

“We specialize in smaller-than-usual residential geo installs,” Mitchell says.

Inc., located in Portland, are dedicated to finding ways to install geothermal systems in their area. While they do commercial projects as well as new residential installations, they have also been able to focus on retrofitting Portland’s older homes.

“"We specialize in smaller-than-usual residential geo installs,” Mitchell says.

(Below) Remains of the old oil furnace system removed to make room for the new geothermal heat pump system will be hauled away.

(Photo courtesy of Geonomic Developments Inc.)

Stubbed out loops and the small amount of excavation needed for manifolding the ground loop system is shown.

(Photo courtesy of Geonomic Developments Inc.)

(Opposite Page) The basement area installation of the new system.

(Photo courtesy of Geonomic Developments Inc.)
“The average Portland home is old, relatively small, and in need of an energy remodel.”

Mitchell and Cabianca started working together after they met and worked on an engineering project at the University of Arizona. Their original focus was on the “ground loop side of geothermal,” Cabianca says.

From the earlier interest in the ground heat exchange aspect of geothermal, they continued their focus on the geology and climatology of the Pacific Northwest and California. They now do projects in Washington, Oregon and California. “We work from San Juan Islands to San Francisco,” Cabianca says.

With a new interest in geothermal, Mankowskie says he looked in the yellow pages to find geothermal businesses in the Portland area. He ended up with bids from several companies. With nearly a half-acre of land, several of the initial bids included horizontal loops for the heat exchange. One of the bidders told Mankowskie that horizontal would not work for his property. They suggested using directional drilling. “But their price was exorbitant,” Mankowskie says.

Geonomics had been the first call that Mankowskie made in his pursuit of geothermal. And he says that working with Geonomics in the bid process had left him feeling very positive about their business and skills.

“They had a lot of information that was presented in a really accessible way,” he says. “They gave us everything from videos from the heat pump manufacturer to magazine articles and brochures that they had. And they just spent a lot of time talking to us over our dinner table, and that was great,” he said. “They weren’t pressuring me for the sale,” Mankowskie said. “I liked that it was a small company and that the owners were young and passionate about their work.”

Even though Geonomics original bid on the project was for horizontal loops, Mankowskie called Nick Mitchell and asked him what he thought the directional drilling possibilities were for his property.

When the re-bid from Geonomics to do the project with directional drilling came in and fit the budget, Mankowskie said the deal was cinched.

“Part of what makes us different is that we are really focused on making the ground loop more accessible for smaller
homes,” Cabianca said. “We do a lot of urban projects on the other end of the scale—much smaller lots in an urban city environment,” he says. “Which is pretty uncommon for geothermal. More than anything else, we have been focused on how this can become a more practical application for mass adoption.”

Both Mitchell and Cabianca say that the Portland market is very interested in sustainable practices. At the same time, clients who tell them they have been told that geothermal was not possible for their property always surprise them. The glitch is that most of the homes located in urban areas are very small and sit on corresponding small lots. Residential Portland is largely made up of 40’ or 50’ x 100’ lots.

When Geonomics came to the Portland area from Arizona, Cabianca says they bought a custom vertical drill with a smaller mast and compact size. They sold it and turned more to innovative solutions for the projects they were bidding. They ended up customizing a directional drill unit made by Ditch Witch.

“What we have done since then,” Cabianca said, “is almost exclusively directional drilling in house.” He says they are turnkey now and do full system installation. Most of their service territory gives them the ability to do directional drilling and they have concluded that it is the most cost effective and most versatile for their company.

“Geonomics has crafted a proprietary method of u-bend installation using
directional drilling,” Mitchell said. “It is the only option on these smaller lots,” Cabianca says.

“Mitchell does the design engineering on the ground loop side and we have our installers that do the drilling,” Cabianca says. “We have a small shop that does the sheet metal and makes custom connections for ductwork.” Geonomics does about 50 projects annually, with about half of them new construction. By doing most of the work in house, Geonomics is able to control and keep costs down.

“Portland is not a heavy heat load with minus temperatures, but you are heating a tremendous amount of time at seven months out of the year,” Cabianca says. He adds that hot water options are generally limited. Being able to provide hot water through the geothermal system is an added benefit for clients.

“Air conditioning was also a bonus for the Mankowskie home,” he said. Cabianca says the project was a straightforward job similar to 10 to 15 other retrofit projects they do a year. Geonomics installed a 3-ton Bosch CE 036, 2-stage water to air unit.

“A lot of the time when they have been using oil or propane,” Cabianca says, “their ducts are so nasty, we’ll do duct cleaning when we are replacing systems. It’s all part of the job.” They also tear out and remove the old oil burning systems.

“We are really, really happy with it,” Mankowskie says. “It’s invisible to us. It is just something you stop thinking about. The air is much crisper and cleaner than the oil heat was.”

Mankowskie says that geothermal does pay off financially. “We’re just one family, but if more people can learn about this and engage with it they would see the advantages,” Mankowskie said.

“And it just feels good to be off of petroleum.”

Editor’s note: Eric Mankowskie mentioned IGSHPA material he saw during his research into the possibility of geothermal for his Portland home. He said it was informative and helped influence his decision.
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Northern California Retrofit Cuts Energy Costs in Half

By Drew Slattery
A field too wet to build on and a local utility provider’s geothermal incentive program combined to create the opportunity for a successful geothermal heat pump installation using a horizontal loop system at Dr. Larry Price’s home in Quincy, California.

Price owns a two-story 3,500-square-foot traditional brick home on 16 acres. Until a seven-ton geothermal system was retrofitted in the summer of 2012, he burned around 1,000 gallons of fuel a year in an oil furnace.

The decision to switch to a geothermal system was made by Price to address both comfort and cost. The house had no air conditioning system, which left the upstairs rooms too hot in the summer. The inefficient and costly oil furnace system left the downstairs too cold for proper use in the winter months of Northern California.

Price tapped Bill Martin, owner of Martin Energetics out of Quincy, California, to consult on and manage the retrofit project.

After running his calculations and surveying the site, it became obvious to Martin that the empty piece of land near the house would make an ideal location for a horizontal heat exchange system setup. The land was left empty by Price, as the combination of soft soil and high year-round moisture levels proved unable to support any kind of structure or practical use besides grazing for animals. Test pits were dug, with the results showing exemplary water-saturation levels of the soil at minimal depth, even in drought conditions. Martin concluded this would serve as an ideal conductivity bed for a horizontal loop.

The utility provider for Price’s region, Plumas-Sierra Rural Electric Cooperative (PSREC), provides loans up to $15,000 to help its members-owners cover the upfront installation cost of the loop portion of a ground-source heat system. The entire cost of the loop field for Price was covered by one of these loans. It is paid back to PSREC at around forty dollars per month included on the regular electric bill. While the entire heat pump system totaled over $70,000 installed, the loop field placed and spaced properly in the horizontal trench before being covered.

(Photo courtesy of Bill Martin)
The header trench as it approaches the house has been covered

(Photo courtesy of Bill Martin)
loan provided by the utility allowed for Price to cover a sizable chunk of the upfront cost.

“We believe in the technology. We know that it works in our region. We know it will save our member-owners money, and we know that it will reduce our peak loads,” PSREC Program Manager Donna Mills said.

PSREC hired a third-party engineering firm to conduct a study of different HVAC systems and their corresponding electric consumption levels within the membership region the cooperative serves. This was done in order to provide the member-owners with accurate and real-world data on energy consumption levels in regard to HVAC systems in the local community. The study concluded that GSHP system residences were the most efficient HVAC systems for the region in terms of electricity use. These results were then shared by PSREC with their member-owners and made public on their website to promote the adoption of the technology within the cooperative.

All excavation and trenching for the loop was done by Brent Dingle with Wilburn Construction out of Quincy, California. The loop was designed and installed by Frank Emsoff of Dryden Plumbing and Heating in Portola, California. Emsoff has been doing

Water was applied in the trench to aide the work of compacting the material around the heat exchange piping as it is being buried

(Photo courtesy of Bill Martin)

The mechanical room shows the installation of both 3-ton and a 4-ton Enertech heat pumps.

(Photo courtesy of Bill Martin)
ground-source heat pump installs for over seven years.

The loop field includes seven 3/4-inch SDR 11 HDPE loops with an 800-foot total circuit length. Supply and return sizes clock in at an inch-and-a-quarter to and from the house with a uniform depth set at six feet. The loop field lies around 285 feet from the house, which initially worried Emsoff and Martin. But after crunching the numbers and running a few test calculations, they determined it to be within the acceptable distance for the system design. The field is level, with no up or downhill sections in the loop, adding to its efficiency.

Emsoff installed a seven-ton split system. He also served as the system designer and mechanical and controls contractor for the project. Enertech was chosen as the manufacturer of the heat pumps used for the system. A three-ton GeoComfort unit for the upstairs and a four-ton ducted GeoComfort unit for the downstairs living spaces were used. A modified platform was tailor built for the mechanical area in the garage, in addition to the upgrade of the residence’s electrical system to a 400-amp main to support the new load levels. A photovoltaic system was installed shortly after the completion of the geothermal installation, in order to offset any rise in electric consumption from switching systems.

The refrigerant and suction lines for the three-ton unit run out of the garage, up past the second floor, and into the attic where the unit’s air handler is located. Both units share the same seven-ton loop but run separate loop pumps. Two pumps run for the four-ton unit when needed and two pumps run for the three-ton unit when needed. Both can run independently and only kick on when necessary, thanks to a solenoid valve set-up designed by Emsoff. The two units both use R410A refrigerant. All new ductwork was laid throughout the house by Dryden, including extensive custom built ducts for the four-ton unit to ensure proper airflow despite the size and space limitations of the mechanical area.

“I always verify that I have 400CFM per ton moving through the ducts. I do heat calculations and size the ducts accordingly. Then I do room by room loads, so I verify we are getting the right airflow to move the BTUs in each room,” Emsoff said.

He believes air velocity and volume are primary concerns, especially in retrofit situations, as improper levels can lead to cold drafts. These cold drafts ruin the customer’s experience because no matter what the savings on energy or utility cost, if a room has a cold draft the retrofit was not effective, he says.

“For me it is a joy to come into a retrofit situation where the customer is paying an enormous amount for oil...
or some other heat source and do our calculations, do a good job, walk away and the customer is comfortable, happy, and saving money,” Emsoff said.

Price says that all things considered he is very happy with the system. “It performs beautifully and I spend half as much as what I did before to keep the house a comfortable temperature year round.”

Readings during the loop testing on the 3-ton stage 2 system taken in late December.

(Photo courtesy of Bill Martin)

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MCALISTER CONSTRUCTION BUILDS GEO COMMUNITY

By Drew Slattery
New homebuyers now more than ever demand homes that are energy efficient and environmentally friendly, all while remaining affordable. This is no easy hurdle for any builder to clear. McAlister Construction from the Oklahoma City area has taken a gamble to set them apart from the competition and accomplish just this. Betting on the energy efficiency of geothermal heat pump systems, they have designed an entire development around the utilization of the technology.

Avondale, a 44-unit neighborhood under development in Moore, Oklahoma, is where McAlister’s wager pays off. Each home boasts a GHP system individually designed for it, leading to HERS scores less than half that of standard new homes. All this while remaining within $3 per square foot of competing neighborhood developments, makes McAlister’s home attractive to buyers.

A third party rater for efficiency has individually tested each of the Avondale houses. The homes all score consistent HERS ratings from the mid-30s to the low-40s. To compare, standard new homes in North America sit at a HERS rating of 100 and existing homes are around 130.

“A GHP system is great for reducing energy consumption for a house, but what is even better is when you put a GHP system in a house that is sealed up tight and built specifically to use GHP” Josh Kitchen of McAlister Construction explains. The dramatically low HERS scores enjoyed by the Avondale homes are possible thanks to the teamwork between a GHP system and a laundry list of cutting-edge energy efficient building practices utilized by McAlister Construction.

Eighteen Avondale houses are currently standing, with more on the way. Ground was first broke for the development in 2014 and when construction is completed in 2017 there will be 44 total homes. Each home has an individual heat load run, to determine its heat loss and gain. Then, each Avondale home has an individual GHP system

McAlister Construction co-owners Greg McAlister & Josh Kitchen show a home they have built in the Avondale addition in Moore, Oklahoma. (Photo courtesy of McAlister Construction)
The homes McAlister builds follow historic Craftsman-style design and are energy efficient. (Photo courtesy of McAlister Construction)

tailored to fit its specific needs. The houses are designed and built from the earliest stages for the inclusion of GHP systems.

This practice of including a GHP system in a build that doesn’t even have an owner yet is rarely seen. Most developers are hesitant to include geothermal in their builds without the customer’s explicit request for the technology or a luxury budget.

“We have done geothermal in the past on custom luxury home builds. The feedback was phenomenal, the customers were in awe at their low energy usage” Kitchen states when asked about the inspiration for the GHP aspect of Avondale. “We have always been an efficiency focused builder, so geothermal was an obvious next step for us” he continues.

Including GHP systems in all of the Avondale homes means a contract for 44 individual GHP system installs. This is a
tall order in an industry where individual installs are typically done on a case-by-case basis. This unordinary project size allowed McAlister Construction to leverage bulk discounts from all the partners involved, as well as streamline the work and limit time spent on site by contractors. This enables the cost per system to be kept several thousands of dollars lower compared to a one-off system installation.

To further offset the cost of including GHPs in Avondale, McAlister Construction participated in the development’s utility provider GHP rebate program. OG & E offers its customers a $375 per ton rebate for GHP system installs, which McAlister Construction claims for every home. Beyond the rebates, McAlister Construction also participated in the federal tax credit incentive program for GHP.

Fire and Ice Geothermal of Woodward, Oklahoma was brought on board to handle the drilling for Avondale. Boreholes are all drilled in the front yard, with houses having between 3 and 5 holes of varying depths from 180 to 260 feet, depending on system needs and soil type. Three quarter inch polyethylene pipe is used for the loops, with inch-and-a-quarter pipe for the headers into the house.

McAlister’s homes are all equipped with ClimateMaster geothermal heat pumps and rate in the 30s and 40s on the Home Energy Rating System Index score. (Photo courtesy of McAlister Construction)

Drilling costs were kept to a minimal, thanks to the inclusion of GHP in Avondale from day one. Fire and Ice Geothermal visits the site roughly every 30 days to drill holes for 4 to 6 houses at a time. This keeps drill rig travel, the most expensive part of drilling, to
a minimum. Additionally, Fire and Ice are able to come in at varying stages of construction to drill and run pipes; some houses may be a foundation only while others are fully framed and roofed. This flexibility prevents repeat trips to and allows the drilling crew to maximize the work done in a limited time on site.

Designing and building Avondale around the inclusion of GHP systems

Mechanical areas for the heat pump also contain the water heater and are located in the garage area. 
(Photo courtesy of McAlister Construction)
Most of the installations have the equipment tucked nicely into a garage closet. (Photo courtesy of McAlister Construction)
not only helps keep the drilling costs low, but installation as well. Every house has a mechanical room tailored to a GHP system designed into the first floor. This keeps equipment out of the temperature fluctuating attic, improving system efficiency and longevity. In addition the system installers, Hadley Heating and Air of Moore, Oklahoma, have all the mechanical room and ductwork needed for the systems pre-built into each house. This limits their job difficulty and time on site to complete an install.

McAlister Construction reached out to long time GHP partner and Oklahoma City neighbors Climate Master for the Avondale system pumps. The Tranquility series was deemed ideal for the home designs, and the systems range in size from 3 to 4 tons- all based on individual building heat loads. Once again the sheer size of the contract helped keep costs low through bulk discounts, as it is not every day a builder places an order for 44 individual systems.

In a rapidly evolving marketplace, McAlister Construction has put themselves ahead of the curve by choosing geothermal for the Avondale development’s HVAC and hot water generation solution.
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WHISPER VALLEY AUSTIN
Austin’s Whisper Valley Underway
By Janet F. Reeder

Austin, Texas is already recognized as an upcoming city with a forward thinking population. Known for country music, the University of Texas and the state capitol, the city is one of the fastest growing in the United States.

Soon the city will also lay claim to having the country’s first Net Zero Energy community. Whisper Valley is located in Austin’s Preferred Development Zone east of downtown and adjacent to State Highway 130. In Phase 1, 240 new NZE homes will be built.

Plans for the sustainable community grew out of a strategic partnership between Bosch North America and Taurus Investment Holdings, a Boston-based real estate development company backed by private investors. Company executives from both partners announced their joint agreement at the International Builders’ Show during Design & Construction Week 2015, in late January at the Las Vegas Convention Center.
Eventually Whisper Valley will be comprised of some 7,500 NZE ready single and multi-family homes and apartments. The 2,062-acre site will eventually include more than 2 million square feet of retail and office space.

All structures will be geothermal and solar equipped, capable of achieving the Net Zero Energy standard adopted by the City of Austin’s Municipal Building Code for all new construction homes. They will also help Austin meet a 2050 target to reduce CO2 emissions to zero.

On the ground literally, for Phase 1, Phil Schoen of Geo Enterprises out of Catoosa, Oklahoma, has been coordinating the drilling and ground-source loop installations for the project’s first 240 homes. All of the project’s homes will have efficient geothermal heat pumps, hot water systems and quiet, premium design appliances.

Schoen has been aware of the project for nearly two years. He has watched it come together in that time. And now he is excited to be a part of it.

“Sure. It is the opportunity of a lifetime,” Schoen says. “This is the largest deployment of geothermal in the United States, to my knowledge.”

For Phase 1, Schoen is overseeing the installation of 239 boreholes that are being bored at 5 1/8 - inch diameter to accommodate two REHAU® pex loops.

**Testing equipment used to test the loops on site.**
*(Photo courtesy of Geo Enterprises)*
Phil Schoen on site at the Whisper Valley project at the start of drilling by Johnson Drilling. (Photo courtesy of Geo Enterprises)
He is also contracted to install the 6-inch district piping that will eventually run to each home and around the perimeter of the development.

At an early March 2015 groundbreaking for the start of drilling, Schoen was interviewed by Axel Lerche with EcoSmart Solution LP. ESS is the sustainability arm of Taurus, Schoen says. He credits Lerche for the high level of sustainable measures being incorporated into the Whisper Valley development.

Taurus and ESS sought out Schoen for the geothermal component of the project because of his experience with other large projects such as the Bird’s Nest Olympic Stadium project in Beijing, and for his knowledge and practical experience with REHAU® products.

Schoen subcontracted borehole drilling to Mark Johnson with Johnson Drilling out of Blue Ridge, Texas. He says no casing is used in the bores, which are grouted with hydration material to establish best conductivity.

Geo Enterprise is responsible for all of the district or “artery system” piping.

Connections to the ground loops and the perimeter piping for the district system are carefully fused and joined.

(Photo courtesy of Geo Enterprises)

The stubbed double REHAU® u-bends after grouting.

(Photo courtesy of Geo Enterprises)
Johnson Drilling’s Clay Johnson is working one rig on the site for the new Whisper Valley development in Austin, Texas.

(Photo courtesy of Geo Enterprises)
and the connections to a utility box for each home. Everything except the loop piping is HDPE pipe, Schoen says.

“During the construction process, as we drill each borehole, we are also digging connecting lines and installing them. They are excavated and inserted next to the borehole and then to each home,” Schoen said. His crew is doing all of the pipe headering and fusion needed on 4-inch and 6-inch piping used to tie the ground exchange system together.

He says the grouting is important because it will seal the boreholes outer dimension to the thermal characteristics of the pipe. Water is being used in the ubends for a closed system. The REHAU® pex loop piping is extruded as one continuous piece and is super strong. Though not necessary for geothermal work, it is actually capable of 600-800 psi, Schoen says.

“Whisper Valley is a very significant project for Bosch in North

stubbed up connections from the main artery line are ready for the finished connections.

( Photo courtesy of Geo Enterprises)

(Opposite Page) Workers with Geo Groundwork, an affiliate of Geo Enterprises, Nick Wells and Michael Nolen fuse piping.

( Photo courtesy of Geo Enterprises)
America and we are delighted to partner with Taurus,” said Robert Bosch LLC President Mike Mansuetti. “It’s a perfect blueprint for new energy-smart communities with a keen focus on conserving.”

Homes in the development will include an array of Bosch ENERGY STAR® rated kitchen appliances as well as Bosch heat pumps.

Grouting boreholes (above) and making good connections in the trenches are both part of the ground exchange work going on at Austin’s Whisper Valley.
(Photo courtesy of Geo Enterprises)
The alliance with Bosch is essential to delivering affordable reliable and sustainable technologies to homeowners across the U.S.,” says Lorenz Reibling, Chairman and Founding Partner of Taurus Investment Holdings LLC. Reibling is a strong advocate for making building sustainability more available. “EcoSmart, in conjunction with Bosch is providing a complete one stop solution package to meet Net Zero Energy standards,” Reibling says. He adds that the homes will provide increased value for homeowners and act as an insurance against rising energy costs.

Bosch, along with other manufacturing partners BASF, REHAU®, Lighting Science Group Corp and Aten Solar, are part of Taurus’ EcoSmart Solution LP subsidiary. ESS develops and implements alternative energy structure programs in large-scale real estate projects. The ESS network includes technology, construction, communications and finance companies, among others.

A geothermal system that uses a ground loop infrastructure pre-installed throughout the community will allow Whisper Valley homeowners the energy efficient technology at no upfront costs. An extended warranty, no maintenance costs for the first three years, and attractive monthly energy costs are all being considered for the plan. Savings from the ESS monthly energy fee are expected to offset utility electric costs.

Phase 1 homes will initially be priced between $175,000 - $300,000 including the EcoSmart Program. The Whisper Valley project has seven planned phases.
Cutting Corners on Horizontal Trenched Applications

Horizontal trenched in applications are where closed-loop ground source heat pumps began back in the mid ’70s. The first applications were series systems with either a single pipe or two pipes in the trench. As the technology matured horizontal series was typically replaced by horizontal parallel applications with 2, 4, or more pipes per foot of trench in narrow (trencher dug) or wide (backhoe/excavator) dug trenches. Later, slinky and horizontal drilling applications began to see increased usage. As these various types of horizontal applications matured, both design manuals and computerized design tools appeared in the marketplace.

Now, you’re wondering why I am talking about known and proven application methods and their supporting design tools. The answer is simple – the design tools require accurate input information, and the system design described by the design tool output is to be installed as specified, not per the installer’s “better ideas” that will accommodate cost and/or installation challenges.

After all these years and the simplistic approach horizontal applications require, I am still surprised by the horizontal system “train wrecks” that keep surfacing. While these issues typically appear in areas that are significantly heating or cooling dominant, they can occur in any application where an inappropriate “better idea” was substituted for accurate design tool input and/or design tool output. For example, the amount of pipe per nominal ton that will satisfy a 2 pipe per foot of trench design will not perform satisfactorily if installed instead as a four or six pipe per foot of trench installation. Further, the spacing required between trenches must be adhered to during installation, and finally, the pipe burial depth must be as designed.

Over the recent past I have had two examples that defy understanding.

Cooling Dominant: As Designed – A horizontal slinky (slinky laid flat in the bottom of a 5’ trench) in damp sandy soil (intermittent irrigation bi-weekly) with 4 trenches on 10’ centers. The better idea – only use two 6’ deep trenches, bury one of the specified slinkies at 6’ and the other at 4’ deep in both trenches. The thought process: these two trenches with four slinkies will replace the specified 4 trenches with one slinky in each. The result: hot loop, poor system performance, dissatisfied customer, and a black eye for geo caused by word-of-mouth negative advertising.

Heating Dominant: As Designed – An older installation that has been an ongoing poor performer with (quoted from the letter – serves a 6 ton GSHP) “a 225ft. long trench with 6 - 1” pipes going out and back in a sandwich design i.e. 2 x 3 outgoing pipes stacked on top of each other in a 2ft wide trench and a depth of 4 - 5 ft.. As a result of an inadequate length the ground loop forms a block of ice throughout the winter causing the trench to heave, push my lawn sideways and then cave in some in the middle when the weather warms up. I’m also not getting as much heat out of the system as I should as the winter progresses, causing my electric back up to kick in prematurely.”

This horizontal application is approximately 25 years old, was undersized, had extremely dense pipe spacing, and shallow burial for a Canadian application. Design recommendations or tools that were available at the time of installation would not have found the approach described acceptable. The key question is why wait 25 years before considering correcting the problem? Basically the same result as the previous example.

The “train wrecks” aside, these and other, similar occurrences lead to a single design approach recommendation: Design your horizontal application using accurate site information and length, spacing, and depth requirements that can be accomplished, then install per the design!

Mr. Rawlings has more than 35 years experience in the geothermal industry. He is the Director of Geothermal Services for Trison Construction, a Certified GeoExchange Designer (CGD) and an IGSHPA Accredited Installer and Trainer.
Just because everyone is doing it, doesn’t mean it’s best.

A geothermal system from EarthLinked Technologies doesn’t need extra pumps, heat exchangers or a large yard requirement. It’s just a simple, efficient and effective system that feels familiar to your technicians and sets your business apart in the market.
Our Champions Work Smarter Not Harder

Bosch products allow your customers to relax while watching the big games at home. Install a Bosch high efficiency, cost-effective geothermal heat pump, and make your customers’ lives more comfortable and worry-free. Our American-made heat pumps, designed for efficiency and quality, provide an unstoppable line-up against high heating and cooling bills. SM Models offer low operating costs, ultra quiet operation with sound levels as low as 52dB, easy servicing, and customizable multi-positional configurations. In addition to our unbeatable 10 year limited warranty on parts and labor*, your customers may be eligible for federal, state and local utility rebates. Go for the win in home comfort. Bosch - the team you know and trust.

*Full warranty, rebate details, and product line up are available at boschheatingandcooling.com