

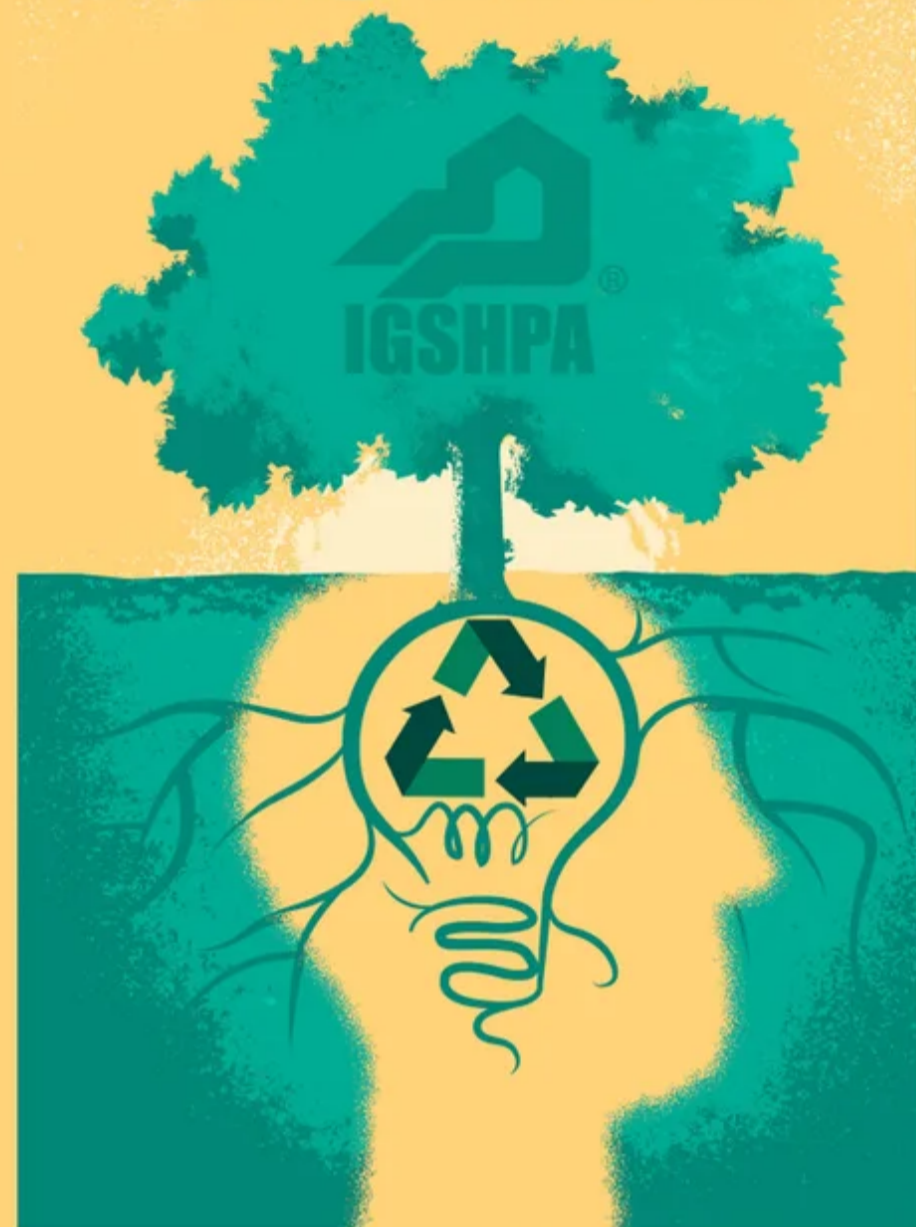


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ON THE COVER

Miami University is targeting the elimination of steam from the Oxford, Ohio, campus by 2026. Salas O'Brien's work with the University over the past decade has contributed to cutting campus-wide energy use by 39 percent and carbon emission by 45 percent – during a period in which campus square footage increased by 25 percent. As an outcome of Salas O'Brien's work, Miami's campus-wide EUI is 87.87 kBtu/GSF, representing a 48 percent decrease.



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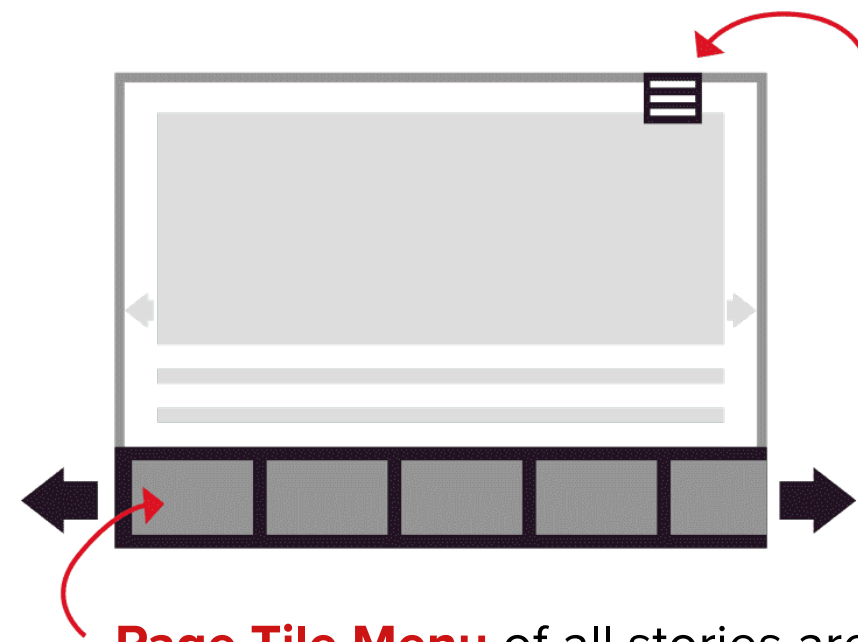


Hire Z!

By Brock Yordy

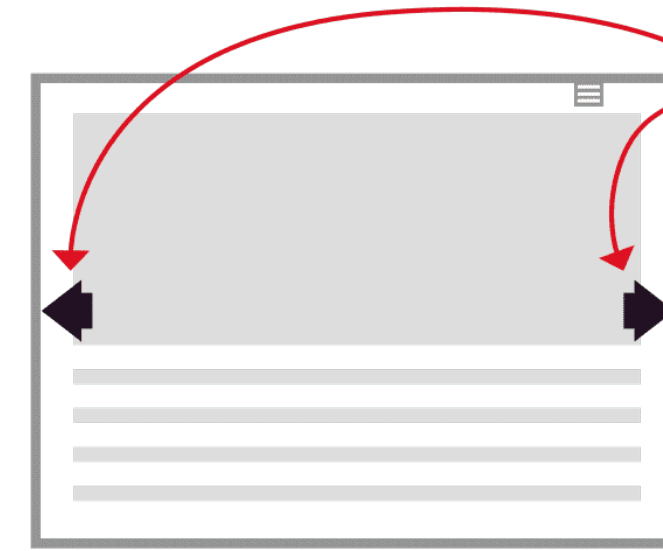


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Princeton, NJ



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LETTER FROM IGSHPA EXECUTIVE DIRECTOR

BY JEFF HAMMOND



International Ground Source Heat Pump Association

Dear IGSHPA Membership & GeoOutlook Readers:

After a hiatus of nearly four years, **GeoOutlook** is back! We still have an archive of magazines dating from the very first issue 20 years ago until the final issue produced by Oklahoma State University in 2019. As an independent non-profit since September 2020, IGSHPA is now in a position to restart this wonderful magazine that I always looked forward to reading every quarter. We are taking “baby steps” at first, starting out with two issues per year, building back up to a quarterly magazine, as we are able to collect interesting articles and enough ad revenue to pay for the costs associated with publishing a regular magazine.



JEFF HAMMOND

One of the most exciting announcements about **GeoOutlook** is our agreement with BNP Media, publisher of **ACHR News, Engineered Systems**, and more. Our agreement for an E-Magazine includes distribution to subscribers of the two magazines mentioned above, which provides a much wider audience to readers in the HVACR and Engineering fields. We expect a big “bang for the buck” for our advertisers and great exposure for authors of articles in GeoOutlook. Watch your Inbox for more details!

Part of the reason IGSHPA can restart **GeoOutlook** is because we have just recently added two new IGSHPA employees, bringing our staff to five employees. Lisa Lipe, the editor of **GeoOutlook**, started at the end of June. Lisa joined IGSHPA as an administrative assistant, and will be concentrating on magazine production, helping with member support, administrative work, and grant writing. Greg Kurtz, technical director, started in the middle of July. Greg brings with him 40 years of experience in the industry and a wealth of knowledge of the ground source heat pump industry. Greg will be concentrating on “ramping up” our efforts in new training modules by working closely with the IGSHPA training committee and subcommittees. He will also be supporting many of the technical projects that are planned.

This is a good time to be in the industry! On the cover, you will see a photo of one of the buildings on the Miami University campus in Oxford, Ohio. The application is bringing geothermal technology to a large-scale campus-wide district system, not only lowering operating costs for the organization, but creating long-term sustainability, and decarbonizing the landscape with grid-friendly electrification of heating and cooling systems.

You can learn more about projects like Miami University at the IGSHPA annual conference, December 5 to 7, 2023 at the Las Vegas Convention Center. We have 11 tracks for workshops, as well as joint sessions with NGWA (National Ground Water Association), the Annual General Meeting, the leadership address, and a very exciting keynote speaker, Alejandro Moreno, U.S. DOE Acting Assistant Secretary for Energy Efficiency and Renewable Energy (EERE). I hope you will join us for a great conference!

Best Regards,
Jeff Hammond



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LETTER FROM THE EDITOR

BY LISA M. LIPE

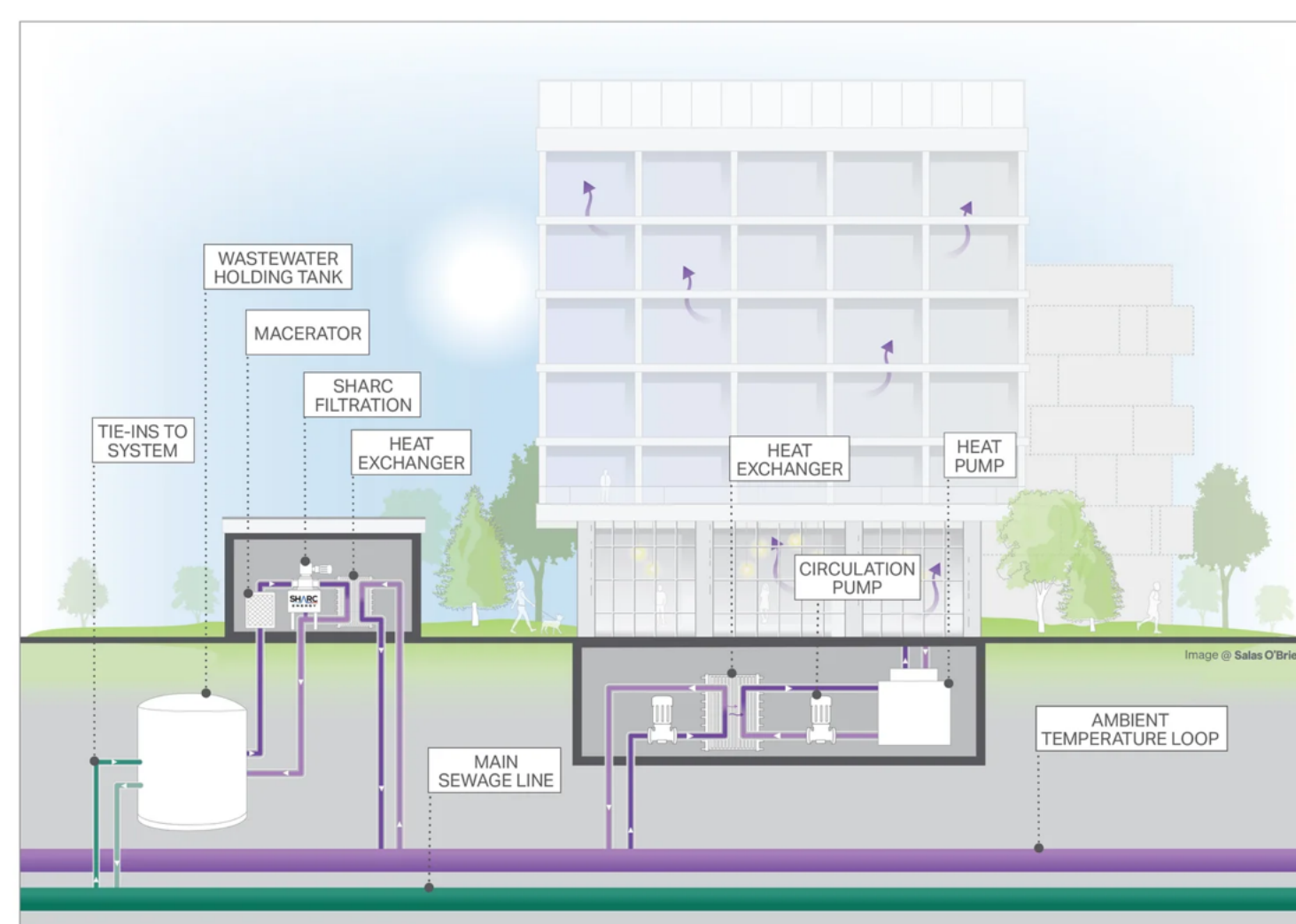


Dear Readers

What an incredible couple of months it has been for me since joining IGSHPA! My name is Lisa Lipe, and in June, I joined the IGSHPA team to bring back **GeoOutlook** E-Magazine, conduct grant research and writing, and assist with administrative duties. I am immensely grateful to Executive Director, Jeff Hammond and the entire IGSHPA team for granting me this opportunity to witness and learn from the unwavering dedication within this industry. I extend my heartfelt gratitude to all our esteemed readers and advertisers, whose support has been invaluable. Exciting times lie ahead as we announce some remarkable changes and opportunities at the International Ground Source Heat Pump Association. Our focus is on elevating our content and fostering greater engagement throughout the year. We are thrilled to share these advancements with you and can't wait to embark on this journey together. Thank you for being a part of our thriving industry!



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Our inaugural edition of **GeoOutlook** E-Magazine is now available! Sincere appreciation is extended to BNP Media and its personnel for their unyielding assistance in making this possible. The revival of **GeoOutlook** has us brimming with excitement! While this is our sole release for 2023, we have even more in store for 2024, with two publications slated for January and July. We currently intend to publish two magazines annually, with a near-term return to quarterly editions (three per year). Our publications thrive on these articles, as they bring forth the voices of those on the front lines, experts, and visionaries, creating a rich tapestry of insights and experiences. With a multitude of perspectives and firsthand expertise, our magazine stands as an invaluable resource for Geothermal Industry professionals. We wholeheartedly encourage each of you to think about and contribute an article to this growing industry by sharing your valuable expertise and knowledge in the field. In each magazine, we feature three articles, ranging from 1200 to 1600 words, providing ample space for in-depth exploration. To make the reading experience even more enriching, articles may incorporate captivating visuals such as pictures, illustrations, and graphics. If you are interested in submitting an article for our future **GeoOutlook** Publications, we would love to hear from you. Please send articles and inquiries to info@igshpa.org or reach out to me directly at llipe@igshpa.org.

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UPDATES FROM GEOEXCHANGE

BY RYAN DOUGHERTY, PRESIDENT GEOEXCHANGE



GEOEXCHANGE

Dear Geo Outlook Reader,

I'm honored to have the opportunity to write a few words for the reintroduction of Geo Outlook. This moment has been several years in the making ever since IGSHPA became an independent entity with a firm focus on the needs of industry professionals. In that time, IGSHPA has elevated its prominence and importance, serving not only industry insiders, but a wide range of external stakeholders.



RYAN DOUGHERTY

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We're approaching a rather auspicious anniversary, one year since the passage and enactment of the Inflation Reduction Act. From the moment Joe Biden became President, GeoExchange knew that there was an opportunity for a major climate and energy package. We worked closely with the relevant tax writing committees in Congress to ensure our inclusion and fair treatment in the proposal. The year and a half of negotiation was something of a rollercoaster, and when all seemed lost and reconciliation declared dead, the IRA materialized out of the blue and quickly passed along party lines.

The year since then has been a flurry of activity. We've submitted formal comments to the Treasury Department, met with climate leaders at the White House, and huddled with our partners at the U.S. Department of Energy, all to ensure that we're able to appropriately leverage the incentives that Congress saw fit to afford us. The devil is always in the details but we're working hard to make sure we get a fair shake in implementation of the IRA's numerous provisions.

I was recently on Capitol Hill meeting with members of Congress and providing updates from the industry. I told a recently elected Congresswoman that being in the geothermal/ground-source heat pump industry is so gratifying because we are supported and encouraged on both sides of the aisle. No matter your political stripe, there's plenty to love about geo. She agreed wholeheartedly and signed a letter of support for us. We will keep up our advocacy work on your behalf and don't hesitate to reach out with questions.

It has been a joy working with Jeff and the entire IGSHPA team and I'm sure they'd concur that the best is yet to come. As an industry, we have lots of work ahead of us, but we are committed to geothermal heating and cooling becoming the preferred technology for buildings. Onward and upward!!

Sincerely,

Ryan Dougherty
President
GeoExchange

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Spotlight on In Geothermal

IGSHPA is pleased to place a "Spotlight" on women in the geothermal industry, starting with the September 2023 issue of *GeoOutlook*. By recognizing and highlighting the accomplishments of women in this traditionally male dominated field, IGSHPA is actively promoting gender diversity and inclusivity. This initiative not only celebrates the achievements of women who have made meaningful contributions to the geothermal sector but also serves as an inspiration for aspiring female professionals. Through showcasing their expertise, leadership, and innovation, IGSHPA is breaking down barriers and fostering an environment where all voices can thrive, ultimately enriching the industry with fresh perspectives and driving it towards a more sustainable and equitable future. In this issue we place the spotlight on *Kortney Lull* of Midwest Geothermal (and IGSHPA Board Chair). We plan to continue spotlighting talented women in our industry over the next year. Who will be next?!?!

HOW LONG HAVE YOU WORKED IN THE GEO INDUSTRY?

15 years

HOW DID YOU GET INTO THE GEO INDUSTRY/WHY DID YOU CHOOSE TO WORK IN GEO?

The stars just aligned. I was young - 24, and I was laid off from my job. It just so happened that a friend of mine knew of a company starting up and they needed help. Oddly, or serendipitously, I had been to a presentation on geothermal and immediately thought how crazy it was that this technology wasn't everywhere! I was anxious to learn more. My friend connected me with the owners of the new entity, and after interviewing in a crazy snowstorm, found my home here in 2008. I've worked my way up through the company, wearing many different hats over the years, and have loved every minute. I couldn't be more passionate about the work and what I, we, do. I am in awe of where the industry, and our company, has come over 15 years and couldn't be prouder to be a part.

KORTNEY LULL



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TELL US WHAT YOU LOVE ABOUT YOUR JOB:

I am passionate about geothermal and what it can offer the world. From a single-family home to big campus solutions, and all those that fit in between, what geothermal can offer goes so far beyond payback - the benefits to this technology are unmatched in the industry. I love teaching people about those benefits, and then watching them realize not only the benefits that we discuss, but that it goes above and beyond their expectations. I love sharing my knowledge and passion with those new to the industry and getting them excited about using our technology.

I love working with industry leadership, brainstorming ways that we can take the geothermal industry to the next level. And, even after 15 years, I LOVE seeing the systems installed. Getting into the field - from seeing a drill rig go down hundreds of feet, seeing how the grout sets up around the pipe, to seeing rows of lateral pipe, running together back to serve the building... seeing that in action never gets old. Those in the field working, the pipelayers, the drillers, the excavation crews - I love being able to support them and being cheerleader for them. I realize that could be a shorter answer to just summarize - I love it all.

WHAT DO YOU WANT TO SEE FOR THE FUTURE OF THE GEOTHERMAL INDUSTRY?

This is a tough one to define - but to pinpoint one path for the future, I want to see geothermal always be the first-choice source for HVAC systems. We are the solution to so many problems - we are renewable and sustainable, a big leap towards electrification. Look no further than geothermal.

I dream of a day where not only is that statement true, but that organizations like IGSHPA and GeoExchange are THE resources to help geothermal customers find all the resources they need, with even more support from a network of state organizations. I dream of a day where I don't hear "it was so hard to find..." but rather hear "I was able to find some great resources!". I dream of a day where you can talk to someone about geothermal, they know what it is, and think it's odd if you DON'T have it in your home or business.

I have big dreams, but if any industry could do it, could be THE answer in our push towards electrification - this industry is it. We have such incredible resources and talent in our industry - we really can change the world.

TWO INTERESTING FACTS ABOUT YOURSELF:

I have recently opened a retail store, The Hive Mercantile, in my hometown. It's a store to celebrate confidence and teaching people to be confident. I am thrilled to give back to my community, and as an avid crafter, I couldn't be more excited to get started.

I am nuts for anything tennis related. I picked the sport back up as an adult and would play all the time if I could. I had picked it back up as a way to exercise that didn't feel like exercise but realize now it means so much more than that. There's something about playing tennis, being set up for an amazing shot, only to have it go right into the net. It's probably one of the most humbling sports I've played, for that very reason. That and the sound a tennis ball makes in the middle of the racket after a great shot is awesome.

Selecting Piping Materials for Ground Heat Exchangers

BY LANCE MACNEVIN, DIRECTOR OF ENGINEERING FOR THE BUILDING & CONSTRUCTION DIVISION AT THE PLASTICS PIPE INSTITUTE (PPI)



The implementation of ground source heat pump systems is growing rapidly as homeowners, governments, businesses, universities, and others are turning to geothermal technology to save energy, address climate change, and construct efficient heating and cooling systems with long-term reliability. The Plastics Pipe Institute, the Texas-based non-profit trade association, estimates growth in demand for GSHP systems of at least twenty-five percent per year over the next several years.

A critical aspect of GSHP systems is the piping that is buried in the ground or submerged in water. The network of pipe and fittings, sometimes referred to as the ground heat exchanger or simply the ground loop, is the link to the earth's thermal energy.

Ground heat exchanger piping materials must provide corrosion resistance, chemical resistance, temperature resistance, flexibility, impact resistance, resistance to slow crack growth, and long-term hydrostatic strength (pressure capability). In addition, ground loop heat exchanger materials must provide suitable heat transfer capabilities, since conducting heat with the earth is the primary function of the ground loop.

Fortunately, several types of plastic piping materials are proven to meet these challenges. Each of these piping materials delivers long-term reliability proven over decades of use around the world.

Because it is important for specifiers, purchasers, and installers to understand the characteristics of each of these materials, as well as the relevant standards, this article will explain four types of plastic piping materials (HDPE, PEX, PE-RT, PP) which are approved in US model mechanical codes for ground loop piping. Three of these materials are in the 2016 edition of ANSI/CSA/IGSHPA C448, while the fourth is planned for inclusion in the next edition.

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HIGH-DENSITY POLYETHYLENE

High-density polyethylene (HDPE) is the predominant piping material used for ground heat exchangers. These pipes and fittings are joined primarily by heat fusion methods to provide leak-free connections.

HDPE pipes have improved significantly over the past twenty years thanks to new bimodal resins that deliver higher strength with greater toughness and resistance to slow crack growth. The highest performing grade is known as PE4710 which has higher density, much better resistance to slow crack growth caused by abrasion, and higher strength than the previous generation PE3408 pipes. The TC value of PE3408 is 3.0 BTU · in/hr · ft² · °F, while the TC value of PE4710 is 3.1.

For vertical boreholes, pipes should be provided with a 180-degree U-bend fused to two parallel pipes in the factory. For example, for a 400-foot-deep borehole, the piping manufacturer will provide two 400-foot pipes which are fused in the factory to a molded U-bend fitting. This allows the drilling contractor to drop the U-bend assembly down the borehole without having to first fuse pipes to the U-bend fitting in the field, saving time and adding reliability.

Since ground loops are a demanding application for pipes, it is recommended for piping components to be third-party certified to industry standards. For HDPE, the first of these is NSF/ANSI 358-1 "Polyethylene Pipe and Fittings for Water-based Ground Source Geothermal Heat Pump Systems".

HDPE pipe should also be certified to a national pipe standard such as ASTM D3035 or CSA B137.1 which defines everything from dimensions to material properties to long-term strength. Finally, it is recommended for ground loop pipes to be certified to NSF/ANSI/CAN 61 "Drinking Water Systems Components - Health Effects" to ensure that any aquifer or water reservoir into which the piping system is installed is not contaminated by the piping itself.



Figure 1: Coil of HDPE piping with molded U-bend already fused to pipe ends. [Courtesy Venia profiles]



Figure 2: HDPE loop in slinky configuration being dropped into a trench. [Courtesy Centennial Plastics]

HDPE pipes and fittings are typically joined using butt fusion, socket fusion, or electrofusion methods. One bad joint could create a leak that is very expensive and difficult to find, access, and repair, so fusion contractors should seek hands-on training from the supplier of the fusion requirement to gain the skills needed for proper fused joints. McElroy University is a popular source of fusion training and provides events across North America.

Once trained, installers should strictly follow the guidance provided in ASTM F2620 "Standard Practice for Heat Fusion Joining of Polyethylene Pipe and Fittings" which describes proper fusion procedures for butt and socket fusion. Electrofusion fittings should be installed in accordance with ASTM F1290.

Once installed, ground loop piping systems should be tested according to ASTM F2164 "Standard Practice for Field Leak Testing of PE and PEX Pressure Piping Systems Using Hydrostatic Pressure". This practice provides the details of safely pressurizing and testing buried pipe systems.

CROSSLINKED POLYETHYLENE

Crosslinked polyethylene (PEX) is HDPE that is modified during manufacturing to crosslink the majority of the polyethylene molecular chains. The result is a flexible pressure pipe material with high temperature capabilities. PEX was first produced in the early 1970s and is now used for many applications. It is more expensive to produce than HDPE.

The primary benefit of crosslinking HDPE into PEX is capability of continuous operation at temperatures of 180°F (82°C) or above. This higher temperature capability may be necessary in borehole thermal energy storage (BTES) systems where thermal solar energy is pumped into the earth to raise the ground temperature during summer, for example. An example of this is Drake Landing Solar Community in Alberta (www.dlsc.ca). PEX tubing also has excellent chemical resistance and it is slightly more flexible than HDPE. The TC value of PEX is 2.9 BTU · in/hr · ft² · °F.



Figure 3: PEX tubing used as horizontal ground loops

"PEX TUBING IS NOT APPROVED FOR JOINING WITH BUTT FUSION OR SOCKET FUSION METHODS BECAUSE MOST OF THE MOLECULES ARE ALREADY LOCKED IN PLACE AND ARE NOT FREE TO FLOW INTO THE ADJOINING COMPONENTS."

PEX tubing is not approved for joining with butt fusion or socket fusion methods because most of the molecules are already locked in place and are not free to flow into the adjoining components. Instead, several types of mechanical compression fittings are approved for underground use with PEX tubing, as are electrofusion fittings. For a new installer of geothermal piping, installing PEX fittings with manual hand tools avoids the cost and complexity of becoming proficient with heat fusion.

In North America, PEX is available up to nominal tubing size 3 and can be supplied as coils, straight lengths, or as prefabricated U-bends for boreholes. PEX ground loop piping should have a minimum material designation code of PEX 1206 and be certified to ASTM F876 or CSA B137.5 as well as NSF/ANSI Standard 358-3 and NSF/ANSI/CAN 61.

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Figure 4: PEX tubing with factory-formed double U-bend. [Courtesy REHAU]

POLYETHYLENE OF RAISED TEMPERATURE

Polyethylene of raised temperature (PE-RT) is high-density polyethylene piping material with enhanced capabilities to withstand temperatures up to 180°F. PE-RT may be joined using heat fusion processes, just like HDPE, or using mechanical compression fittings, just like PEX. PE-RT tubing may be produced using PE3608 or PE4710 materials. The TC value is 3.0 BTU · in/hr · ft² · °F or 3.1, depending on the base resin that is used for its production.

PE-RT tubing is typically more expensive than HDPE but less expensive than PEX and can be a great choice when higher temperature resistance than what HDPE can provide is required.

Like PEX tubing, PE-RT is typically produced in copper tube size dimensions, but larger diameter PE-RT pipes are also available. PE-RT ground loop tubing should be certified to ASTM F2769 or CSA B137.18 as well as NSF/ANSI Standard 358-4 and NSF/ANSI/CAN 61.

POLYPROPYLENE

Polypropylene (PP) is a rigid piping material that is used in a wide range of plumbing and mechanical applications. Two types of PP are used for pressure piping systems: PP-R (polypropylene random copolymer) and PP-RCT (polypropylene random copolymer with modified crystallinity and temperature resistance). PP-RCT material has approximately 25% higher pressure rating than PP-R pipes for the same wall thickness at a given operating temperature.

Polypropylene pipes may include layers of chopped glass fibers for reduced longitudinal thermal expansion/contraction. PP-R and PP-RCT pipes and fittings are completely compatible with each other.

PP-R and PP-RCT piping can be used for geothermal headers and manifolds in vaults or mechanical rooms, as well as indoor piping. Joints are typically heat fused following standard industry practices, but flanged and grooved fittings are also available.

PP piping should be certified to ASTM F2389 or CSA B137.11 as well as NSF/ANSI Standard 358-2.

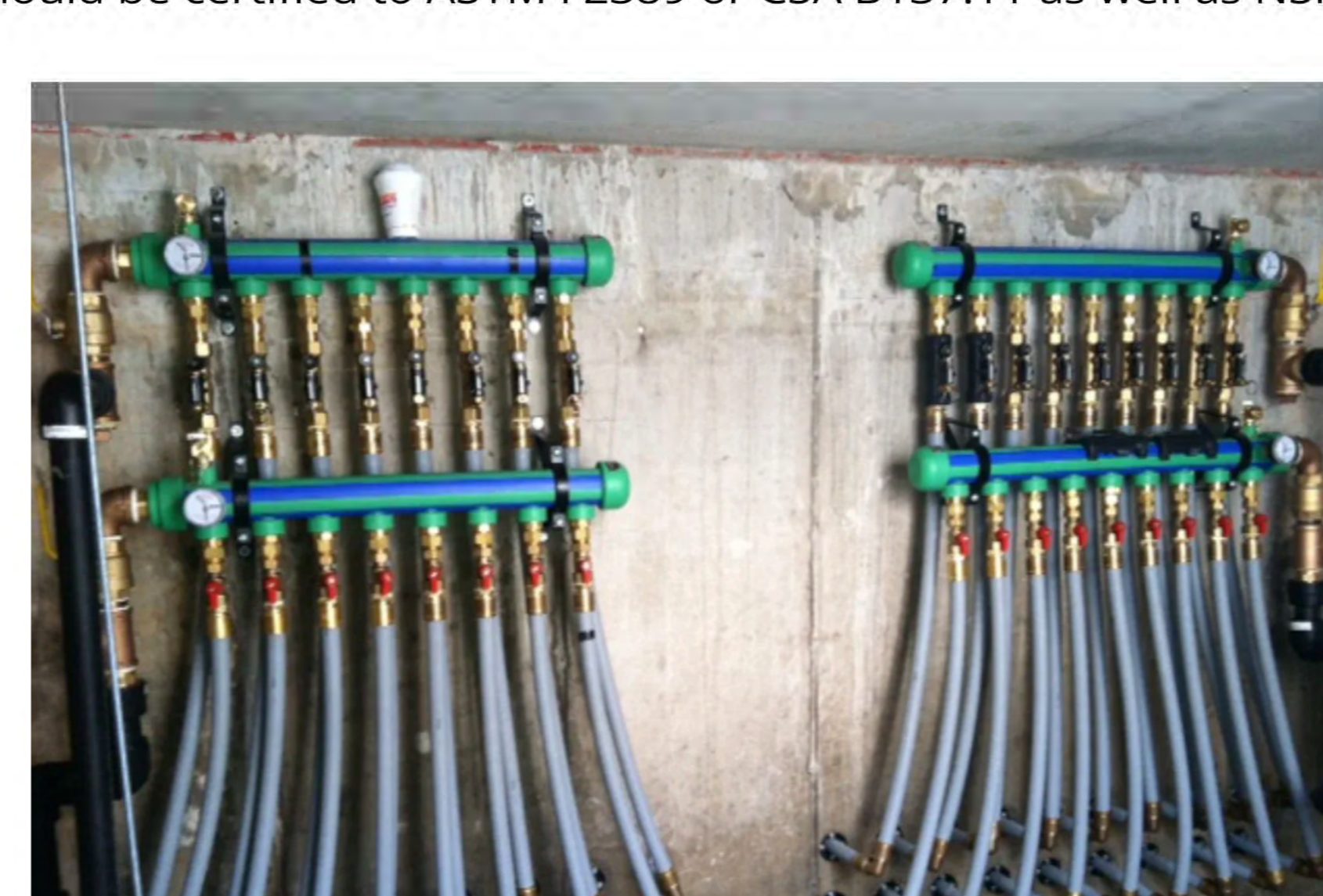


Figure 5: PP-R manifolds in an outdoor vault

SUMMARY

HDPE, PEX, and PE-RT are all recommended for ground loop piping, and each has its own benefits. Additionally, PP is a suitable material for headers and indoor piping. These piping materials provide high performance and reliability over decades of service.

When selecting each of these materials, it's important to specify the correct standards and certification requirements, and to be sure to seek out proper training for the joining system/s being utilized.

PPI recently published the new Model Specification MS-7 "Plastic Piping Materials for Ground Source Heat Pump Applications" that covers each of these materials in detail. MS-7 also provides installation advice for piping systems. Lance can also use the free online Plastic Pipe Design Calculator at www.plasticpipecalculator.com to assist with calculations such as pressure loss and static water column pressure.



LANCE MACNEVIN, P.ENG., is the Director of Engineering for the Building & Construction Division at the Plastics Pipe Institute (PPI). He has been in the plastic pipe industry since 1993 involved with applications such as hydronic heating and cooling, geothermal, plumbing, and fire protection systems. Lance earned his IGSHPA installer accreditation in 2008 and has been closely involved with the geothermal industry ever since. He serves on technical committees within ASHRAE, ASPE, ASTM, AWWA, CSA, JAPMO, ICC, and IGSHPA.

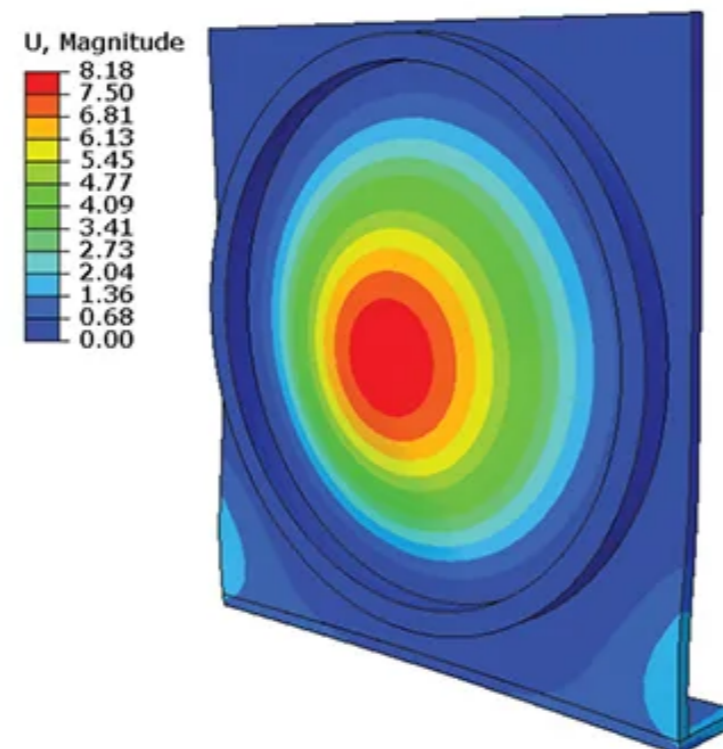
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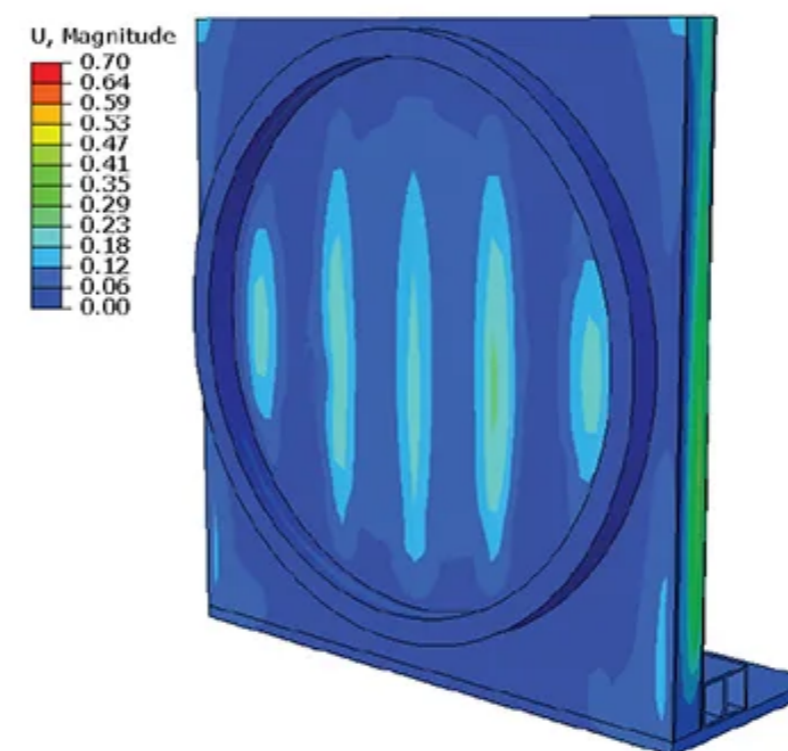


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Typical Vault with PE Plate End



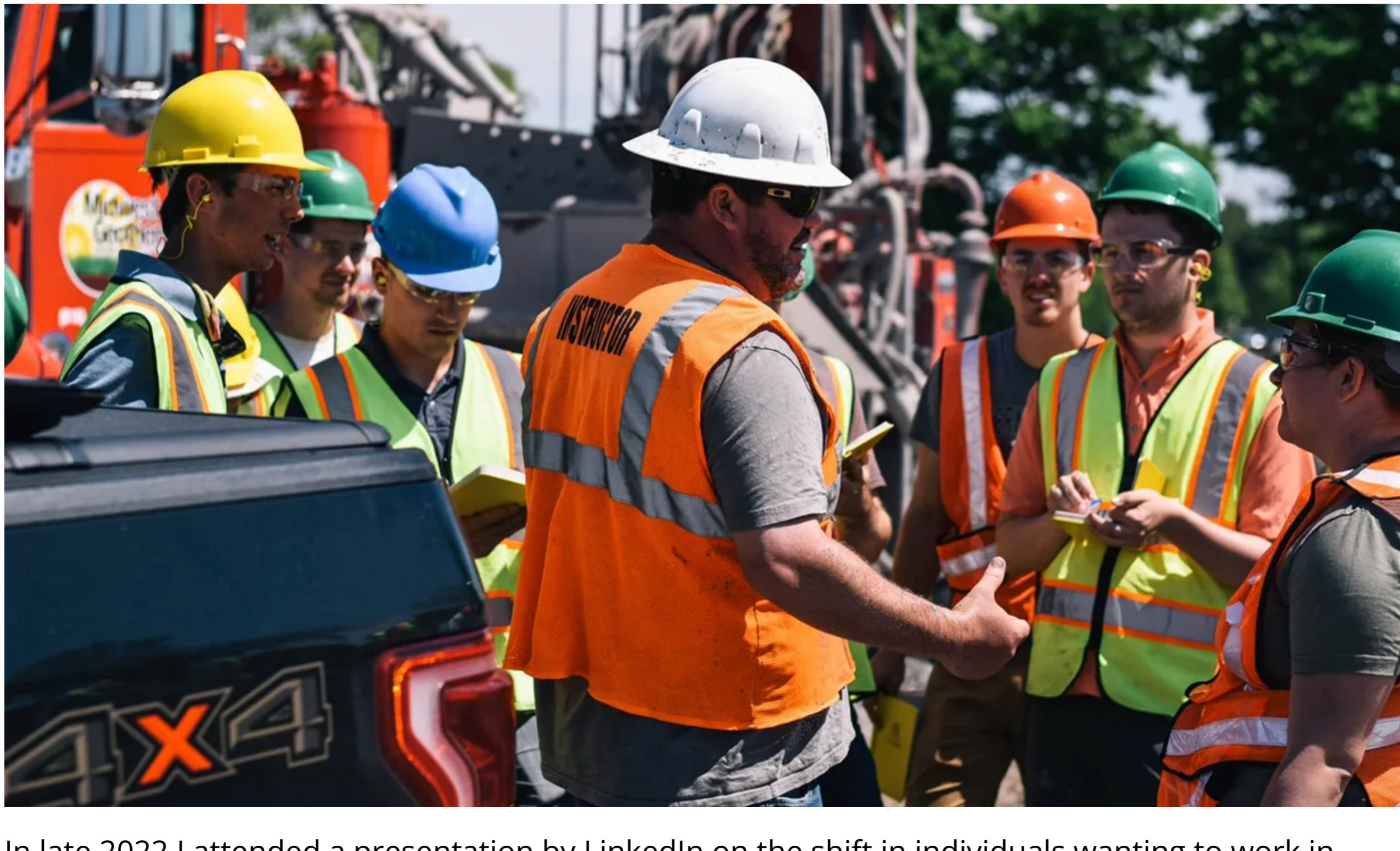
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Hire Z!

BY **BRock YORDY**, GLOBAL WATER AND DRILLING SME



In late 2022 I attended a presentation by LinkedIn on the shift in individuals wanting to work in green jobs. LinkedIn stated that profiles focusing on sustainability and green jobs would surpass oil and gas job profiles by the end of 2023. I believe they are right. The next time you scroll on LinkedIn and see a post advocating for NetZero, click on it and look at when they graduated high school or college. The majority are the youngest of Millennials and Generation Z. The current top green jobs that people under 30 study, prepare for, and desire to be part of are Sustainability Manager, Wind, Solar, Ecologist, and Environmental Safety. But those are different from the jobs we in the ground source geothermal industry must fill. We want Geothermal Driller, Loop Installers, Heavy Equipment Operators, and Green Job Laborers. The top green jobs have college-focused programs with onboarding, blended training, and detailed career paths. Generation Z is witnessing the impacts of carbon emissions on our planet through fires, extreme weather, and droughts. They cannot see that 45% of the construction industry's workforce is over 55 and will be retired by 2030. We as an industry must drill deeper into the construction workforce dynamics and Generations Z expectations to develop the next generation of geothermal professionals.

THE CONSTRUCTION WORKFORCE PLAYING FIELD

The United States has 166 million individuals working every day. There are 7.9 million employed in the construction industry generating over 1.4 trillion dollars in revenue. The construction workforce is less than 5% of the entire US workforce. As we drill deeper into the 7.9 million individuals working in construction, the majority of the workforce is Laborers, Carpenters, Electricians, and Plumbers. Sadly, Laborer is the lowest-paid role on site, whereas the other three are the highest. Yes, organized labor programs establish higher wages, and several progressive states have enacted the "Jobs Acts." Yet the average pay for most laborers is \$21.00 an hour. Alternatively, the average hourly wage in America is \$27.00 an hour, which is almost adequate for a living wage for one. Still, it is not a capable wage for sustaining a family. Beyond the wage disparagement, construction operators make up 1.2 million of the 7.9 million active construction workers, with the majority working in mining, followed by heavy equipment and oil/gas. All three have established training programs to develop new hires. This leaves about 1% of the US workforce to work in geothermal drilling and fieldwork.



WHERE DID ALL THE WORKERS GO?

The reality is that the entire construction industry needs help recruiting, hiring, and retaining. The rough and tough culture has blamed the last two generations' work ethic. Sadly, that is not the case. Three significant influences have created a labor shortage in the past two decades. First, many great individuals who would have been perfect for the construction and geothermal industry volunteered to counteract Global Terrorism. For twenty years, many great candidates continued to do their part with the military worldwide. The War on Terror also created the largest generation of service-connected disabilities in history, resulting in a shortage of veteran new hires in construction. The subsequent significant influence was the late 2000s housing crisis slowing down new home builds and reducing many companies' capabilities to hire and develop a new generation of workers. The first two influences took much work to foresee or identify. However, the third was a trend we could have all seen coming. Twenty-five years ago, the US had an average high school dropout rate of 12%, with many of those people entering the construction trades. However, by 2012 the average was just above 6% and has continued to trend downward for the past ten years.

THE NEXT GENERATION: MOTIVATED BY THEIR FIRST 20 YEARS

This spring, 3.3 million Generation Z high schoolers graduated and entered the workforce. As they enter the adult world, 86% of Generation Z feel pushed to attend college by their family today, and 50% believe that is no longer the required path to success. Did your company hire any of them? Stop! If you were about to say this generation is too soft or doesn't want to work, you need to reflect on where they came from. Generation Z is primed to go out and get muddy in the field while loving every minute. The same significant influences that impacted our ability to hire young people also helped develop Gen Z. They learned stories and heartbreak from their families who sacrificed so much to make a difference around the world, deterring evil. Generation Z desires that same purpose but wants to make a difference locally that impacts globally. They witnessed the financial hardship of the housing crisis, with many families losing their homes. That experience has driven them to find jobs that provide a career path with family-sustaining benefits and wages. They want to develop skills that create worth and purpose within them. Compounding that purpose with the impact of extreme weather and climate change, working green jobs is the only way to a sustainable future.



"TWELVE YEARS AGO, INSTEAD OF SAYING, "THESE DAMN KIDS ARE ALWAYS PLAYING MINECRAFT," WE SHOULD HAVE LOBBIED MINECRAFT TO CREATE A CITY PLANNING AND GEOTHERMAL LOOP FIELD MAP!"

GENERATION Z WANTS TO BE MUDDY; THEY JUST CAN'T GET THEIR PHONES WET

I believe the greatest misinterpretation about Generation Z is that they don't want to get muddy. They do; it is just that they have been told not to get their technology wet for their entire life. The difference between Generation Z and X is that our learning paths have been reversed. Like the previous generations, Gen X had to experience the world by going out and doing. We got muddy because it is how we learned. Generation Z experienced the world through a touch screen with the ability to instantly ask questions to learn anything desired. Twelve years ago, instead of saying, "These damn kids are always playing Minecraft," we should have lobbied Minecraft to create a city planning and geothermal loop field map.

The reason why 50% of Generation Z believes they can go out and learn a trade versus attending college is that they have always had the resource technology-driven knowledge available. As a Gen X'er, I left my father's drill company to attend college because I could get muddy anytime, but I didn't have access to knowledge through technology. This generation and the next operate where soft and hard skills have been blended because technology and knowledge have blended.

WORK FORCE DEVELOPMENT

Work Force Development programs and funding initiatives developing today are perfect for Generation Z and all who want to participate in the NetZero revolution. These programs can utilize multiple learning platforms encompassing online webinars, classroom theory, and field learning applications. The major overhaul in onboarding, training, and retaining will be blending a new workforce with the veterans in the field—the new workforce with academic task learning and working alongside experienced personnel who learned by doing. Work Force Development will require leadership development programs. Beyond blending multiple generations of experience, the field will need to update field methods. Beyond blending multiple generations of experience, the improvements require the latest risk assessment, safety analysis, documenting best operating procedures, and understanding of process management. The next generation of the workforce will look different, think differently, and complete tasks differently, but they will help us succeed in meeting our NetZero goals. In the next issue of GEO Outlook, I will continue this conversation on specific building blocks to develop Generation Z into drillers.



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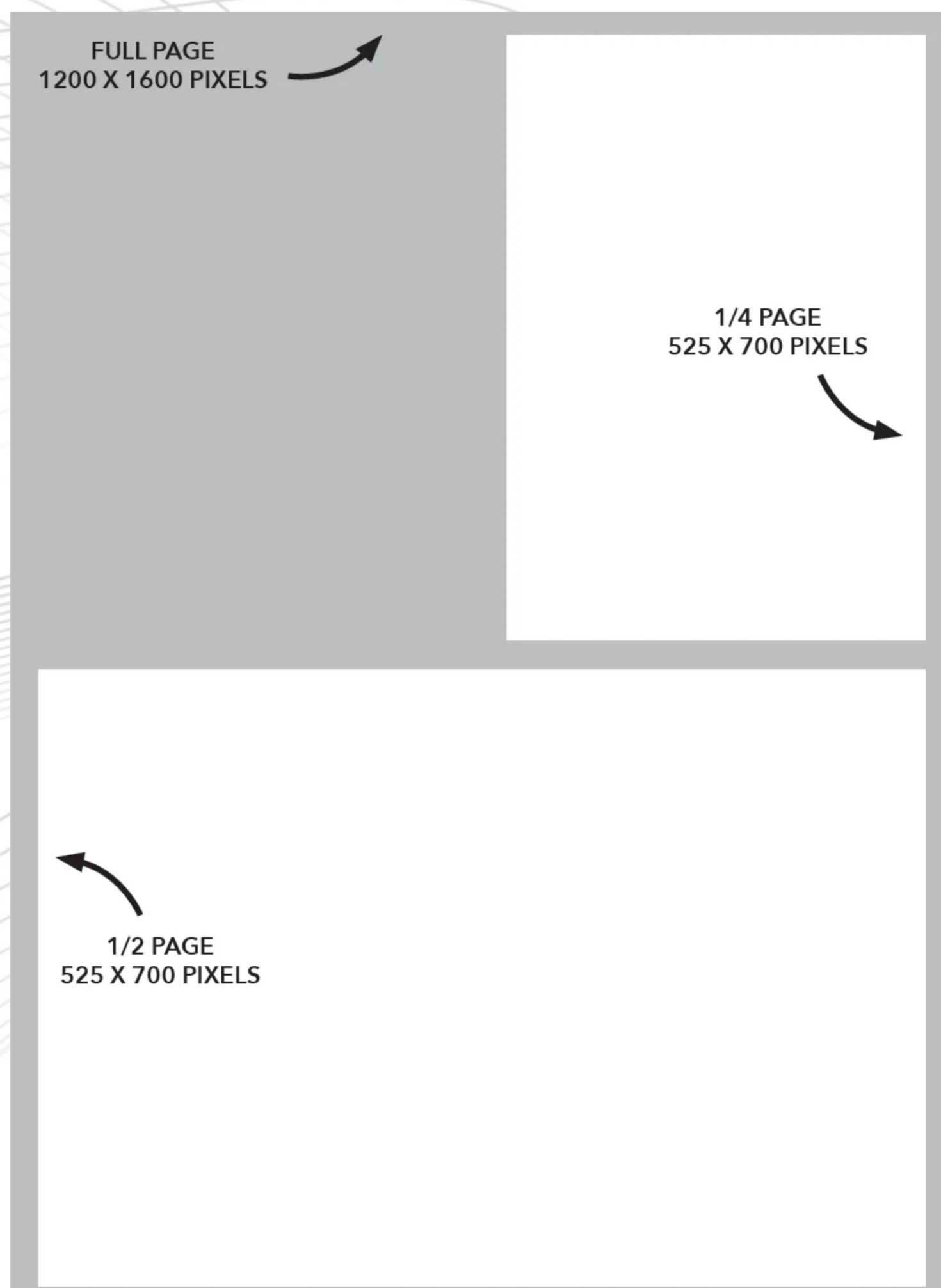
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