



HARC

Building a Critical Energy and Water Workforce in Under-resourced Communities



Acknowledgements

A photograph of a male worker in a white hard hat, safety glasses, and a high-visibility vest, focused on adjusting a component of a piece of machinery. The background is a blurred industrial setting. The image is overlaid with a semi-transparent blue filter.

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Executive Summary

Harris County stands at a pivotal moment in preparing its workforce for the future of the water and clean energy sectors. These sectors are critical to the region’s economic competitiveness, environmental resilience, and equitable growth, yet both face urgent workforce shortages and skills gaps. Clean energy jobs in solar, storage, hydrogen, and efficiency are expanding rapidly, while the water sector is challenged by retirements and limited recruitment of new talent.

Community surveys and focus groups reveal a strong interest in these careers but also a limited awareness of pathways, unclear training requirements, and persistent barriers, particularly for low- and moderate-income residents. Employers emphasize the need for adaptable, technically skilled workers in roles such as heating, ventilation, and air conditioning (HVAC); electrical; plumbing; energy analysis; and water operations. Training providers are responding with relevant programs and industry-recognized credentials, but systemic barriers like transportation, childcare, digital literacy, and financial hardship continue to restrict access and limit equitable participation.

Key findings include:

High Demand, Low Awareness

- 80% of respondents say energy and water jobs are important, but only 11% are very familiar with these careers.
- Just one-third of survey respondents expressed interest in pursuing such jobs.

Training Participation

- One in three respondents have participated in training, most commonly at Houston Community College (HCC), University of Houston (UH), and Lone Star College.
- Nonprofits such as Goodwill, United Way, and Urban League were also frequently cited as providing training.
- Training was generally positive, but 41% reported difficulty transitioning to long-term employment.

Persistent Barriers

- Transportation, childcare, and financial hardship remain the “holy trinity” of barriers.
- Digital literacy gaps, documentation burdens, and awareness challenges further limit participation.
- Many respondents reported unmet needs for financial aid, job placement, and hands-on training.

Employer Needs

- High-demand careers include HVAC, plumbing, solar installation, mechanical engineering, and energy analysis.
- Skills in demand: adaptability, applied math, coding/systems analysis, energy modeling, and professional communication.
- Employers struggle with retention, competitive salaries, and limited in-house training capacity.

Provider Perspectives

- Wraparound supports such as transportation, childcare, food assistance, and counseling drive program success.
- Employer partnerships, apprenticeships, and customized trainings are most effective.
- Funding remains the biggest systemic challenge, alongside limited entry-level roles for new workers.

To close these gaps and ensure equitable access to water and clean energy careers, Harris County should expand outreach and career awareness, especially for youth; strengthen employer-education partnerships to better align training with evolving technologies and billable skills; and invest in wraparound supports such as childcare, transportation, and financial assistance to reduce barriers for underserved populations. At the same

time, increasing access to hands-on training, apprenticeships, and job placement services will help community members transition from training into sustainable employment. Finally, coordinated communication and centralized resources will be critical to building trust, improving visibility, and ensuring that opportunities are accessible to all communities.

Introduction

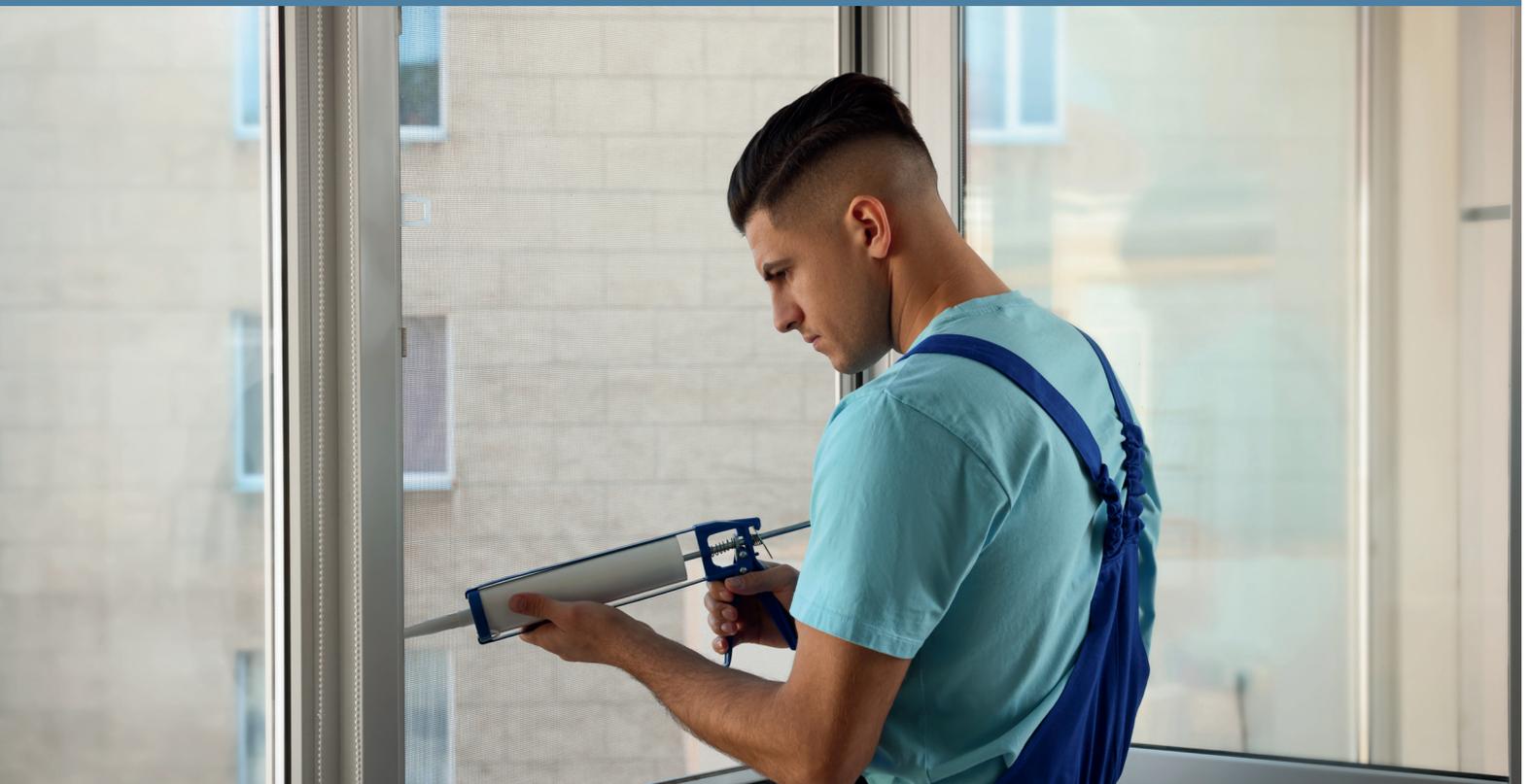
The water and energy sectors play a crucial role in the economic and environmental sustainability of the Harris County Metropolitan Area, providing essential services to its growing population and industries. As demand for clean water and reliable energy continues to rise, so do the opportunities for workforce development within these fields. This analysis aims to summarize the current labor market trends, job availability, and skill requirements in water and energy sectors within the Harris County Metropolitan Area. By examining industry needs, workforce gaps, and potential career pathways, this analysis will offer insights into how local stakeholders, including business, policymakers, and educators, can support job growth and workforce readiness in these critical industries.

The Houston area will be greatly impacted by the energy transition yet it does not have a workforce trained or informed about opportunities that will be available. To prevent further disparity in workforce development and opportunities, understanding of community needs and preferences related to job

training, employment opportunities, and services meant to support access for community members is crucial.

The anticipated career opportunities focus on traditional and emerging roles in energy and water infrastructure, specifically clean energy and energy resilience (solar, battery storage, hydrogen, wind, transmission, distribution, energy efficiency, and weatherization) and water supply (water and wastewater utility). These industries are chosen due to their critical role in maintaining necessary energy and water supplies and their role in the energy transition.

The goal of this research is to identify the baseline level of education and training of community members interested in workforce opportunities, what is needed to help them, and the community members' perspective of the gaps in employment services that would best serve unemployed and underemployed community members, as well as those who live in census tracts identified as disadvantaged communities.



Background

The 2023 U.S. Energy and Employment Report shows that Texas remains at the center of the nation's energy workforce. In 2022, there were 936,477 energy workers in Texas, 11.5% of all U.S. energy jobs, reflecting a 6.3% increase from 2021.¹ Education and training requirements for these roles vary widely, from short term certificates and vocational programs to high school diplomas and post-secondary degrees.

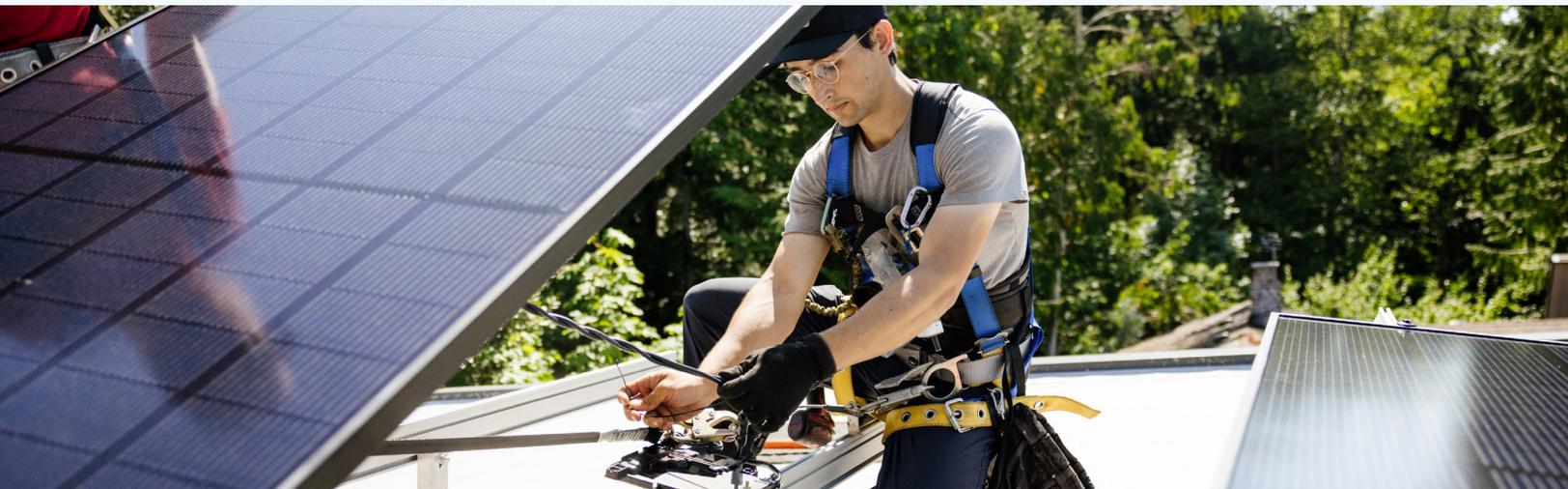
Solar is one of the fastest growing sectors, with employment in Texas rising by 29.3% between 2018 and 2023. Nationwide, the industry reports over 263,000 workers and is expanding rapidly in Houston, the energy capital of the world.² These jobs are increasingly accessible, in 2022, nearly one-third of solar workers were aged 18 to 29, and more than half of new jobs did not require a bachelor's degree. Still, meeting national clean energy goals will require the solar workforce to grow more than 1 million workers.³

Research from the University of Houston (UH) emphasizes an "all-of-the-above" energy strategy, balancing renewables with traditional fuels, hydrogen, carbon capture, utilization and storage (CCUS), carbon dioxide removal, and other emerging technologies.⁴ Building this workforce will require both retraining existing workers and equipping new workers with hands-on experience. Partnerships between industry, schools, and/or training organizations are essential to align skills with evolving job demands. UH emphasizes the

need for hands-on training and diverse approaches to prepare both new and existing workers for success in a rapidly changing energy ecosystem.

Despite these opportunities, employers face rising challenges in hiring and retaining skilled workers. The Greater Houston Partnership (GHP) found there is a notable gap in skills among the workforce that will be required not just to meet current needs but also the sector's continued development. The gap stems from technological advancements and increasing demands that are evolving at a much faster rate than workforce training. This trend risks exacerbating economic inequality for individuals who lack access to technological training and potentially contributing to the marginalization in some communities. The study suggests the City of Houston must develop strategies that ensure individuals interested in pursuing a career in the clean energy sector receive the appropriate education and training to qualify for these opportunities. This challenge represents one of several critical components for workforce development efforts in the City of Houston.⁵

The water industry in Texas is facing similar challenges, particularly a workforce shortage driven by an increase in retirements and limited recruitment of new workers to replace those retiring from the field. Without stronger workforce pipelines, this trend threatens the long-term sustainability of both the state's water infrastructure and the industry as a whole.





Water sector employers face persistent challenges to attract younger and more diverse workers.⁶ Limited public visibility and a lack of strong career and technical education (CTE) pathways reduce awareness and advancement opportunities, while low interest and limited experience among potential candidates further restrict the pipeline. Workforce strategies also often overlook the varying capacities of different communities, leading to uneven access. In addition, employers face inadequate recruitment and retention practices, gaps in both technical and soft skills training, and barriers to higher education such as cost and time. Without clear assurances of job security, industry training alone is often insufficient to draw new workers into the field or keep them long term.



While there are online programs available for incoming skilled workers to earn post-secondary degrees, these programs are not very well known or fully utilized by potential workers.⁷ This lack of visibility limits advancement into managerial or higher-level roles. Bridging these gaps will require closer collaboration between higher education institutions and employers to build a more sustainable and skilled water workforce.

These challenges in both the energy and water sectors underscore the need to improve pathways and outcomes for workforce development across Texas.

Community Understanding

Demographics

Harris County, located in Southeast Texas, is home to about 4.8 million people and includes Houston, the state's largest city and most populous since 1930.⁸ The broader Houston-The Woodlands-Sugar Land Metropolitan Statistical Area (Houston MSA) spans nine counties: Austin, Brazoria, Chambers, Fort Bend, Galveston, Harris, Liberty, Montgomery and Waller, totaling a population of 7.2 million in 2020.⁹

In addition, Harris County is one of the most diverse in Texas. According to the U.S. Census Bureau, the Hispanic population makes up 44.1%, exceeding the state average of 39.8%. The Black population represents 19%, compared to 12% statewide, and the Asian population accounts for 7.4% (above the state's 5.6%). In contrast, the White population is 26.1% far below the Texas average of 38.7%. Native populations make up a small proportion at 0.1%, slightly under the state average of 0.2%.¹⁰

Language diversity is also significant: 54.7% of households speak only English at home, 35.5% speak Spanish, 4.8% speak Asian or Pacific Island languages, 3.1% speak Indo-European languages, and 1.8% speak other languages.¹¹ The population is relatively young, with 25.6% under 18, 62.3% between 18 and 64, and 12.1% aged 65 or older.¹² Notably, 7.1% are between 15 and 19 years old, representing strong potential for future workforce development.



Workforce Training and Education in Harris County

With an estimated GDP of \$697.0 billion in 2023, the Houston MSA is the seventh largest metro economy in the United States.¹³ According to the International Monetary Fund, the Houston MSA's GDP ranks higher than many countries, outpacing nations such as Belgium (\$684.9 billion) and Argentina (\$683.5 billion).¹⁴ The area was home to 3.5 million nonfarm jobs between May 2024 and May 2025.¹⁵

The median household income is \$72,336 with a per capita income of \$39,483.¹⁶ The cost of living, \$43,727, suggests financial hardship for people based on the per capita income in Harris County.¹⁷

The unemployment rate at 5.8% is higher than the state average of 4.4%.¹⁸ Harris County has a higher percentage of individuals below the poverty line (16.0%) than Texas as a whole (13.7%).¹⁹ Families within Harris County follow the same trend, with 12.8% of families falling below the poverty line compared to the state average of 10.3%.²⁰ The main source of income for people comes from educational services, and healthcare and social assistance, 20.9% which is slightly lower than the state average of 21.7%.²¹ Other industries and their comparisons to the state averages can be seen in Table 1.



Industry	Harris County (%)	Texas (%)
Agriculture, forestry, fishing, hunting, and mining	1.9	2.3
Construction	9.6	8.4
Manufacturing	8.7	8.7
Wholesale trade	2.8	2.2
Retail trade	10.5	10.8
Transportation, warehousing, and utilities	7.8	6.8
Information	1.1	1.7
Finance, insurance, real estate, rental, and leasing	6.1	7.1
Professional, scientific, management, administrative, and waste management services	14.4	13.1
Educational services, health care, and social assistance	20.9	21.7
Arts, entertainment, recreation, accommodation, and food services	8.6	8.5

Table 1: Percent of Industry in Harris County or Texas overall

Harris County generally lags behind Texas overall in educational attainment, with slightly lower rates of high school completion, associate’s degrees, and bachelor’s degrees. However, two key trends stand out. First, a larger share of the population has not completed 9th grade (10.2% compared to 7.3% statewide), underscoring the need for accessible entry-level training and adult education. Second, Harris County has a higher proportion of individuals with graduate or professional degrees (12.8% compared to 11.9%), reflecting the area’s concentration of advanced industries and

professional sectors (Table 2).

The most significant opportunity lies in the 18.8% of the population who have completed some college but hold no degree. This group represents a substantial pool of potential workers who could benefit from targeted workforce programs, short-term opportunities, or pathways to complete their education. Addressing gaps at both the lower and middle levels of attainment will be critical for expanding the pipeline of skilled workforce in the water and clean energy sectors.

Level of Education	Harris County (%)	Texas (%)
Less than 9th grade	10.2	7.3
9th-12th grade, no diploma	7.3	7.0
High school graduate (includes equivalency)	22.7	24.3
Some college, no degree	18.8	20.6
Associate’s degree	7.2	7.7
Bachelor’s degree	21.0	21.1
Graduate or professional degree	12.8	11.9

Table 2: Educational attainment of the population 25 years and over: Harris County vs. Texas overall²²





Existing Energy Workforce Training Programs

Harris County has many education and workforce training opportunities throughout the county and often extend to high school students and those already in the workforce.

Houston Community College (HCC) houses the Global Energy Center of Excellence,²³ which educates students to become workers in multiple energy sectors: from pipeline transportation to petrochemical manufacturing and beyond. The Center trains both incumbents and potential new hires to address shifts in the energy industry and an aging workforce. Workforce programs include Electronics Engineering Technology, Instrumentation and Controls Engineering Technology, Petroleum Engineering Technology, and Process Technology.

Electronics Engineering Technology had 28 graduates in 2018 and 14 graduates in 2019. HCC estimates there are 3,874 Electronics Engineering Technicians employed in the Greater Houston Area, and that is expected to increase by 5.4% over the next four years. With an estimated 147 job openings per year and median wages of \$65,000 per year, this provides a strong workforce pathway.

For Instrumentation and Controls Engineering, there are an estimated 1,324 Control and Valve Installers and Repairers employed in the Greater Houston Area. This number is expected to increase by 5.8% over the next four years. The number of estimated annual job openings is 66 jobs a year with median wages of \$45,000 annually. For the Petroleum Engineering Technology program, there are 5,514 Petroleum Pump System Operators, Refinery Operators, and Gaugers employed in the Greater Houston Area. This number is expected to increase by 6.1% over the next four years, with current job openings at 318 jobs a year paying a median of \$67,000 annually. Process Technology has estimated annual job openings of 148 jobs per year paying a median of \$68,000 annually.

The Energy Technology program at Lone Star College²⁴ recognizes that energy careers require engineering skills and the ability to complete technical tasks. As the energy industry evolves, interdisciplinary fields in energy and engineering are shifting to address new energy workforce challenges. The engineering technology program is part of the Energy & Manufacturing Institute²⁵,

which prepares students to perform many different jobs in energy and serves as a hub for students working toward a range of energy careers. Degree programs include energy systems, robotics, automation, machining, computer programming and data analytics.

San Jacinto College (SJC) workforce training programs are tailored to business needs, covering a range of experience levels with education to build skill, reskill, and upskill.²⁶ Funding support from the Texas Workforce Skills Development Fund expands access to these opportunities. The Lyondell-Basell Center for Petrochemical Energy and Technology at SJC²⁷ offers hands on training and connects students to experts currently in the workforce. Through strong partnerships with industry employers, students are better prepared and positioned to succeed in the energy workforce.

Wharton County Junior College (WCJC) plays a role in workforce development across multiple sectors. The College offers entry level online training in solar energy, providing students with an accessible pathway to begin careers in this growing field.²⁸ Distinctively, WCJC also focuses on nuclear power, offering specialized training for nuclear-grade welders, reactor operators, and radiation control technologists.²⁹

Workforce development in the energy sector extends beyond college programs. Energy Institute High School, part of the Houston Independent School District, prepares students in grades 9-12 for careers in science, technology, engineering, and math (STEM) and energy through project-based curriculum.³⁰ Students gain early exposure to the field by engaging with industry leaders, participating in hands-on projects that address challenges in energy production, sustainability, technology, and collaborating on solutions to real-world issues. Partnerships with energy companies and organizations provide mentorships, internships, and early industry engagement, equipping students with practical experience. To date, the school has supported 676 students.

Workforce training opportunities are also available for employed individuals interested in the energy sector. The Energy Training Centre, a global organization with a strong presence in Houston, offers courses and workshops on topics such as risk management, oil and gas management, and upstream fundamentals.³¹ Additionally, UpSkill Houston, an employer led initiative, strengthens the pipeline of skilled workers by focusing on careers that require education or training beyond high school but less than a four-year degree.³² This initiative ensures industries have access to the talent they need to sustain and grow Houston's energy workforce.



Existing Water Workforce Training Programs

Workforce opportunities in the water sector in the Houston area are mainly focused on basic water operations, plumbing, other pipefitting, and wastewater opportunities.

Houston Community College (HCC) offers three different training programs in the water industry. These include basic wastewater operations; basic water works operations; and plumbing technician, occupational skills achievement (OSA). The basic wastewater operations certification prepares students for the Class D Wastewater operator exam.³³ After completing the certification and passing the exam, students are licensed by the Texas Commission on Environmental Quality (TCEQ) and can work in both public or private sectors. Similarly, the Basic Water Works Operations certification trains students for the Class D license exam which is required by TCEQ.³⁴ Finally, the Plumbing Technician, OSA program trains students in the maintenance, installation, repair, and replacement of plumbing systems that distribute water and remove waste and sewage in buildings, preparing them for employment in the plumbing industry.³⁵

Brazosport College offers a pipefitting certification program in the Houston area with flexible pathways.³⁶ Students can pursue a basic certificate requiring 18 credit hours, an advanced certificate that requires 33 hours, or an associate degree requiring 60 credit hours. The program grants course credit for relevant prior experience.

Additional plumbing certifications in the Houston area include a certification through SERJobs, which gives a National Center for Construction Education and Research (NCCER)³⁷ Level 1 certification. The

Texas A&M Engineering Extension Service also provides certifications on wastewater operator, water maintenance technician, and water operator.³⁸ While these courses are often held outside of the Houston area, virtual options are sometimes available.

In addition, TCEQ further supports the workforce by offering resources for certification and license



renewal in multiple fields including water treatment specialist, water operator resiliency, wastewater collection operators, and wastewater treatment operators.³⁹

Community Survey Analysis

HARC distributed a 27-question community survey via Pollfish, an online survey platform, to 578 respondents over the span of a month. The survey used logic branching, so response counts varied by question. It was conducted to establish a baseline understanding of workforce education and training levels, workforce needs, and gaps in employment services among community members, particularly those in disadvantaged census tracts and those experiencing under- or unemployment. Four different audiences were identified for the survey: low- and moderate-income (LMI), unemployed/ part-time employment, general, and people of color (POC). Invalid entries were removed from the analysis.

The goal of this research was to assess what resources community members already have access to, what support they need to succeed, and how

existing services can be strengthened to expand opportunities in energy and water careers.

Overview

Survey findings highlight broad recognition of the importance of energy and water jobs, with nearly 80% of respondents agreeing that these careers are critical for their communities. However, familiarity with career pathways remains limited: just 11% reported being very familiar with such jobs, and only a third (33%) expressed interest in pursuing them. Barriers to these careers cited included lack of awareness, competing career interests, and uncertainty about training requirements. Low- and moderate-income (LMI) respondents reported lower familiarity and fewer training experiences than their non-LMI peers, indicating inequities in access to information and opportunities.

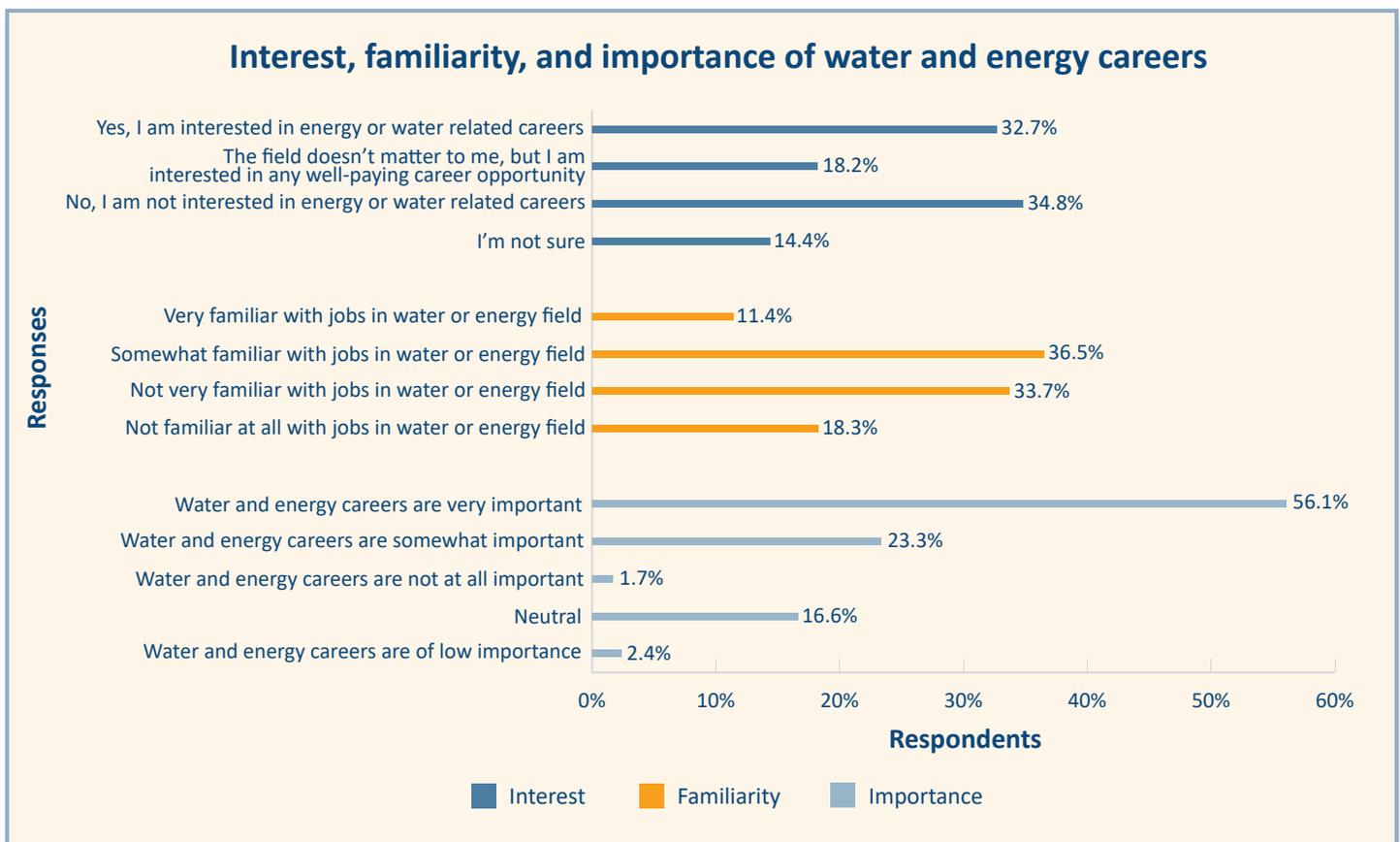


Figure 1: Interest, importance, and familiarity of water and energy careers

Those who participated in training reported largely positive experiences. Community colleges such as Houston Community College, Blinn College, and Lone Star College emerged as leading providers, while nonprofits including Goodwill, the Houston Area Urban League, and United Way of Greater Houston were also frequently cited as providing workforce training programs. Programs most often

included on-the-job training, internships, and online courses, with participants rating these experiences highly. Yet, employment outcomes were mixed. While some secured related jobs, many participants reported difficulty transitioning from training into long-term employment – particularly among LMI respondents.



Figure 2: Where respondents participated in workforce training programs

The survey results showed that participants most often learned about energy efficiency, renewables, and water treatment in training programs, and commonly recommended the Texas Workforce Commission, HCC, Goodwill, and United Way of Greater Houston as training providers. Access to support services also revealed significant gaps, as 52% had not used any free services, but those who did identified life skills training, scholarships, transportation, and childcare as critical to completing their programs and reducing financial

burdens. These services were most often provided by community-based organizations, government programs, and colleges, with Texas Workforce Commission, HCC, Goodwill, Metro, United Way of Greater Houston, and the Houston Area Urban League cited repeatedly. More than half of the respondents (53%) felt like their needs were not met, with top unmet needs including financial assistance, job placement services, and hands-on training or internships.

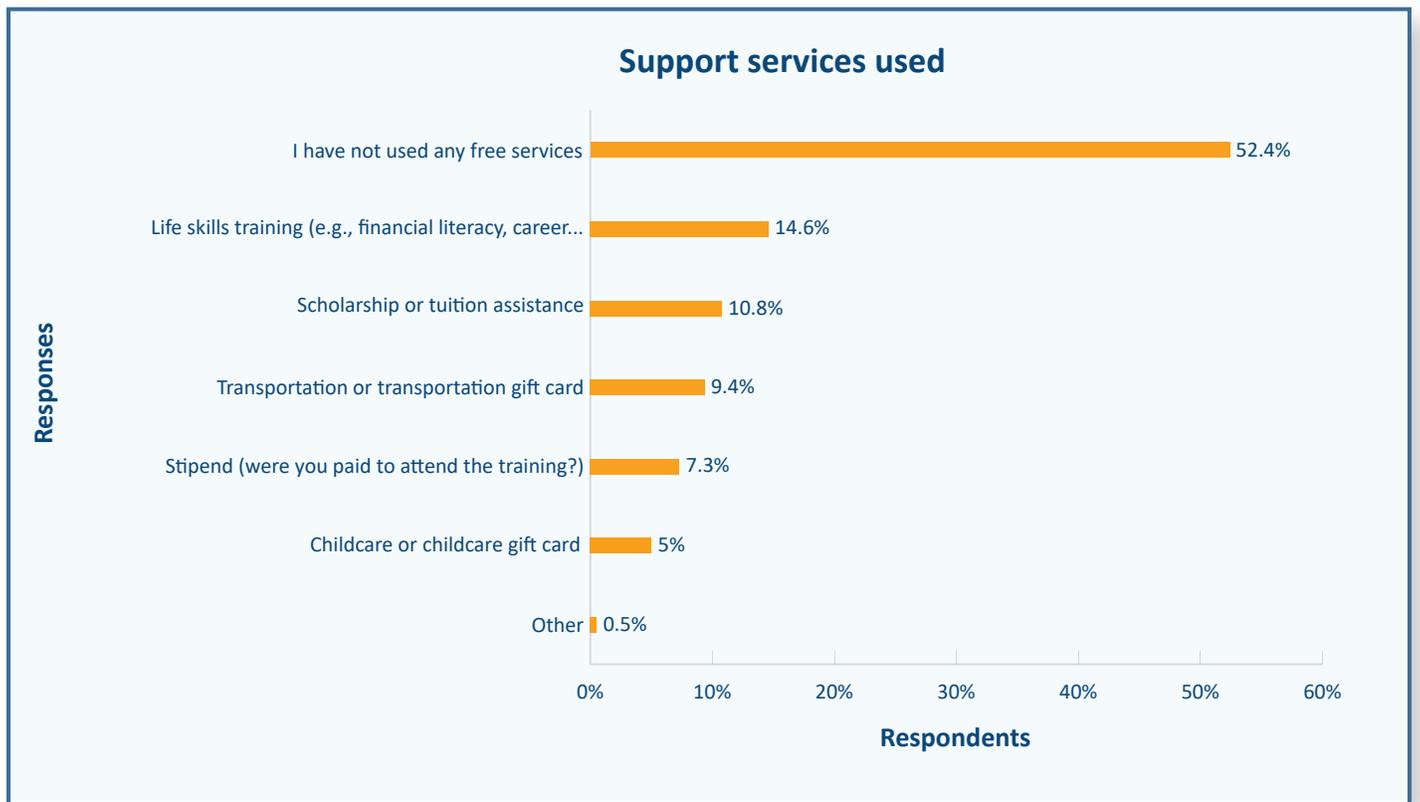


Figure 3: Support services used by respondents

The survey results highlight strong community support for workforce development in energy and water careers, paired with persistent barriers to awareness, access, and employment outcomes. Community colleges and nonprofit organizations emerged as trusted providers, but many people, especially those in disadvantaged and low-income

communities continue to face unmet needs. Expanding awareness of training programs, strengthening financial and wraparound supports, and building clearer pipelines from training to long-term employment will be essential to ensuring equitable access to these career pathways.



Key Highlights



Importance of Careers: Nearly 80% said energy and water careers are important for their communities, but only 11% are very familiar with these careers. These knowledge gaps were more pronounced among LMI respondents.



Interest & Barriers: 33% of respondents expressed an interest in these careers. The top barriers were lack of awareness, competing career interests, and unclear training pathways.



Training Participation: 1 in 3 participated in training, most often at Houston Community College, UH, or Lone Star College; nonprofits like Goodwill and Urban League also played a role in providing training.



Employment Outcomes: Training was positive, but 41% did not secure job placement, many reported challenges transitioning into long-term employment.



Support Services: Over half (52%) of respondents did not use free support services. Of those who did, scholarships, transportation, and childcare were highlighted.



Unmet Needs: Over 50% said their needs were not fully met. Top unmet needs were financial aid, job placement, and hands-on training.



Organizations Communities Didn't Recommend: Most respondents had no answer (42%) or were unsure (19%), with only a few naming Goodwill, Job Corps, or the YMCA.

Implications

While community interest is high, low awareness, limited access to training, and gaps in support services, especially for LMI individuals, could constrain sector growth and limit equitable workforce participation. Addressing these gaps will be important:



Lack of awareness and exposure to energy and water career jobs especially for LMI individuals



Insufficient access to training and participation



Post training employment outcomes



Lack of knowledge/access to support services

These results highlight gaps in support systems and point to the need for stronger outreach, better access to wraparound services, and clearer pathways from training to long-term employment, particularly in LMI communities.

Focus Group Analysis

HARC conducted focus groups on June 26, 2025 and July 30, 2025, involving a total of 13 participants, with the intention of evaluating community needs and investigating critical clean energy and water workforce opportunities and services. These meetings brought together organizations focused on workforce development, sustainability, and community resilience to discuss their programs and challenges in serving underserved populations, particularly in the energy and water sectors.

Participants shared their experiences in training and placing workers, addressing transportation barriers, and connecting people to careers through various communication channels and support services. The group explored opportunities for collaboration, scaling workforce development programs, and strengthening employer involvement, while identifying funding and awareness as key challenges to overcome.

Key Findings

The following information is a summary of responses by participants. They should not be interpreted to comprehensively explain all issues in workforce development. However, these insights help characterize the workforce landscape in Houston.

Key themes:

1 Underserved populations

3 Wraparound support services

2 Barriers to participation

4 Emerging workforce pathways

Primary takeaways:



Workforce providers primarily focus on underserved populations in their search for clients and job seekers.



Transportation and childcare are the most persistent barriers in accessing training and employment.



Wraparound services lead to the most successful outcomes for clients.



Employer and community partnerships drive program success.



Career pathway awareness remains limited, especially among younger populations.



Funding remains the most significant systemic challenge.

Analysis

Focus group participants emphasized that workforce providers primarily serve underserved groups, including Black or African American and Hispanic individuals, Afghan and Middle Eastern populations, justice-impacted individuals, and single mothers. They target people 18 and older with high school diplomas but limited college education, while recognizing that many of these groups require specific supports, such as childcare for single parents and language assistance for non-native English speakers. However, participants noted that systemic barriers often prevent people from accessing training and employment. Transportation poses a major obstacle, both for workers in remote areas of Houston with little public transit and for community members traveling to distant work sites. Childcare and utility bill assistance emerged as equally pressing needs, while digital literacy gaps and burdensome documentation requirements create additional hurdles. Job scams further erode trust, discouraging some individuals from pursuing legitimate opportunities in the energy and water sectors. Providers agreed that addressing these barriers is essential to expanding equitable participation.

“That’s kind of the ‘Holy Trinity’: transportation, childcare, and food.”

Highlights of the Focus Group Conversations:

“The easier you can make it for someone to access the services, the more successful they’re going to be.”



“ I’ll talk to anybody who I think has the hunger for it...If the spark comes, then we can further it... I’ve had engineers, and I’ve had guys who just got out of the county jail.

- “We try to connect with clients who are interested in maybe coming to a new career or switching careers to have a sustainable job in the event of a disaster.”
- “My role [is]...being very intentional about how we are serving our participants and getting them into gainful, thriving employment.”
- “I like to be able to present options to people, people who didn’t know about something that they could possibly be very, very good at and get paid a really good amount for their time.”
- “There’s also a lot of remediation before we start training programs that needs to be done, and that’s very unique among different populations.”
- “[Many of the refugee clients] do have degrees that will help them get into these kinds of jobs—the only barrier they had was the language.”
- “I think sometimes you put in support services and then make participants jump through hoops to even access them in terms of documentation proving that they need the support service. So, I think the most effective ones are giving kind of no questions asked as much as possible.”
- “Time is a resource.”

A photograph showing a group of people sitting around a table, engaged in a discussion. The focus is on a young man with a goatee and a blue cardigan, who is looking towards the right. Another person in a plaid shirt is visible on the right, and a person in a white shirt is on the left. The background is bright and out of focus.

To overcome these challenges, providers emphasized the importance of wraparound services as a cornerstone of successful workforce development. Financial support, childcare, transportation, utility assistance, and post-job placement resources such as clothing and equipment were all described as critical. They also stressed the value of consistent training, soft skill development, and mentorship with regular check-ins. Following up with clients, both for motivation and accountability, improves their outcomes. Local brick-and-mortar training facilities offer additional advantages by reducing transportation barriers and supporting digital access, making them a practical solution for expanding opportunities across the state, especially for those who have not completed any postsecondary education.

- “One [of the three most important issues our target communities face] is...their academic levels...The basic reading and comprehension skills, I think, are lacking in the community, which causes challenges with passing any of the entry exams into the career fields and/or apprenticeships.”
- “What’s been successful is working with youth in smaller cohorts and making a program specific for them rather than our traditional workforce system for the average 30-year-old.”

“ I think some of the barriers that are facing this are...accessibility, education, or even awareness of training programs. And then maybe a mismatch between what the employers and workforce really needs and what training looks like in a quick and productive manner.



“ I think if you asked the average person, and maybe I would dare to say that most of us [in this focus group] to describe a typical day in any of these careers, we wouldn't be able to tell you.

Providers described a growing array of workforce programs that align with emerging clean energy and community needs. Examples include training in wind turbine and hydrogen facility inspection, the Urban Energy Jobs Program, healthcare initiatives, FoodRx for individuals with health challenges such as poor indoor air quality, and a youth pre-apprenticeship program. They identified 2-year colleges as an effective vehicle for workforce development, while also emphasizing the need to expand upskilling in digital and communication skills. Providers recognized the importance of tailoring approaches to different age groups, from high school students exploring career awareness to adults seeking to reskill. However, they noted that too few entry-level roles exist for individuals without prior experience, which limits access for many potential workers in the energy and water sectors. Furthermore, in Houston's strong oil and gas environment, some community members may be unaware of the clean energy and water career opportunities available to them.

- “There's a lot of room for upskilling, especially in that range of adults from like 20-32 who can really be doing some more skilled jobs and higher paying jobs. And how do we outreach to those people?”
- “If you ask the average middle school or high school student, they can't really identify specific entry level careers that they can access...so without specific knowledge about specific positions that they can upscale and get credentialed for, they're kind of lost when it comes to choosing the right post secondary pathway.”
- “What are the jobs that are really transferable in the region and what are accessible to new pipelines of talent?”

“ I think a lot of times, people feel that, even though Houston has all these energy jobs, they're not accessible to them.



“ There’s a big gap between people saying they want to hire people and what they actually need to work effectively when they come in. So there’s people who are always hiring, but they’re constantly turning over because they’re not setting a curriculum for an entry-level person.

“ Consistency—having [clients] trained well up to the code or expectations and being able to deliver the same kind of person when they’re ready again.

“ I’m hesitant to want to establish training partnerships or resources without employer buy in from the get-go.

The focus group discussions highlighted the critical role of partnerships in delivering training and employment opportunities. Providers reported strong success with employer relationships, particularly through registered apprenticeships, customized training programs, and entry-level hiring. They also praised collaboration with community organizations and Resilience Workforce Collaborative (RWC) members, which has enabled them to deliver comprehensive support to participants. At the same time, challenges persist. Employers and entry-level workers often have misaligned expectations, and providers struggle to secure firm hiring commitments. Participants suggested building more intentional collaborations that expand the number of people served, not just the depth of services for a few, and recommended pursuing joint grant initiatives as a way to strengthen outcomes. They agreed that employer buy-in remains essential for community-based organizations to confidently invest in new training.

- “The Resiliency Workforce Collaborative has been an instrumental group in... creating opportunities that are thriving.”
- “Having an employer partner was very beneficial to us...they’re able to give us that feedback on how our clients are doing, and then also let us know...what they’re looking for throughout the client’s career.”
- “Getting a jobs guarantee from a company is one of the hardest parts of doing this work... Companies are willing to come to the table and have these conversations and develop a lot of what it’s going to take to do it. But getting them to commit...is often where the rubber meets the road.”



“ If you are doing good work and good service, word of mouth will trump everything else. That’s the best method to get people through the doors.

Providers described the wide range of channels they use to reach both trainees and employers. Social media platforms such as Facebook and Instagram, direct mail campaigns, digital screens, churches, and local job fairs all play a role in outreach. They also use the United Way portal, a Slack channel with over 50,000 climate workforce users, and word-of-mouth referrals built through success stories. Some providers attend industry events in target communities to understand local needs and find collaboration opportunities. Even with these strategies, participants stressed the importance of building centralized resources. They suggested an online job or information board managed by reputable sources and a statewide portal or newsletter to promote funded training pathways, particularly in fragmented areas like solar workforce programs. This type of transparency and coordination would also help counter misinformation and rebuild trust in legitimate opportunities among community members.

- "A big form of our outreach has been through the relationships with churches in our community."
- "They come in for a backpack, and they leave with a wealth of information." (with regard to a foot in the door method of offering resources)
- "Social media is an important channel of information for the community, especially for the average teenager."

“ The authenticity of the job or the company that is offering the job is very important.

Finally, providers pointed to systemic issues that limit the growth of workforce initiatives in Texas. Funding was repeatedly cited as the primary barrier, but participants stressed that greater resources could support rapid expansion to other cities, including Dallas and San Antonio, within six months. They also called for better marketing and early recruitment pipelines, particularly through increased career awareness for middle and high school students. Empowering small businesses to participate in workforce pipelines was another priority, as was developing collaborative strategies. Joint training cohorts and job fairs, participants argued, could create a “big splash” that strengthens recruitment, increases efficiency, and accelerates readiness for careers in the energy and water sectors.

- “[Expanding staffing] would be a big power change in our industry.”
- “What happens often when we do current proposals collaboratively is that we are still sharing the same client and that the number of clients getting served doesn't usually increase. You kind of have like 2 organizations collaborating on one client instead of growing the client base.”

Other:

- “I would just challenge the collaborative to think about how this work is different from any other workforce work that's going on in the region and why the specific focus on green careers. I understand and it seems like it potentially could be siphoning resources away from broader workforce issues that we need in the region.”

“Time is a big factor in urgency, and time to respond to the needs of people, because people don't have a lot of time. If the request isn't met immediately, then they're probably not going to bring it up again.”



SME Interviews

HARC interacted with subject matter experts (SMEs) including employers and workforce trainers to understand their role in placing and retaining people in water and energy careers. SMEs were asked about their expertise, experience, successes, and challenges in supporting job placement.

Employers

Employers in the water and clean energy sectors report growing demand for skilled workers in energy efficiency, green building design, and building performance analysis. High-need careers include home energy assessors, energy and data analysis, mechanical engineers, and commissioning specialists. Critical skills range from technical expertise in energy modeling, coding, and system analysis to transferable competencies and soft skills such as data synthesis, adaptability, and

professional communication.

According to the employers interviewed, workforce challenges center on rapid technological change, particularly with artificial intelligence and evolving software platforms, as well as limited in-house training capacity, retention difficulties due to competitive salaries, and barriers for foreign nationals (visa issues, client restrictions). Employers currently rely on a mix of online job postings, career fairs, mentoring programs, and certifications for recruitment and training when recruiting new talent.

To better meet industry needs, workforce organizations should align training with billable technical skills and emerging tools, strengthen soft skills development, and provide more direct pipelines for workforce ready candidates.

Workforce Providers

Workforce training providers in the water and clean energy sectors are focused on preparing diverse populations, including underserved and disadvantaged groups. High demand trainings include HVAC, electrical, plumbing, pipefitting, and solar, alongside renewable energy certifications such as those from the National Center for Construction Education and Research (NCCER). They noted that employers are looking for coachable talent, people with soft skills and certifications in technical fields and safety are in high demand. Key challenges include skill gaps in basic math and applied technical areas, limited support services, and barriers such as transportation, childcare, tuition costs, and lack of industry awareness and career paths. Many providers offer support and wraparound services, such as transportation subsidies, food assistance, childcare, and counseling to help students and trainees overcome life challenges and remain in training.

Training providers rely on strong employer relationships, apprenticeships, customized training programs, and advisory committees

to keep curriculums relevant and to ensure alignment with industry needs. To better support workforce development, employers can strengthen engagement with training providers by shaping their curriculums, providing mentorship, expanding internship and apprenticeship opportunities, and offering clear hiring pathways. While providers report success in preparing candidates with industry-recognized credentials, greater employer involvement is critical to translating training into sustainable employment opportunities.

In summary, both employers and training providers recognize the growing need for a skilled workforce to meet the demands of the water and clean energy sectors. Employers emphasize the importance of technical proficiency, adaptability, and retention, while training providers highlight the need for strong partnerships, wraparound services and support, and clear employment pathways. Strengthening collaboration between industry and education will be essential to bridging skill gaps, reducing barriers for underserved populations, and ensuring a workforce that is both prepared and resilient in a rapidly evolving clean energy economy.

Resource Inventory and Gap Analysis

To create the resource inventory, HARC leveraged existing partnerships and connections made through the Resilience Workforce Collaborative (RWC) to initiate discussions surrounding the most important resources in the study area. We also drew information and examples from the focus groups and responses in the survey, and we conducted desktop research to identify other sources of support that may not have been mentioned. Over 150 different resources were identified and catalogued in the attachment, Resource Inventory.

Gap Analysis

The focus group highlighted clear gaps in workforce development for the energy and water sectors in Texas. While providers are reaching underserved populations, persistent barriers (including transportation, childcare, digital literacy, and excessive documentation) continue to limit participation. Entry-level roles remain scarce for individuals without prior experience, creating a misalignment between community needs and employer expectations. Career awareness is also low among middle and high school students, leaving many without exposure to career pathways in clean energy and water. These gaps underscore the need for early pipelines, stronger outreach, and targeted

supports to broaden access and build trust.

At the systems level, providers emphasized funding as the most significant constraint to scaling programs. Employer engagement and hiring commitments are inconsistent, making it difficult for community-based organizations to confidently invest in training. Fragmentation of resources, such as scattered solar training initiatives and various communication platforms, further limits visibility and impact. Addressing these gaps will require intentional partnerships between employers, educators, and community organizations, as well as coordinated funding and outreach strategies that expand reach while ensuring participants have the wraparound supports needed for long-term job success.

From the resource inventory, areas of improvement were identified. Awareness and exposure to energy and water career opportunities remain limited, particularly for low- and moderate-income individuals, while access to training programs and the ability to participate in them are also constrained. Even when training is available, gaps persist in achieving strong employment outcomes after program completion. In addition, access to support services that help individuals succeed throughout training and into employment is insufficient.



Conclusion

This research demonstrates that Harris County stands at a crossroads in shaping the future of its water and clean energy workforce. Demand for skilled labor in these sectors is growing rapidly, yet barriers such as low career awareness, inconsistent training to employment pipelines, and persistent challenges around childcare, transportation, and financial hardship continue to constrain participation, especially for low to moderate income communities. Employers and training providers alike recognize the urgency of bridging these gaps, with employers calling for adaptable, technically skilled workers and providers emphasizing the need for wraparound supports and stronger employer engagement.

The findings make clear that no single organization or institution can solve these challenges alone. Sustained collaboration between employers, workforce training providers, higher education institutions, community organizations, and policymakers will be essential to align training with industry demand, reduce systemic inequities, and create pathways that lead not just to jobs, but to long-term careers. Investments in awareness-building, hands-on training, and accessible wraparound services must go hand-in-hand with industry partnerships that provide real hiring commitments and advancement opportunities.

The Resiliency Workforce Collaborative (RWC) in Houston is an ideal avenue to deploy these recommendations. The RWC should continue strengthening partnerships that bring employers into curriculum design and job placement efforts, while also advocating for the expansion of wraparound supports that address barriers like

childcare, transportation, and financial insecurity. By championing hands-on training opportunities and coordinating across education, training, and industry partners, the RWC can play a pivotal role in aligning programs with emerging workforce needs. In doing so, the RWC can ensure the Harris County area not only meets immediate labor demands but also builds a resilient, future-ready workforce that serves as a national model for equitable workforce development.

To strengthen the Collaborative further, HARC recommends establishing a clear organizational structure within the RWC to maximize impact and efficiency. This framework should define roles and responsibilities among participating organizations, allowing them to contribute to the RWC's goals based on unique strengths. For example, organizations providing specific skills training may need to partner with or refer trainees to those providing soft skills training. Maintaining a resource library for referrals and partnership could benefit all parties. Moreover, building communities of practice or working groups around certain services can provide avenues for knowledge sharing to improve services across the community. This coordinated approach will reduce duplication, enhance service quality, and create a more seamless experience for individuals navigating the workforce system. The RWC has key implementation partners in Houston City College and JP Morgan Chase. This partnership has been the backbone for the RWC's success so far. A partnership with a research partner like HARC could elevate strategic pathways and innovative approaches to improved community resilience and individual, household, and community-level economic strength.



Endnotes

- ¹ “U.S. Energy and Employment Report - 2023.” *USEER*, United States Department of Energy, <https://www.energy.gov/sites/default/files/2023-06/USEER23-TX-v2.pdf>
- ² “Solar Jobs for All: Five Facts on the Rising Solar Workforce.” *SEIA*, Solar Energy Industries Association, 24 Dec. 2024, www.seia.org/blog/solar-jobs-all-five-facts-rising-solar-workforce/
- ³ “Solar Jobs for All: Five Facts on the Rising Solar Workforce.” *SEIA*, Solar Energy Industries Association, 24 Dec. 2024, www.seia.org/blog/solar-jobs-all-five-facts-rising-solar-workforce/
- ⁴ Khan, Rashda. “Preparing Houston’s Workforce for the Energy Evolution.” *University of Houston*, University of Houston, 30 July 2024, www.uh.edu/news-events/stories/2024/july/07302024-white-paper-workforce-energy.php
- ⁵ “Strategy Report - Leading the Energy Transition.” *Houston Energy Transition Initiative*, Greater Houston Partnership, June 2021, www.htxenergytransition.org/wp-content/uploads/2023/07/05.19.22-HETI-Strategy-Report-V1.pdf
- ⁶ D’Andrea, Caroline, and Farrah Farnese Roma. “Creating Infrastructure Pathways in Texas: Water and Broadband.” *Telicon*, Jobs for the Future, <https://dingo.telicon.com/library/2025021175.PDF>
- ⁷ Smyth, Davida, and Walter Den. How Texas could lead the nation in addressing a growing water workforce problem.” *Texas Water Journal*, vol. 16, no. 1, 28 July 2025, pp. 80–92, <https://doi.org/10.21423/twj.v16i1.7194>
- ⁸ “Census Profile: Harris County, TX.” *Census Reporter*, Census Reporter, <https://censusreporter.org/profiles/05000US48201-harris-county-tx/#:~:text=Census%20data%20for%20Harris%20County%2C%20TX%20%28pop.%204%2C835%2C125%29%2C,sex%2C%20income%2C%20poverty%2C%20marital%20status%2C%20education%20and%20more>
- ⁹ “Houston Metropolitan Statistical Area Profile.” *Greater Houston Partnership*, Greater Houston Partnership, <https://d9.houston.org/houston-data/houston-metropolitan-statistical-area-profile>
- ¹⁰ “B16001: Language Spoken at Home - Harris County.” *American Community Survey*, United States Census Bureau, <https://data.census.gov/table/ACSST1Y2022.B16001?q=Houston&t=Language+Spoken+at+Home>
- ¹¹ “B16001: Language Spoken at Home - Harris County.” *American Community Survey*, United States Census Bureau, <https://data.census.gov/table/ACSST1Y2022.B16001?q=Houston&t=Language+Spoken+at+Home>
- ¹² “Census Profile: Harris County, TX.” *Census Reporter*, Census Reporter, <https://censusreporter.org/profiles/05000US48201-harris-county-tx/#:~:text=Census%20data%20for%20Harris%20County%2C%20TX%20%28pop.%204%2C835%2C125%29%2C,sex%2C%20income%2C%20poverty%2C%20marital%20status%2C%20education%20and%20more>
- ¹³ “CAGDP1 County and MSA Gross Domestic Product (GDP) Summary.” *BEA Interactive Data Application*, U.S. Bureau of Economic Analysis, apps.bea.gov/itable/index.html?appid=70&stepnum=40&Major_Area=5&State=5&Area=XX&TableId=533&Statistic=3&Year=2023&YearBegin=-1&Year_End=-1&Unit_Of_Measure=Levels&Rank=1&Drill=1&nRange=5
- ¹⁴ “GDP, Current Prices.” *IMF*, International Monetary Fund, Apr. 2025, www.imf.org/external/datamapper/NGDPD@WEO/OEMDC/ADVEC/WEOWORLD
- ¹⁵ “Houston Area Employment - May 2025.” *U.S. Bureau of Labor Statistics*, U.S. Bureau of Labor Statistics, 2 July 2025, www.bls.gov/regions/southwest/news-release/areaemployment_houston.htm
- ¹⁶ “Census Profile: Harris County, TX.” *Census Reporter*, Census Reporter, <https://censusreporter.org/profiles/05000US48201-harris-county-tx/#:~:text=Census%20data%20for%20Harris%20County%2C%20TX%20%28pop.%204%2C835%2C125%29%2C,sex%2C%20income%2C%20poverty%2C%20marital%20status%2C%20education%20and%20more>
- ¹⁷ “Family Budget Calculator.” *Economic Policy Institute*, www.epi.org/resources/budget/

- ¹⁸ “DP03: Selected Economic Characteristics - Harris County.” *American Community Survey*, United States Census Bureau, <https://data.census.gov/table/ACSDP5Y2021.DP03?y=2021&d=ACS+5-Year+Estimates+Data+Pr ofiles&g=1400000US48201433504>
- ¹⁹ “S1701: Poverty Status in the Past 12 Months - Harris County.” *American Community Survey*, United States Census Bureau, <https://data.census.gov/table/ACSST1Y2023.S1701>
- ²⁰ “S1701: Poverty Status in the Past 12 Months - Harris County.” *American Community Survey*, United States Census Bureau, <https://data.census.gov/table/ACSST1Y2023.S1701>
- ²¹ “DP03: Selected Economic Characteristics - Harris County.” *American Community Survey*, United States Census Bureau, <https://data.census.gov/table/ACSDP5Y2021.DP03?y=2021&d=ACS+5-Year+Estimates+Data+Pr ofiles&g=1400000US48201433504>
- ²² “S1501: Educational Attainment - Harris County.” *American Community Survey*, United States Census Bureau, <https://data.census.gov/table/ACSST5Y2023.S1501?g=060XX00US1812711566>
- ²³ “Global Energy.” *HCC*, Houston Community College, www.hccs.edu/centers/global-energy/
- ²⁴ “Energy Technology.” *Energy Technology - Programs of Study*, Lone Star College, <http://www.lonestar.edu/programs-of-study/energy-technology.htm>
- ²⁵ “Energy & Manufacturing Institute.” *LSC-EMI*, Lone Star College, <http://www.lonestar.edu/programs-of-study/energy-technology.htm>
- ²⁶ “Workforce Training.” *San Jacinto College*, San Jacinto College, www.sanjac.edu/information-for/business-partners/workforce-training/
- ²⁷ “LyondellBassell Center for Petrochemical Energy and Technology.” *San Jacinto College*, San Jacinto College, www.sanjac.edu/information-for/business-partners/cpet/
- ²⁸ “Solar Energy Training.” *Career Training*, Wharton County Junior College, <https://careertraining.wcjc.edu/training-programs/solar-energy-training/>
- ²⁹ “WCJC Nuclear Power Technology Program Lauded in State Report.” *WCJC*, Wharton County Junior College, 17 Mar. 2025, www.wcjc.edu/news/Press-Releases/2025/20250317-WCJC-NUCLEAR-POWER-TECHNOLOGY-PROGRAM-LAUDED-IN-STATE-REPORT.aspx
- ³⁰ “Energy Institute High School”, *Energy Institute*, Getting Smart, www.gettingsmart.com/school/energy-institute-high-school/
- ³¹ “Training Courses in Houston - Texas.” *The Energy Training Centre*, www.energytraining.ae/training/houston-usa
- ³² “Upskill Houston: Building a Skilled Workforce for the Region’s Future.” *Greater Houston Partnership*, Upskill Houston, www.houston.org/upskillhouston
- ³³ “Basic Wastewater Operations.” *HCC*, Houston Community College, www.hccs.edu/continuing-education/ce-programs/basic-wastewater-operations/
- ³⁴ “Occupational Licenses: Water System Operators.” *TCEQ*, Texas Commission on Environmental Quality, www.tceq.texas.gov/licensing/licenses/waterlic/
- ³⁵ “Plumbing Technician, OSA”. *HCC*, Houston Community College, www.hccs.edu/continuing-education/ce-programs/plumbing-technician-osa/
- ³⁶ “Pipefitting for Operators.” *Center for Business and Industry Training (CBIT) Program*, Brazosport College, www.brazosport.edu/areas-of-study/center-for-business-and-industry-training-cbit-programs/safety-and-technical-courses/pipefitting-for-operators/
- ³⁷ “Plumbing.” *SER Jobs*, SER Jobs, www.serjobs.org/programs/training/plumbing/
- ³⁸ “Water and Wastewater.” *Texas A&M Engineering Extension Service*, Texas A&M Engineering Extension Service, www.teex.org/program/water-and-wastewater/
- ³⁹ “Occupational Licenses: Water System Operators.” *TCEQ*, Texas Commission on Environmental Quality, www.tceq.texas.gov/licensing/licenses/waterlic/



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