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Gateway Theater First for SHARC in North America

IGSHPA Reorganizes to Better Serve GSHP Industry
Introducing the New Line of Carrier® Geothermal Products.

The geothermal market is poised for growth, and Carrier is actively digging in. If you’re currently offering geothermal, you’ll be thrilled by our new line of packaged and split-system heat pumps, as well as our hydronic systems. If your dealership has yet to jump into the geothermal groundswell, check out how Carrier’s most sustainable comfort system can yield deep savings of up to 79% on heating costs and up to 24% on cooling costs for your customers. Depending on climate and system usage, geothermal’s long-lasting, low-maintenance equipment and generous tax incentives can make a quick return on investment well within the realm of possibility. So homeowners can feel good about a more comfortable home and great about their bottom line.

1 According to LoopLink® software based on a comparison of a 6.0-ton Carrier® model GT geothermal heat pump to an 80,000 BTU, 78% AFUE propane furnace in St. Louis, Mo., with electricity costs of $0.098/kWh and propane fuel costs of $3.18/gallon as of 4/30/14.

2 According to LoopLink® software based on a comparison of a 6.0-ton Carrier® model GT geothermal heat pump to a 3.5-ton, 13-SEER air source air conditioner in St. Louis, Mo., with electricity costs of $0.098/kWh as of 4/30/14.
Introducing the New Line of Carrier® Geothermal Products.

The geothermal market is poised for growth, and Carrier is actively digging in. If you’re currently offering geothermal, you’ll be thrilled by our new line of packaged and split-system heat pumps, as well as our hydronic systems. If your dealership has yet to jump into the geothermal groundswell, check out how Carrier’s most sustainable comfort system can yield deep savings of up to 79% on heating costs1 and up to 24% on cooling costs2 for your customers. Depending on climate and system usage, geothermal’s long-lasting, low-maintenance equipment and generous tax incentives can make a quick return on investment well within the realm of possibility. So homeowners can feel good about a more comfortable home and great about their bottom line.

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Designing the Future of IGSHPA

IGSHPA 2.0 is the name for the project to redesign the IGSHPA organization. A new governing structure, a new mission, and long term goals and objectives that will move this industry forward from market niche to market relevance has now been launched. We have new bylaws and are in the process of electing the first Board of Directors in January. The rest of the industry base structure will follow with total completion expected by the end of the first quarter of 2015.

During the recent IGSHPA Conference in Baltimore, I received numerous communications with the feeling of, “IGSHPA is doing the right thing.” We will balance the desire for progress with the patience required for evolving the association with long-term goals in mind. As I stated in my presentation in Baltimore, this will work only with new ideas, new people, new energy and innovation. We need your involvement. We need you.

The Baltimore Conference, which was my first to experience the entire process, was an absolute success from planning to execution. This was truly a motivating experience. It involves an 18-month planning process for a three-day conference. I am proud to be a part of this team of professionals, both on the staff and on the industry side, who pulled this off in an excellent manner and starting asking questions on how we can improve the conference for next year the day after this year’s conference ended.

One of our goal areas in IGSHPA 2.0 is research that leads to innovation. In this issue of Geo Outlook, we have an excellent article about the capture of heat from wastewater. The common term for wastewater is sewage. How can anything extracted from sewage be good? Heat exchange through hermetically sealed piping is both clean and efficient. The Gateway Theater in Richmond, British Columbia, shows us to look everywhere for innovation.

Finally, in this edition we have another historic home in Pennsylvania retrofitted with GSHP. Historic homes, new homes and apartments with district systems, utility owned heat exchangers, even heat exchangers using sewage, all highlight the innovation and application of GSHPs and how the technology is positioning itself for the mission and goals of IGSHPA 2.0.
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INDUSTRY LEADERS

Mueller at Forefront of Wastewater Heat Recovery
By Janet F. Reeder

Lynn Mueller

Lynn Mueller is a man on a mission. Mueller is determined to make a difference in how the world looks at energy recovery. He has a straightforward approach and his technology and methodology is drawing interest from municipalities around North America and the world.

Mueller is president and CEO of International Wastewater Systems (IWS), a Canadian company that is rapidly expanding to a global outreach. IWS is a team of professionals dedicated to the widespread implementation of Sewage SHARC systems as an alternate energy source. The group has more than 100 years of combined experience in alternative energy projects and is positioned to achieve their goal.

IWS is best known for development of the SHARC, a specialized sewage heat recovery system with potential for game changing growth in Canada, the U.S., the U.K. and Australia. Later this year they will also enter the market in Mexico. After three years of development, and proven installation of the environmentally friendly system in the Vancouver, British Columbia area, IWS continues to expand.

“About the time I got to thinking about the possibilities of sewage heat recovery, I saw a report from the DOE in the U.S. that said residentially 350 billion kW hours a year of energy end up just going down the drain,” Mueller said. “It is a huge amount.”

Showing an ironic sense of humor, Mueller says that his “passing knowledge” of the geothermal business allowed him to realize the real potential energy savings involved in wastewater recovery systems.

“I thought about how that was a pretty constant available source of heat,” Mueller says. “When coupled with a geothermal system, it could have a real game changing affect on the geothermal industry.” That realization motivated Mueller to see if the idea had already taken hold anywhere in North America or in Europe.

“I did the world sewage tour and it is not as exciting as it sounds,” Mueller says. He discovered a variety of sewage recovery systems mainly associated with sewage treatment plants.

“There weren’t a lot of people living around the treatment plants to be able to use the energy they were saving,” he said. “So I wanted to design a system—and I invented and patented the SHARC—that we could use on a single family system or in a district system. It is the kind of application where you could use it where people are,” he says. “The challenge we had has been to have a sewage tap-in without the smell.”

Mueller admits that sewage isn’t
a topic most people are interested in discussing for obvious reasons. He has heard all of the jokes and puns and doesn’t mind sharing them when he is promoting his company’s system and products even in other cultures.

“Our SHARC system is completely hermetically sealed. You can go into any of our installations and you couldn’t tell that there is a tie-in to the sewer,” Mueller said.

The SHARC system takes warm water out of the sewage system and either uses it for heating or cooling through the geothermal heat pumps. A designed separation in the system allows for the heat transfer without the wastewater looping through the heat pump system.

“The beauty of our system is that you get to use the same heat every day. You take it out of the sewage system and put it back in the heating or cooling system and you get to use it again. Then it goes back into the waste system stream you took it from, so you just get to recycle the energy every day,” Mueller says. The SHARC system can be used to pre-heat conventional heat pump systems.

“We can take the pre-heated water up to about 120 degrees Fahrenheit. We also have a high temperature model where we can take the water up to about 170 degrees Fahrenheit,” Mueller says.

Mueller says the equipment is not something that can be buried and forgotten like the exchange loop for conventional geothermal.

“The equipment does require regular maintenance. If you don’t maintain it, it doesn’t work for long.” The systems are distributed through exclusive agreements that require distributors to service the systems. Mueller says the system is easily serviced on an annual basis and touch screen controls allow monitoring of system efficiencies as well as any needed troubleshooting.

Return on investment for installations like hospitals or prisons can be as short as two years, according to Mueller. Retrofitting is not a difficult task, especially if the installation already has heat pumps. Generally, cooling towers and boilers are eliminated, along with their intensive use of water resources.

Mueller says goals for IWS include finding distribution partners and growing the company. He is adamant about taking care of his employees and has an innovative and forward thinking program to allow them to grow with IWS.

“We have got the best team of employees I have ever seen,” he says. “They are on the cutting edge and they really enjoy it. We value them.”

Mueller looked at setting up manufacturing facilities in other locations originally, he said. “We just couldn’t stand behind some of the stuff they were trying to sell. So we decided to create jobs where we are.” IWS handles manufacturing at their Port Coquitlam location in British Columbia, Canada.

“It has been the most fun job I have ever had,” Mueller says. “I enjoy the dickens out of geothermal, but this is way better than my earlier geothermal days.”

Expanding the application and performance of geothermal by creating an innovative new product that reclaims wastewater heat and also saves water has been just the ticket for Mueller, who is glad he didn’t retire for long.
Gateway Theater First for SHARC in North America

By Janet F. Reeder
The 540-seat Main Stage is the location for four annual productions in the Gateway Signature Series. The space is also available for rent and is popular for meetings and receptions. (Photo by Rob Kruyt)
The Gateway Theater in Richmond, British Columbia, home to Richmond’s only live professional theater company and Metro Vancouver’s second largest theater company, stands out as an example of the city’s strategic interest in sustainability.

Gateway Theater is heated and cooled by an innovative sewage heat recovery system called the SHARC. It is the first installation of its kind in North America.

City of Richmond Energy Manager Levi Higgs explains that the city performed a feasibility study to determine the best way to reduce natural gas usage for the older system at the theater to extend viability of the popular facility.

“The City of Richmond is interested in bringing innovative technology forward,” Higgs said. “We are happy to have the opportunity to put something like this in place.”

The city has a mandate to reduce greenhouse gas emissions (GHG) and integrate renewable technologies into its existing corporate energy systems. The priorities guide the city’s building rehabilitation and retrofit decisions.

“We decided to move forward on a demonstration basis,” Higgs said. “The theater is located right next to a large pumping station so there is a fair amount of heat available.” The city expects to reduce GHG, reduce natural gas usage, and achieve $15,000 annual energy savings at the theater.

International Wastewater Systems (IWS), near Vancouver, worked with the City of Richmond to install a SHARC heat recovery system at the theater in 2012. CEO and President of IWS, Lynn Mueller, said the theater retrofit project is an improvement on the original system the theater used to heat and cool 60,000 square feet for year-round operations.

“The Gateway Theater was equipped with geothermal heat pumps on a boiler and cooler tower situation,” Mueller said. “We just took the boiler and the cooling tower out of the equation and tapped into a sewage holding system and pumping station that happened to be right under the theater. Richmond has to pump anyway, so why not get the benefit?”

Inside the Gateway Theater patrons experience the architectural features of the curving glass facade as they mingle between acts. (Photo by Rob Kruyt)
The installation was fairly straight forward from a mechanical point of view,” Higgs says. “The theater had significant space for the air handling units in the mechanical area and that helped position the units in an appropriate spot for easy access.”

The retrofit utilized 39 existing Mammoth heat pump units ranging from 2-tons to 5-tons each for a total of 200 tons capacity. Associated Engineering provided engineering on the project. C.I.R. Mechanical handled both the general contracting and the mechanical contracting. Aerco Industries designed and installed the controls for the system.

In Richmond, as in many other cities Mueller has visited with his product, authorities quickly understood the potential wastewater heat recovery offers for energy savings and possible new revenue streams.

“We will be taking a better look at the system operationally in the next few months to see how it looks against estimates,” Higgs says.

Initial estimates are for the system to be able to annually displace over 900 gigajoules of natural gas. That is enough to heat 15 homes in British Columbia for one year. An expected reduction of 70 tons of GHG annually is also estimated.

Key components that made IWS’s technology attractive to the City of Richmond included contracted minimal yearly maintenance and a life cycle projected in excess of 25 years. It is expected that this system will pay for itself within six or seven years, a good return on investment time frame that could be shortened by anticipated increases to natural gas costs.

Mueller calls the Gateway project the “perfect storm” for his company’s product. Richmond’s wastewater system has 165 sewage pumping stations. Sewage and wastewater are pumped and re-pumped to drain to the wastewater plants.

“By tying in to the available resources of the sewage system, we can reduce the cost of installation by between 10 to 50 percent. And it increases efficiency in the winter and in the summer, because you have better COP in the winter and better air conditioning operation in the summer,” Mueller says.
“It is geothermal without the boreholes,” he says. It addresses the impediment of the cost of drilling or finding a driller. Mueller said he is just beginning to introduce his product into the geothermal market.

“We’ve evolved to this state now where we can,” he says. “We have gone from feasibility to real projects and full scale implementation,” Mueller said. IWS has accomplished an international presence in three years. “We just opened in the U.K. to serve the European market. We are opening in Australia this year, and in Mexico.” Mueller is working on a number of projects in the U.S. and overseas.

Allan Kidson of AERCO Industries provided and programmed the electronic direct digital controls for the Gateway’s wastewater heat recovery system.

“The SHARC is controlled by a DDC system that uses pressure, temperature and current sensor inputs to control the loop temperature by varying the flow through the heat exchanger that extracts heat from the wastewater,” Kidson says.

Data from the DDC system is sent continuously to both the theater system and back to IWS headquarters. At the theater a display seen by visitors shows a running total of Btus saved by the system.

“The DDC system also provides an interface to the theater’s existing building automation system. In addition, the controller monitors critical parameters such as fluid temperature, system pressures, tank levels and pump current draw. Alarms are activated if those parameters fall outside of preset limits,” Kidson explains.

Mueller is persuasive in presenting the benefits of the SHARC to municipal officials in Canada, the U.S., and overseas. He gets some ribbing just about everywhere he goes, but is good at turning it around. One of the first questions Mueller is asked is about problems with odor.

Mueller is persuasive in presenting the benefits of the SHARC to municipal officials in Canada, the U.S., and overseas. He gets some ribbing just about everywhere he goes, but is good at turning it around. One of the first questions Mueller is asked is about problems with odor.

(Above) Process water loop piping for the Sewage SHARC system is neatly installed in a mechanical area that is easily accessible. (Photo by Rob Kruyt)

(Opposite) The Sewage SHARC by International Wastewater Systems processes raw sewage in preparation for recovering its heat energy. (Photo by Rob Kruyt)
“Our system is completely hermetically sealed,” he said. “You can go into any of our installations and you couldn’t tell that there is a tie-in.” The SHARC system takes warm water out of the sewage system and either uses it for heating or cooling through the heat pumps.

Another view of the piping system for the process water loop for the SHARC system shows the flow to the heating water supply for Gateway’s system. (Photo by Rob Kruyt)

“The beauty of our system is that you get to use the same heat every day. You take the heat out of the sewage system and put it back in the heating and cooling system,” Mueller said. “And you get to use it again. So you just get to recycle the energy everyday.”

The SHARC system can take preheated water up to about 120 degrees F. A high temperature model can take the water up to about 170 degrees F, Mueller says.

“Borrowing the heat from the waste doesn’t impact anything down line,” Mueller says. He addresses concerns and issues readily, understanding that questions need addressed. “There is at least four degrees of separation between the sewer water and potable water,” he said.

The Gateway Theater project, commissioned in December 2013, was subsidized by the city, by a $80,000 federal grant and by IWS.

“It is a working example of the geothermal and heat pump application of the SHARC,” Mueller said. “We do mechanical tours all of the time.”

The Gateway Theater was a relatively small project for IWS and likely one of the smallest installations they will do. Even so, for Mueller, the project has been particularly rewarding.

“It gave me great pride because it is in the city where I live,” Mueller says. “It is nice to see the city where you live be that progressive.”

As a result of the theater project, Mueller says the IWS SHARC system is the system of choice for the city’s second district energy system currently in planning.

In 2012, Richmond completed the Alexandra District Energy Geothermal System capable of serving 400 homes and a daycare. The second district energy system will support residential development around the Richmond Olympic Oval, a facility built to accommodate the 2010 Olympic Winter Games.
Historic Pennsylvania Home Retrofitted with GSHP

By Paige Worley
A West Chester, Pennsylvania home built in 1922 has become the comfortable residence of a local physician after a geothermal retrofit made the imposing home comfortable for the family.
(Photo by Bill Sinton)
Changing a West Chester, Pennsylvania home, built in 1922, from an oil heating system to geothermal technology, transformed a large historic house into a comfortable home for the Neiblum family.

David and Susan Neiblum purchased the home because of its beauty and uniqueness. Wrapped in local fieldstone, lined with gargoyles, and filled with a central staircase and fireplaces imported from France, the house was a magnificent structure stuck in time.

“We didn’t want a cookie-cutter house, which was kind of what we had been living in,” Neiblum said. “We went back and forth and finally decided, let’s do it.”

But upon further review of the heating and cooling system, the homeowners were told it was missing a key element. The home had no ductwork.

The previous owners paid as much as $4,000 in the worst winter months to heat the 6,700-square-foot home with oil heat and radiators. It also had no air conditioning system.

After looking into installing an electric air conditioning system and ductwork, he found the cost was similar to what he would see with a ground-source heat pump installation, because of federal tax credits. The GSHP system would both heat and cool the large home.

(Below) Initial construction of the home was in phases and created surprises and obstacles in providing the needed ductwork for the new GSHP system. (Photo by Bill Sinton)

Gargoyles perch appropriately on the Neiblum’s historic home and create additional character the huge fieldstone residence commands. (Photo by Bill Sinton)
Drilling also presented challenges to overcome to provide the six boreholes for the geothermal system. Getting the unit across a driveway and then drilling without impacting future footings for the home’s photovoltaic array were only two of those challenges.

(Photo by Bill Sinton)
After closing on the house in August 2011, the Neiblums decided to take bids from engineering firms for GSHP technology, something David Neiblum had researched before.

“I have always liked geothermal, and have looked into it before for a house we were planning to build but never did,” Neiblum said. “Taking ductwork into the cost, it just made sense to do geothermal.”

The Neiblums received job proposals from three companies. Because the project was so involved, Neiblum took the time to get to know each company, he said. He chose to work with Bill Sinton and his team at Sinton Air Conditioning and Heating Inc., to do the ductwork as well as the GSHP design and installation.

“We just felt really comfortable with them,” he said. “We felt Sinton was going to look at it very carefully.”

Sinton Air Conditioning and Heating Inc., was the mechanical contractor and designed all of the ground heat exchange system as well as the systems. Drillers had to carefully move heavy equipment across an asphalt driveway to a 25-foot embankment behind the home to begin drilling. The vertical boreholes were drilled on top of the hill, underneath where a solar panel array would soon be located.
“So we had to plan all of the bores so that they were out of the way of the concrete pilings of the big photovoltaic cell mounts,” Sinton said.

Six vertical boreholes were drilled 380 feet deep. The vertical bores were 6 inches in diameter, and the pipes that lead to the basement were 3 inches in diameter. While B.L. Meyers drilled the boreholes, Sinton, an IGSHPA member, worked on the ductwork and insulation.

“The house had very little insulation in a lot of the perimeter walls, so we had to keep the ductwork inside the envelope of the house,” Sinton said. “We weren’t going to put ductwork in the outside walls or unconditioned spaces without being able to insulate it.”

The ductwork was brought down from the attic inside the perimeter walls on the third floor. Sinton then made the rooms 5 inches narrower than before through adding insulation and having a carpenter re-plaster the walls.

But the ductwork became more complicated after finishing the third floor. The house, standing three stories high in addition to a basement, was built in sections. Unlike houses built today, the walls did not overlap, which made ductwork trickier, he said.

“You had to walk up and down stairs to different levels to get from one wing to the other, there were many different levels throughout the house,” Sinton said. “It would have made the house extremely interesting to live in.”

On top of the design, the building materials were almost 100 years old. The ductwork design allowed for a separate thermostat for each floor. Whether it was old pipes in the wall or beams or joists that had to be headed...
off or squared, the problem had to be addressed.

“The amount of design in this project was extraordinary versus a conventional replacement or installation of the geothermal system,” Sinton said. “There wasn’t anything easy about the job.”

Two split systems and one package unit were placed in the attic and basement respectively, to manage five zones total. The systems use R410A refrigerant to heat and cool the home. The WaterFurnace systems totaled 15 tons.

The most unique thing about the project was the character of the house, not the design or ductwork, Sinton said. “It’s the only house I have ever worked at that the house had actual gargoyles in the corners of the house and they did not look out of place,” Sinton said. “I mean, this house deserved gargoyles.”

The GSHP construction took about three months, and the family was then able to move in and begin enjoying their new home. The system, installation and ductwork cost $121,222. Over the spring, summer and fall, the electric bill has been as low as $200. Sinton estimated a 60 percent savings from GSHP, versus oil. The Neiblums are pleased with their choice.

The home has since won an award from PennFuture, naming David Neiblum a Green Power Lifestyle Leader. The award recognizes his leadership in residential applications of renewable energy through his home installation of a geothermal heating and cooling system and solar panels.
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Cleaning up the Industry
IGSHPA’s Baltimore Conference Motivates Industry

By Paige Worley
Baltimore, Maryland, lit up for the IGSHPA Technical Conference and Expo October 15-16.

The event included IGSHPA training, speakers from the industry and exhibitors with their offerings and products geared toward the geothermal industry. The two-day event showcased 52 exhibitors and attracted more than 550 attendees.

The week kicked off with IGSHPA training classes for Accredited Installer, Accredited Driller, Certified GeoExchange Designer and Building Load Analysis. IGSHPA trainers from across the country trained 44 participants.

“We had a great turn out for the training,” IGSHPA Program Manager Roshan Revankar said. “I’m glad we could bring our training courses to that area of the country where a large population of our membership resides.”

This year’s venue had the conference and expo in two buildings connected by a skywalk. The Baltimore Convention Center hosted the Expo and the Baltimore Inner Harbor Hilton Hotel hosted the IGSHPA Conference. The exhibitor hall had a drilling rig in the middle, provided by Allied Well Drilling. WaterFurnace and ClimateMaster returned to exhibit this year along with other manufacturers, vendors and dealers, nearly filling the exhibit hall.

Conference and Membership Coordinator Shelly Fitzpatrick and Conference and Membership Assistant Gail Ezepek spent a year and a half planning the details of the conference with IGSHPAs Marketing Committee. They have received positive feedback, Fitzpatrick said.
“The sessions were well received and well attended,” Fitzpatrick said. “We honestly had one of the best opening sessions we have ever had.” Fitzpatrick thinks combining the opening session with breakfast, as IGSHPA has done previously, boosted the early morning attendance at the keynote session.

IGSHPA Director Bob Ingersoll opened the conference with a discussion on the future of the association. Bosch Thermotechnology of North America President Richard Soper gave the keynote speech, “The Time is NOW!” The speech highlighted the opportunities in the industry during a time when “reliability and sustainability are words that are used daily.”

A representative for Maryland Gov. Martin O’Malley came to the opening session to receive the IGSHPA Visionary Award for his role in ensuring GSHP was included in the state renewable energy portfolio standard.
“The IGSHPA staff, advisory council and committee members have worked hard to make this conference the best one yet,” Ingersoll said. “We had a variety of top-notch presenters and people in the field who work with ground-source heat pump equipment daily. It was a great success,” he said.

More than 65 presenters discussed topics including new innovations, manufacturer updates, commercial and institutional applications, and residential applications. This year’s conference also featured a popular utility section and special Department of Energy reports.

DOE presented final research findings on 36 GSHP projects funded by the American Recovery and Reinvestment Act (ARRA). Performance data researched for one year was recorded on all ARRA projects and made available at the sessions. Projects were diverse and ranged from government and university installations to experimental use of GSHP technology in agriculture. Presenters from DOE saw their sessions
well attended. At the end of the presentations, a panel discussion was held to answer questions on how the research would help move the GSHP industry forward.

IGSHPA partnered with GeoExchange’s John Kelly in an ARRA funded project involving the creation of national certification standards for all primary personnel involved in the installation of GSHP systems. Kelly reported on that research during the DOE sessions.

“We were just participants listening in, but this could have fairly huge implications for us,” Ingersoll said. “It takes someone like the DOE to move standardization of job descriptions through and to help deploy GSHP technology on a larger scale.”

Along with the DOE presentation, there were sessions for manufacturers,
drillers, installers and the return of a number of utility sessions.

IGSHPA has always worked closely with utility groups such as Western Farmers Electric Cooperative, a Touchstone® Energy Cooperative, and many others from the beginning of the organization. IGSHPA’s long-standing relationship with utilities has built a solid foundation that has potential to be even bigger, Ingersoll said.

“All utilities are facing the same issues, dealing with peak demand and deciding whether or not to build a new plant, as well as upcoming carbon credits legislation,” Ingersoll says.

Ingersoll said the utility sessions also had good turnouts. Mark Faulkenberry with WFEC and John Franceschina with Public Service Enterprise Group Long Island discussed how widespread adoption of GSHP technology could impact their industry. These sessions at the conference were received well and are a sign of a renewed and stronger relationship, he said.

“This is a change in IGSHPA,” Ingersoll said.

Marketing and Membership Committee Co-Chair Jack DiEmna has attended IGSHPA conferences for 25 years. “This year had a whole new feel for the attendees,” he said.

“The main focus of the conference was improving your business, meaning the members and attendees businesses,” he said. “Whether you are a manufacturer or an installer or a designer, there was something for everyone.”
Changes at the conference reflect IGSHPA’s values and future goals, DiEnna said. The sessions were designed for attendees to take away more information than they ever have before.

“If you missed the conference then you really missed something of value,” DiEnna said.

Next year’s conference will be held in Kansas City, Missouri, on Oct. 7-8, at the Crown Center Sheraton Hotel.

*(All IGSHPA Conference and class photos by Janet F. Reeder)*
Baltimore Classes

Baltimore CGD Plus Class participants included: Ben Bacon of Baltimore, MD; Skip Daugherty of Leesburg, VA; Mike O’Boyle of Gaithersburg, MD; Aaron Anderson of Omaha, NE; Cameron Hurst of Flanders, NJ; Christopher Butts of Loveland, CO; Russell Schmitt of Laconia, NH; Peter Governale of Mansfield Center, CT; and Jose Acuna from Sweden. Instructor was Ed Lohrenz.

Baltimore BLA Class participants included: Raymond Eric McPike of Huntsville, TX; Donald Colbert of Norwood, NY; Chris Blanchet of Baltimore, MD; Chris Montgomery of Baltimore, MD; David Spohn of Baltimore, MD; Jeremy Hartlaub of N. Myrtle Beach, SC; Richard Clemenzi of Asheville, NC; Tim Smigelski of Philadelphia, PA; Dwight Beaven of Bethlehem, PA; James Thorn Drunagel of Warrenton, VA; Malcolm Porter of Huntsville, AL; and Mohammed Ahamimi of Saudi Arabia. Instructor was Chris Balbach.
**Baltimore AI Class** participants included: Tyler Bates of Beech Creek, PA; Kerry Rowland of Tulsa, OK; Scott Ward of Norfolk, VA; Michael Cliggett of Reston, VA; Patrick Carroll from Canada; Clifton Edwards of Brooklyn, NY; Zachary Anders of Middletown, MD; Michel Mba of Takoma Park, MD; Brendan Silver of Frederick, MD; Brian Crampton of Frederick, MD; Jayme Ciaramitaro of Gloucester, MA; Brian Redmond of Beech Creek, PA; Lester Short of Newport, TN; and Ted Stump of Lenhartsville, PA. Trainers were: Garen Ewbank, Phil Rawlings, Peter Tavino, Terry Proffer, Brian Urlaub, Jim Cusack, Mike Hammond, Sean Hogan, Michael Golightly and Kevin Creek.

**Baltimore Drillers Class** participants included: Juan Ramon Quintana, Jr., of Huntsville, TX; Brendan Gardes of Atlanta, GA; Garrison Eaves of Frederick, MD; Glenn Eaves of Frederick, MD; Robert Mohler of Frederick, MD; Tom Nowak of Tulsa, OK; Stefan Wilkendorf from Chile; Jason Blatner of Depew, NY; Kristopher Fry of Depew, NY; Jesse Scott of Mornstown, OH; Charles Bo Dozier of Toano, VA; and Ben Dozier of Toano, VA. Instructors were Dominique Durbin, Garen Ewbank, Michael Golightly and Kevin Creek.
The revival of a fairly simple technology that has ever expanding potential to change the energy usage equation for the built world, pretty much came about in a happenstance way. Engineers have always built on the early work of other innovators, and in the case of geothermal heat pump technology, that practice is evident.

In the early 1970s, Dr. James Bose, an Oklahoma State University engineering professor, was called on to solve a swimming pool heater problem that led to searching through an old engineering text for

Cordell South located near the Boone Pickens Stadium on the OSU campus was the longtime location of the IGSHPA offices. (Photo by Janet F. Reeder)
answers. Bose, retired director of the International Ground Source Heat Pump Association, found a solution that he turned into a life long pursuit. So the story goes for the history of IGSHPA. That chance project started the development of an entire industry to advance and support using GSHP technology to move heat in and out of the ground to efficiently condition the built environment.

In 1987, Bose and a handful of early advocates formed IGSHPA with the mission of promoting the technology through training and communication.

“Promoting a certain technology is not something a university typically does,” Bose said in an early Geo Outlook interview. “We formed the association because this industry needed a peer-reviewed group of industry leaders to set the manufacturing and training standards.” He says that IGSHPA was founded on “a competitive cooperation idea, where like-minded individuals worked to establish a voice for their industry.”

The geothermal heat pump industry historically has had many champions and supporters, according to Bose. He says the first government support for what would become IGSHPA came from the Department of Energy (DOE) in 1974. It involved a research project at Oklahoma State University called Solar Assisted Ground Coupled Heat Pump Systems.

“That DOE research jump-started the GHP industry we know today,” Bose says.

When deregulation of electric utilities occurred late in 1978, with the Public Utility Regulatory Policies Act passed as part of the National Energy Act, utility support of training programs for geothermal declined.

“The responsibility for training was placed on industry heat pump manufacturers and the allied component manufacturers. Training programs started in many states,” Bose says. At the same time, the need for industry recognition of the technology, codes, standards and...
training resulted in the formation of an industry-elected advisory board to serve as the governing body of IGSHPA.

Bose remembers that the first installer’s course, “developed by a handful of forward thinking individuals,” trained three new installers in the initial class held in Stillwater, Oklahoma in 1984.

Early advocates and adopters of the technology included the federal government and the Federal Energy Management Program (FEMP). Military bases in the U.S. and worldwide benefited from the interest in GSHP and the proven energy savings of the technology. Tribal entities also quickly became adopters of GSHP technology and added to the growth of installations.

Bose, who also served as the longtime director of the Division of Engineering Technology at OSU, was principal investigator on many private and government contracts that included the Electric Power Research Institute (EPRI), the National Rural Electric Cooperative Association (NRECA), the American Society of Heating Refrigeration and Air-Condition Engineers (ASHRAE), the Department of Energy (DOE), the Oklahoma Department of Commerce (ODC) and others.

NRECA recognized the benefit the technology could have to their members, who lived in rural areas with plenty of space to install horizontal loop heat exchangers. The NRECA Research Fund and the Electric Power Research Institute played integral roles with the OSU Division of Engineering Technology to develop several early training texts. The first, published in 1988, was titled Closed-Loop/Ground-Source Heat Pump Systems: Installation Guide and the second, published in 1997 as an extension of the first guide was titled Geothermal Heat Pumps Introductory Guide.
Both publications have been used extensively in training in the industry.

Next to the formation of the association, Bose says two of the industry’s biggest milestones have been the implementation of technology to measure the thermal properties of the earth and the utilization of high-density polyethylene (HDPE) pipe. Thermal conductivity testing takes the guesswork out of calculating what is needed for the heat exchange part of a system. The advancement of the pipe significantly lengthens the life of ground loops.

A distinguished group of industry leaders has helped to shape and lead IGSHPA over the past 27 years. It is to their credit that the association has been a steady supporter of good practices, encouraged research to facilitate adoption of the technology and moved the industry forward through both good and bad economic times.

Schools have always been a leader in the market for many reasons, Bose says. Recent efforts to promote net-zero schools have been supported by forward thinking designers in the industry who are leading in the demonstration of how to merge other renewable technologies with geothermal.

“Solar and wind need ground source heat pumps more than GSHPs need solar and wind,” Bose said. “If we continue to make advances in high efficiency delivery methods such as radiant technology, then we take a giant leap toward a national energy-efficiency benchmark standard. Improvements in energy efficiency will be the challenge that faces our industry for the next 20 years.”
Since its inception in 1987 until November 1, 2013, IGSHPA was a program within the Mechanical Engineering Technology Department in the College of Engineering, Architecture and Technology at OSU under the direction of Dr. James Bose. In the fall of 2013, OSU hired Dean Ed Kirtley as the first Assistant Dean of Outreach and Extension for CEAT, Dr. Bose retired and IGSHPA moved from a grouping in MET to an Outreach and Extension unit. Bob Ingersoll was hired as the second director of IGSHPA in March 2014.

IGSHPA was housed on the OSU campus in the MET facilities until 2011 when it moved to its own building on Innovation Way in Stillwater, Oklahoma. When housed in the MET facilities, IGSHPA training did not have year-round instruction and laboratory support due to the facilities being dedicated to academic teaching for MET students. IGSHPA now has a state-of-the-art, year-round training facility and in-house lab for training held in Stillwater. Staff is more accessible to IGSHPA members when members are visiting Stillwater.

As a land grant university, OSU’s core mission includes teaching, research and outreach. As an outreach unit in CEAT, joining other programs such as Fire Service Training and Fire Protection Publications, IGSHPA encompasses the outreach piece of the land grant mission through its membership. As an outreach unit in CEAT, IGSHPA has broader access to college resources for research and business support. A CEAT outreach unit, working in conjunction with accredited engineering programs, can produce standards and training with greater authority.

“We are proud of the long organizational history we have had with IGSHPA,” said Dean Kirtley. “We are proud that the relationship continues and this year that relationship is stronger than ever. This is the members’ association: drillers, manufacturers, designers and a full myriad of professionals in the ground-source heat pump industry. OSU is the caretakers and stewards of your association. We work with you and we are here to serve you, the leaders and members of this association in a way that helps you reach success-research success, financial success-whatever that success may be that will help this industry continue to grow and thrive and we at OSU are proud of this relationship.”

The Michael S. Morgan Business Accelerator Building in Stillwater, Oklahoma, is the current location of IGSHPA offices. The facility includes classroom and lab accommodations.

After conversations among IGSHPA staff, CEAT leadership and IGSHPA members the past two years; staff and leadership knew it was a time to come together with the membership to talk about how to make IGSHPA a strong member association for the future of the geothermal industry.

“Dean Kirtley and others saw the need for IGSHPA to have a structure that would allow IGSHPA to be more responsive to the geothermal industry, its members, and other trade organizations and associations,” said John Turley, IGSHPA advisory council member, longtime geothermal supporter and IGSHPA member since 1994.

IGSHPA Advisory Council Members, committee chairs, staff and others in the industry met in Tulsa, Oklahoma, May 14-16 for an organizational design summit facilitated by Glenn Tecker of Tecker International. Attendees discussed the history of IGSHPA, the
geothermal market trends and conditions, and the direction IGSHPA needed to go to be the best association it can be for the membership. Key topics included core ideology of the mission and values, goals of the association moving forward, strategic objectives and strategies to reach the objectives.

Summit attendees worked in small groups to design infrastructure models for the membership, governance, program, workforce and finance. Each small group’s model was presented to the overall group and a consensus among the group was formed on how the infrastructure will be designed.

“In May, a group of leaders met to determine the future of IGSHPA,” Dean Kirtley said. “The core group met to help design and charter a new course for IGSHPA. This course will better serve this association than we have ever been able to do.”

The design team corresponded over phone and via email from June to October to design the new bylaws of IGSHPA. Bylaws were presented during the 2014 Technical Conference and Expo and approved unanimously by the advisory council.

IGSHPA will now have a board of directors, an advisory council and industry sectors for membership. The ten-member board of directors is responsible for strategic planning over the affairs and funds of the association, except that they may not modify any action taken by the members at an annual or special meeting.

The advisory council’s duties include making policy recommendations to the board regarding the industry after gathering information from industry sector meetings, members and staff.

By having a Board of Directors, an advisory council and sectors that meet regularly, members will have a say in the endeavors at IGSHPA. IGSHPA will emerge as a stronger, premier membership association for the geothermal industry.

“We have two goals at OSU to better serve IGSHPA,” Dean Kirtley said. “One is to improve communication within the industry, which we have been doing, and more importantly listening to the industry. Also, we want to enhance collaboration within the industry sectors and the other organizations that represent the ground-source heat pump industry. We have to reach out to those organizations, respect each
other’s piece of the industry and be a good partner to the industry. OSU is completely committed to IGSHPA and its success as an association and to the growth of the industry.”

IGSHPA will also expand its current committees to include an advocacy committee that will allow for closer work with other professional associations and utilities.

“Regional and state geothermal groups are being formed across the U.S. to promote the industry,” Turley said. “As the market share of our technology grows, a local source of information for customers, contractors, manufacturers, regulators and other players will be important. IGSHPA recognizes this and hopes to play a role in providing one of the forums for communication between the groups. A unified voice for the industry will help promote better understanding, practical regulations and best practices.”

IGSHPA and the geothermal industry have a lot of work to do to become a leader in the renewable energy sector.

“The geothermal heat pump industry has often been at a disadvantage to other renewable technologies, like wind and solar, because our industry is represented by a number of associations working autonomously,” Turley said. “At times this has resulted in conflicting agendas and a duplication of efforts. The IGSHPA 2014 Conference provided a chance for some of the important groups to air their differences and agree to a cooperative effort moving forward.

“A unified voice in Washington, and around the world, will require IGSHPA, GEO, NGWA, ASHRAE, AGWT and others to work together to push the technology forward. The first steps were taken in Baltimore at the 2014 annual conference.”

IGSHPA has seen a lot of growth and changes since 1987. The future is bright for our organization as we continue to work with other organizations for the betterment of the geothermal heat pump industry.

“The 2014 conference had the feel and the activity of autonomous agendas merging together for the good of the industry to move forward,” Ingersoll said.
IGSHPA's Mission
Included in the new bylaws is a new mission statement-IGSHPA is an association of companies, professionals and users dedicated to promoting the science, utility and use of geothermal (ground source) heating and cooling technology. IGSHPA accomplishes its mission by:

- Advocating for ground-source heat pump technology
- Distributing reliable insight and education
- Promoting basic and applied research
- Providing a clearinghouse for relevant information
- Serving as a forum for the development and dissemination of standards.

IGSHPA 2.0 Design Team - Created New Bylaws

- Trey Austin-Geo-Energy Services
- Randy Chambers-OG&E
- Jeromy Cotten-Tennessee Valley Authority
- Jack DiEnna-Geothermal National & International Initiative
- Garen Ewbank-Ewbank Geo Testing, LLC
- Dan Fisher-Oklahoma State University
- Abhishek Ghale-IGSHPA staff
- Dean Grunseth-Mammoth Inc.
- Jack Henrich-Bergerson-Caswell, Inc.
- Bob Ingersoll-IGSHPA staff
- Ed Kirtley-OSU
- Ed Lohrenz-GEOptimize, Inc.
- Kevin McCray-National Groundwater Association
- Lisa Meline-Meline Engineering Corp.
- Mark Metzner-CSA Group, Inc.
- Howard Newton-Mammoth, Inc.
- Erin Portman-IGSHPA staff
- Terry Proffer-Major Geothermal, Inc.
- Roshan Revankar-IGSHPA staff
- Phil Schoen-Geo-Enterprises, Inc.
- Allan Skouby-Geothermal Resource Technologies, Inc.
- Chris Smith-Bosch Thermotechnology
- Ted Striplin-McElroy Manufacturing, Inc.
- John Turley-Middleton Geothermal Services
- Brian Urlaub-Enertech Global, LLC

Members of the IGSHPA 2.0 Design Summit team met in Tulsa, Oklahoma, in the spring to reorganize the association to better relate to a growing industry.
This year we lost Carl Ledbetter, one of the pioneers of the GSHP industry. This summer, at Carl’s wake, I saw Jim Partin; another of the original GSHP developers and pioneers and the owner of the first system installed. Jim’s system had been installed as a research project in Jim and Annella’s new super-efficient home in early 1978, and as such was metered and documented throughout the GSHP system’s life. Jim told me that his GSHP (shown below), which Carl had installed, had finally been replaced earlier this year.

Besides the remarkable fact that the system had been in service since 1978, the system is the poster child for and verification of every performance and benefit claim we as an industry make about the systems today, including the use of a desuperheater.

The new replacement system is a split system with air handler and desuperheater, as shown below.

If you want to talk about reliability, efficiency, service life, etc., etc., - this system did it all!

**Reliability:** The system was in service from 1978 to 2014, and logged 52,693 operating hours.

**Reduced Maintenance:** In 36 years of service the system required 2 compressor contactors and one circulating pump be replaced and a hard start kit be installed.

**Ground Heat Exchanger Reliability:** After the original PVC loop was almost immediately replaced (the first ever lesson in why not to use PVC for ground heat exchangers), the original 1200’ polybutylene series flow horizontal ground heat exchanger lives on and now serves the new GSHP with NO maintenance.

**Efficiency:** Per Jim regarding its 36 years of service “the system paid for about half the cost of the original home.”
Finally, I want to thank Dr. Jim Partin and his wife Annella for the pictures and information that made this article possible, and include a personal thanks to Jim for hiring me in January of ’78, which led to my participation in what became the GSHP industry. Jim – Many thanks!!

Editors note: In the previous Earth Insight column, “Two for the Price of One”, it was incorrectly stated that “there is preventative maintenance or maintenance requirements on HDPE pipe”, and instead should have read “there is no preventative maintenance or maintenance requirements on HDPE pipe”. We apologize for the inconvenience.

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.

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**Early 2015 IGHSPA Training Schedule**

**January 21-23**

Accredited Drillers Workshop

**February 18-20**

Accredited Installer Workshop

**March 18-20**

CGD Plus Course

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* Products used in the application cited may vary from those shown.

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– Brock Vinton, Developer & Conald Frank, SMC Geothermal

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