

The Future of Houston's Clean Energy Workforce

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Introduction: Houston's Energy Transition

Houston is well positioned to be a leader in the clean energy transition, as the city can leverage its existing workforce, infrastructure, demographics, and geography. Clean hydrogen is one such opportunity on the near horizon. With recent federal funding efforts, there are billions of dollars to be captured in addition to private investment. However, these opportunities must intentionally and explicitly support the local workforce and the communities they will operate within to ensure benefit to local Houstonians. An energy transition that leaves the community and local workforce behind will only harm community wellbeing, the economy, and Houston as a whole. This is a monumental opportunity to rebuild the American middle class in a way that is equitable, accessible, and supports the fight against climate change.

Currently, the energy workforce of Houston and the clean energy workforce nationally do not reflect the demographics of the overall workforce, indicating a **lack of opportunity and access**. At the national level, 61% of clean energy workers are white non-Hispanics, and women represent less than 30% of the clean energy workforce.¹ On the positive side, renewable energy employs more Hispanic workers than the energy sector broadly. In Houston specifically, Black, Indigenous, and people of color (BIPOC) workers make up 42% of the energy workforce but 60% of the overall regional workforce, and representation in senior management and board roles is even less (26% in senior management and 14% in board roles).² On the other hand, women make up 32% of the energy workforce even though they are 54% of the Houston regional workforce.

When people are able to access jobs in or adjacent to clean energy **they are not always quality jobs**, particularly in roles with fewer education requirements. In 2021, a Texas worker died on the job every 16.5 hours and a construction worker died every 3 days.³ Though local municipalities such as Austin and Dallas have attempted to increase worker protections through

policies such as mandated water breaks, in June 2023 Governor Greg Abbott nullified those local policies, decreasing worker protections.⁴ As temperatures increase due to climate change, outdoor workers' exposure to hazardous heat conditions will quadruple, threatening both their health and their earnings.⁵ This will disproportionately affect BIPOC workers, who make up 40% of outdoor workers nationally.

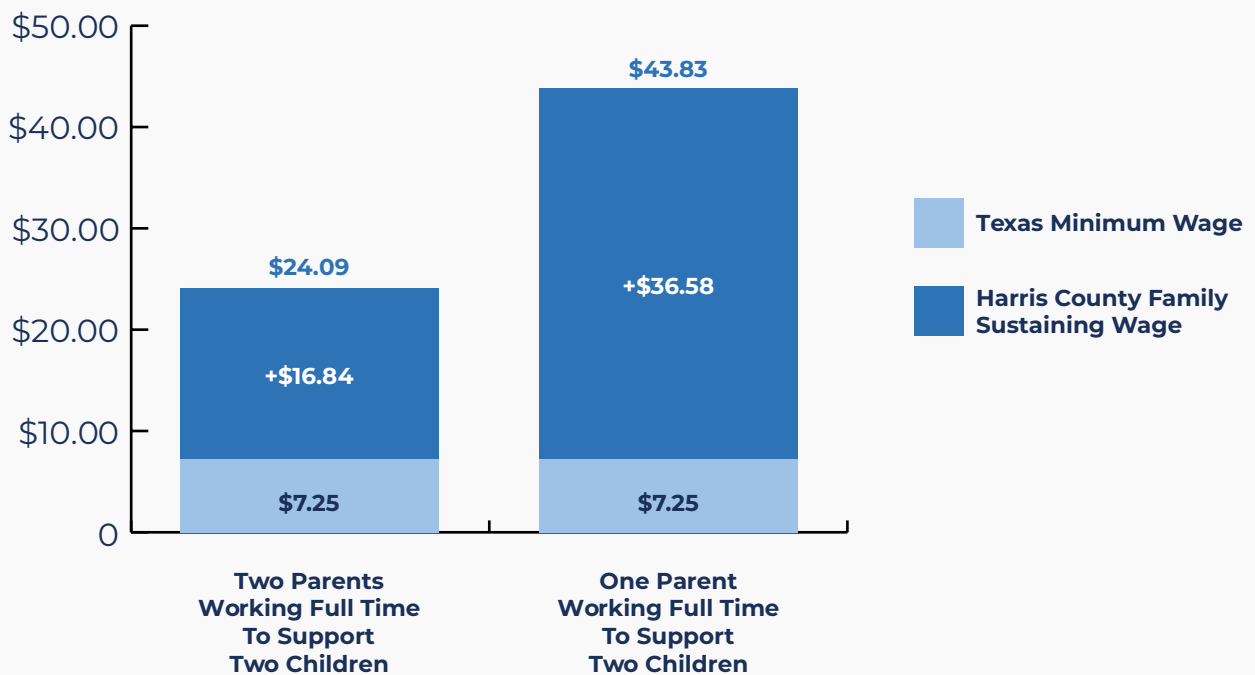
The US Department of Labor and Department of Commerce have agreed on **Good Job Principles that include aspects of recruitment and hiring; benefits; diversity, equity, inclusion and accessibility (DEIA); free and fair choice to join a union; job security and working conditions; organizational culture; pay; and skills and career advancement**.⁶ These principles were developed with input from businesses through the U.S. Chamber of Commerce, provide a baseline framework for job quality, and can act as a job quality standard for federal funding. While many frameworks and definitions for job quality exist, they share similar principles of equitable hiring practices, living wages or family sustaining wages, physical and psychological safety on the job, benefits

that support workers' ability to succeed, and accessible advancement opportunities.

Underlying the Good Jobs Principles and other similar frameworks is a considerable base of evidence demonstrating that by providing competitive wages and benefits, employers see increased productivity, lower turnover, and other business gains.⁷ In the clean energy industry, providing high-quality jobs can result in more effective talent sourcing and retention, fewer project delays, and increased social license to operate. Though companies may be unsure of how to proceed, there are ample resources and case studies on how to implement and sustain practices that are good for workers and good for business.^{8,9}

In Harris County, a family sustaining wage—defined as one parent working full time to support two children—is \$43.83/hour.¹⁰ If you assume two working parents, which can be difficult to manage given the cost and inaccessibility of childcare, the family sustaining wage would be \$24.09/hour. These calculations assume typical expenses such as food, housing, childcare, transportation, medical, and others. When compared to the state minimum wage of \$7.25/hour, the stark gap functions as a call to action for policymakers and employers to improve conditions and support economic opportunity for families, communities, and regions.

Figure 1: Minimum Wage vs Family Sustaining Wage Gap



Source: "Living Wage Calculation for Harris County, Texas." Livingwage.mit.edu.

H2Hubs Opportunity

As part of the Bipartisan Infrastructure Law (BIL) passed in 2022, the federal government issued a \$7 billion funding opportunity to support **seven regional hydrogen hubs**. Hub applicants must commit to 50% nonfederal cost sharing for the projects, and the awards cover planning, development, construction, and 2-4 years of operations. The Department of Energy (DOE) selected hub groups in October 2023, including one applicant group in Houston.¹¹

The **Hyvelocity Hub** includes a range of companies across the hydrogen value chain, academic partners, and industry groups. Core industry partners include GTI Energy, AES Corporation, Air Liquide, Chevron, ExxonMobil, Mitsubishi Power Americas, Ørsted, and Semptra Infrastructure.¹² Other partners include the University of Texas at Austin, The Center for Houston's Future, and Houston Advanced Research Center. As required for the DOE funding process, this group has conducted some community engagement but both labor and community representatives are largely dissatisfied with the depth and intentionality of engagement to date.^{13, 14, 15}

Alongside BIL funding and other federal programs, the Biden administration developed the **Justice40 Initiative** to set a goal for 40% of the overall benefits of select federal programs (including H2Hubs) to flow to disadvantaged communities that are marginalized, underserved, and overburdened by pollution.¹⁶ Hub applicants were required to submit a Community Benefits Plan (CBP) as part of their application, though some stakeholders have expressed a lack of clarity in what is required and how to execute their plans. Questions include what kind of exemptions do and do not apply to hydrogen hubs, how companies

will be held accountable to CBPs, and what resources are available to companies as they try to figure this out. Throughout the next stages of negotiations and planning, improving the clarity of CBPs and providing implementation guidance will support successful alignment with Justice40 and other requirements for this funding.

Workforce System

One of the reasons Houston is well suited for the clean hydrogen opportunity is its pre-existing infrastructure and workforce. As a long-standing home of oil and gas, as well as a prominent wind and solar energy producer, the **Houston area has a deep and broad bench of over 213,000 energy professionals** across skills, roles, and levels.¹⁷ There is a solid system of workforce preparation, ranging from eight week nonprofit-led training programs, to DOL-registered apprenticeships that offer earn-while-you-learn and mentorship, to two and four year degrees and certifications through the postsecondary education system.

Though Texas is a right-to-work state and has low union density, unions play an important role in ensuring job quality in the growing clean hydrogen sector. With Harris County approving funding for DOL-registered apprenticeships earlier this year, the Houston region has a solid foundation for expanding offerings, increasing participation, and targeting underrepresented communities of color. The focus on DOL-registered apprenticeships was emphasized by stakeholders across the board, as those standards align with the DOE's position on quality jobs. Unions can be a powerful tool for racial and economic equity when they consciously design policies with the accessibility and equity of all workers at the center.¹⁸

Experts predict that there will be significant overlap between the roles and skills needed to construct, maintain, and operate clean hydrogen projects and the existing skills of the energy workforce in Houston, though a comprehensive workforce analysis has yet to be done. This overlap extends across engineering, fabrication, business administration, construction, operations, and maintenance, and there is particular alignment with the roles and skills of the natural gas sector. Additionally, many indirect jobs will be created upstream in manufacturing and downstream in retail and other support services near these projects.

This overlap in skills means that the effort required to transition the existing energy workforce into clean hydrogen roles should be low, perhaps a single course rather than a full recertification. **However, there is still a need to increase interest in and understanding of clean hydrogen careers overall**, particularly earlier in the education pipeline (K-12). Though there are more immediate needs to engage high-school-level students, a long term strategy should be building interest and understanding in younger children as well.

Barriers to Ensuring Job Quality in Clean Hydrogen

The development of the clean hydrogen industry is a prime opportunity to improve job quality and broaden access to opportunity for all community members. In our conversations with stakeholders on the ground in Houston and across the country, we identified a number of barriers that hinder Houston's ability to seize this opportunity.

To improve job quality across an ecosystem, there needs to be a combination of inspiring incentives (“carrots”) and accountability (“sticks”). Underneath these incentives and

accountability measures, the ecosystem must build a **foundational understanding of what constitutes a quality job** (such as the Good Jobs Principles), as well as the **business case** for job quality, employee retention, and recruiting and advancing diverse talent. This includes both employers and policymakers building their understanding of how gaps and challenges in the current energy workforce system impact workers, communities, and businesses. By investing in job quality and meaningful community engagement, employers see their ROI in the form of improved recruitment, productivity and retention, and fewer project delays.¹⁹

One of the “carrots” that is currently missing in Texas is an **employer champion**, a leading company that vocally advocates for and demonstrates the business case for high-quality jobs, particularly in entry-level and roles that do not require four year degrees. Unions are the most vocal and coordinated advocates on job quality, but low union density, right-to-work state policies, and other dynamics limit their ability to influence and integrate into clean hydrogen efforts.

As for “sticks,” there is currently **little to no accountability** for employers to ensure quality jobs in their company and throughout their value chain. Local enforcement agencies attempt to hold companies accountable for clear digressions of pollution and community safety, but system-wide enforcement of employment practices and worker protection is lacking.

The DOE requirements related to H2Hubs funding offer some hope for improvement, but enforcement mechanisms are still unclear this early in the process. Some of the challenges stem from a **timing issue**—the clean hydrogen industry is early in its development, many of the proposed projects

will not begin construction nor will they be fully operational for years. In this case, companies are more focused on transitioning their workforce rather than improving conditions for that workforce. At a time when companies are vying for project sites, permits, and prospective workers, there is little incentive or capacity for collaboration.

On the **supply** side of this workforce opportunity, we see that prospective workers and young people are not aware of, interested in, or ready for clean hydrogen jobs. There is an optics challenge where people perceive those jobs as dirty, unsafe, or undesirable; and women and BIPOC workers have not historically seen people who look like them in those roles and thus do not believe it is a viable career option. There is also an awareness issue, in that community members are not informed about the range of job opportunities, relevant skills, or how to access training and education to build their skills for these jobs. There is a significant gap in understanding of both **when** hydrogen jobs will become a reality, and **how** to access them.

Recommendations For Ensuring Quality Jobs In Clean Hydrogen

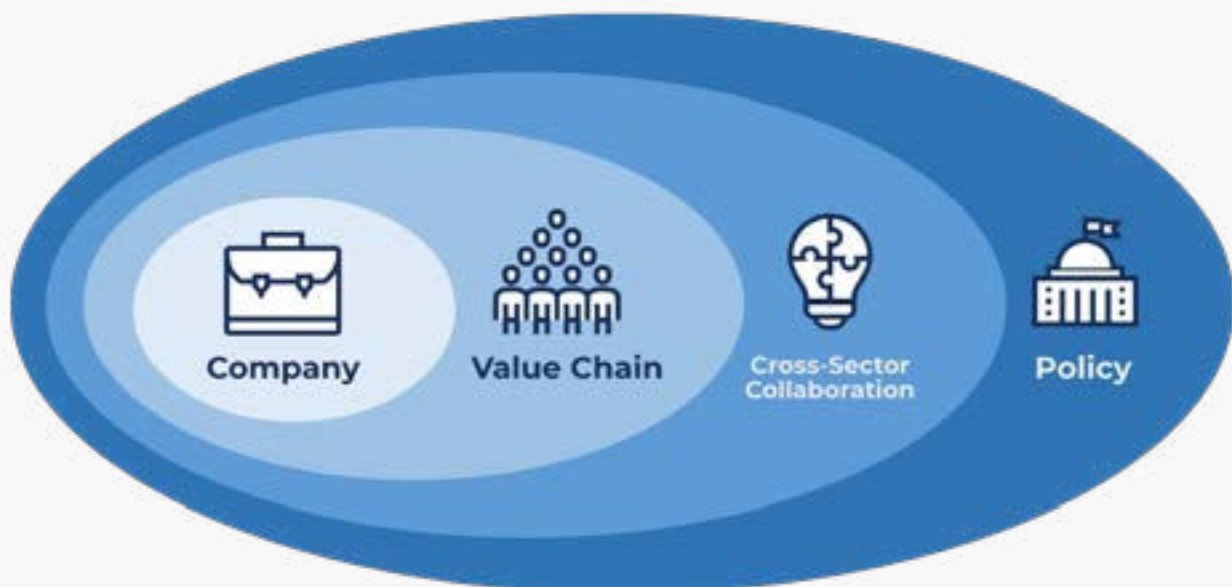
Ensuring job quality in the burgeoning clean hydrogen industry requires capacity building and collaboration across multiple levels of the ecosystem—within companies, throughout the value chain, across sectors, and among policymakers at all levels (local, state, and national).

Company

In order for companies to prioritize job quality in their business strategy without external pressure, they must first understand the business case for doing so. As a relatively new industry, companies working in hydrogen are focused more on regulatory concerns, permitting, and raising capital than on equitable talent strategies.

This is happening in a statewide socio-political context of resistance to the clean energy transition and anti-DEIA laws, together slowing progress on this issue.^{20,21,22}

Figure 2: Quality Jobs Ecosystem



To work through these challenges, there should be corporate leadership education efforts focused on the DOL Good Jobs Principles and the business benefits of equitable talent strategies. Contextualizing these principles and strategies within the Houston region and clean hydrogen sector will make these abstract concepts more accessible for the business community (e.g., discussing living wage and transportation access in the context of Houston today).

This foundation of education is critical to increase corporate interest in and demand for **technical assistance and implementation support** in shifting HR policies and practices. After there is buy-in for job quality comes the hard work of assessing current practices, gathering employee feedback, developing a talent strategy focused on job quality, and implementing practice changes. This work is often authorized by leadership and C-suite executives, but the heavy lifting is led by human resources (HR), hiring managers, and supervisors. Employer practice change efforts may include assessing existing data on retention and talent needs, addressing bias and barriers in the hiring process, improving benefits and on-the-job support to increase retention, and developing more inclusive pathways to career and economic mobility. These efforts may require internal capacity building as well as external technical assistance support.

In recognizing the historically discriminatory infrastructure build-outs of the past, the federal government is putting sustained effort into ensuring that communities that face project impacts also see project benefits.²³ However, there is often misalignment between what constitutes success for companies in community engagement and what constitutes success for communities. For companies,

success is demonstrating goodwill through transactional conversations and securing license to operate, whereas for communities success is collaborative and transformative partnership that benefits the local community members and workforce. Corporate community engagement efforts should shift to orient around community-led outcomes, engage in proactive and mutually beneficial collaboration, and provide accessible opportunities to engage non-traditional stakeholders. This shift will require additional capacity building, technical assistance, and resources (e.g., case studies, guidebooks) as companies, nonprofits, and local and federal governments implement these new streams of public funding.

Value Chain

To ensure job quality throughout the ecosystem, the above recommendations for companies should apply throughout the value chain. Subcontractors typically are not held accountable to community engagement or labor practices to the same degree as companies receiving public and private funding, so it is important to uphold these practices throughout the value chain. Subcontractors are also where many of the entry-level, non degreed jobs exist, and therefore often have lower job quality. Companies and funders should hold subcontracting partners accountable to the same job quality practices and standards that companies implement internally and are held accountable for externally.

Cross-Sector Ecosystem

While much of the employee experience is directly influenced by their employer, there is an entire ecosystem of partners that contribute to job quality, including K-12 education, postsecondary education, labor unions, workforce training nonprofits, wraparound support nonprofits, organizations representing business interests, research organizations, and other civic institutions. While there are pockets of collaboration and bright spots of innovative partnerships to lift up, the overall connectivity and alignment of this Houston ecosystem are low, inhibiting productive cross-sector collaboration. Though competition for funding, talent, and other resources limits collaboration between peer organizations, there is an opportunity to invest in relationship- and trust-building to create alignment on shared priorities to advance a safe, thriving clean hydrogen industry that directly benefits local communities. Identifying potential convening organizations with existing relationships, and starting with conversations among like institutions before convening cross-sector stakeholders would be helpful first steps.

Regional Talent Pool Development

In order for Houston to leverage its immense advantage in the existing energy workforce, employers, nonprofits, and labor partners should work together to invest in the attraction, retention, and transition of the regional talent pool. Despite federal investments and capital interests in this sector, there are limited funds to support the development of the talent pool, and a collaborative approach would make the most efficient use of resources.

These efforts can focus on **understanding the local clean hydrogen workforce needs, attracting young talent** to clean hydrogen roles, **communicating about and providing support for training and education programs** to improve access and equitable outcomes, transitioning the existing energy workforce, and **investing in employer practice change** at the ecosystem level.

- Most immediately, all engaged stakeholders would benefit from a **comprehensive, data-driven workforce analysis** that articulates the upcoming demand for hydrogen jobs and the current supply of related skills. This analysis should identify what jobs will exist; on what timeline; in what sectors, including an indication of temporary versus permanent jobs; and what skills are needed in those roles. On the supply side, it should clarify the current gaps in the training and education systems, representation of marginalized communities in the existing workforce, how existing talent could be upskilled, and what new talent will need to be cultivated.
- **Companies highlighted a need for targeted recruitment and awareness building earlier in the education pipeline, including elementary and middle school students, to increase understanding of and interest in clean hydrogen jobs.** These efforts should also include a targeted focus on engaging women and BIPOC talent to ensure the economic opportunity of this industry is accessible for all Houston residents.
- Education institutions, registered apprenticeship programs, and nonprofit workforce training programs

should work together to **clarify the range of training options** available to the community. Putting the learner and worker at the center, this training menu should include considerations for time to completion, cost or pay, benefits, and a clear connection to specific jobs. These pathways may include DOL-registered apprenticeship programs, employer training programs, nonprofit training programs, and college or university credentials. These efforts should also work at streamlining pathways from K-12 through higher education and other forms of training to support efficiency and affordability of access to career opportunities.

- There is a significant gap in public understanding of clean hydrogen generally, job opportunities in the sector, and how to access those jobs. By **communicating the multiple pathways** to quality clean energy jobs, the ecosystem can address that knowledge and access gap. Efforts to date have largely focused on roles that require at least four-year degrees, leaving a massive gap in skilled trades roles when those sectors are already facing a labor shortage.
- Alongside the training and education pathways, learners and workers should also have access to **wraparound services** that support their ability to complete and successfully transition into the workforce, such as childcare, financial support, legal support, and transportation. Coordinating this suite of services requires collaboration among nonprofits and social services to specify what resources are available to Houston communities, and create partnerships to coordinate service provision.

- Though the clean energy transition will occur over a long timeline, it is important to pre-emptively identify workers who will be affected and provide **retraining and transition opportunities**. Whether these workers make the transition due to personal interest, economic opportunity, or market factors is immaterial; it is the ecosystem's responsibility to ensure that this transition does not leave workers behind. There is a significant amount of skill and role overlap between oil and gas roles and clean hydrogen roles, creating opportunity for a smooth transition with enough foresight and intention. Given that many companies in the hydrogen space are also in the oil and gas industry, these retraining efforts can be leveraged as an internal advancement opportunity. Retraining efforts should include components to minimize negative impacts on workers to encourage participation, such as job guarantees, earn-while-you-learn programs, registered apprenticeships, and wraparound supports.
- Lastly, as employers are implementing the practice changes indicated above in service of job quality, it can be powerful to come together in **place-based communities** of practice to share lessons learned, work together on shared resources, and mitigate duplication. This also creates a sense of shared responsibility, and can encourage greater momentum across the corporate space.

Ultimately, these recommendations together indicate the need for collaborative, cross-sector regional talent pool development. This effort should include agreed-upon minimum standards for job quality.

Labor

Though union participation is low in Texas due to state policies that limit worker power, labor unions are one of the biggest proponents of job quality in the ecosystem. Identifying and **sharing positive examples of employer-union relationships** can support a shift, albeit a slow one, in this long-standing dynamic that inhibits job quality across sectors, not just in clean hydrogen. Since project labor agreements are one outcome of the DOE H2Hubs funding process, **building companies' capacity to engage in productive partnerships** and meet the commitments of their agreement will improve job quality and meet the funding requirements.^{24, 25}

At the time of writing, Hydrogen Hub awardees were just announced, and labor and community stakeholders are actively engaging in alignment conversations to identify key priorities. Houston labor organizations are calling for **binding community workforce** agreements in the construction sector. Community workforce agreements help to establish minimum wage standards and prioritize historically disadvantaged communities to get access to apprenticeship training. On the operations and maintenance side, labor unions are calling for **binding labor peace agreements** to allow employees a fair and neutral environment to decide whether to unionize at the facility level if and when there is sufficient support among the employee base. Across these agreements, unions are advocating for safety training, healthcare benefits, pensions, apprenticeship training, and prevailing wages.

Capital

Since the H2Hubs funding requires 50% cost share, federal money will constitute up to half of the funding required to build out clean hydrogen projects. This creates an opportunity for green banks, investment funds, and other capital sources to encourage job quality in their application and selection process. Private funders in Houston have demonstrated interest in hydrogen and can play an important role in increasing accountability and incentives for companies to invest in their workforce and value chain.

Accountability and Measurement

At this early stage of the clean hydrogen sector, it is important to embed mechanisms for accountability and measurement on workforce development and job quality. The HyVelocity Hub includes research institutions, and their data and analytic capacity can be leveraged to understand and communicate workers' experience of job access, job quality, and economic mobility. Similarly, understanding the broader regional economic impact on communities will be invaluable in monitoring adherence to the Justice40 principles and inclusive economic growth goals of the region.

Policy

Current State: In order to understand the policy opportunities, it is important to recognize the role policy played in creating opportunities in clean hydrogen and how policy has also contributed to many of the barriers listed above. Though companies in Houston may pursue clean hydrogen projects without H2Hubs funding, federal policies such as the Bipartisan Infrastructure Law catalyzed a significant degree of

interest and greater urgency, and may also contribute to competitive dynamics in the sector. Most importantly, the scale of projects enabled by H2Hubs funding implies a greater number of job opportunities for the local workforce than would otherwise exist. There is a strong incentive to ensure that businesses are maximizing their funding opportunities and tax credits, and this can be a powerful leverage point for accountability.

As mentioned above, local and state policies have cultivated more challenges than opportunities when it comes to job quality in clean energy, particularly for entry-level, non-degreed jobs, women, and people of color. A long legacy of policy decisions that prioritize business interests over the wellbeing and safety of workers has created the poor job quality we see today. Additionally, anti-DEIA policies limit the ability of universities, school systems, businesses, and others to implement programs and policies that aim to increase representation, diversity, and equity in the workforce.

Policy Opportunities: Though this report is not focused on policy, we would be remiss to not mention the local, state, and federal policies that would support job quality in Houston's clean hydrogen sector. State level policies in Texas have long favored business interests over those of workers and community members most affected by industry. It may be unlikely that Texas will transition from a right-to-work to a right-to-organize state in the near term, but there are still opportunities to improve working conditions and opportunities at the local level.

Local jurisdictions can implement hiring and procurement standards that commit companies to investing in communities most affected by the energy transition and

industry. For example, this could mean requirements and/or supports to contract with women- and minority-owned businesses. With this must come enforcement, which requires capacity building, and Rutgers University's Labor Standards Enforcement Toolbox offers useful resources. Additionally, local funding streams for training pathways, such as the Harris County funding for DOL-registered apprenticeships developed in partnership with the Texas Gulf Coast Area Labor Federation, support the expansion of accessible pathways into the industry.²⁶

At the federal level, the above-mentioned Justice40 Initiative and Good Job Principles provide a foundation for job quality and require **enforcement and accountability**.²⁷ At this point in the funding cycle, it is unclear how H2Hub applicants will be held accountable for their project labor agreements and community benefits agreements, but this can be a major lever for accountability. The DOE and DOL can offer support to both applicants and local governments on the enforcement of Good Jobs Principles and Justice40 Initiative in DOE-funded projects.

There are other elements of the policy landscape that **have yet to be determined** and could help or hinder job quality. Permitting standards do not exist at the time of writing, and should be developed in a way that requires more labor and community planning and engagement. There is also limited data on risk and safety in clean hydrogen, inhibiting the ecosystem's ability to establish industry-specific safety protocols and training to protect workers.

Immediate Next Steps

At this early stage in the development of Houston's clean hydrogen sector, there are both ample opportunities to influence job quality and many outstanding questions. Our conversations identified a few immediate opportunities to begin advancing job quality in the sector:

- Funding a comprehensive workforce analysis to understand job and skill demands and supplies over the implementation timeline of clean hydrogen projects.
- Resolving outstanding differences between HyVelocity and Texas labor organizations to ensure binding community workforce agreements for construction workers and labor peace agreements for manufacturing, operations, and maintenance workers on future hydrogen projects.
- Building interest in and understanding of clean hydrogen job opportunities through engagement with the K-12 education system, as well as in the communities most impacted by the energy transition.
- Engaging clean hydrogen employers to articulate the job opportunities and pathways that their projects will support, to begin developing a menu of options for workers and learners.
- Engaging the corporate sector to build understanding of the business case for quality jobs.
- Investing in relationship building within and across sectors to lay the foundation for greater collaboration.

Outstanding Questions

Given the limitations of these findings (see Methodology), it is important to highlight the remaining questions that need to be explored in order to move forward.

- What is the **workforce analysis** for what kinds of jobs, skills, and training will be required to implement hydrogen hubs in Houston, and how does that match against the current supply of talent and availability of training programs? How do stakeholders in this system define a clean hydrogen career?
- Which organizations or individuals have the capacity and trust from the community to play a **convening role** to identify priorities for quality jobs from the workers' perspectives?
- Which companies involved in H2Hubs are the most advanced in their job quality efforts and can act as a **champion** to advance the field?
- In what ways can the Department of Energy, private investors, and green banks, as funders of clean hydrogen, function as an **accountability mechanism** to ensure job quality and community benefit?

Methodology

Talent Rewire interviewed 17 stakeholders who are engaged in job quality or clean energy work in Houston and nationally to understand the local context and identify best practices from other regions. Local stakeholders included community college leaders, workforce development organizations, workers' rights organizations, economic development organizations, and those representing community voices. Our work intentionally did not engage employers so as to respect the ongoing process of labor negotiations related to H2Hub proposals, and we recognize this as a necessary limitation of the work. Many more organizations were contacted to share their point of view and did not respond.

We also participated in three in-person community meetings related to clean hydrogen and green jobs. Secondary research included a landscape scan of reports and data related to clean hydrogen, job quality, DOE processes, and local Houston news.

Overall, it is important to note that these findings included a limited range of perspectives and a specific point in time in a rapidly evolving context (recommendations were finalized in November 2023). This report is not intended to encapsulate the broad range of perspectives and opportunities to advance job quality in Houston's clean energy sector. The Outstanding Questions section captures the most pressing topics to explore and folks to engage to better understand the opportunity.

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