

# Ulbrich Heights Geothermal Project Workforce Development and Training Plan

## Introduction

This localized workforce development plan for Wallingford, Connecticut, was created on behalf of the Connecticut Department of Energy and Environmental Protection (CT DEEP) for its District Geothermal Heating + Cooling Deployment in an Environmental Justice Community project. This project is funded by the U.S. Department of Energy (DOE) and focuses on developing a networked geothermal system for Ulbrich Heights, a multifamily affordable housing complex in Wallingford.

In July 2024, CT DEEP, in collaboration with Northeast Energy Efficiency Partnerships (NEEP), the University of Connecticut, LN Consulting, the Wallingford Housing Authority, and the Wallingford Electric Division, published a [Geothermal Heat Pump Workforce Development Plan for Connecticut](#). This plan builds on the findings of a prior [Connecticut Geothermal Industry Workforce Needs Assessment](#). The plan analyzes the workforce needs assessment's findings and proposes various strategies for the state to consider, including geothermal licensing, drilling, training new professionals, and promoting equity.

Building on insights from these two previous reports, this localized workforce plan details the needs and requirements for designing and deploying a networked geothermal system specific to the town of Wallingford and the Ulbrich Heights project. The plan provides recommendations to establish workforce support structures, uphold labor best practices, and contribute to the growth of the geothermal workforce across the state.

## Project Design

This geothermal system design features 90 500-foot-deep boreholes spaced 20 feet apart in a large greenspace that serves as the central common area of the Ulbrich Heights site. This design is based on energy modeling and geothermal field simulations conducted by the project partners. The central common lawn provides sufficient space for all of the system's required boreholes in a single location, as well as sufficient space to install a central pump house enclosure. This enclosure would contain the system's main circulator pumps and a distribution manifold for the geothermal borehole field loops. Centrally locating the pump house offers the advantage of reduced system pipe size. With this configuration, the system's piping can be redistributed after exiting the pump house, allowing each main branch to serve approximately 50 percent of the complex.

The system's boreholes would use 1.25 inches of SDR-11 piping. At the prescribed depth of 500 feet, the likelihood of encountering underground geological issues during drilling is reduced. This depth is typical for networked geothermal installations, matches the test well's depth, and aligns with the property's existing facilities. Water-source heat pumps would be installed in each housing unit and connect to piping that leads to the central pump house.

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## Workforce Needs for Implementing the Ulbrich Heights Project

Networked geothermal system installations require a diverse set of skilled workers and comprehensive project management and oversight. The exact roles of these managers can be flexible, variable, and can sometimes overlap depending on the requirements of the project and preferences of site owners. An **architect** is not mandatory but would likely be helpful in a project of this complexity. The architect would collaborate with the Wallingford Housing Authority (WHA)—owner of Ulbrich Heights. The architect would create more detailed design documents for buildings (e.g., pumphouse, patching interiors of apartments), ensure compliance with applicable building codes, and ensure that construction aligns with the bid document and initial project plans. The **asset manager's owner's representative** (“owner’s rep”) would facilitate communication and coordination between the owner, architect, and general contractor or construction manager, as well as have the authority to make decisions on behalf of WHA to ensure that the housing authority’s interests are represented. A mechanical, electrical, and plumbing (MEP) firm could act as the owner’s representative.

A project of this complexity requires either a **general contractor** or a **construction manager**. The general contractor or construction manager would be responsible for hiring and overseeing subcontractors, organizing the workflow, obtaining necessary construction permits, and addressing other project needs as required. While a single entity could perform either role, the construction manager would be subject to a procurement policy, including a request for proposals (RFP) and qualification vetting process. A general contractor would be selected via a bid process based on bid documents created by the project architect and would subcontract all of the contractors needed for the job. Working with a general contractor would be simpler for WHA, which will most likely be publishing RFPs and bids, because it would reduce the number of individual RFPs or bids WHA would need to publish. The RFP and/or bid documents would specify the required work and any provisions that subcontractors must meet.

**Additional required roles** would include a modeling and design firm (which would typically work under the direction of the project architect), a mechanical engineering contractor, a system controls contractor, a drilling company, pipefitters, heat pump installers (including a technician qualified to decommission the existing natural gas heating systems), electricians, plumbers, installers for any other clean technologies (e.g., a licensed photovoltaic solar installer), and operations and maintenance staff. The team’s composition could vary widely based on the in-house capabilities of each contractor or subcontractor. For example, an MEP firm could provide energy modeling services while also acting as the owner’s representative. Similarly, a geothermal company could take responsibility for system design, drilling the boreholes, site excavation, controls, and heat pump installation. See Figure 1 for a visual representation of the bidding and construction process.

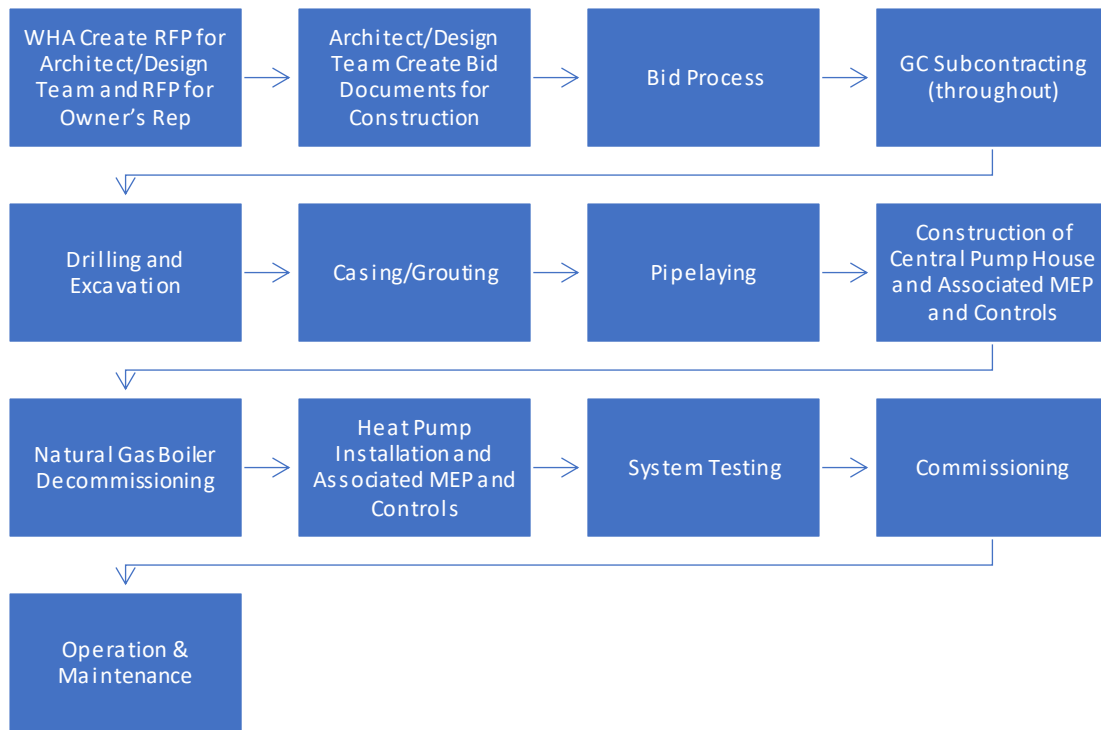


Figure 1. Flow chart of the construction process for a networked geothermal system.

It is difficult to determine the precise number of workers needed to implement this design, as companies utilize varying configurations of workers and subcontractors. The number of workers and drill rigs used, as well as the timeline for completion, would be determined by the drilling companies that submit bids for the project. The drilling company or geothermal contractor would need drillers to drill 90 boreholes 500 feet deep and pipefitters to install approximately 10,000 feet of piping to connect the system to the central pump house and individual units. In one possible configuration and timeline for this part of the construction, a drilling company would use two drilling rigs with about six workers to drill the whole bore field in 45 to 50 days, and then finish all grouting and looping of boreholes two weeks after drilling. The horizontal piping that would connect all boreholes to the pump house and to all buildings might take 4 to 5 weeks. Additionally, HVAC contractors would be required to install 554 ductless heat pumps consoles and decommission 132 natural gas boilers. The specific workforce needed for these tasks would vary based on the contractors' approach and employees' capabilities and licenses.

To maintain the geothermal system, facilities staff would need to replace the filter on each interior heat pump head element ideally two times per year to ensure system efficiency and proper airflow. Facilities staff, or a contracted third party, would also need to check the heat pump units and condensate lines. Additionally, the pump house and geothermal loop would require annual maintenance, such as water testing, addition of biocides and corrosion inhibitors, inspection of pump operations, and inspection of central controls. Given that the workload involved might exceed the capacity of Wallingford Housing Authority maintenance staff, the authority could opt to utilize a third-party contractor to perform system maintenance.

## Equity in Hiring

Ulbrich Heights is an affordable housing complex owned by Wallingford Housing Authority, where households must have incomes less than 80 percent of the area median income to qualify for housing. In 2022, the CT DEEP Office of Environmental Justice designated the census block that contains Ulbrich Heights as an [Environmental Justice Community](#). The project team will focus on supporting individuals—such as those from Ulbrich Heights— with restricted income, low educational attainment, language barriers, and other factors that create obstacles to employment and opportunity.

The [Governor’s Workforce Council Strategic Plan](#) specifies diversity, equity, and inclusion as “foundational pillars” for a capable and sustainable workforce.<sup>1</sup> The project team would therefore focus workforce development strategies on training and hiring individuals from historically underserved and environmental justice [communities](#) in Connecticut.

To align with Justice40 criteria, the project team would prioritize construction proposals that employ women- and minority-owned business enterprises ([WBE](#) and [MBEs](#)) for at least 40 percent of their subcontracts. Additionally, the project would benefit the residents of the Ulbrich Heights complex by meeting Justice40’s requirement that 40 percent of benefits go to disadvantaged communities. Justice40 defines seven categories of benefits, and the District Geothermal Heating + Cooling Deployment in an Environmental Justice Community project would address four of these categories: climate change, clean energy and energy efficiency, affordable and sustainable housing, and training and workforce development.<sup>2</sup>

The project team would include equity in hiring goals when drafting RFPs to ensure that the goals and requirements flow down to all subcontractors. To support and track these equity goals, the project team would employ several strategies. For example, NEEP recommends that, to promote equitable access in the bid review process, the project team include a requirement for weighted scoring that favors WBE/MBEs. The project team should also mandate that contractors report whether new project subcontractors are WBE/MBEs and provide appropriate documentation. Additionally, the project team could collect home zip codes of workers and review business ownership structures to determine if the workforce is originating from [Connecticut Environmental Justice Communities](#).

## Labor Requirements

Commercial building owners who commit to installing ground source heat pumps (GSHPs) are eligible for tax credits under the federal [investment tax credit](#). The base tax credit is six percent, and will decrease to 5.2 percent in 2033 and 4.4 percent in 2034. Businesses are eligible for “bonus credits” (wherein credits are increased by five times, up to 30 percent total) if projects meet [prevailing wage and registered apprenticeship requirements](#). Prevailing wages are [determined](#) by the U.S. secretary of labor and must align with the federal [Davis-Bacon Act](#). To meet the apprenticeship requirements, 15 percent of the total labor hours must be performed by qualified apprentices.

To further center equity in hiring, the project team would draft the RFP to prioritize proposals that plan to voluntarily comply with the [U.S. Department of Housing and Urban Development \(HUD\)’s Section 3](#) requirements. These requirements focus on creating employment opportunities for low- and very low-

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<sup>1</sup> CT.gov, “Governor’s Workforce Council Strategic Plan,” 2024, [https://portal.ct.gov/-/media/gwc/governors-workforce-council-strategic-plan\\_public-version-february-28-2024.pdf](https://portal.ct.gov/-/media/gwc/governors-workforce-council-strategic-plan_public-version-february-28-2024.pdf).

<sup>2</sup> The White House, “Justice40: A Whole-of-Government Initiative,” <https://www.whitehouse.gov/environmentaljustice/justice40/>.

income individuals. HUD Section 3 mandates that 25 percent of all labor hours must be performed by Section 3 workers, with 5 percent of all labor hours required to be performed by Targeted Section 3 workers. Section 3 workers are considered low- or very low-income, per [income limits established by HUD](#). These individuals must be employed by a Section 3 business or be designated as YouthBuild participants. YouthBuild is a community-based pre-apprenticeship program that provides job training and educational opportunities for at-risk youth ages 16 to 24 who have previously dropped out of high school. See Figure 2 for information on the criteria for Section 3 workers and businesses. A Targeted Section 3 worker is an individual who is employed by a Section 3 business, or is one of the following: a resident of public housing or Section 8-assisted housing; a resident of other public housing projects or Section 8-assisted housing managed by the PHA that is providing the assistance; or a YouthBuild participant. The nearest YouthBuild program to Wallingford is in Bridgeport, Connecticut.

<p>Section 3 workers are:</p> <ul style="list-style-type: none"><li>• Workers whose incomes for the previous or annualized calendar year are below the income limit established by HUD</li><li>• Employed by a Section 3 business concern</li><li>• YouthBuild participants</li></ul>
<p>Section 3 business concerns are:</p> <ul style="list-style-type: none"><li>• At least 51% owned and controlled by low- or very low-income persons</li><li>• Businesses where Section 3 workers perform over 75% of the labor hours over a three-month period</li><li>• At least 51% owned and controlled by current public housing or Section 8-assisted housing residents</li></ul>

Figure 2. Table defining HUD Section 3 worker and business concerns from the U.S. Department of Housing and Urban Development

According to the Code of Federal Regulations Title 24 Subtitle A Part 75 Subpart B Section 75.9 ([24 CFR § 75.9](#)), recipients required to comply with Section 3 and their contractors and subcontractors must make a meaningful effort to provide employment and training to Section 3 workers in the following order of priority:

1. Residents of the public housing projects where the financial assistance is assigned
2. Residents of other public housing projects or Section 8-assisted housing managed by the same public housing authority providing the assistance
3. Participants in YouthBuild programs
4. Low- and very low-income individuals living within the metropolitan area (or nonmetropolitan county) where assistance is being provided

24 CFR § 75.9 also states that the public housing authority complying with HUD Section 3 and its contractors and subcontractors must make their best effort to award contracts to Section 3 business concerns in the following order of priority:

1. Section 3 businesses that provide economic opportunities for residents of the public housing projects for which the assistance is provided
2. Section 3 businesses that provide economic opportunities for residents of other public housing projects or Section-8 assisted housing managed by the public housing authority that is providing the assistance
3. YouthBuild program participants
4. Section 3 businesses that provide economic opportunities to Section 3 workers residing within the metropolitan area (or nonmetropolitan county) in which the assistance is provided

These requirements should be included in the original RFP and bid documents to ensure contractors maintain documentation of hours worked by Section 3 workers and how workers qualify as Section 3. Employers of Section 3 workers must also implement data collection efforts that comply with Section 3 regulations.

If the project is to receive Eversource utility incentives, contractors must be part of Connecticut's [Heat Pump Installer Network \(HPIN\)](#). To participate in the HPIN, contractors must sign the Energize CT Heat Pump Installer Participation Agreement, provide relevant licenses and certificates, and certify compliance with industry training requirements. Geothermal heat pump installers must show certification of installation or service training provided by a ground source heat pump manufacturer within the last five years or be certified as an International Ground Source Heat Pump Association (IGSHPA) installer or GeoExchange designer. Within the first year of participation, all installers must provide a certificate of completion for cold climate heat pump sizing and design training by a manufacturer and complete all assigned heat pump training via the eLearning Center featured in the state's contractor portal. This HPIN requirement will be stated in the RFP.

The applicability of the Build America Buy America Act (BABA) provisions to this project needs to be further investigated. [BABA requires that](#) all iron, steel, manufactured goods, and construction materials used in federally funded infrastructure projects are manufactured domestically. BABA only applies to public infrastructure, which is defined as publicly owned infrastructure or privately owned infrastructure primarily used for a public purpose. If BABA is found to apply to this project, then the requirements would need to be incorporated into any procurements and subsequent contracts.

## Technical Education and Training Program

To support future growth of the geothermal workforce in the Wallingford area and beyond, NEEP encourages CT DEEP to explore establishing a collaborative relationship with a [regional workforce development board](#) that has previously deployed training programs and connected job seekers to training opportunities in the green jobs industry. The project team could work with a workforce development board and industry stakeholders to identify relevant, short-term geothermal training opportunities for existing workers in the field of HVAC and engineering. Because these careers require specialized knowledge and licensing, and the barrier to entry is relatively high, the team proposes that a

short-term program would be most effective if it focused on reskilling existing workers rather than training new entrants.

Several regional workforce boards in Connecticut already have experience and/or ongoing initiatives with clean energy employers to provide training for individuals seeking employment in roles with companies performing solar installations or brownfield remediation, while providing certifications such as OSHA (Occupational Safety and Hazard Administration) designations 10, 30, 40 or HAZWOPER (Hazardous Waste Operations and Emergency Response) certification. For example, Southwestern Connecticut's regional workforce board, [The WorkPlace](#), has a U.S. Department of Labor funded program called [EnergyWorks](#). In this program, job seekers are provided with training for solar, weatherization, or utility line worker roles. Workforce boards would be excellent partners for a new geothermal training program due to their established local presence, extensive experience, and historic and ongoing investment in local workforce development.

This program could draw from training modules from the [IGSHPA](#) on topics such as ground source heat pump installation, geothermal system design, or geothermal system maintenance and repair. The project team and workforce boards could explore partnering with a variety of institutions to host in-person training. The project team might also collaborate with local utilities, including Eversource and United Illuminating, as these utilities have diverse workforce needs and have previously partnered with workforce boards.

The program could include both classroom training and paid on-the-job training with geothermal system installers. To encourage employers to host on-the-job trainees, the program could subsidize or completely pay trainees' wages, if funds were available. To ensure that the program is accessible to Connecticut residents from disadvantaged communities, the program would ideally also have funding to provide wraparound services, such as stipends for employment-related transportation and childcare, help with resume writing, or soft skills training.

To ensure that the program benefits are equitably distributed, NEEP recommends that the program aligns with Justice40 metrics by creating a goal that at least 40 percent of candidates in each of the following training program recruitment steps are from [Connecticut Environmental Justice \(EJ\) Communities](#):

- Candidates in recruitment pools
- Candidates receiving interviews
- Candidates extended training program participation offers
- Candidates participating in the training program

Since the designation of Connecticut EJ Communities is based on geographic location, requiring candidates in the program recruitment pipeline to provide their home zip code would allow for tracking of the latter three goals. Recruitment efforts should focus on directing 40 percent of advertising and outreach to minority-owned businesses and businesses located in or primarily serving Connecticut EJ Communities in an attempt to ensure that people from these communities see the recruiting materials and are aware of the training and potential employment opportunities associated with them.

## Conclusion

For any construction project, it is challenging to determine the exact workforce size needed prior to procurements. However, this project-specific workforce plan seeks to identify the required skills and outline the scope of work typical to these roles. The project team could specify project requirements and include workforce-related provisions that meet the state's equity goals in any project-related requests for proposals (RFPs). These provisions could flow down to all subcontractors involved in the project. Networked geothermal projects are highly complex and demand significant coordination between contractors and property owners, making effective communication and community buy-in essential for effective implementation and sustainable operation. Ensuring an adequate workforce is vital for maintaining construction progress and controlling labor costs. Requiring contractors to provide employment or contract opportunities to low-income individuals and women- and minority-owned businesses would support the equitable distribution of workforce opportunities.

## Next Steps

If the project team is successful in winning Phase Two funding from the U.S. Department of Energy, the procurement of a project architect would be an immediate first step. The architect would then work with the project team to understand the initial modeling and design and draft construction bid documents. Wallingford Housing Authority should also consider hiring an owner's representative. For Phase 2 of the [Community Geothermal Heating and Cooling Design and Deployment Grant](#), the project team would work to complete construction within 30 months.

Other initial steps could include:

- Drafting an RFP for a construction manager
- Working with an architect to publish bid documents for a general contractor
- Setting quantitative targets for Justice40 goals the project intends to achieve
- Finalizing any workforce stipulations (such as compliance with HUD Section 3 requirements) that would be included in an RFP and would apply to all subcontractors
- Publishing an RFP through CT DEEP to solicit a regional workforce board for collaboration on the geothermal training program

The project team could promote the project to a broader audience throughout the construction process to raise awareness about networked geothermal systems as a solution for decarbonizing multifamily affordable housing. Maintaining and updating the current project website, hosting webinars, and producing visually engaging materials could help reach affordable housing owners, potential geothermal workers, community leaders, and other stakeholders, particularly those from underserved and environmental justice communities.