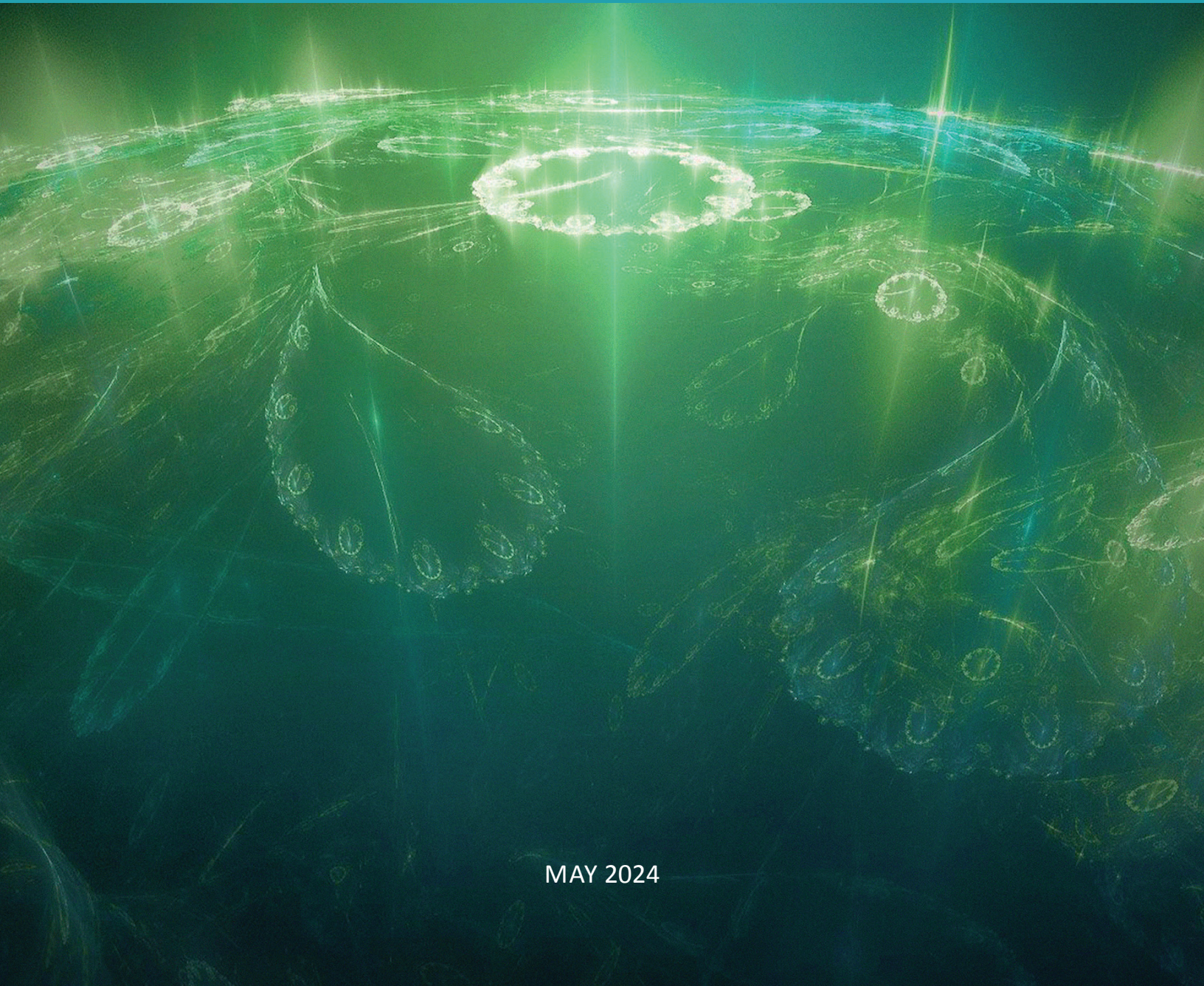




Connecticut Geothermal Industry Workforce Needs Assessment



MAY 2024



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We also acknowledge the members of the [Project Advisory Committee](#) for their feedback and guidance.

About NEEP

NEEP was founded in 1996 as a non-profit whose mission is to serve the Northeast and Mid-Atlantic to accelerate regional collaboration to promote advanced energy efficiency and related solutions in homes, buildings, industry, and communities. Our vision is that the region’s homes, buildings, and communities are transformed into efficient, affordable, low-carbon resilient places to live, work, and play.

Disclaimer: NEEP verified the data used for this white paper to the best of our ability. This paper reflects the opinion and judgments of the NEEP staff and does not necessarily reflect those of NEEP Board members, NEEP Sponsors, or project participants and funders.

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Executive Summary

During research on the state of the geothermal workforce in Connecticut, NEEP explored barriers to geothermal growth, specifically focusing on workforce needs, challenges, and opportunities. Three major barriers to the growth of geothermal technology were identified through this research: inadequate awareness of and/or interest in geothermal careers, tension between an uneven supply of workers and an increasing demand for projects, and the remaining high upfront costs that further constrains geothermal uptake. This report discusses barriers to the growth of the workforce required to meet the anticipated rising demand.

The project team surveyed and interviewed a wide range of experts and professionals in the geothermal industry. Survey respondents included geothermal system installers, drillers, manufacturers, the relevant facilities managers, and heating, ventilation, and air conditioning (HVAC) training center staff. Interviewees represented various industry stakeholders including unions, consultants, and well drillers. These interviews surfaced three main topics: licensing requirements, drilling as a bottleneck, and recruiting and training new entrants to the industry.

This needs assessment outlines:

- Disparities in opinions in the industry about state HVAC licensing requirements.
- Difficulties in getting both new workers and equipment for geothermal drilling.
- Current opportunities and barriers for new entrants interested in geothermal careers.

Through surveys and 19 interviews, the team found that overall geothermal growth in Connecticut is limited by high upfront costs, mostly due to drilling. Drilling costs can constitute over 50 percent of total project costs. Growth of the geothermal workforce was found to be limited by the following factors:

- Prospective entrants to the industry lacking adequate awareness of and interest in pursuing careers in the geothermal industry.
- Inadequate availability of drillers and drilling equipment is one of the major bottlenecks faced by geothermal projects.
- The growth of heat pump-focused companies, or the entrance of heat pump installers from other states, is constrained by certain licensing requirements. The industry may also benefit from improved clarity from the Department of Consumer Protection about certain licensing pathways or rules. Further avenues for research include the demographics and diversity of training centers' students and recipients of geothermal certifications, the preparedness of facilities managers to maintain geothermal systems, and the options available to increase the number of trainers and educators.

Through the survey and interviews, the team gathered recommendations and suggestions to improve the geothermal industry. These included early outreach and targeted marketing of trade career opportunities, coordinated drill rig manufacturing and driller training, more equipment for technical high school HVAC programs to teach with, adjustments to licensing requirements to facilitate growth for heat pump focused companies, and expanded access to classroom trainings that satisfy licensing requirements. Other suggestions included standardizing bore field specifications, offering incentives to contractors to pursue geothermal, connecting



homeowners to geothermal contractors and drillers, creating a list of contact information for geothermal well drillers to connect with contractors, and making residents and businesses more aware of the geothermal incentives. This Needs Assessment and further outreach with industry stakeholders will inform a full Geothermal Workforce Development Plan for Connecticut.

Introduction

In 2008, [Connecticut set statewide goals](#) to reduce statewide GHG emissions: 10 percent below 1990 levels by 2020, 45 percent reduction from 2001 levels by 2030, and 80 percent below 2001 levels by 2050. To meet Connecticut’s climate goals, the state urgently needs to decarbonize its thermal sector. Emissions in the residential sector (from on-site fossil fuel combustion) need to fall 36 percent from 2022 to meet the 2030 target and 77 percent from 2022 to meet the 2050 target.¹ To put the residential sector’s emissions in line with the statewide 2030 target, they must decrease 6.9 times faster from 2022 through 2029 than the rate of emissions reductions between 2001 and 2022; and reductions must be 4.2 times faster from 2030 onward to put the sector in line with the 2050 statewide target. In the commercial sector, the situation is even more dire; commercial sector emissions from on-site fossil fuel combustion increased slightly from 2001 to 2022, meaning that all emissions reductions necessary to put the sector in line with the 2030 and 2050 targets must occur from 2023 onward.²

Geothermal heat pumps (also referred to as ground-source heat pumps, or GSHPs) are among the [most efficient technologies](#) available on the market for space and water heating. The ground temperature of approximately 55 degrees Fahrenheit in Connecticut can be utilized to maintain loop temperatures at a high efficiency throughout the year. Figure 1 shows three different configurations of ground loops. Reliable and stable heating and cooling at a high efficiency helps to minimize electric peak demand, which has long-term benefits for grid management. As Connecticut’s electric grid becomes emissions-free – a Connecticut mandate by [2040](#) – GSHPs are also guaranteed to align with the state’s GHG reduction goals.

However, deployment of this technology is nascent due to cost and market barriers, including a lack of sufficient and highly trained workforce for project installations. Initial conversations about the difficulties of installing geothermal heat pumps in Connecticut highlighted that shovel-ready geothermal projects might wait months for drillers to be available, causing significant delays in project implementation. This workforce challenge is a significant barrier to increased adoption and scalability. Furthermore, although geothermal is one of the most energy-efficient space heating options available, upfront costs associated with installation and equipment are among the highest. Workforce shortages, as well as high upfront costs, are factors that may slow the rate of wide-scale adoption.

Installing a networked geothermal project involves multiple processes: the heat pump or system must be manufactured, the holes drilled, the plumbing and piping fitted, and equipment must be transported to the site

¹ Synapse analysis for CT DEEP using [Connecticut Greenhouse Gas Reduction Progress Reports](#)

² CT DEEP, “Connecticut Greenhouse Gas Inventory: 1990-2021, with preliminary look at 2022,” https://portal.ct.gov/-/media/deep/climate-change/1990-2021-ghg-inventory/deep_ghg_report_90-21_pre-22.pdf.

and installed. A trained, licensed workforce must exist at each of these steps. Research questions included:

- “What are the biggest bottlenecks in the industry?”
- “How do we pinpoint where the bottlenecks are in this process?”
- “Why do these bottlenecks exist?”
- “What kinds of recommendations can we make to address them?”

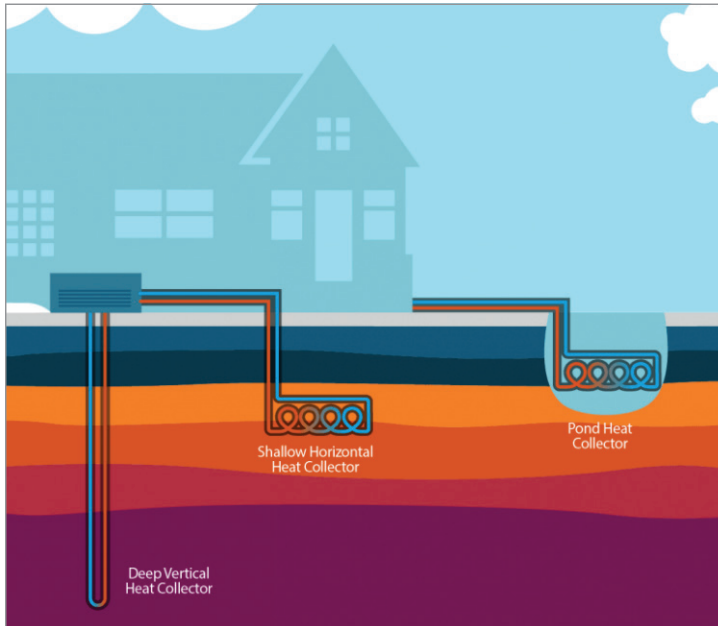


Figure 1. Adapted from the [U.S. Department of Energy](#) showing configurations of ground loops

This assessment seeks to understand the current state of the geothermal workforce across the residential and commercial sectors in Connecticut, and whether the status of training infrastructure and the current rate of growth will be sufficient to meet the growing demand for decarbonization. It considers the full supply chain, including drilling equipment, and describes the nature of the current workforce and training programs most applicable to community geothermal heating and cooling.

This study combines the results of surveys and interviews conducted between October 2023 and April 2024. Surveys were crafted by NEEP, with guidance from CT DEEP, to inform interviews conducted by members of the NEEP team.

This workforce needs assessment is part of a [larger project](#) in which the Connecticut

Department of Energy and Environmental Protection (CT DEEP), The University of Connecticut, Northeast Energy Efficiency Partnerships (NEEP), the Wallingford Housing Authority (WHA), and the Wallingford Electric Division public utility are using funding from the U.S. Department of Energy to explore the feasibility of a networked geothermal heating and cooling system for Ulbrich Heights, a public housing complex in Wallingford, CT. During Phase 1 the team is designing the system, facilitating a project advisory committee, creating a community engagement plan, and conducting this workforce needs assessment. This assessment will inform the workforce development plan to be delivered to CT DEEP by September 25, 2024.

Methods

To begin, the project team assembled a list of stakeholder categories across the geothermal industry, ranging from procurement entities to educational institutions, nonprofits, industry associations, the public sector, specific companies, and workforce groups. Next, initial interviews were conducted with stakeholders across these categories to understand their main concerns in expanding the geothermal industry. Survey questions



and formalized interviews were designed after these initial conversations. The surveys were intended to provide primarily quantitative data, while the interviews focused on qualitative data.

Initial interviews

Initial interviewees were chosen through representative and purposive sampling to provide a diverse range of perspectives. They included experts from utilities, companies installing geothermal projects, and manufacturing companies. The research team asked about topics including the range of sizes of companies operating in the field, if there were bottlenecks in growing the size of the workforce, the number of projects the existing workforce could handle, change in demand for geothermal projects, professional development pathways in the field, and more. The team also began the process of purposive sampling through these calls, asking interviewees for help with outreach to other contacts the team identified as knowledgeable about the landscape of the geothermal industry in the state, as well as suggestions for any other contacts that initial interviewees thought would be valuable.

Survey

To explore equity considerations, the team examined the existing demographic patterns and professional development pathways in the geothermal industry. The team determined that questions of demographics in the workforce and training programs, major categories of hiring barriers, and major categories of barriers in professional development could be asked of a wider audience if they were sent out as a survey, rather than trying to schedule time with each potential respondent organization.

Target respondents for the surveys were grouped into four categories: Wallingford Housing Authority facilities managers, training centers, trade schools, and a larger industry category that included drillers, engineering companies, and geothermal installers.

The project team surveyed the existing facilities managers at the Wallingford Housing Authority about resources (time and money) spent on current heating system maintenance and the level of staff experience with heat pumps.

The team referenced a list of training centers with HVAC (Heating, Ventilation, and Air Conditioning) programs, of which there are nine in the state, as well as a list of technical high schools with HVAC programs from the Connecticut Technical Education and Career System's (CTECS) website. The surveys for these two groups, trade schools and training centers, asked about the diversity of the student body and the geothermal trainings or courses offered.

Drillers, engineering companies, and installers of geothermal systems in Connecticut were found through the Energize CT database and outreach within the project team's network. The survey for this group asked about each company's capacity to undertake geothermal projects; employee demographics; salaries; training and licensing requirements and pathways; as well as trends in turnover, recruitment, and hiring.

Surveys were created through Survey Monkey and disseminated via email.



Secondary Research

To understand the current geothermal heating and cooling workforce available in the state, the team utilized several online resources for secondary research. These included Energize Connecticut’s participating contractor list, the Connecticut Department of Consumer Protection’s list of drilling license holders, the International Ground Source Heat Pump Association member directory, and the Energize Connecticut Energy Dashboard.

Interviews

Interviews were designed to gather additional qualitative information. These interviews probed in greater detail institutional barriers to licensing, previous actions taken to galvanize the workforce, clarifications on professional development pathways, and changes expected to occur in the industry over the next decade. The following categories of stakeholders were targeted for interviews:

- Utilities
- Drilling Companies
- Unions
- Installers
- Manufacturers
- CT Technical Education and Career System

The project team considers the interviewees to be topic area experts. Interviews were mostly conducted over video calls. In total, 19 interviews were conducted, each lasting approximately 30 minutes.

After an interview with staff from the Connecticut Technical Education and Career System (CTECS), upon suggestion of the interviewee, the team requested and received data from CTECS’ Education Consultant of Data Management & Research.

Limitations

The team achieved the greatest success in collecting interview data. Interviewees across industry subsectors were eager to share their perspectives on the past and hopes for the future of the geothermal industry and provided welcome assistance in helping the team reach other stakeholders.

Survey results are more limited. Completion of a survey was expected to require 15 to 20 minutes, which may represent a significant amount of unpaid time, especially for a smaller company. It is possible that this constrained the number of survey responses received or biased the responses if companies with administrative staff (who have time to answer desktop surveys during their workdays) were more likely to respond than companies without administrative staff.

The research period also fell within an academic year, which may account for the difficulty the team experienced in getting information from trade schools.



Stakeholder Survey Results

The survey results reported here are anonymized and representative of the body of data we gathered. Not all data are presented; instead, high-level themes across survey and interview responses are reported.

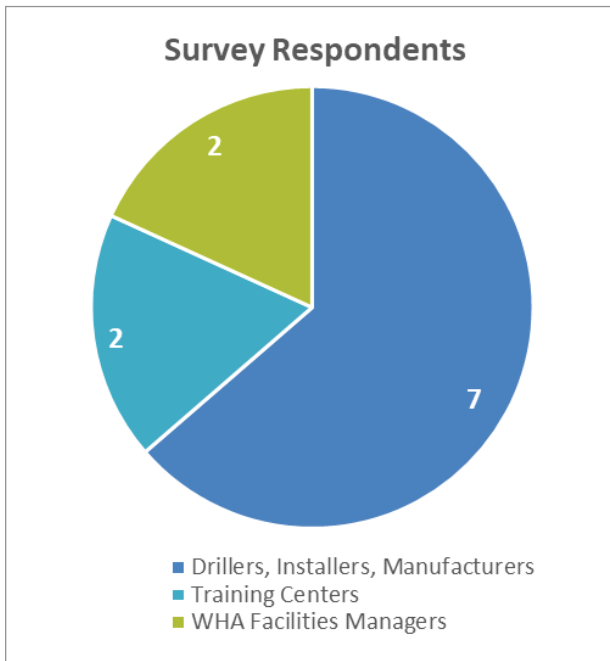


Figure 2. Survey Respondent Stakeholder Groups

The project team received 11 survey responses across the four stakeholder groups surveyed, with the most responses from drillers, installers, and manufacturers (see Figure 2).³

Wallingford Housing Authority Facilities Managers

There are two facilities staff members at the Wallingford Housing Authority (WHA), a facilities manager and a maintenance technician, and both responded to the survey.

This survey was tailored to understanding the Housing Authority’s time and money spent on maintaining the heating system of Ulbrich Heights. Both respondents reported spending up to 50 percent of their time maintaining the heating system of Ulbrich Heights both during and outside of the heating season. The facilities manager reported spending more time than

the technician on system maintenance. This translated to an average of fifteen hours per week for the facilities manager versus four hours per week for the maintenance technician.

The project team was also interested in gauging familiarity with heat pumps, which may transfer to geothermal maintenance work. While neither respondent has worked with a geothermal heat pump system, both indicated some familiarity with the concept. The survey responses did not indicate what current limitations might exist for geothermal adoption at Wallingford Housing Authority, so the project team will need to seek out additional information.

Local Trade Schools

The team sent the survey to eleven trade schools but received no responses. Additional phone outreach was conducted but resulted in only one brief conversation. Eventually, through an introduction from Connecticut’s

³ No survey responses were received from local trade schools.



Office of Workforce Strategy, the team was able to schedule an interview with the state-wide consultant for licensed trades in the technical high school system. Key takeaways from that discussion are reported in a later section covering interview results.

Training Centers

Two of the nine training centers in Connecticut (independent of the CT Technical Education and Career System) invited to respond completed the survey. Some inconsistencies exist between the two responses, because one respondent filled out the wrong version of the survey.⁴

The first training center respondent reported that geothermal content is not mandatory within their HVAC program and is provided only at the instructor's discretion. Of the 65-85 students reported to be in the HVAC program, the respondent estimated that 40 students went through geothermal-relevant training trained on geothermal within the past year based on their conversations with students. However, the same respondent reported that the overall number of students being trained is declining, and it is unclear whether the geothermal course content will be expanded due to a lack of instructor experience in geothermal systems.

The survey inquired about student demographics. The center reported that of the students offered some geothermal training, two percent are women and 40 percent are minorities. The respondent was unsure if the school focuses any recruitment spending on women and/or minorities.

The respondent stated that HVAC technicians represent the bulk of tradespeople moving into geothermal due to their familiarity with water source heat pumps for commercial applications. Additionally, many tradespeople looking to make the switch can access online retraining through companies such as Butterfly, Inc. and Dandelion Energy. However, the respondent was hesitant to predict which related trades, if any, may be likely to transition to the geothermal industry.

When students complete the HVAC program, the training center helps them find apprenticeships in geothermal careers. It was unclear from the survey response what employer outreach strategies are employed. The most common pathways reported for professionals entering the geothermal workforce after graduation were green energy certificates and the Connecticut Registered Apprenticeship Program. These certificates are available after a student graduates and require a level of knowledge outside the current purview of the training center. In describing the main challenge of the training center, one respondent stated, "A lot of it has to do with the students' engagement and understanding of basic systems. Geothermal systems use concepts that typically only competent licensed technicians hold. Our student population struggles with mathematics, computer literacy, and basic understanding of how to use tools properly." This response seems to imply that geothermal systems require advanced skills that are taught outside the center's curriculum and are acquired by certification.

⁴ During the survey outreach period, Connecticut DEEP advertised the surveys on their LinkedIn account. It is likely that the respondent was unclear on the difference between trade school and training center versions of the survey.



The respondent provided a further written response about the center’s challenge with students’ grasp of foundational skills such as computer literacy and experience with tools. Given that HVAC instructors spent substantial time building these foundational skills, the respondent suggested specialized geothermal training was out of reach. Instead, the respondent proposed, “I do, however, have some students that excel in class and would love to offer this specialized training to them but think some sort of incentive should be offered. Perhaps an additional certification or possibly ensured job placement?” In addition, the respondent proposed starting outreach and education of the trades during elementary and secondary school. This would include assistance from the state with training plans and incentives for students to choose a pathway toward geothermal careers.

The second respondent indicated that their HVAC training center offers no classes on geothermal energy for its approximately 70 students and growing. The respondent did not see any plans for expansion of a geothermal program or indication of other tradespeople moving to geothermal, citing inadequate market demand for geothermal systems. Yet as the training center grows, the respondent reported, there is increased inquiries about air source heat pump training.

Drillers, Installers, Manufacturers, and Engineering Companies

The team sent a survey to 97 Connecticut firms expected to be involved in geothermal. The firms were identified primarily from the [Energize CT](#) database, the International Ground Source Heat Pump Association ([IGSHPA](#)) directory, and communication with other project team contacts. From this outreach, the team received seven responses (7 percent) from a variety of firms working in geothermal well-drilling, geothermal design and engineering, geothermal manufacturing, geothermal installation, HVAC, and service/maintenance work (see Figure 3). When polled about the proportion of the firm’s work that is geothermal-related, the range spanned from zero percent to 100 percent, with four of the seven respondents spending more than 50% of their time on geothermal.

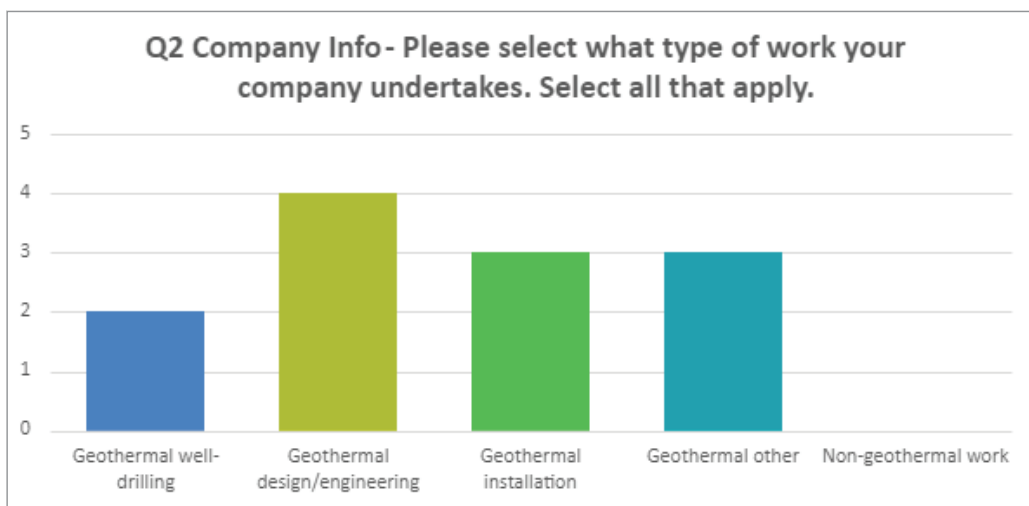


Figure 3. Company Work Type Graph



The survey asked where the companies conduct their operations. Six of the seven respondent firms reported working in Connecticut and 22 additional states (see Figure 4). Two companies reported working internationally in Canada, the UK, Australia, and South Korea. The headquarters of the firms surveyed included Guilford and Bethlehem, CT; Michigan; Burlington, VT; Winnipeg, Canada; Baton Rouge, LA; and Mount Vernon, NY. The seventh firm noted that it would expand into Connecticut when work is available. The respondent was hopeful about the northeast becoming more favorable to heat pumps and indicated willingness to register in the state.

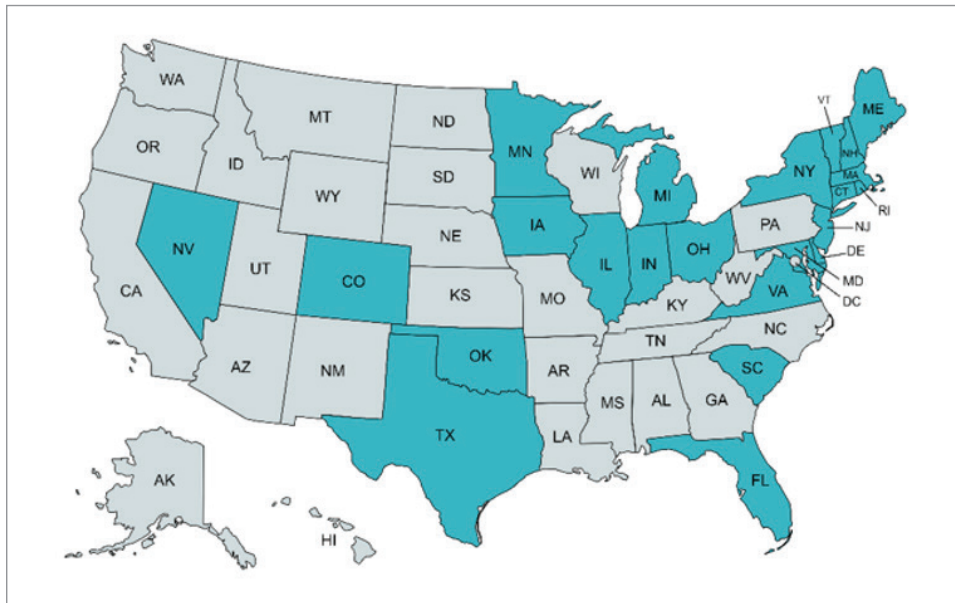


Figure 4. Map of Surveyed Firms Geographic Reach (blue states indicate where firms conduct work)

The second section of the survey invited respondents to include information about the company capacity and employee demographics. Of the seven companies, the average number of employees per firm was 7.4. The smallest company had three employees, and the largest company had 15. An average of 67 percent of the firms' employees work on geothermal projects. Of these, 77 percent are employed full-time. The respondents reported an average of 14 percent of geothermal employees are women and an average of 7 percent are minorities. Only one company reported having employees represented by unions or labor agreements, with 33 percent of their employees falling into this category.

Respondents provided information regarding their company compensation and benefits. The surveyed firms reported various geothermal job titles, the most common being driller, design engineer, and project manager (see Figure 5). For salaried geothermal roles, the respondents reported three ranges: \$65,000 - \$200,000, \$100,000 - \$150,000, and \$64,000 - \$130,000. Respondents were also asked about employees compensated hourly; only one firm reporting this compensation structure, with a range of \$30 to \$40 per hour. In addition, most respondents indicated that geothermal employees are offered numerous benefits such as medical, dental, paid time off, life insurance, standard 401k, and a bonus structure. One respondent reported that their company did not provide any benefits.



Figure 5. Word Cloud of Geothermal Job Titles (size of word is related to response frequency)

The next survey section inquired about required and preferred training/certifications. Most common responses included licensed well driller, safety, installation certifications, and design certifications. Specific certifications mentioned included the National Ground Water Association (NGWA) certification, the International Ground Source Heat Pump Association (IGSHPA) accreditation, DesignBuilder training, Certified GeoExchange Designer, U.S. Environmental Protection Agency refrigerant certification, and Occupational Safety and Health Administration 30 (OSHA 30) certification. Respondents were then asked where their company’s employees receive training. Using in-house curriculum or on-the-job training for submission to licensing applications were common responses. Also reported were external sources such as training from the National Council of Examiners for Engineering and Surveying (NCEES) State Professional Services, IGSHPA, and HVAC manufacturers and suppliers. One respondent reported that their company has applied to the recently developed Connecticut Registered Apprenticeship program as an avenue for training. Apprenticeships were not reported widely among the firms responding to the survey, with only two of the seven respondents hosting apprentices (see Figure 6).



Figure 6. Geothermal Apprentices Graph



Three out of seven respondents indicated that licensing of geothermal workers in Connecticut is “moderately difficult” and two indicated “moderately easy,” suggesting there is not currently extreme difficulty (see Figure 7). Recommendations collected from open responses for improving the licensing process and training in Connecticut included: organizing and tapping into the state’s well driller apprenticeship program; and developing geothermal Centers of Excellence, an emerging concept for regional stakeholder support to bolster the geothermal workforce. Additionally, respondents cited standardized licensing across the country and local geological training as approaches that would benefit their company’s training process. Another respondent stated: “There are no barriers at this point. The only barriers we see are actual well drillers and growth of geothermal installers. This includes overcoming the additional cost for geothermal.”

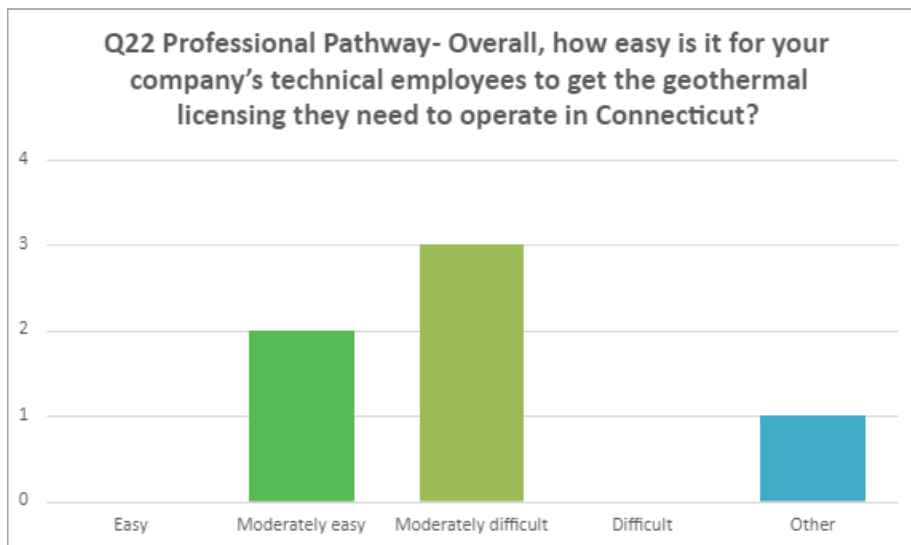


Figure 7. Geothermal Licensing Graph

The respondents next reported on company growth. They indicated moderate growth or little growth in the last year. Three firms reported hiring one geothermal employee in the last year, with one firm hiring three new employees: one energy modeler and two “level one” design engineers, both working on geothermal. None of these employees were hired to replace departing personnel; and only one new staff member was reported to be represented by a union. When asked about growth in the last five years, no growth was reported but one firm reported hiring an additional two principal engineers and one person for drafting. Respondents uniformly reported that geothermal roles do not turn over more quickly than other related roles. Supporting this, the firms reported their employees remain on staff an average of 8.8 years (with a range of 5 to 18 years). The survey then asked about predicted future company growth. Four respondents expected to create 1 or 2 new geothermal positions in the next year, with one expecting to create 7. Some firms looked to train and promote from within, while others expected to expand to new cities.



Understanding how to foster geothermal growth was a key objective of the survey. When asked for input on why individuals want to work in geothermal, the team received responses such as climate justice, reducing environmental impact, opportunities for learning, job permanence, and participation in a green industry. On the other hand, respondents reported major difficulty “finding people willing to be trained,” closely followed by “finding workers with adequate training” (see Figure 8). Retention of employees was challenging due to the respondents reporting difficulty of “ensuring enough work can support employee salaries” and, given the hard and dirty work, “finding people who want to work, and want to work in well drilling.”

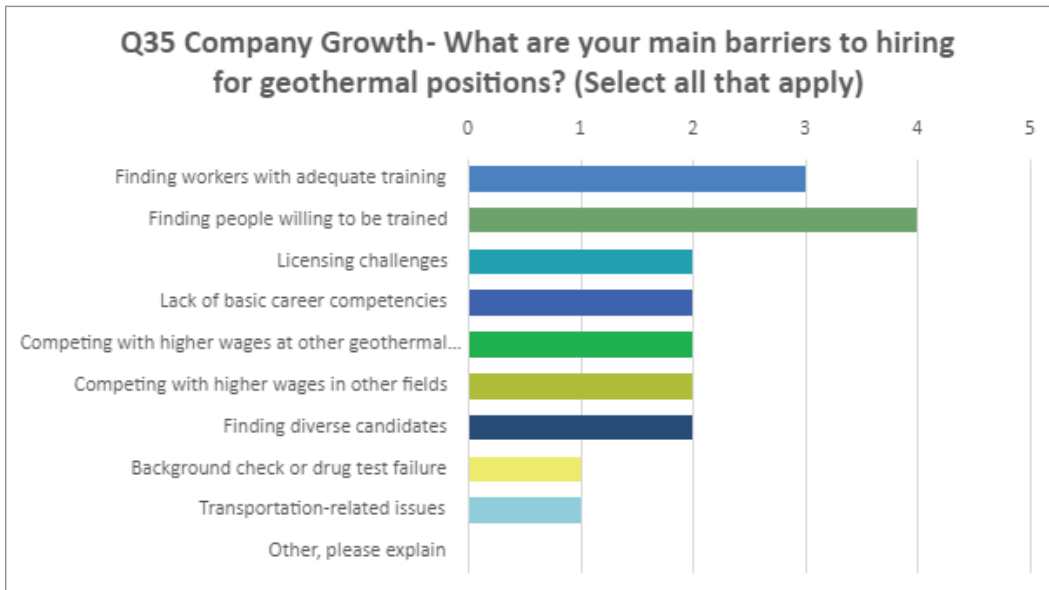


Figure 8. Company Hiring Barriers Graph



Respondents reported inadequate availability of qualified workers and the considerable cost for a customer to install geothermal as two key barriers to growing their geothermal businesses (see Figure 9).

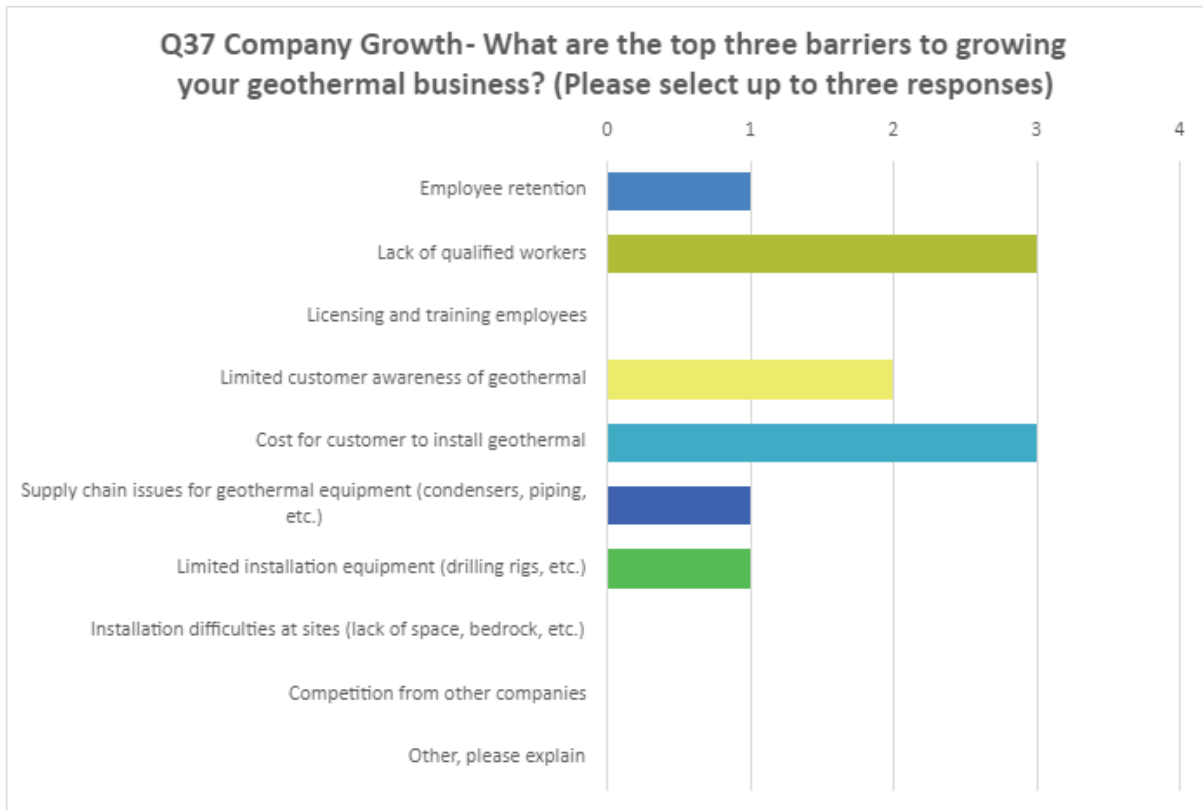


Figure 9. Company Growth Barriers Graph

At their current capacity, two companies reported completing 100 geothermal projects per year, with two others reporting 10 and 20-30 projects per year. This translates into the current capacity of most firms being able to undertake three to five projects at once. When asked about the nature of their capacity constraints, three firms responded that personnel considerations were the limiting factor and one firm responded that both equipment and personnel were the limiting factors (see Figure 10). One respondent indicated that the availability of “quality projects” limited the firm’s capacity.

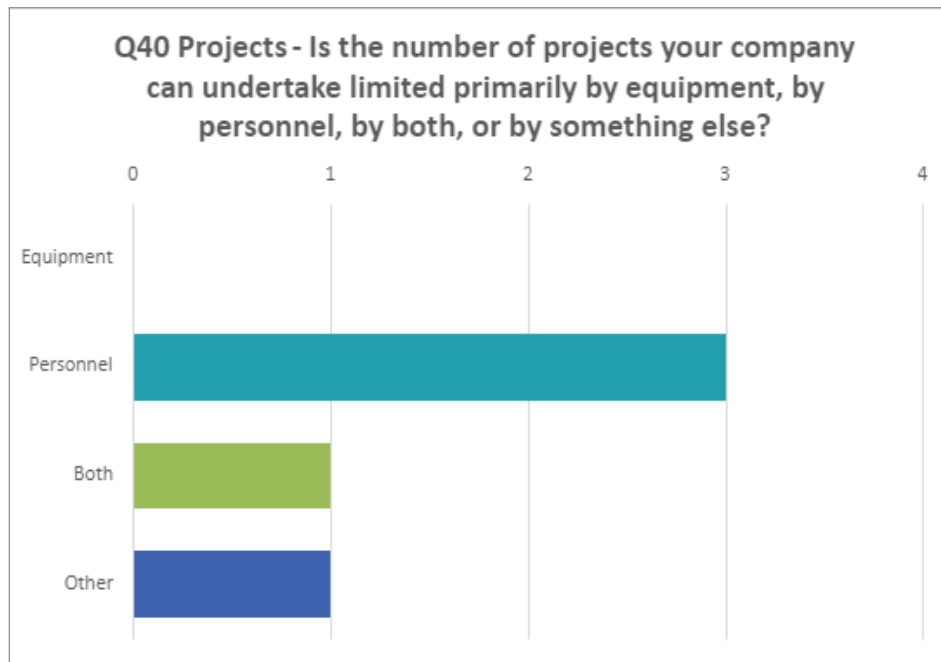


Figure 10. Project Limitations Graph

The final section of the survey allowed the respondents to submit open-ended responses regarding how the state of Connecticut can assist geothermal firms. Suggestions included:

- Standardizing bore field specifications;
- Encouraging individuals to pursue drilling and mechanical career paths;
- Offering incentives for contractors to pursue geothermal;
- Connecting homeowners to geothermal contractors and drillers;
- Creating a list of contact information for geothermal well drillers to connect with contractors;
- Guiding residential and commercial clients to take full advantage of incentives to make geothermal affordable; and
- Providing bridge loans to builders for geothermal.



Secondary Research

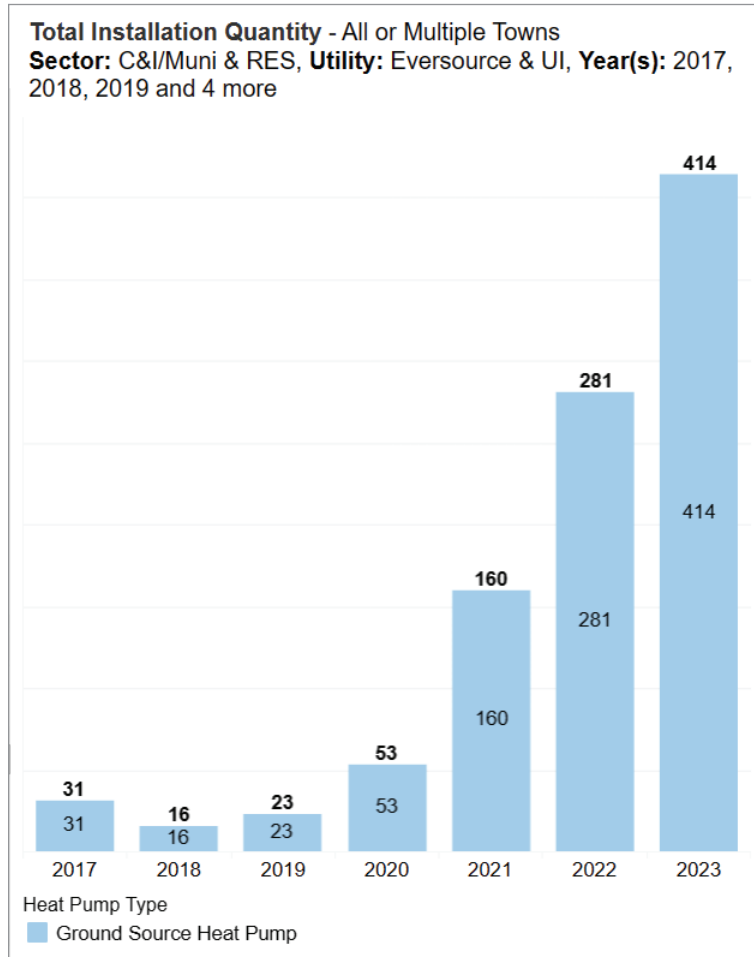


Figure 11. Ground Source Heat Pump Installations in Connecticut since 2017

The annual rate of ground source heat pump installations in Connecticut has risen 25-fold since 2018 (see Figure 11)⁵. Ground source heat pump installations as a percentage of overall heat pump installations in residential and commercial/institutional properties increased from less than 0.4 percent in 2017 to 2.3 percent in 2023. Applications include applications for residential, commercial, and municipal building examples.

[Energize CT's list](#) of participating contractors identifies 75 ground source heat pump installation businesses operating in the state. All but five of these companies also install air source heat pumps. The only businesses that offer only ground source heat pump installation are Dandelion Energy and King Energy. A handful of companies install water source heat pumps in addition to ground source heat pumps.

The Connecticut Department of Consumer Protection (DCP) offers [geothermal well drilling licenses](#) (W-8 Limited Geothermal Driller and W-10 Limited Direct Exchange Geothermal Driller) and geothermal contractor licenses (W-7 Limited Geothermal Contractor and W-9 Limited Direct Exchange

Geothermal Contractor) for drilling, installation of piping, casing, and heat transfer media, etc. However, these licenses are relatively new, and the DCP website does not yet allow users to download lists of license holders for them. According to DCP records, 97 people in CT hold W-1 Unlimited Driller Well Contractor or W-2 Unlimited Well Driller licenses. Of those 97 license holders, 76 have an address in Connecticut. There are 54 people with W-3 Limited Non-Water-Supply Contractor or W-4 Limited Non-Water-Supply Driller licenses in the state, and 27 of them have an address in Connecticut. See Table 1 for the available drilling licenses.

⁵ From [Connecticut Energy Dashboard](#)



Table 1. Drilling licenses offered by the Connecticut Department of Consumer Protection

LICENSE TYPE	This registration permits the registrant to...	NUMBER OF LICENSE HOLDERS	NUMBER OF LICENSE HOLDERS BASED IN CT
W-1 Unlimited Well Driller Contractor	Engage in well construction	72	56
W-2 Unlimited Well Driller	Construct a well, including but not limited to, the installation, repair and maintenance of pumps, pump motors, pump piping, valves, wiring, electric controls and tanks. Registrants must be in direct and regular employment of a contractor registered for this work.	25	20
W-3 Limited Non-Water-Supply Contractor	Construct a non-water-supply well, including but not limited to, the installation, repair and maintenance of pumps, pump motors, pump piping, valves, wiring, electric controls, and tanks.	39	20
W-4 Limited Non-Water-Supply Driller	Construct a non-water-supply well, including, but not limited to, the installation, repair and maintenance of pumps, pump motors, pump piping, valves, wiring, electric controls and tanks. Registrants must be in the direct and regular employment of a contractor registered for this work.	15	7
W-5 Limited Well Casing Extension Contractor	Perform well casing extension, repair, and maintenance work. The registrant's ability to repair is limited solely to the well casing extension and excludes any other parts of a well.	42	40
W-6 Limited Well Casing Extension Journeyman	Perform well casing extension, repair, and maintenance work only while in the employ of a contractor licensed for this work.	27	27
W-7 Limited Geothermal Contractor	Construct a geothermal bore hole or geothermal system, up to and including the manifold connection, including, but not limited to, the installation, repair, and maintenance of piping, casing, heat transfer media, pumps, pump motors, and valves. This registration excludes work on direct exchange systems.	—	—
W-8 Limited Geothermal Driller	Construct a geothermal bore hole or geothermal system, up to and including the manifold connection, including, but not limited to, the installation, repair and maintenance of piping, casing, heat transfer media, pumps, pump motors, and valves. Registrants must be in direct and regular employment of a contractor registered for this work. This registration excludes work on direct exchange systems.	—	—
W-9 Limited Direct Exchange Geothermal Contractor	Construct a geothermal bore hole or geothermal system, up to and including the manifold connection, but limited to those geothermal bore holes employing direct exchange or direct expansion technology, including but not limited to, drilling associated with the installation of copper or other piping containing a direct exchange heat transfer medium, the installation, repair and maintenance of piping, casing, and heat transfer media.	—	—
W-10 Limited Direct Exchange Geothermal Driller	Construct a geothermal bore hole or geothermal system up to and including the manifold connection but limited to those bore holes employing direct exchange or direct expansion technology, and associated components of a direct exchange geothermal system. This includes but is not limited to, drilling associated with the installation of copper or other piping containing a direct exchange heat transfer medium, the installation, repair and maintenance of piping, casing, and heat transfer media. Registrants must be in the direct and regular employment of a contractor registered for this work.	—	—



As mentioned previously, nine training centers in Connecticut offer HVAC programs. These programs' web sites do not clearly indicate whether they offer geothermal curricula.

According to a [report by the Geothermal Heat Pump Consortium in 2013](#) for the U.S. Department of Energy, there are 14 main job classifications or “personnel qualifications” in the geothermal industry. These job titles are as follows:

- Ground Source Heat Pump System Project Manager
- Ground Source Heat Pump System Engineer/Designer
- Geological Formation Thermal Properties Tester
- Ground Source Heat Pump System Commissioning Agent
- Vertical Loop Driller
- Horizontal Directional Driller
- Ground Heat Exchanger Grouter
- Ground Heat Exchanger Looper
- Ground Source Heat Pump System Water Well Driller
- Ground Source Heat Pump System Water Well Pump Installer
- Ground Source Heat Pump Mechanical System Installer
- Ground Source Heat Pump System Operations/Maintenance Technician
- Ground Source Heat Pump System Inspector/Regulator
- Ground Source Heat Pump System Trainer

Several of these titles are consistent with those provided in the survey by industry players. Survey results included project managers, lead installers, drillers, and trainers.

Five IGSHPA, or International Ground Source Heat Pump Association, members are based in Connecticut, and 56 members include Connecticut in their service territory. IGSHPA members include manufacturers, product distributors, engineers, designers, ground loop installers, drillers, and more.

Interview Insights

Across the 19 interviews with a wide range of industry stakeholders, a few general themes about the industry emerged. Multiple interviewees spoke about the prevalence of small “mom and pop” shops, both among drilling companies and heat pump installers. A ground source heat pump manufacturer said that, by volume, most of their heat pump sales are to small businesses, and that their main base of customers installs other types of HVAC equipment, such as air source heat pumps and traditional fossil fuel systems, in addition to ground source heat pumps. Many drilling companies are small and do small projects within a local service territory, while a few much larger companies travel for larger jobs. In addition to the size of these small businesses, stakeholders mentioned that the geothermal workforce is aging and that many small businesses do not seem to have a clear line of succession in place.

Only a few companies focus solely on geothermal systems in CT. According to Local 777, the plumbers, pipefitters, and HVAC-R union in the state, it does roughly 75 percent of the commercial geothermal projects and very few of the residential projects.



Beyond the general composition of the industry, the interviewees tended to focus on three main topics: drilling as a bottleneck, licensing, and worker training and recruitment.

Drilling as a Bottleneck

Many interviewees identified a shortage of drillers and drill rigs as the biggest current bottleneck and understood this to be a consensus view in the industry. Because many drilling companies are smaller and unwilling to travel far for jobs, there is a strain on drillers that are equipped to do larger projects. One interviewee estimated that only one or two drilling companies in New England can do very large projects (requiring 50 boreholes or more), and that the rest of the demand is currently met by larger companies coming in from Canada or other parts of the U.S. Another interviewee said that there are more drilling companies with the capacity for large projects in New England but agreed that drilling is still a bottleneck. According to [Dandelion Energy](#), drilling costs can constitute over 50 percent of the cost of a geothermal heating and cooling project. As noted by a different interviewee, installation of more conventional fossil fuel heating systems or air source heat pump systems can be easier for contractors because they are able to do all the work themselves; geothermal installations require additional coordination of a well driller which adds additional time and cost to the project.

Drilling has become a significant constraint for three key reasons: historic fluctuations in geothermal demand due to changing federal incentives, limited access to equipment, and inadequate interest in or awareness of drilling careers. Multiple interviewees noted that many drillers do well water or oil drilling rather than exclusively geothermal work. When the federal geothermal tax credit [expired in 2016](#) (and was not reinstated until 2018), many drillers left the geothermal industry for more stable, consistent opportunities. The high upfront installation cost of geothermal heating and cooling is a major constraint on demand and uptake, so the availability and dollar amount of federal tax credits has a significant impact. One potential strategy for increasing drilling capacity is enticing well water and oil drillers to geothermal, but there would have to be a clear benefit for them and their businesses.

IGSHPA is developing training for geothermal drilling and has collaborated with NGWA to reach the audience of well water drillers. According to the executive director of IGSHPA, Jeff Hammond, trainings are geared toward people with existing drilling knowledge who are interested in transitioning to geothermal, rather than training new drillers.

Based on the interviews, it is unclear whether the drilling bottleneck is more intense in the commercial sector or residential sector. Residential projects attract more of the “mom and pop shops,” and the supply and demand may be better matched. Contradictorily, one interviewee said that he saw more drilling capacity going to large jobs that were more efficient and profitable for drillers, and he suspected this may be cannibalizing the residential sector.

The limited availability of drill rigs is another key factor. Interviewees indicated that important constraints include the slow rate of rig manufacturing and the limited number of foreign-built rigs that come to the United States. One interviewee from a drilling company said it was difficult to find a working used drill rig and that even new ones sometimes have mechanical problems.



One interviewee mentioned that water well and natural gas drilling require larger rigs that can reach greater depths than geothermal drilling typically requires, and that many drillers use these larger rigs for geothermal drilling. This results in geothermal projects incurring unnecessarily high fuel and equipment-transport costs. Geothermal-only drillers may be able to use smaller equipment, but diversification seems to be an important part of many drillers' business models. The International Union of Operating Engineers Local 150 runs a [geothermal drilling apprenticeship program](#) in the Chicago area; at the New York Geothermal Energy Organization Albany Conference in April 2024, David Bowers from Local 150 said that the organization takes advantage of the transferrable skills between geothermal, well water, and oil and gas drilling to help ensure that apprentices consistently have work placements.

Finally, an interviewee mentioned that drilling costs vary across the country because of differences in geology. In the Midwest, drillers often drill smaller boreholes and drilling cost can be \$20-25 per foot, including casing and grout. In the Northeast, drilling costs are closer to \$40-50 per foot because geology is more challenging, underscoring the importance of compressing costs.

Some industry stakeholders are proposing innovative solutions to the problem of driller and drill rig constraints. The Geothermal Market Capacity Coalition⁶ has coalesced around the concept of a drill rig manufacturing and driller training hub as a geothermal "center of excellence." Sustainable Westchester has developed a proposal for the county government to purchase a drill rig that would be used for local training and leased for local projects.

Finally, many interviewees mentioned the difficult nature of drilling jobs as a deterrent to new entrants. One drilling company said it does have the capacity to train people in-house, it is just difficult to find and retain workers. This company said that most of its drillers and field technicians are in their 40s and 50s, and the company worries about being able to replace them. Difficulty with staffing can also create push and pull with the need for equipment. This drilling company at one time had three drilling rigs but did not have adequate staff and ended up selling one. According to the interviewee, however, the demand for drilling projects is not presently a limiting factor for the company.

Licensing

Licensing requirements for HVAC contractors in Connecticut have prompted much disagreement and even tension between various industry stakeholders. Some feel that DCP's current requirements are critical for ensuring quality work and protecting union jobs, while others feel that the requirements are overly burdensome to heat pump installers and are holding back geothermal development in Connecticut compared to neighboring states.

In 2023, [Dandelion Energy lobbied for legislation](#) that would create a small-system heat pump installer license – applicable to both air- and ground-source installers – without requirements for training on installation of

⁶ The Geothermal Market Capacity Coalition is a group of leading ground source heat pump manufacturers, contractors and geothermal drillers, trades groups, and educational, environmental, and advocacy organizations. The Geothermal Market Capacity Coalition (GMCC) aligns industry stakeholders to relieve supply chain, labor, and capacity shortages that are crippling growth.



fossil fuel systems. The legislation also sought exemptions for licensing requirements for systems under 10 tons (for residential applications). Dandelion argued this would streamline licensing of the heat pump workforce, reduce training costs, and enable broader deployment of heat pumps to accelerate progress toward the state's decarbonization goals. A union in the state and a pro-union nonprofit opposed the legislation, contending it would undermine installation quality and training requirements that benefit workers. The legislative effort failed.

Some interviewees indicated that the licensing issue is only of concern to heat pump-only companies and is not a major constraint because so few of these companies operate in the state. However, a stakeholder from a heat pump-only company said that the problem will likely affect more businesses as deployment of air- and ground-source heat pumps accelerates and that neighboring states with licensing requirements more conducive to heat-pump-only businesses have been able to attract more firms employing this business model. In Massachusetts, there is no statewide HVAC license, and contractors handling lesser amounts of chemical refrigerants (amounts typically needed for residential applications) need only EPA certification.

Some disagreement on licensing requirements stems from differing opinions on how much fossil fuel systems training is necessary for safely decommissioning these systems when they are replaced with heat pumps. Some heat pump companies and other stakeholders have argued that workers need only limited training hours on fossil fuel systems to decommission them safely, while others have said that more robust education and training is required. One suggestion that some industry stakeholders have made is removing or reducing the number of hours of training on fossil fuel systems in the D-2 Limited Warm Air, Air Conditioning, and Refrigeration Journeyman license to make it more applicable to heat pump installers.

Interviewees identified several other concerns regarding Connecticut HVAC licensing. First, some said that the limited set of accredited training programs that count toward classroom hours presents a major barrier to new entrants who did not attend a technical high school, and these courses often are quite costly. At the time of the interviews, one interviewee was taking a year-long course for \$30,000 to qualify for a CT license exam. Other programs that offer similar training at a lower price, such as Building Performance Institute, Efficiency for All programs in CT, and heat pump dealer/manufacturer training, do not count toward the hours required to sit for a license exam. Secondly, interviewees indicated it is difficult to transfer out-of-state experience in residential applications to Connecticut on-the-job training (OJT) requirements. The interviewee who mentioned he was taking the year-long course at a technical school that currently installs heat pumps in New York and plans to petition to use his out-of-state experience to replace the in-state OJT requirements. Currently, he does only weatherization work in Connecticut.

Recruitment and Training

All technical high schools in Connecticut are run by one organization, the [Connecticut Technical Education and Career System \(CTECS\)](#). There are 20 schools across the state, and 11 of them offer an HVAC program. Other relevant program areas include Electrical; Plumbing and Heating; and Architecture. As of March 2024, each HVAC program was staffed with two teachers.



CTECS demographics data obtained by the research team is from March 2024. The data distinguishes between two programs – the 9-12th grade program and the adult program. The data also describes CTECS’s overall student demographic data and the HVAC programs specifically.

Enrollment for the 9-12th grade HVAC program totals 562 students. The HVAC program is heavily male dominated; 10.7 percent identify as female, and 89.3 percent identify as male. In contrast, in the overall 9-12th student body has a notably higher percentage of female students; 38.8 percent of the students identify as female, 60.5 percent identify as male, and 0.7 percent identify as nonbinary. Students in the HVAC program are less racially diverse than students in the system overall; 56 percent of the students in the 9-12th HVAC program are white, while 39.2 percent of students in CTECS are white.

CTECS HVAC adult program enrollment totals 260 students. In this program, approximately 1.9 percent of the students identify as female, 98.1 percent as male, and 0.4 percent as nonbinary. The percentages are similar for the CTECS adult HVAC program, with approximately 2.8 percent identifying as female, 96.7 percent identifying as male, and 0.1 percent identifying as nonbinary. In the adult HVAC program, 55 percent of students are white, while 61.2 percent of students in the total adult student body are white. The CTECS Education Consultant of Data Management & Research noted that the adult education program data may be incomplete due to lower than 100 percent participation by students in demographic surveys.

In discussion about the technical high schools’ curricula and resources for heat pump and geothermal training, some inconsistencies arose. According to CTECS, all the HVAC programs teach curricula on heat pumps and geothermal, and the system viewed these as “need to know” topic areas. In a brief phone conversation, however, a teacher at a technical high school said they did not teach geothermal heat pump material; and other sources said that not all technical high school HVAC programs cover geothermal. Also, multiple interviewees mentioned a consistent need for teachers, despite the fact that the HVAC programs are all currently fully staffed (according to CTECS).

One theme that emerged as a need for technical high schools was access to training equipment or funding for equipment. Anecdotally, one HVAC teacher said they had a barely functioning air conditioning unit to train on. Other stakeholders mentioned hearing about the severe need for equipment. One interviewee suggested that ground source heat pump manufacturers could help fill the need for equipment in the schools and raise awareness of and bolster education on geothermal systems.

Energize CT, a utility-funded energy efficiency program, does help fill some equipment and curriculum gaps. [Green STEP](#) (Sustainability Technical Education Program) is part of Energize CT and offers specialized curricula and training for public high schools on various sustainability and efficiency topics. The program originally was focused on providing training in CTECS schools, but in 2022 and 2023 it began pilot programs offering paid opportunities for public school students after school and during the summer. The Green STEP curriculum does not currently include geothermal content, but it could be expanded to include it, according to utility representatives running the program. Energize CT also supports the “E-House” Initiative at CTECS schools, where students build model homes and learn about energy efficiency and renewable energy. Since the program began in 2011, seven



E-Houses have been built at technical schools in Connecticut. These houses do not use geothermal, but they do use heat pumps and offer foundational education needed for geothermal heating and cooling.

Unions recruit from technical high schools in Connecticut, although the percentage of technical school students that go into the unions is unclear. Local 777, the plumbers, pipefitters, and HVAC-R union for the state, gets 500-600 applicants every year and accepts only 75 apprentices. According to the interviewee from Local 777, the number of new apprentices accepted is based on the projections of future careers, to assure that apprentices accepted have adequate work opportunities in the long term. If demand for geothermal projects rises significantly, Local 777 may need to bring in additional instructors from the field.

Some interviewees indicated that the barriers to union apprenticeships are significant, especially for people who did not attend technical high schools. Local 777 says it actively recruits veterans, women, minorities, and people who did not attend technical schools. More conversation is needed to understand the nuance of barriers to union apprenticeship.

Local 478, the Connecticut chapter of the International Union of Operating Engineers (IUOE), offers drilling training for natural gas and well water drilling. While they do not offer training specific to geothermal well drilling, apprentices can gain all the necessary skills for geothermal drilling from the existing curriculum. Local 478 gets about 350 applicants for apprentices every year (for drilling and other skills) and accepts 25 to 40. The limiting factor for acceptance is the demand for projects; similarly to Local 777, they accept only as many apprentices as they believe they will be able to provide full-time employment. There may be opportunity for the state to project future geothermal uptake based on the historic new investments from the Inflation Reduction Act and Bipartisan Infrastructure Law.

In addition to its existing drilling curriculum, Local 478 is working to bring a geothermal well drilling apprenticeship program to Connecticut. IUOE Local 150 in the Chicago area developed a geothermal drilling apprenticeship program in 2009. It is currently the only registered geothermal well drilling apprenticeship in the country.

IGSHPA, the preeminent organization for geothermal trainings and certifications, is in the process of releasing updated curricula that are modular and readily applicable in school settings. IGSHPA is using the U.S. Department of Energy's 14 geothermal job descriptions and is creating modules for entry-level positions, service technicians, commercial design and inspection, residential design, and more. In New York, IGSHPA accreditation is required for accessing geothermal incentives. IGSHPA leadership believes that the new topic areas and design of the trainings should enable the program to reach larger audiences.



Conclusion

Overall, the project team identified three major barriers to the growth of geothermal technologies in Connecticut: inadequate public awareness of geothermal careers, high upfront costs, and the relationship between supply of workers and demand for projects. Among segments of the population that could be attracted to geothermal careers, awareness of geothermal career paths lags, behind what will be needed to scale up geothermal technologies. Marketing the types of positions that become available and making them appealing and accessible to new entrants will be critical for aggressively scaling up the geothermal industry to help meet Connecticut's climate goals. Meanwhile, the steep upfront costs associated with geothermal heating and cooling (especially for retrofits) also pose a major challenge for the market growth needed to drive geothermal deployment and employment. At the same time, multiple stakeholders highlighted the tension between supply and demand and voiced a consensus that geothermal is becoming more popular and demand is rising. While some stakeholders expressed that current demand for geothermal installations in Connecticut is mostly being met by the existing workforce, this demand level must increase to be in line with Connecticut's climate goals. Therefore, Connecticut must work towards growing both the geothermal workforce and demand for geothermal in parallel. An increased supply of drillers (and drill rigs) could bring down the price of drilling, which constitutes a substantial portion of the upfront costs for geothermal projects. With growing awareness of geothermal technology and access to newly increased federal tax incentives and other initiatives for geothermal, more consumers will likely be drawn to geothermal. In tandem, workers will need to be in place to serve this demand.

Various recommendations for the Workforce Development Plan have arisen during the surveying and interviewing for this needs assessment. These recommendations include early outreach and targeted marketing of trade career opportunities, coordinated drill rig manufacturing and driller training, adjustments to licensing requirements to facilitate heat pump-only company growth, and expanded access to classroom trainings that satisfy licensing requirements.

Next Steps

While this research is foundational to understanding Connecticut's geothermal workforce, the project team encountered several challenges that may limit its utility. Despite reaching out to many stakeholders from firms, training centers, unions, and trade schools in Connecticut, the response rate to the surveys was low. Many stakeholders were unresponsive or indicated they were too busy to participate. The small sample size also posed difficulties for quantifiable results about job growth and industry projections. Given the research and stakeholder participation gathered, the project team is confident that the information presented in this report is valuable and provides insight from a broad cross-section of voices in the industry. But further research is needed to form a complete picture of the geothermal workforce.

With more time, further insights from educators and new entrants and trainees should be collected, both to achieve a larger sample size and to hear a wider range of perspectives. Some additional questions to explore in future Connecticut geothermal workforce studies are: What messages do new entrants hear about the geothermal industry that draws them to it? What do new entrants to the industry feel are the greatest barriers



to industry growth? What employment barriers do employers mention that new entrants do not, and what does that imply about missing steps in the path to accessing quality jobs? Would a sample including more trade schools provide additional insights?

Additionally, the survey responses gathered from training centers provided only limited information on demographics and diversity and geothermal certifications, presenting avenues for further research. Additional research should also explore the ability of facilities managers to maintain geothermal systems post-installation, and the possible need for training or additional staff to support this work.

In May 2024, NEEP will host four geothermal workforce solution workshops with the goal of reconciling some of the conflicting viewpoints outlined here and developing proposed solutions for the current barriers and bottlenecks. These workshops will inform a Connecticut Geothermal Workforce Development Plan providing recommendations to the state on how to facilitate development of the state's geothermal workforce. NEEP will develop the Workforce Development Plan during Phase I of the project and, if the project team is awarded Phase 2 funds, implement it as part of the continued project activities.

The team will explore these recommendations and others through workshops and further conversation with industry stakeholders to support successful scale-up of the geothermal workforce in alignment with Connecticut's climate and grid-management goals.



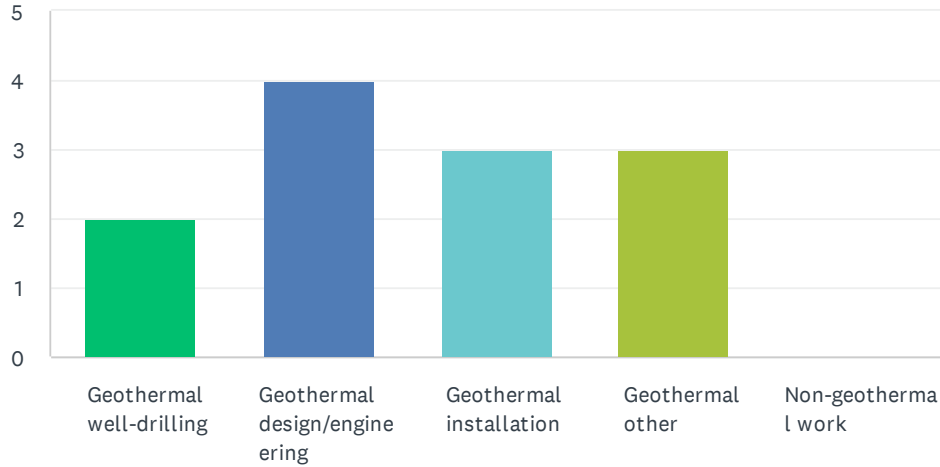
APPENDIX

This appendix reflects summary survey data from training centers, WHA facilities managers, and drillers, installers, manufacturers, and engineering companies. The data is exported from the SurveyMonkey platform and contains both summary graphs and open responses. Respondent organizations, emails, or any other identifying information have been redacted.

Note: One respondent from a training center incorrectly completed a survey intended for local trade schools.

Q2 Company Info -- Please select what type of work your company undertakes. Select all that apply.

Answered: 7 Skipped: 0



ANSWER CHOICES	RESPONSES
Geothermal well-drilling	28.57% 2
Geothermal design/engineering	57.14% 4
Geothermal installation	42.86% 3
Geothermal other	42.86% 3
Non-geothermal work	0.00% 0
Total Respondents: 7	

#	EXPLANATION	DATE
1	Service work	2/13/2024 4:09 PM
2	Educator , SME, Journalist	2/6/2024 10:57 PM
3	Manufacturing of Slim Jim lake plates & geothermal HVAC wholesale distributor	1/23/2024 9:48 AM
4	We can install the indoor equipment and controls	1/8/2024 3:12 PM

Q3 Company Info -- What proportion of your work is geothermal related?

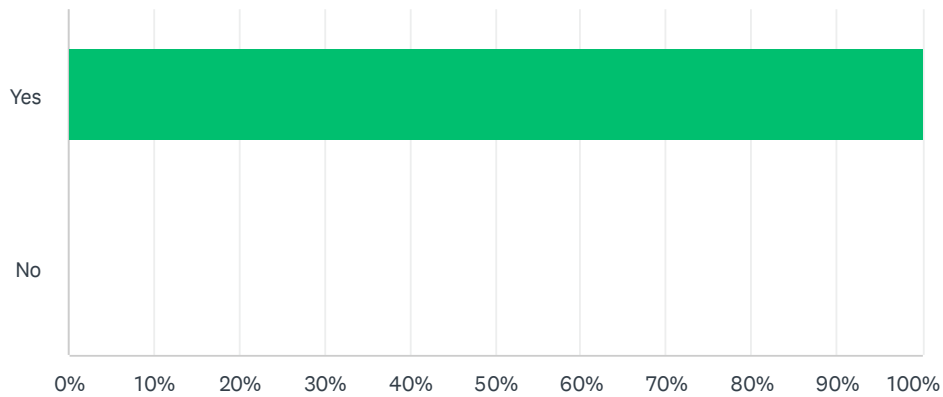
Answered: 7 Skipped: 0

#	RESPONSES	DATE
1	What?	2/13/2024 4:09 PM
2	75%	2/8/2024 12:55 PM
3	50%	2/6/2024 10:57 PM

4	15%	1/28/2024 12:29 PM
5	100%	1/24/2024 3:16 PM
6	99%	1/23/2024 9:48 AM
7	0	1/8/2024 3:12 PM

Q4 Company Info -- Does your company currently work in Connecticut?

Answered: 6 Skipped: 1



ANSWER CHOICES	RESPONSES
Yes	100.00% 6
No	0.00% 0
TOTAL	6

Q5 Company Info -- In which state(s) does your company work?

Answered: 7 Skipped: 0

#	RESPONSES	DATE
1	Ct	2/13/2024 4:09 PM
2	CT, NY, RI, MA	2/8/2024 12:55 PM
3	Michigan, Indiana, Massachusetts, New York, Texas, Oklahoma, Vermont, Ohio, Nevada, Colorado, Illinois, Iowa, Minnesota,	2/6/2024 10:57 PM
4	Vermont, New York, Maine, Connecticut, New Hampshire, Massachusetts, South Carolina, Florida, Ohio, Rhode Island	1/28/2024 12:29 PM
5	Across U.S., Canada and internationally	1/24/2024 3:16 PM
6	All US states plus the UK, Australia, & South Korea	1/23/2024 9:48 AM
7	New York, New Jersey, Connecticut, Delaware, Maryland, Virginia	1/8/2024 3:12 PM

Q6 Company Info -- Where is your company's headquarters?

Answered: 7 Skipped: 0

#	RESPONSES	DATE
1	Guilford ct	2/13/2024 4:09 PM
2	BETHLEHEM, CT	2/8/2024 12:55 PM
3	Michigan	2/6/2024 10:57 PM
4	Burlington, Vermont	1/28/2024 12:29 PM
5	Winnipeg, MB, Canada	1/24/2024 3:16 PM
6	Baton Rouge, La.	1/23/2024 9:48 AM
7	Mount Vernon, N.Y.	1/8/2024 3:12 PM

Q7 Company Info -- If your company is not currently registered to do geothermal work in Connecticut, do you plan to expand into Connecticut? Why or why not?

Answered: 6 Skipped: 1

#	RESPONSES	DATE
1	We already do	2/13/2024 4:09 PM
2	As a consultant there is a possibility.	2/6/2024 10:57 PM
3	We are licensed to do work in CT.	1/28/2024 12:29 PM
4	Not currently registered to work in CT, but willing to register as required	1/24/2024 3:16 PM
5	Yes, because the northeast is becoming more favorable in waster source heat pumps	1/23/2024 9:48 AM
6	Yes, if the work is available	1/8/2024 3:12 PM

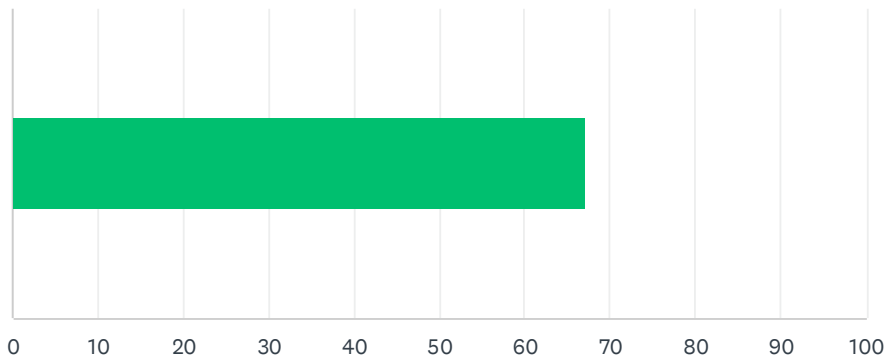
Q8 Employee Info -- How many employees does your company have total?

Answered: 7 Skipped: 0

#	RESPONSES	DATE
1	3	2/13/2024 4:09 PM
2	15	2/8/2024 12:55 PM
3	3	2/6/2024 10:57 PM
4	11	1/28/2024 12:29 PM
5	4	1/24/2024 3:16 PM
6	8	1/23/2024 9:48 AM
7	8	1/8/2024 3:12 PM

Q9 Employee Info -- What percent of employees at your company work on geothermal projects?

Answered: 7 Skipped: 0

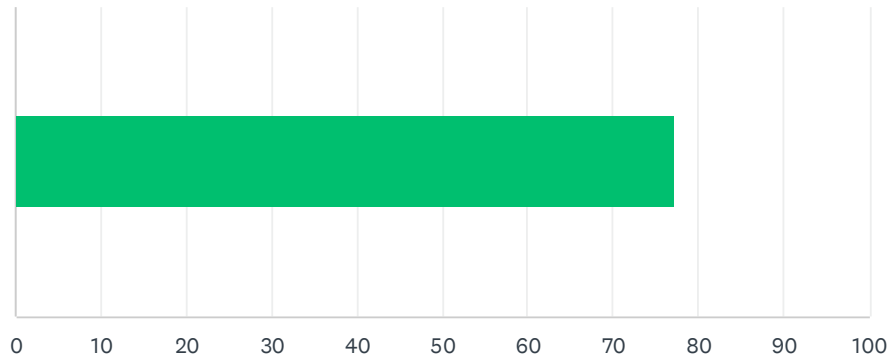


ANSWER CHOICES	AVERAGE NUMBER	TOTAL NUMBER	RESPONSES
	67	470	7
Total Respondents: 7			

#		DATE
1	35	2/13/2024 4:09 PM
2	60	2/8/2024 12:55 PM
3	100	2/6/2024 10:57 PM
4	70	1/28/2024 12:29 PM
5	100	1/24/2024 3:16 PM
6	100	1/23/2024 9:48 AM
7	5	1/8/2024 3:12 PM

Q10 Employee Info -- What percent of geothermal employees are full-time?

Answered: 7 Skipped: 0

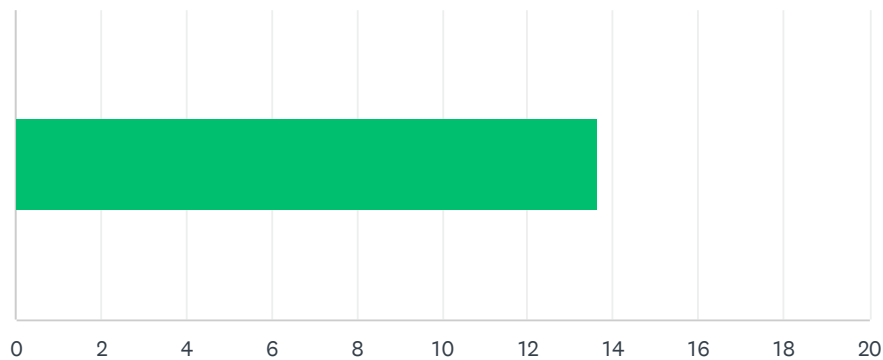


ANSWER CHOICES	AVERAGE NUMBER	TOTAL NUMBER	RESPONSES
	77	541	7
Total Respondents: 7			

#		DATE
1	38	2/13/2024 4:09 PM
2	100	2/8/2024 12:55 PM
3	100	2/6/2024 10:57 PM
4	100	1/28/2024 12:29 PM
5	100	1/24/2024 3:16 PM
6	100	1/23/2024 9:48 AM
7	3	1/8/2024 3:12 PM

Q11 Employee Info -- What percent of geothermal employees are women?

Answered: 6 Skipped: 1

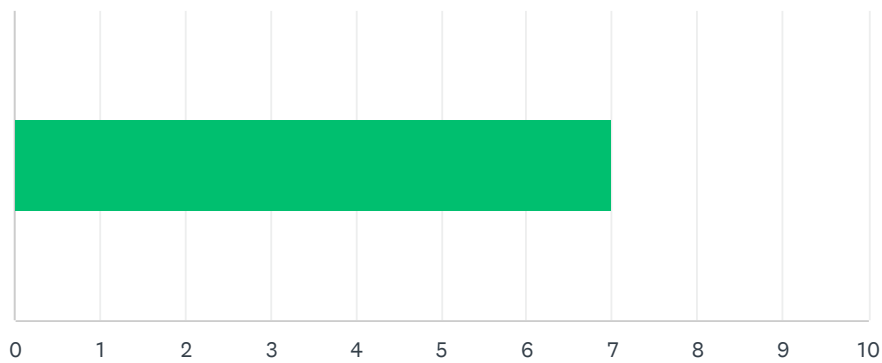


ANSWER CHOICES	AVERAGE NUMBER	TOTAL NUMBER	RESPONSES
	14	82	6
Total Respondents: 6			

#		DATE
1	0	2/8/2024 12:55 PM
2	33	2/6/2024 10:57 PM
3	10	1/28/2024 12:29 PM
4	0	1/24/2024 3:16 PM
5	38	1/23/2024 9:48 AM
6	1	1/8/2024 3:12 PM

Q12 Employee Info -- What percent of geothermal employees are minorities? (Definition of minority)

Answered: 4 Skipped: 3

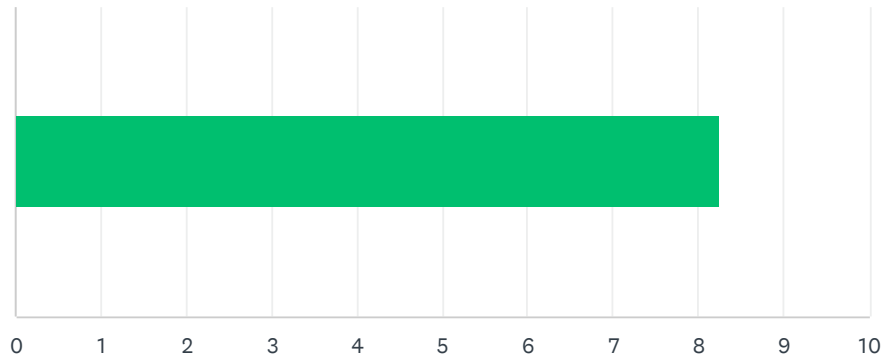


ANSWER CHOICES	AVERAGE NUMBER	TOTAL NUMBER	RESPONSES
	7	28	4
Total Respondents: 4			

#		DATE
1	11	2/8/2024 12:55 PM
2	0	1/24/2024 3:16 PM
3	12	1/23/2024 9:48 AM
4	5	1/8/2024 3:12 PM

Q13 Employee Info -- What percent of these geothermal employees are represented by unions, collective bargaining agreements, and/or project labor agreements?

Answered: 4 Skipped: 3



ANSWER CHOICES	AVERAGE NUMBER	TOTAL NUMBER	RESPONSES
	8	33	4
Total Respondents: 4			

#		DATE
1	0	2/8/2024 12:55 PM
2	33	2/6/2024 10:57 PM
3	0	1/24/2024 3:16 PM
4	0	1/8/2024 3:12 PM

Q14 Employee Info -- Please share job titles for each geothermal role.

Answered: 5 Skipped: 2

#	RESPONSES	DATE
1	WELL DRILLER, GROUTER, TIE IN/PIPING	2/8/2024 12:55 PM
2	Consultant, driller, project management, trainer	2/6/2024 10:57 PM
3	Geothermal/Mechanical - Principal Geothermal/Mechanical - Project Manager Geothermal/Mechanical - Energy Modeler Geothermal/Mechanical - Level 1 Design Engineer Geothermal/Mechanical - Level 2 Design Engineer	1/28/2024 12:29 PM
4	3 people with PE / P.Eng 3 people with CGD accreditation	1/24/2024 3:16 PM
5	General manager Design engineer Project manager Shift manager Lead installer	1/23/2024 9:48 AM

Q15 Employee Info -- For those on a salary, what is the range and median?

Answered: 3 Skipped: 4

#	RESPONSES	DATE
1	\$65,000-\$200,000	1/28/2024 12:29 PM
2	\$100k - \$150k	1/24/2024 3:16 PM

3	\$64,000-\$130,000	1/23/2024 9:48 AM
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Q16 Employee Info -- For those with hourly wages, what is the range and median?

Answered: 2 Skipped: 5

#	RESPONSES	DATE
1	\$30-\$40	1/28/2024 12:29 PM
2	M/a	1/23/2024 9:48 AM

Q17 Employee Info -- Does your company use any other pay structures?

Answered: 3 Skipped: 4

#	RESPONSES	DATE
1	No	1/28/2024 12:29 PM
2	no	1/24/2024 3:16 PM
3	No	1/23/2024 9:48 AM

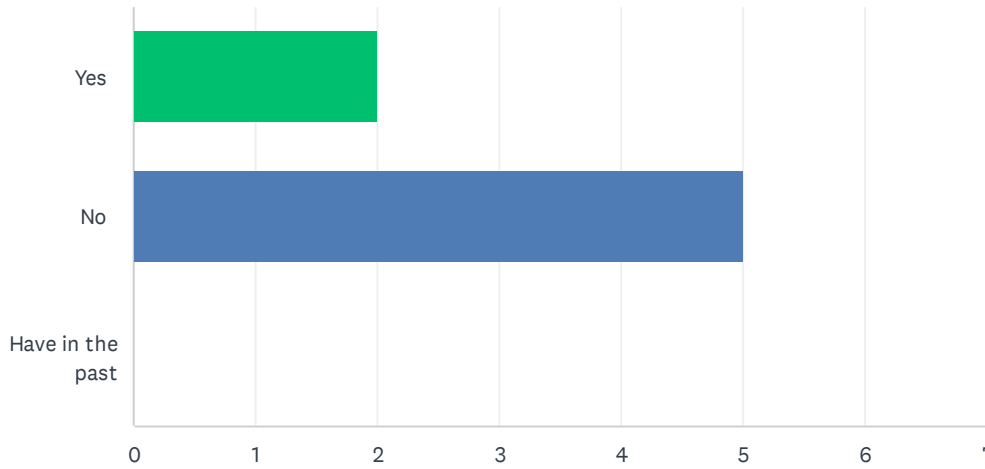
Q18 Employee Info -- What benefits does your company provide to full-time geothermal employees? To part-time geothermal employees?

Answered: 5 Skipped: 2

#	RESPONSES	DATE
1	MEDICAL/DENTAL, PAID TIME OFF, LTD, STD, 401K	2/8/2024 12:55 PM
2	401K, Bonus Structure, Health Insurance	1/28/2024 12:29 PM
3	medical / dental	1/24/2024 3:16 PM
4	All full time... Health, PTO, dental, life	1/23/2024 9:48 AM
5	We don't provide any at this time	1/8/2024 3:12 PM

Q19 Professional Pathway -- Does your company host geothermal apprentices?

Answered: 7 Skipped: 0



ANSWER CHOICES	RESPONSES
Yes	28.57% 2
No	71.43% 5
Have in the past	0.00% 0
TOTAL	7

Q20 Professional Pathway -- What are the required or desirable training/certifications for each position at your company?

Answered: 6 Skipped: 1

#	RESPONSES	DATE
1	LICENSED WELL DRILLER, NGWA CERTIFICATION, IGSHPA ACCREDITATION	2/8/2024 12:55 PM
2	Driller, PM, Safety, Geoscience	2/6/2024 10:57 PM
3	Engineering Intern Professional Engineer IGSHPA Certification Design Builder and Energy Plus training GLDesign training	1/28/2024 12:29 PM
4	PE, CGD	1/24/2024 3:16 PM
5	Install certifications, design certifications	1/23/2024 9:48 AM
6	EPA Refrigerant Certification, OSHA 30 (either have it or plan to get it)	1/8/2024 3:12 PM

Q21 Professional Pathway -- Where does your company get their necessary training/licensing?

Answered: 6 Skipped: 1

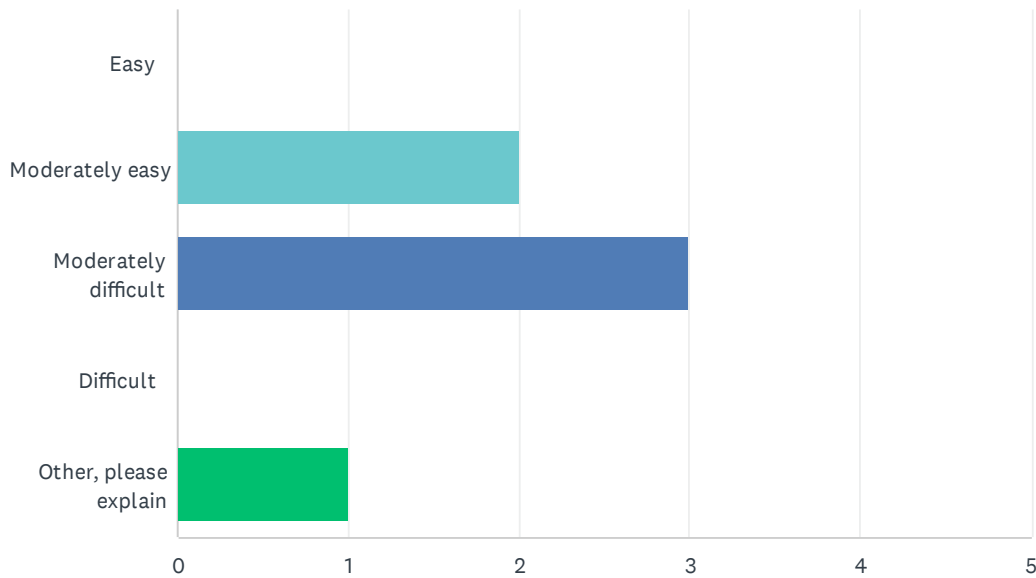
#	RESPONSES	DATE
1	ON THE JOB. RECENTLY CT HAS DEVELOPED AN APPRENTICESHIP PROGRAM THAT WE HAVE APPLIED FOR. UP UNTIL NOW WE HAVE LOGGED TRAINING HOURS AND	2/8/2024 12:55 PM

SUBMITTED LICENSING APPLICATIONS BASED ON THE TRAINING WELL DRILLER'S RECOMMENDATIONS.

2	Internally	2/6/2024 10:57 PM
3	NCEES State Professional Services IGSHPA	1/28/2024 12:29 PM
4	teach CGD course	1/24/2024 3:16 PM
5	Vendors and in house curriculum	1/23/2024 9:48 AM
6	Online/In-Person HVAC Manufacturer/Supplier training	1/8/2024 3:12 PM

Q22 Professional Pathway -- Overall, how easy is it for your company's technical employees to get the geothermal licensing they need to operate in Connecticut?

Answered: 6 Skipped: 1



ANSWER CHOICES	RESPONSES
Easy	0.00% 0
Moderately easy	33.33% 2
Moderately difficult	50.00% 3
Difficult	0.00% 0
Other, please explain	16.67% 1
TOTAL	6

#	OTHER, PLEASE EXPLAIN	DATE
1	Not sure	1/8/2024 3:12 PM

Q23 Professional Pathway -- What types of additional geothermal training, certification, and/or licensing would benefit your company?

Answered: 3 Skipped: 4

#	RESPONSES	DATE
1	Standardized licensing for USA	2/6/2024 10:57 PM
2	N/A	1/28/2024 12:29 PM
3	Local geological information	1/23/2024 9:48 AM

Q24 Professional Pathway -- How could the geothermal licensing process in Connecticut be improved?

Answered: 4 Skipped: 3

#	RESPONSES	DATE
1	WE ARE HOPING THAT THE WELL DRILLER APPRENTICESHIP PROGRAM IN CT WILL BE AN EASIER WAY FOR OUR EMPLOYEES TO FOLLOW AN ORGANIZED PATH TO BECOMING LICENSED WELL DRILLERS.	2/8/2024 12:55 PM
2	Centers of Excellence	2/6/2024 10:57 PM
3	N/A	1/28/2024 12:29 PM
4	N/a	1/23/2024 9:48 AM

Q25 Company Growth -- What are your company's main barriers to training geothermal employees? (Please elaborate if there are differences between training new and existing employees)

Answered: 2 Skipped: 5

#	RESPONSES	DATE
1	There are no barriers at this point. The only barriers we see are actual well drillers and growth of geothermal installers. This includes overcoming the additional cost for geothermal.	1/28/2024 12:29 PM
2	N/	1/23/2024 9:48 AM

Q26 Company Growth -- What is the average number of years geothermal employees have worked at your company?

Answered: 5 Skipped: 2

#	RESPONSES	DATE
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1	AVERAGE 10 YEARS	2/8/2024 12:55 PM
2	5	2/6/2024 10:57 PM
3	18	1/28/2024 12:29 PM
4	5	1/24/2024 3:16 PM
5	6	1/23/2024 9:48 AM

Q27 Company Growth -- How many new geothermal positions has your company created in the last year? What were the position titles?

Answered: 5 Skipped: 2

#	RESPONSES	DATE
1	OUR FIELD EMPLOYEES ARE NOT LIMITED TO GEOTHERMAL POSITIONS. WE HAVE WELL DRILLERS, WELL DRILLER HELPERS, A GROUT CREW, TIE IN CREW, HYDRO-SURGE AND PUMP INSTALLERS. OUR SERVICES INCLUDE DOMESTIC WATER WELLS, HYDRO SURGE AND PUMPS AS WELL AS THE GEOTHERMAL PORTION.	2/8/2024 12:55 PM
2	1	2/6/2024 10:57 PM
3	Three (1)Geothermal/Mechanical - Energy Modeler (2)Geothermal/Mechanical - Level 1 Design Engineer	1/28/2024 12:29 PM
4	1 PE	1/24/2024 3:16 PM
5	1...training manager	1/23/2024 9:48 AM

Q28 Company Growth -- How many employees hired in the last year were represented by a union?

Answered: 5 Skipped: 2

#	RESPONSES	DATE
1	NONE	2/8/2024 12:55 PM
2	1	2/6/2024 10:57 PM
3	0	1/28/2024 12:29 PM
4	0	1/24/2024 3:16 PM
5	0	1/23/2024 9:48 AM

Q29 Company Growth -- How many of your company's current geothermal staff was hired in the last year to replace personnel who left the firm?

Answered: 5 Skipped: 2

#	RESPONSES	DATE
1	NONE	2/8/2024 12:55 PM

2	0	2/6/2024 10:57 PM
3	0	1/28/2024 12:29 PM
4	0	1/24/2024 3:16 PM
5	0	1/23/2024 9:48 AM

Q30 Company Growth -- How many new geothermal positions has your company created in the last 5 years? What were the position titles?

Answered: 5 Skipped: 2

#	RESPONSES	DATE
1	SEE ANSWER TO QUESTION 27.	2/8/2024 12:55 PM
2	1	2/6/2024 10:57 PM
3	Three (2)Geothermal/Mechanical - Energy Modeler (2)Geothermal/Mechanical - Level 1 Design Engineer	1/28/2024 12:29 PM
4	3 PEs. 1 drafting	1/24/2024 3:16 PM
5	0	1/23/2024 9:48 AM

Q31 Company Growth -- Do some geothermal positions at your company tend to turn over more quickly than others? Which ones? Why?

Answered: 3 Skipped: 4

#	RESPONSES	DATE
1	NO	2/8/2024 12:55 PM
2	No.	1/28/2024 12:29 PM
3	No	1/23/2024 9:48 AM

Q32 Company Growth -- How many additional geothermal positions do you expect to create in the next year?

Answered: 5 Skipped: 2

#	RESPONSES	DATE
1	WE ARE CURRENTLY WORKING ON TRAINING OUR CURRENT EMPLOYEES SO THAT WE CAN PROMOTE THEM FROM WITHIN. IN THIS CASE WE WILL BE LOOKING FOR 1-2 WELL DRILLERS HELPERS SO TRAIN.	2/8/2024 12:55 PM
2	7	2/6/2024 10:57 PM
3	1 to 2	1/28/2024 12:29 PM
4	1	1/24/2024 3:16 PM

Q33 Company Growth -- If you expect to create geothermal positions in the next year, what positions will they be for? Are you currently/will you soon be trying to hire more employees?

Answered: 5 Skipped: 2

#	RESPONSES	DATE
1	WELL DRILLERS HELPERS. WE ARE NOT CURRENTLY ACTIVELY SEEKING OUT NEW EMPLOYEES BUT ARE ALWAYS WILLING TO INTERVIEW AN APPLICANT.	2/8/2024 12:55 PM
2	Yes	2/6/2024 10:57 PM
3	(1(1)Geothermal/Mechanical - Project (1)Geothermal/Mechanical - Design Engineer Level 2	1/28/2024 12:29 PM
4	PE and support	1/24/2024 3:16 PM
5	Expanding to new cities	1/23/2024 9:48 AM

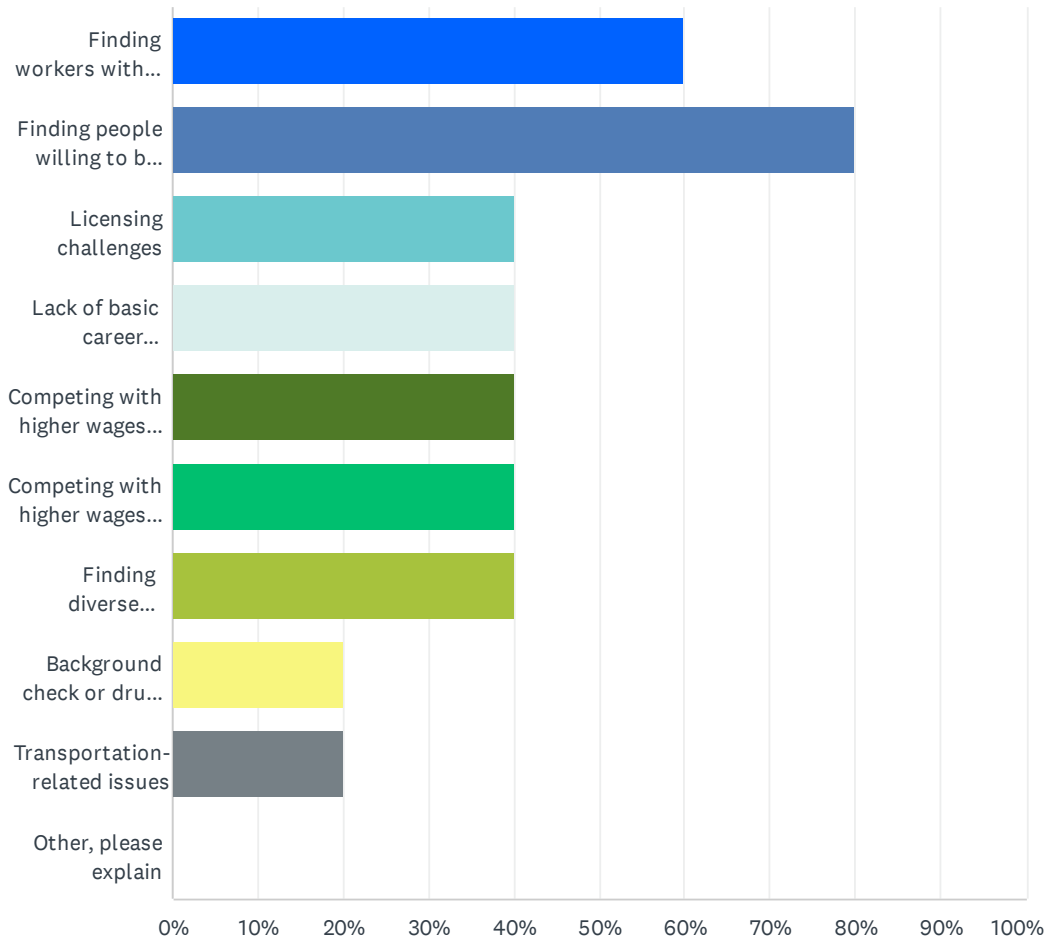
Q34 Company Growth -- Why do you think people want to work in geothermal? What aspects of the work/geothermal field do you highlight in recruiting employees?

Answered: 5 Skipped: 2

#	RESPONSES	DATE
1	THE WELL DRILLING PORTION OF A GEOTHERMAL PROJECT IS HARD WORK, DIRTY AND NOT MANY PEOPLE WANT TO DO IT. WE HAVE BEEN LUCKY TO RETAIN OUR EMPLOYEES FOR 5-32 YEARS CURRENTLY. PEOPLE LOOK AT GEOTHERMAL AS THE FUTURE SO IT IS ATTRACTIVE TO SOMEONE WHO WANTS A PERMANENT JOB.	2/8/2024 12:55 PM
2	Climate justice	2/6/2024 10:57 PM
3	Individuals who are interested in efficient and carbon free ways to heat and cool buildings. Allows for fully electrified building. Allows for net-zero building operation when renewables are used. Reduces fossil fuels in building.	1/28/2024 12:29 PM
4	interest in reducing impact on environment	1/24/2024 3:16 PM
5	Green industry, younger hires like the learning involved	1/23/2024 9:48 AM

Q35 Company Growth -- What are your main barriers to hiring for geothermal positions? (Select all that apply)

Answered: 5 Skipped: 2



ANSWER CHOICES	RESPONSES	
Finding workers with adequate training	60%	3
Finding people willing to be trained	80%	4
Licensing challenges	40%	2
Lack of basic career competencies	40%	2
Competing with higher wages at other geothermal companies	40%	2
Competing with higher wages in other fields	40%	2
Finding diverse candidates	40%	2
Background check or drug test failure	20%	1
Transportation-related issues	20%	1
Other, please explain	0%	0
Total Respondents: 5		

#	OTHER, PLEASE EXPLAIN	DATE
	There are no responses.	

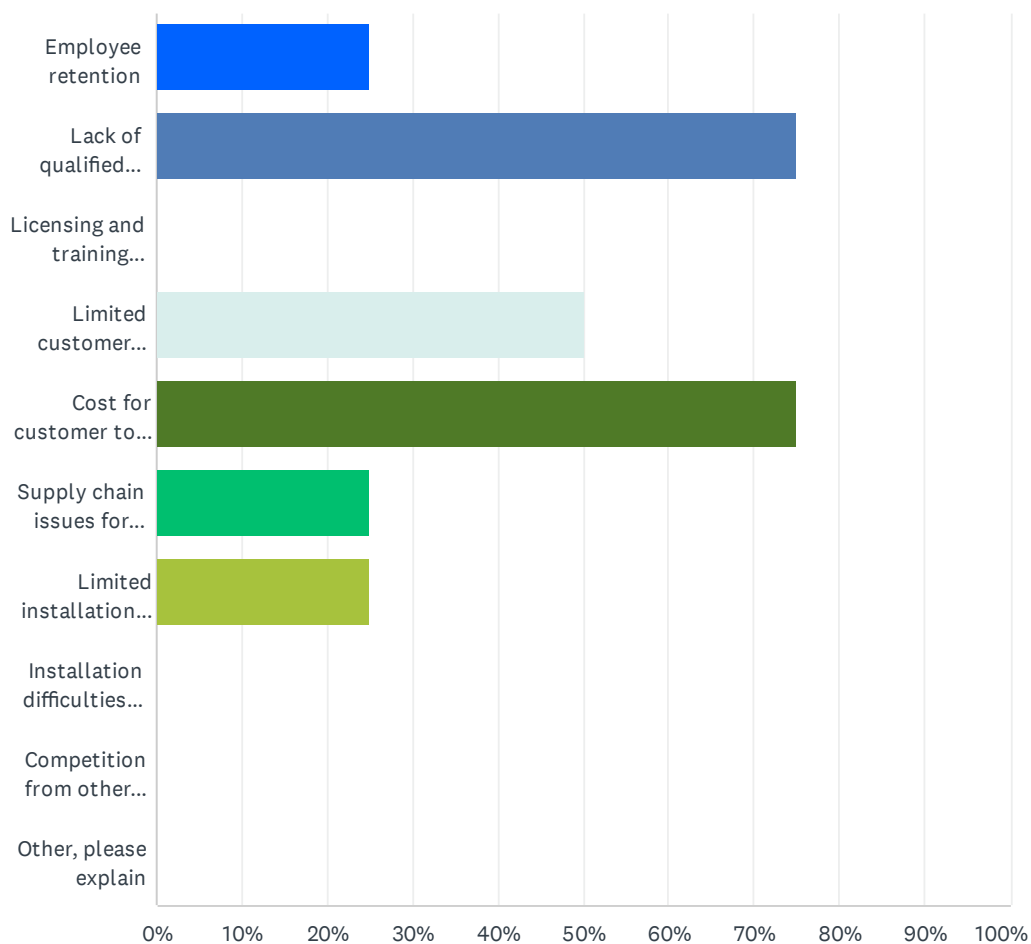
Q36 Company Growth -- What are your main barriers to retention for geothermal employees?

Answered: 3 Skipped: 4

#	RESPONSES	DATE
1	FINDING PEOPLE WHO WANT TO WORK AND WANT TO WORK IN WELL DRILLING.	2/8/2024 12:55 PM
2	Ensuring enough work can support employee salaries.	1/28/2024 12:29 PM
3	None	1/23/2024 9:48 AM

Q37 Company Growth -- What are the top three barriers to growing your geothermal business? (Please select up to three responses)

Answered: 4 Skipped: 3



ANSWER CHOICES	RESPONSES
Employee retention	25.00% 1
Lack of qualified workers	75.00% 3
Licensing and training employees	0.00% 0
Limited customer awareness of geothermal	50.00% 2
Cost for customer to install geothermal	75.00% 3
Supply chain issues for geothermal equipment (condensers, piping, etc.)	25.00% 1
Limited installation equipment (drilling rigs, etc.)	25.00% 1
Installation difficulties at sites (lack of space, bedrock, etc.)	0.00% 0
Competition from other companies	0.00% 0
Other, please explain	0.00% 0
Total Respondents: 4	

#	OTHER, PLEASE EXPLAIN	DATE
	There are no responses.	

Q38 Projects -- How many geothermal projects do you typically complete per year?

Answered: 4 Skipped: 3

#	RESPONSES	DATE
1	100	2/8/2024 12:55 PM
2	10	1/28/2024 12:29 PM
3	20-30	1/24/2024 3:16 PM
4	100	1/23/2024 9:48 AM

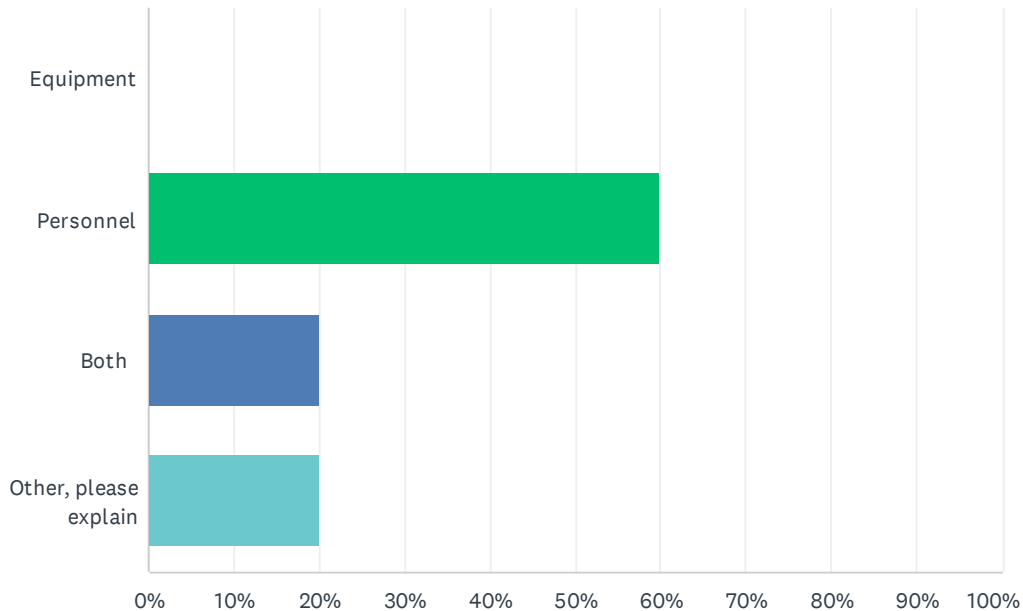
Q39 Projects -- How many geothermal projects can your company undertake at once?

Answered: 5 Skipped: 2

#	RESPONSES	DATE
1	4-5	2/8/2024 12:55 PM
2	6	2/6/2024 10:57 PM
3	10	1/28/2024 12:29 PM
4	3-5	1/24/2024 3:16 PM
5	3-5	1/23/2024 9:48 AM

Q40 Projects -- Is the number of projects your company can undertake limited primarily by equipment, by personnel, by both, or by something else?

Answered: 5 Skipped: 2



#	OTHER, PLEASE EXPLAIN	DATE
1	Quality projects	2/6/2024 10:57 PM

Q41 How can the State of Connecticut help your company with any challenges or barriers to geothermal work that you identified in this survey?

Answered: 3 Skipped: 4

#	RESPONSES	DATE
1	HELP FIND PEOPLE WHO WANT TO WORK, AND WANT TO WORK IN THIS INDUSTRY	2/8/2024 12:55 PM
2	Standardize borefield specifications	2/6/2024 10:57 PM
3	Encourage individuals to pursue well drilling and mechanical careers. Offer incentives for contractors to pursue geothermal. Offer information to home owners on how to connect to well drillers and mechanical contractors interested in pursuing geothermal. Offer guidance to residential and commercial clients on how to ensure they can maximize their project to take advantage of all the incentives (IRA, etc.) to make geothermal affordable. Provide means to fund construction bridge loans so that it would not cost anymore to residential and commercial builders who want to take pursue geothermal. loan would be paid after construction based on geothermal incentives.	1/28/2024 12:29 PM

Q42 Please feel free to use this space to share any additional comments not covered above.

Answered: 0 Skipped: 7

#	RESPONSES	DATE
	There are no responses.	

Q2 What is the focus of your training center?

Answered: 1 Skipped: 0

#	RESPONSES	DATE
1	HVAC	1/22/2024 1:43 PM

Q3 How many classes does the center offer on geothermal heating and cooling systems? If it does not offer any, are there plans to add this topic?

Answered: 1 Skipped: 0

#	RESPONSES	DATE
1	None and no.	1/22/2024 1:43 PM

Q4 How many students does the center host in a year? How has this number changed over the last 10-15 years?

Answered: 1 Skipped: 0

#	RESPONSES	DATE
1	Approximately 70 and we have been growing for the past 10 years.	1/22/2024 1:43 PM

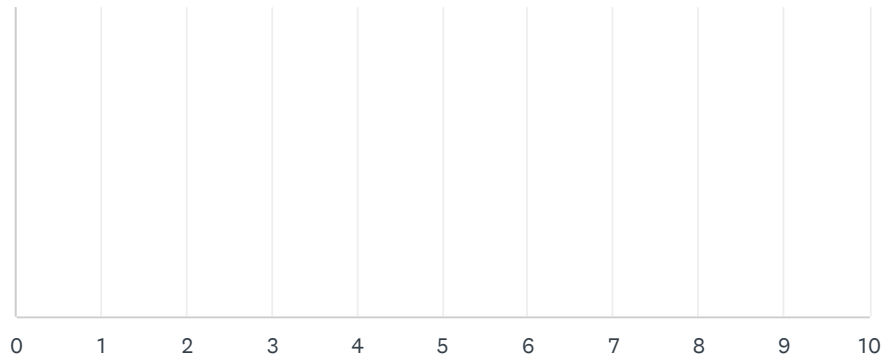
Q5 How many students go through geothermal-relevant training?

Answered: 1 Skipped: 0

#	RESPONSES	DATE
1	None	1/22/2024 1:43 PM

Q6 What percentage of your students taking geothermal classes are women?

Answered: 1 Skipped: 0



ANSWER CHOICES	AVERAGE NUMBER	TOTAL NUMBER	RESPONSES
	0	0	1
Total Respondents: 1			

#	DATE
1	1/22/2024 1:43 PM

Q7 What percentage of your students taking geothermal classes are minorities? (Definition of minority)

Answered: 0 Skipped: 1

No matching responses.

ANSWER CHOICES	AVERAGE NUMBER	TOTAL NUMBER	RESPONSES
	0	0	0
Total Respondents: 0			

#	DATE
There are no responses.	

Q8 Does your center focus any recruitment spending on women and/or minorities?

Answered: 0 Skipped: 1

No matching responses.

ANSWER CHOICES	RESPONSES
Yes	0.00% 0
No	0.00% 0
Not sure	0.00% 0
TOTAL	0

Q9 If answered yes above, what percentage of spending is focused?

Answered: 0 Skipped: 1

 No matching responses.

ANSWER CHOICES	AVERAGE NUMBER	TOTAL NUMBER	RESPONSES
	0	0	0
Total Respondents: 0			

#	DATE
There are no responses.	

Q10 Does your training center plan on expanding its geothermal program in the next few years?

Answered: 1 Skipped: 0

#	RESPONSES	DATE
1	No	1/22/2024 1:43 PM

Q11 What other geothermal workforce development initiatives are occurring in the region?

Answered: 0 Skipped: 1

#	RESPONSES	DATE
There are no responses.		

Q12 What are the current pathways for professionals entering the geothermal workforce?

Answered: 0 Skipped: 1

#	RESPONSES	DATE
	There are no responses.	

Q13 What technical high schools, colleges, or apprenticeship programs are feeders to the geothermal industry?

Answered: 0 Skipped: 1

#	RESPONSES	DATE
	There are no responses.	

Q14 What re-training is readily available for other tradespeople who want to start working in geothermal?

Answered: 0 Skipped: 1

#	RESPONSES	DATE
	There are no responses.	

Q15 Are there any related trades from which your center sees workers moving into geothermal?

Answered: 1 Skipped: 0

#	RESPONSES	DATE
1	No	1/22/2024 1:43 PM

Q16 Are there any related trades in declining industries whose workforces you anticipate may want to be re-skilled or upskilled for geothermal work in the next 10 years?

Answered: 0 Skipped: 1

#	RESPONSES	DATE
	There are no responses.	

Q17 How can the State of Connecticut assist with the development of geothermal training programs and growing the geothermal workforce?

Answered: 0 Skipped: 1

#	RESPONSES	DATE
	There are no responses.	

Q18 What are your center's main barriers to growing the geothermal workforce?

Answered: 1 Skipped: 0

#	RESPONSES	DATE
1	Lack of market demand for these systems	1/22/2024 1:43 PM

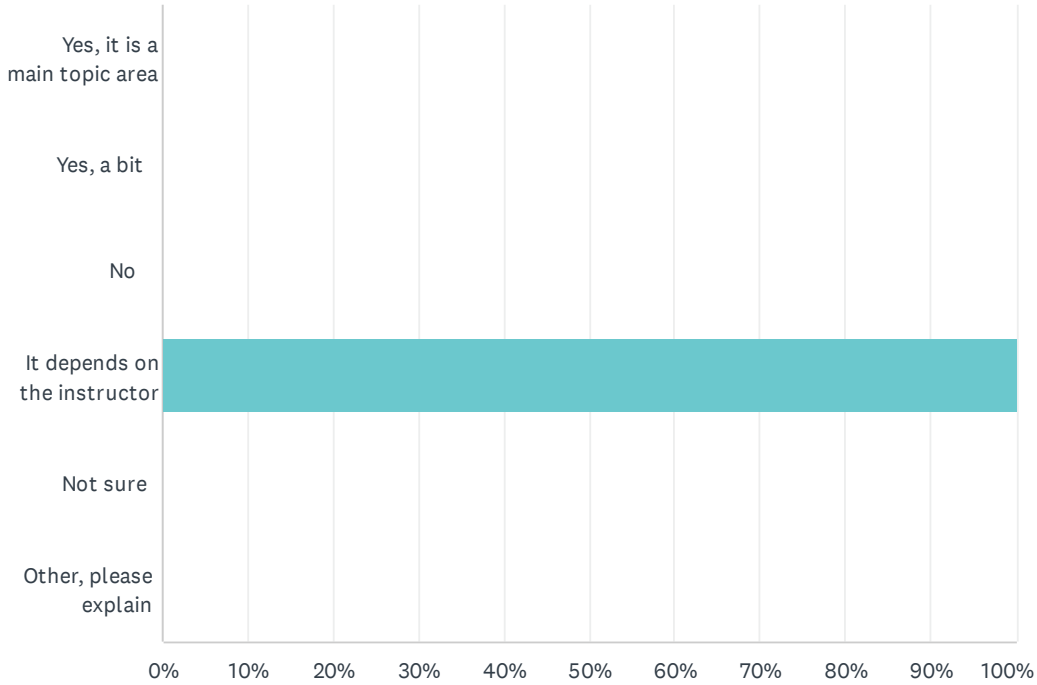
Q19 Please feel free to use this space to share any additional comments not covered above.

Answered: 1 Skipped: 0

#	RESPONSES	DATE
1	While we have seen an increase in demand for our training on air source heat pumps we have had no requests for geothermal training.	1/22/2024 1:43 PM

Q2 Does your school have any course material on geothermal heating and cooling in the HVAC program?

Answered: 1 Skipped: 0



ANSWER CHOICES	RESPONSES	
Yes, it is a main topic area	0.00%	0
Yes, a bit	0.00%	0
No	0.00%	0
It depends on the instructor	100.00%	1
Not sure	0.00%	0
Other, please explain	0.00%	0
TOTAL		1

#	OTHER, PLEASE EXPLAIN	DATE
	There are no responses.	

Q3 How many students does the school host in a year? How has this number changed over the last 10-15 years?

Answered: 1 Skipped: 0

#	RESPONSES	DATE
1	65-85 per year in the HVAC program, this number is down compared to years past	1/22/2024 10:10 PM

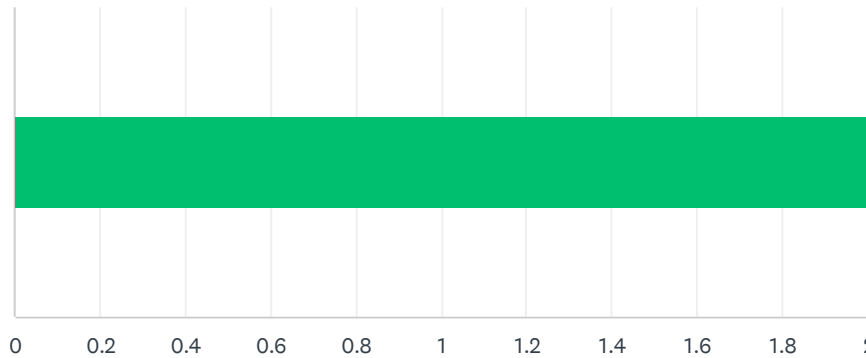
Q4 How many students go through geothermal-relevant training?

Answered: 1 Skipped: 0

#	RESPONSES	DATE
1	It is based on the instructor. I have discussed it with roughly 40 students within the past year	1/22/2024 10:10 PM

Q5 What percentage of your students participating in geothermal-relevant training are women?

Answered: 1 Skipped: 0

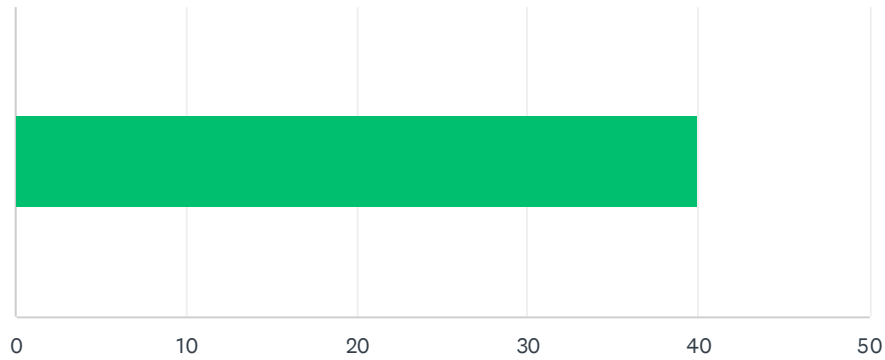


ANSWER CHOICES	AVERAGE NUMBER	TOTAL NUMBER	RESPONSES
		2	2
Total Respondents: 1			1

#	DATE
1	2
	1/22/2024 10:10 PM

Q6 What percentage of your students participating in geothermal-relevant training are minorities? (Definition of minority)

Answered: 1 Skipped: 0

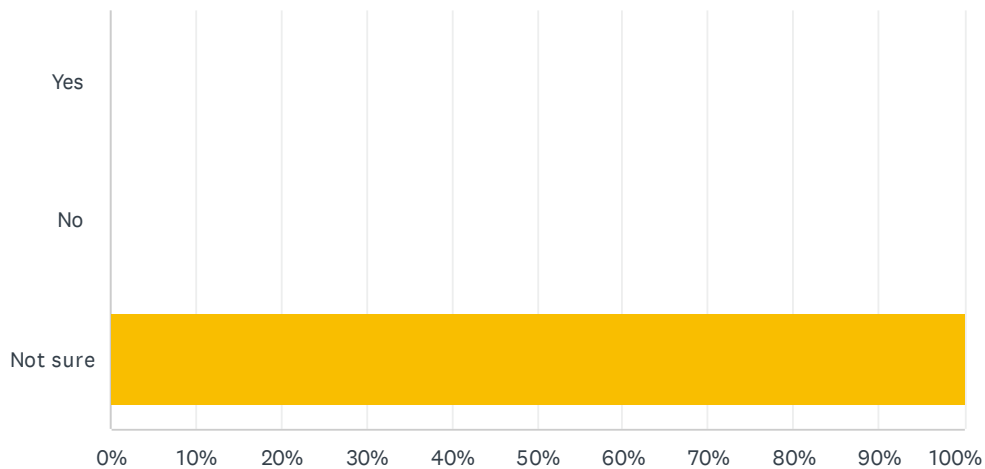


ANSWER CHOICES	AVERAGE NUMBER	TOTAL NUMBER	RESPONSES
	40	40	1
Total Respondents: 1			

#	DATE
1	1/22/2024 10:10 PM

Q7 Does your school focus any recruitment spending on women and/or minorities?

Answered: 1 Skipped: 0



ANSWER CHOICES	RESPONSES
Yes	0.00% 0
No	0.00% 0
Not sure	100.00% 1
TOTAL	1

Q8 If answered yes above, what percentage of spending is focused?

Answered: 0 Skipped: 1

 No matching responses.

ANSWER CHOICES	AVERAGE NUMBER	TOTAL NUMBER	RESPONSES
	0	0	0
Total Respondents: 0			

#	RESPONSES	DATE
There are no responses.		

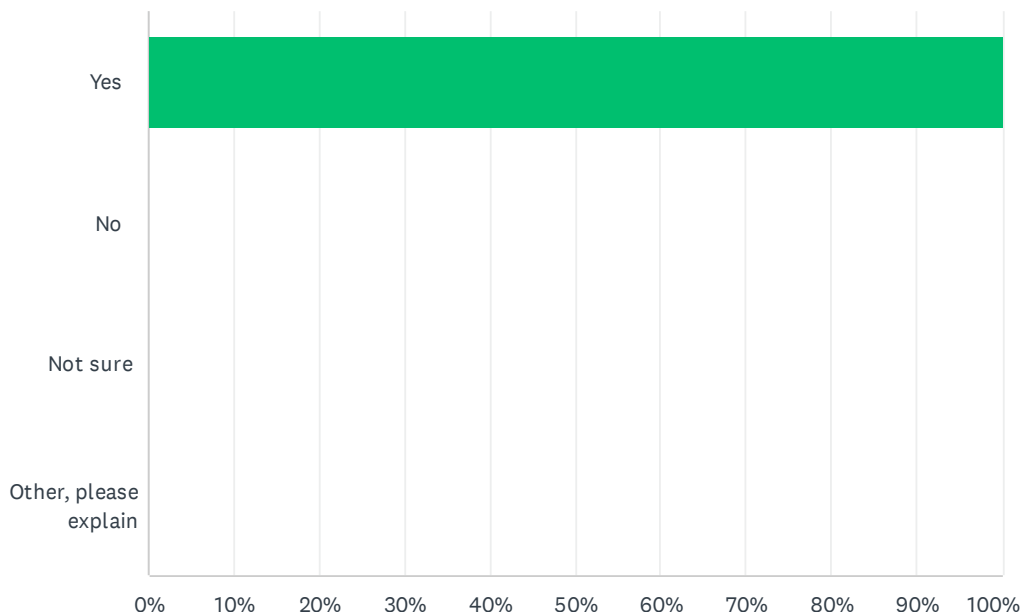
Q9 What are the current pathways for professionals entering the geothermal workforce after graduating from your school?

Answered: 1 Skipped: 0

#	RESPONSES	DATE
1	Green energy certificate, CT apprenticeship program	1/22/2024 10:10 PM

Q10 Does your school help students find apprenticeships in geothermal careers?

Answered: 1 Skipped: 0



ANSWER CHOICES	RESPONSES	
Yes	100.00%	1
No	0.00%	0
Not sure	0.00%	0
Other, please explain	0.00%	0
TOTAL		1

#	OTHER, PLEASE EXPLAIN	DATE
	There are no responses.	

Q11 Does your school plan on expanding its geothermal program in the next few years?

Answered: 1 Skipped: 0

#	RESPONSES	DATE
1	Unsure. We do have a geothermal trainer and we do cover some it in class, but unfortunate a majority of our instructors do not have experience in geothermal systems	1/22/2024 10:10 PM

Q12 What other geothermal workforce development initiatives are occurring in the region?

Answered: 1 Skipped: 0

#	RESPONSES	DATE
1	Partner companies such as Budderfly in Shelton CT and Dandelion Energy	1/22/2024 10:10 PM

Q13 What re-training is readily available for other tradespeople who want to start working in geothermal?

Answered: 1 Skipped: 0

#	RESPONSES	DATE
1	Online or manufacturer based.	1/22/2024 10:10 PM

Q14 Are there any related trades from which your school sees workers moving into geothermal?

Answered: 1 Skipped: 0

#	RESPONSES	DATE
1	Most HVAC. Geothermal uses the same concept as water source heat pumps in commercial applications so there is a strong crossover	1/22/2024 10:10 PM

Q15 Are there related trades in declining industries whose workforces you anticipate may want to be re-skilled or upskilled for geothermal work in the next 10 years?

Answered: 1 Skipped: 0

#	RESPONSES	DATE
1	Unsure	1/22/2024 10:10 PM

Q16 What are your school's main barriers to growing the geothermal workforce?

Answered: 1 Skipped: 0

#	RESPONSES	DATE
1	A lot of it has to do with the students engagement and understanding of basic systems. Geothermal systems use concepts that typically only competent licensed technicians hold. Are student population struggle with mathematics, computer literacy, and basic understandings of how to use tools properly	1/22/2024 10:10 PM

Q17 How can the State of Connecticut assist with the development of geothermal training programs and growing the geothermal workforce?

Answered: 1 Skipped: 0

#	RESPONSES	DATE
1	Promote the trades better during K-8 and 9-12 grades. Assist with training plans and incentives for students to chose that pathway	1/22/2024 10:10 PM

Q18 Please feel free to use this space to share any additional comments not covered above.

Answered: 1 Skipped: 0

#	RESPONSES	DATE
1	As mentioned above, our student population entering into trade school are having difficulties with the basics. The States current curriculum is theory heavy, but is quite overwhelming for most of these students. I would personally like to push green energy, along with geothermal systems, cogeneration, and of the sort, but unfortunately I think it is a far stretch that my students will be able to comprehend this technology. I do however have some students that excel in class and would love to offer this specialized training to them, but think some sort of incentive should be offered. Perhaps an additional certification or possibly ensured job placement?	1/22/2024 10:10 PM

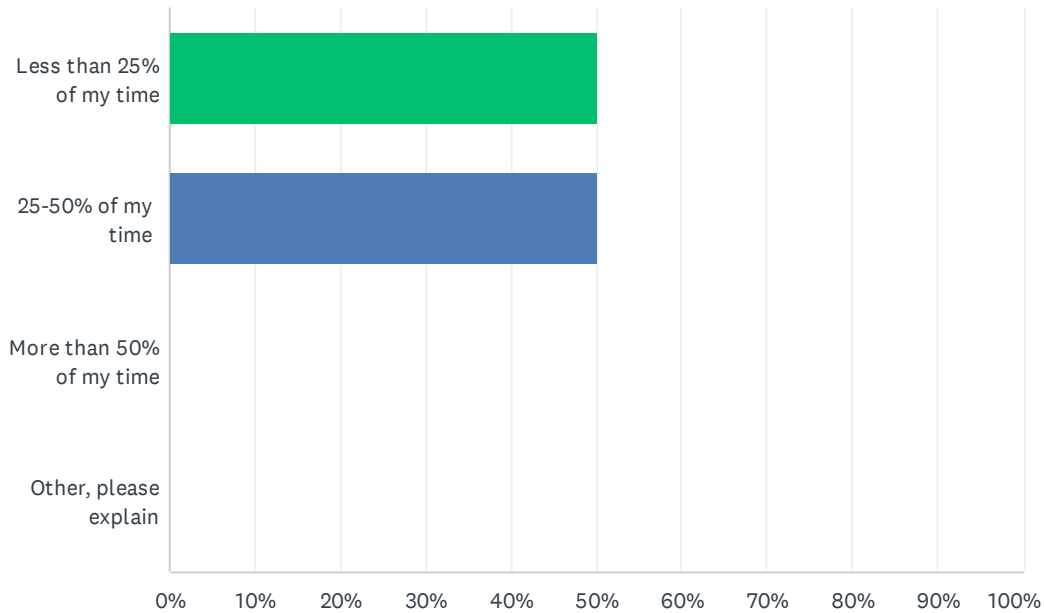
Q1 What is your title at W.H.A.?

Answered: 2 Skipped: 0

#	RESPONSES	DATE
1	Maintainer	1/22/2024 12:56 PM
2	Facilities Manager	1/22/2024 12:14 PM

Q2 During the heating season, how much of your time do you currently spend maintaining the heating system of the Ulbrich Heights buildings?

Answered: 2 Skipped: 0

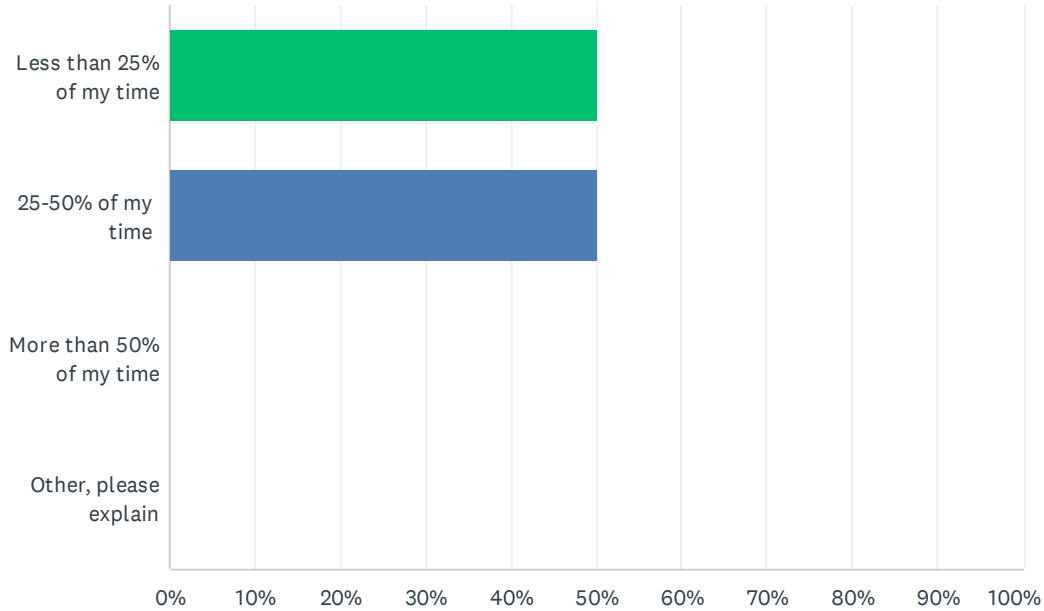


ANSWER CHOICES	RESPONSES	
Less than 25% of my time	50.00%	1
25-50% of my time	50.00%	1
More than 50% of my time	0.00%	0
Other, please explain	0.00%	0
TOTAL		2

#	OTHER, PLEASE EXPLAIN	DATE
	There are no responses.	

Q3 Outside of the heating season, how much of your time do you currently spend maintaining the heating system of the Ulbrich Heights buildings?

Answered: 2 Skipped: 0



ANSWER CHOICES	RESPONSES
Less than 25% of my time	50.00% 1
25-50% of my time	50.00% 1
More than 50% of my time	0.00% 0
Other, please explain	0.00% 0
TOTAL	2

#	OTHER, PLEASE EXPLAIN	DATE
	There are no responses.	

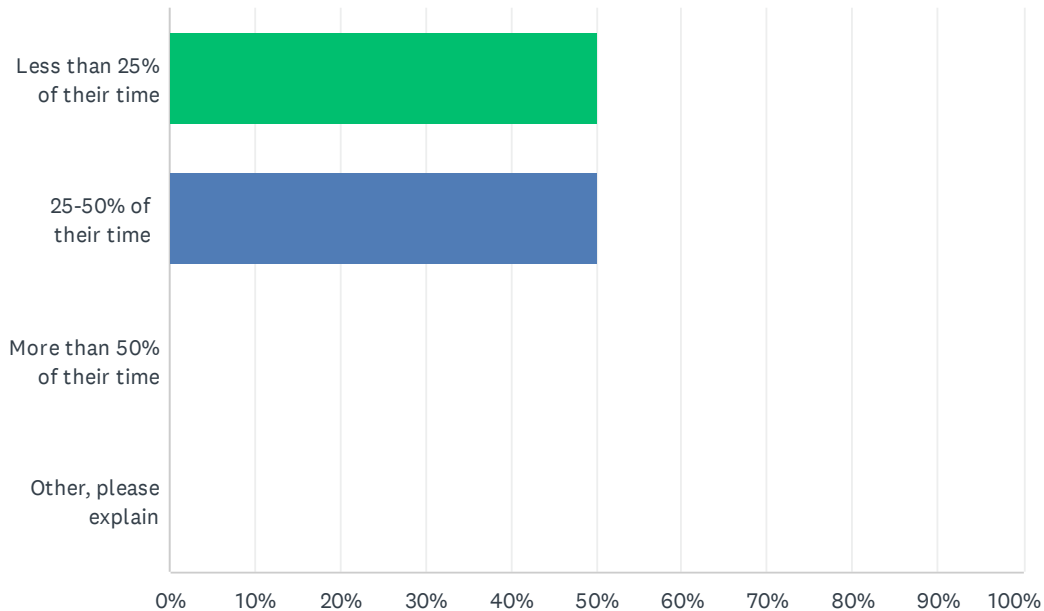
Q4 How much time do contractors and the facilities staff, as a whole, in hours per week, spend maintaining the heating system at Ulbrich Heights?

Answered: 2 Skipped: 0

#	RESPONSES	DATE
1	4	1/22/2024 12:56 PM
2	15	1/22/2024 12:14 PM

Q5 During the heating season, how much time do contractors and the facilities staff, as a whole, as an approximate percent of their time, spend maintaining the heating system at Ulbrich Heights?

Answered: 2 Skipped: 0

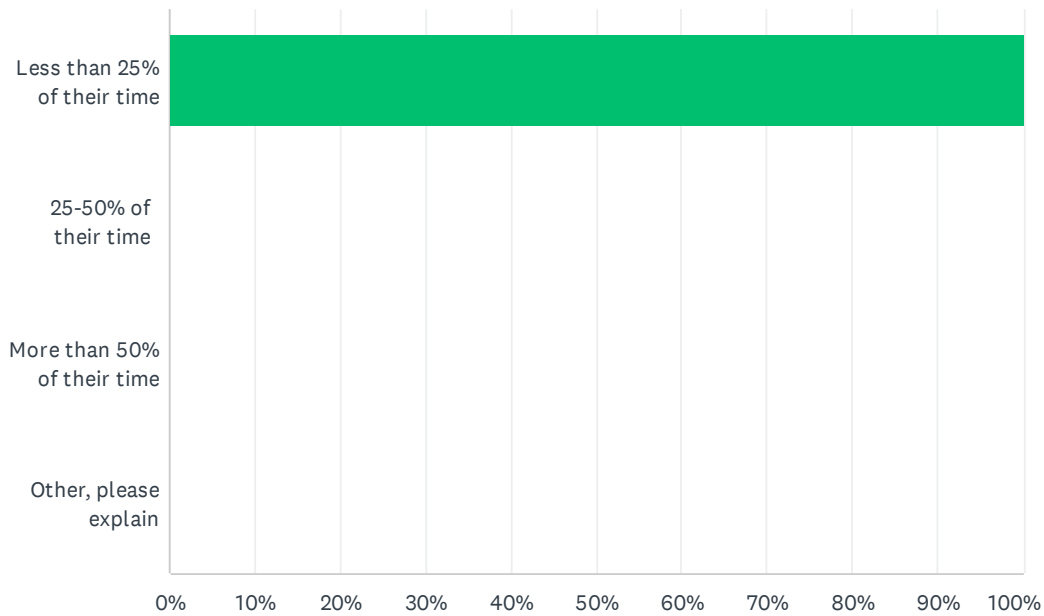


ANSWER CHOICES	RESPONSES
Less than 25% of their time	50.00% 1
25-50% of their time	50.00% 1
More than 50% of their time	0.00% 0
Other, please explain	0.00% 0
TOTAL	2

#	OTHER, PLEASE EXPLAIN	DATE
	There are no responses.	

Q6 Outside of the heating season, how much time do contractors and the facilities staff, as a whole, as an approximate percent of their time, spend maintaining the heating system at Ulbrich Heights?

Answered: 2 Skipped: 0

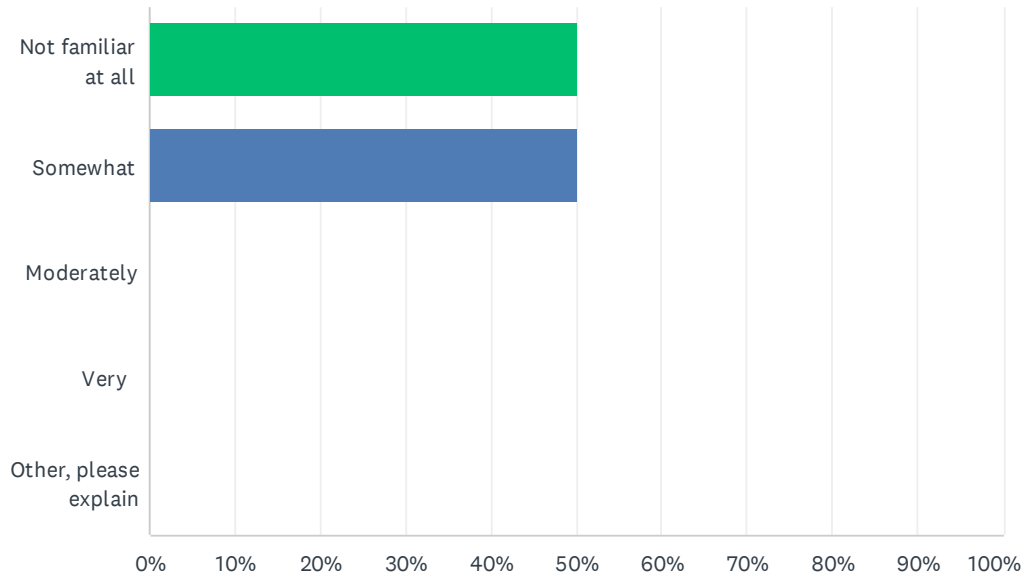


ANSWER CHOICES	RESPONSES	
Less than 25% of their time	100.00%	2
25-50% of their time	0.00%	0
More than 50% of their time	0.00%	0
Other, please explain	0.00%	0
TOTAL		2

#	OTHER, PLEASE EXPLAIN	DATE
	There are no responses.	

Q7 How familiar are you with geothermal heat pumps?

Answered: 2 Skipped: 0

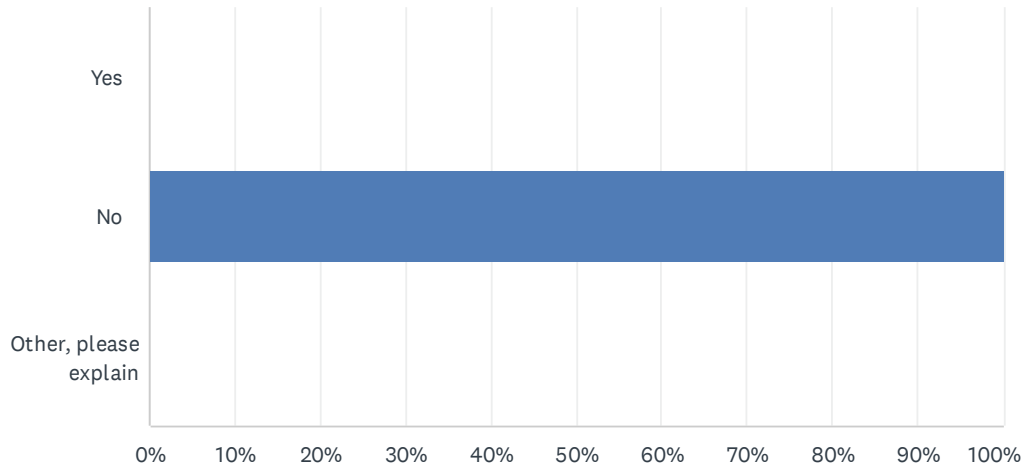


ANSWER CHOICES	RESPONSES	
Not familiar at all	50.00%	1
Somewhat	50.00%	1
Moderately	0.00%	0
Very	0.00%	0
Other, please explain	0.00%	0
TOTAL		2

#	OTHER, PLEASE EXPLAIN	DATE
	There are no responses.	

Q8 Have you ever worked with a geothermal heat pump system before?

Answered: 2 Skipped: 0

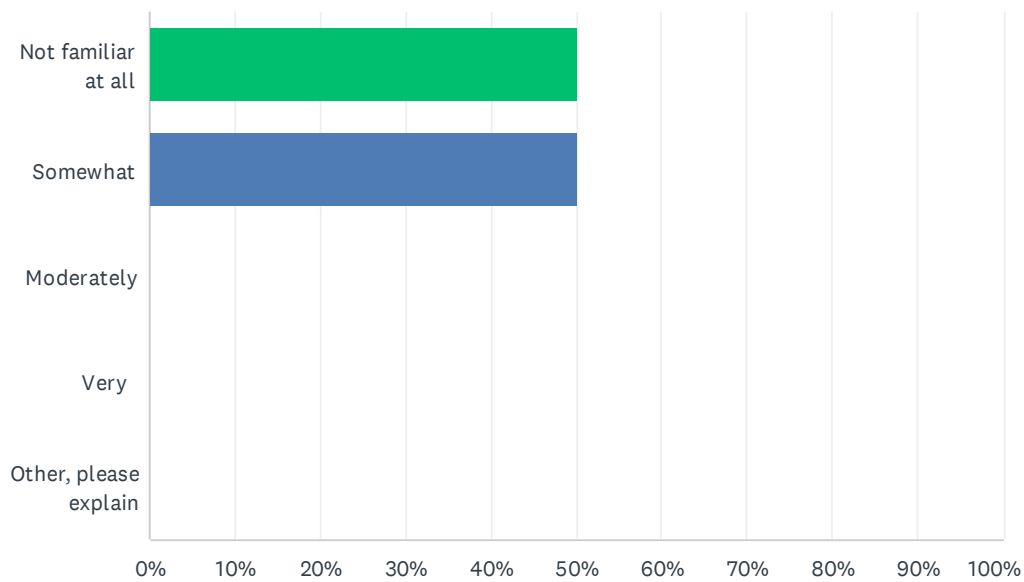


ANSWER CHOICES	RESPONSES
Yes	0.00% 0
No	100.00% 2
Other, please explain	0.00% 0
TOTAL	2

#	OTHER, PLEASE EXPLAIN	DATE
There are no responses.		

Q9 How familiar are you with ground source and geothermal heat pumps?

Answered: 2 Skipped: 0



ANSWER CHOICES	RESPONSES	
Not familiar at all	50.00%	1
Somewhat	50.00%	1
Moderately	0.00%	0
Very	0.00%	0
Other, please explain	0.00%	0
TOTAL		2

#	OTHER, PLEASE EXPLAIN	DATE
	There are no responses.	

Q10 Please feel free to use this space to share any additional comments not covered above.

Answered: 0 Skipped: 2

#	RESPONSES	DATE
	There are no responses.	

Q11 If you have interest in learning more about ground source and geothermal heat pumps, please provide contact information below.

Answered: 0 Skipped: 2

#	RESPONSES	DATE
	There are no responses.	