

Creating an Inclusive Water + Energy Workforce

LANDSCAPE REVIEW



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Ann Arbor, Michigan

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WATER + ENERGY
FORWARD

THE WATER COUNCIL

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CIS

About This Report

This report was prepared by Corvias Infrastructure Solutions, LLC (CIS) with Cross Management Services, Inc. (Cross) for The Water Council as part of their aspiring NSF Engine, W+E Forward.

CIS is a national leader in the development and implementation of public infrastructure solutions that improve environmental health, protect human health and well-being, bolster local economic development, and build local workforce capacity. CIS also offers related advisory/research expertise and services on topics including environmental finance, nature-based solutions, climate resilience, disaster prevention, environmental equity/justice, water affordability, and public trust.

Cross is a consulting firm that provides community outreach, contract compliance, construction management, and real estate brokerage services. Cross specializes in designing, coordinating, and monitoring DEIA Programs for developers, contractors, corporations, and governmental entities on construction projects.

The Water Council is a global hub dedicated to solving critical water challenges by driving innovation in freshwater technology and advancing water stewardship.

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1. Purpose of the Landscape Review

The National Science Foundation (NSF) Engines program has three overarching goals: **1) Boost Innovation Capacity**, **2) Create Sustainable Innovation Ecosystems**, and **3) Demonstrate Inclusive Economic Growth**. Engines perform three key functions to accomplish these goals, including producing use-inspired research and development, supporting the translation of innovation results to society, and workforce development to grow and sustain regional innovation.

A key focus of the NSF Engines is to ensure **Inclusion at All Levels**, described as ensuring “diversity, equity, inclusion, and accessibility (DEIA) are intentionally and meaningfully embedded at all levels in leadership, R&D, and workforce development activities” (U.S National Science Foundation, 2023). Inclusion is emphasized in two of the program’s three goals. The first goal includes a focus on embedding a “culture of innovation and inclusion within participating organizations.” That means that the Engine’s leadership team, partners, and engaged stakeholders should be representative of the region it serves. The third goal is also centered around the concept of inclusive economic growth. This means harnessing innovation and research to support economic growth for all people interested in science and engineering, “regardless of their backgrounds, organizational affiliations, or geographic locations.”

There are three pathways we focus on for supporting inclusivity in Wisconsin’s water and energy sectors through the Water + Energy Forward (W+E Forward) NSF Engine. The primary pathway for accomplishing this objective is Workforce Development. Building this workforce not only requires recruiting and maintaining an inclusive workforce but also building an inclusive talent pipeline and increasing participation of small- and medium-businesses and other disadvantaged business enterprises. The goal of this landscape review is to help the W+E Forward understand how to embed DEIA into all its foundational components and develop a framework to inform the development of a plan to achieve **Inclusion at All Levels**.

2. Conceptualizing Inclusion in the Water + Energy Workforce

There are many terms used to describe the arena of work that will result in **Inclusion at all levels**. However, we use the term inclusion throughout this review since it is used by the NSF Engines program. Below, we summarize four terms that inform our understanding of **Inclusion at All Levels** within the context of the water and energy workforce:

Workforce Diversity refers to the existence and extent of differences within the workforce in classifications like race, gender, sexual orientation, age, religion, disability status, and other

identifying factors (Center for Energy Workforce Development, 2022). Typically, diversity is reported as a comparison to a reference population such as the civilian labor force or population (National Association of State Energy Officials, 2021). A diverse workforce is one that is representative of the community or labor force it is drawing from. Diversity can be measured with demographic data and therefore may be easier to quantify than other components of DEIA. Perhaps for this reason, DEI or DEIA goals or reporting frequently focus on diversity, which is not necessarily an indication of overall DEIA (Gaudiano, 2022; Puritty et al., 2017; Sherbin & Rashid, 2017).

Workforce Equity is the fair treatment, access, and advancement of workers, resulting in the elimination of income gaps and a workforce that is representative of the population across levels of pay, occupational groups, and sectors (Center for Energy Workforce Development, 2022; National Fund for Workforce Solutions, n.d.). In an equitable workforce, all jobs are good jobs (Langston et al., 2022). While the precise definition of “good jobs” may vary, key components are a living wage, a stable or growing base of employment, and opportunity for equitable advancement (Domeika et al., 2023; Langston et al., 2022). Workforce equity may be assessed with earnings, advancement, and leadership/management diversity metrics.

Workforce Inclusion points to how the workforce is treated and how they feel (Puritty et al., 2017). An inclusive workplace incorporates employees in planning, decision-making, and other key organizational activities and its employees feel welcomed, respected, and valued (Center for Energy Workforce Development, 2022; Gambatese et al., 2019). As one prominent DEI consultant phrases it: “Diversity is being invited to the party. Inclusion is being asked to dance” (Myers, 2018). Inclusion is a factor that drives employee retention, so turnover rate can be an indicator of inclusion, as can responses to employee surveys (Gambatese et al., 2019).

Workforce Accessibility is the practice of ensuring equal access to the workforce for persons with disabilities through physical or technological accommodations and supportive processes (Employer Assistance and Resource Network on Disability Inclusion, n.d.). Employers have legal obligations under the Americans with Disabilities Act and, if receiving federal funding, Section 504 of the Rehabilitation Act, but implications of accessibility go beyond compliance to benefit businesses and facilitate inclusive work environments. Measuring workforce accessibility can be challenging because accessibility entails a wide range of experiences and employees may not disclose disability status with their employer: although 30% of employees have disabilities, only an average of 3.2 percent self-identify as having a disability to their employer (Sherbin et al., n.d.). Diversity, equity, and inclusion metrics specific to persons with disabilities can support an understanding of workforce accessibility.

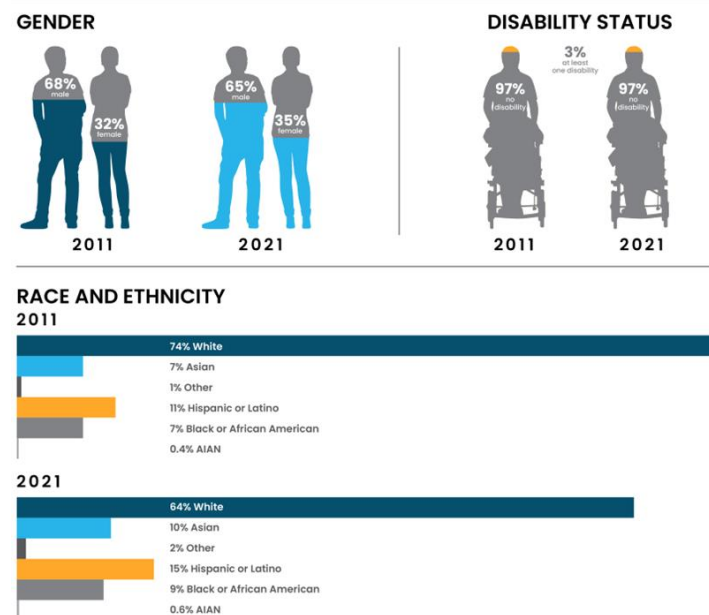
3. The Current State of Inclusion in the Water + Energy Workforce

3.1 National Landscape

3.1.1 Workforce Diversity

The STEM workforce has long had underrepresentation of women, BIPOC workers, persons with disabilities, LGBTQIA2S+ (LGBTQ+), and other underserved groups. Recent years, however, have seen improvement. A study by the National Center for Science and Engineering Statistics (2023) shows that representation has improved among several key demographics from 2011 to 2021 (Figure 1). There has been a 9 percent increase in the proportion of women in the workforce. There has also been a 14 percent decrease in the proportion of nonwhite workers – increasing from 26 percent to 36 percent. There is greater representation of BIPOC workers, with a 29 percent increase in the proportion of Black or African American workers, 36 percent increase in the proportion of Hispanic or Latino workers, and 21 percent increase in the proportion of Asian workers. Representation of persons with disabilities, however, has not changed since 2011. While this is representative of the national workforce, 9 percent of the U.S. population has at least one disability.

Change in the U.S. STEM workforce demographics from 2010-2021



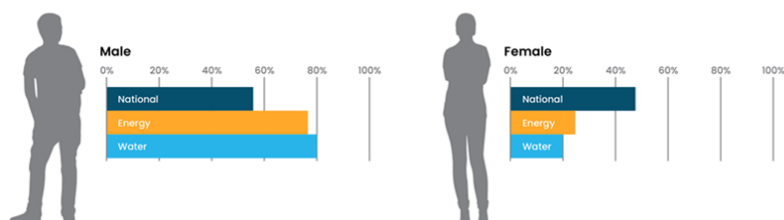
*Figure 1. Changes in STEM workforce composition 2010 – 2021
(Source: National Center for Science and Engineering Statistics, 2023)*

While there has been progress in increasing diversity in the STEM workforce, many demographics are still not representative of the national workforce. This is true of the water

and energy workforce (Figure 2), which poses a challenge for the Engine to ensure Inclusion at All Levels. Women comprise only 20 percent in the water workforce (Kane & Tomer, 2018) and 25 percent in the energy workforce (USDOE, 2022) – compared to 47 percent of the national workforce. Similarly, Black or African Americans are underrepresented, comprising only 9 percent of the water workforce (Kane & Tomer, 2018) and 8 percent of the energy workforce (USDOE, 2022) – compared to 12 percent of the national workforce. Studies on workforce diversity in these sectors also lack measures of key demographics, such as persons with disabilities, LGBTQ+ workers, and other underutilized groups.

Water + Energy Workforce vs. National Workforce Demographics

GENDER IN WORKFORCE



RACE IN WORKFORCE

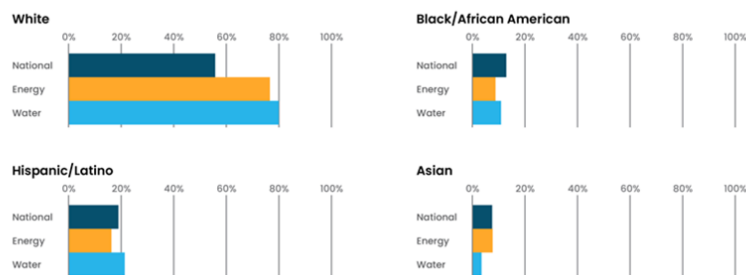


Figure 2. Overview of the water and energy workforce compared to the national workforce.¹

There are many factors that contribute to underrepresentation in the water and energy workforce, and it is important to understand that these statistics do not capture the quality of employment. Part of the gender and racial imbalance in the water and energy sectors is a result of inequities in hiring and retention practices. Additionally, some of this disparity can be attributed to earlier stages in the pipeline, including schooling and college choices, where girls and nonwhite students are often underrepresented in STEM fields. A lack of leadership and staff diversity hampers employers' understanding of the needs of their diverse customers and changing priorities for service improvements. A steady increase in women and non-White students choosing STEM careers (NSF, 2023) means that employers must pay

¹ Water workforce data was taken from a Brookings report, "Renewing the Water Workforce" (Kane & Tomer, 2018). Energy workforce data was taken from a USDOE report, "United States Energy and Employment Report 2022." National workforce data was collected from the U.S. Census Bureau. Since the national workforce averages were within one percentage point for 2016 and 2020, we used the national workforce averages from 2020.

attention to their hiring, retention, and workplace culture practices to remain attractive as a career option for this diverse talent pool. A survey of employees in the U.S. energy sector found that “fewer than half of energy workers across race and ethnicity were optimistic about their company’s diversity and inclusion in recruitment, hiring, promotion, and leadership roles” (Lehmann et al., 2021).

3.1.2 Workforce Equity

Equity is key to attracting and retaining a diverse workforce. Too often, underserved groups experience discrimination in the workplace leading to inequitable remuneration. The STEM workforce still has significant pay gaps for key demographic groups. For instance, a study by the National Center for Science and Engineering Statistics (2023) shows that women make 28 percent (or \$24,361) less per year than their male counterparts in science and engineering (S&E) occupations. Asian and White workers in S&E occupations make the most annually, at an average of \$107,150 and \$88,977 per year, while Hispanic or Latino workers make \$75,179 per year and Black or African American workers make \$73,062. The average pay is, however, similar for people with at least one disability and for people with no disability, \$89,087 and \$89,992 respectively.

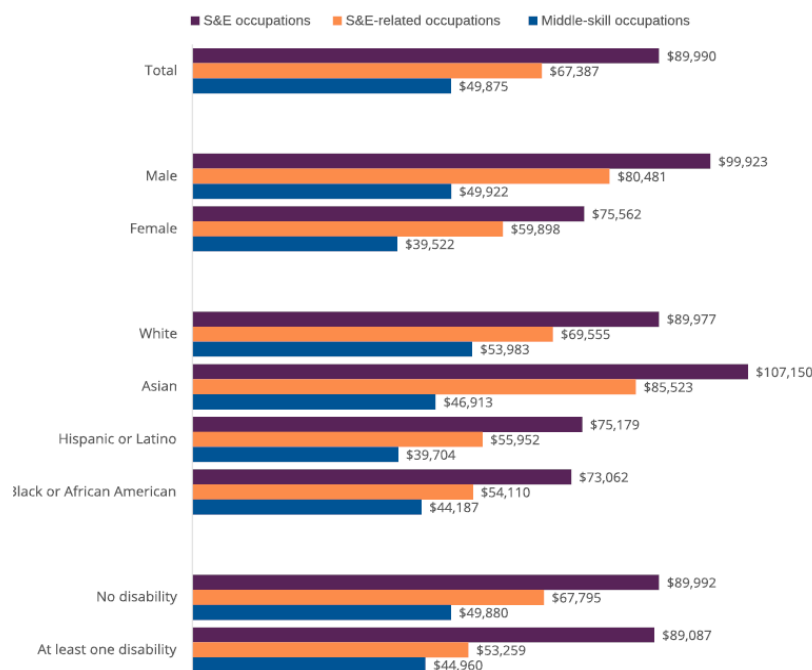


Figure 3. Overview of median wage and salary earnings for the STEM workforce ages 18–74
(Credit: National Center for Science and Engineering Statistics, 2023)

LGBTQ+ populations also experience a significant pay gap. A study by Folch (2022) found that college-educated workers in the LGBTQ+ community earn 22 percent less than their heterosexual cisgender counterparts a decade after graduation. According to the study: “About half of this gap can be attributed to LGBTQ+ graduates being less likely to complete a high-paying major and work in a high-paying occupation (e.g., STEM and business)” (Folch,

2022, sec. abstract). The study also found that these graduates are twice as likely to report mental illness.

Broadly, good jobs are a foundational component of an equitable workforce. Among the nine most common occupations² in the water utility, energy utility, primary metal manufacturing, food manufacturing, and paper manufacturing industries, only two occupations in the Green Bay MSA and four occupations in the Milwaukee MSA had a 10th percentile wage that would be considered a living wage, defined here as the wage that can support two working adults and one child (<https://livingwage.mit.edu/>). One occupation in the Green Bay MSA and two occupations in the Milwaukee MSA had median wages below the living wage: food processing workers in both locations and production occupations in Milwaukee. Wage data for these occupations are presented as cross-industry results, and therefore present challenges in truly understanding the wage distribution in the industries of interest. Nonetheless, these data help characterize the income of these occupations which is important to understand because wages that cannot sustain basic needs inherently cannot provide an equitable work environment.

Workforce retention is already a challenge in the water sector in general, and the problem will continue to grow as the workforce ages. A study by Dickerson and Butler (2018) estimates 30 to 50 percent of drinking water and wastewater operators will retire in the next 5 to 10 years. This poses a significant challenge for the water sector, as it will have to retain its remaining workers and find ways to attract a qualified workforce (EPA, 2020). It does, however, also present a significant opportunity to increase the level of diversity in the workforce.

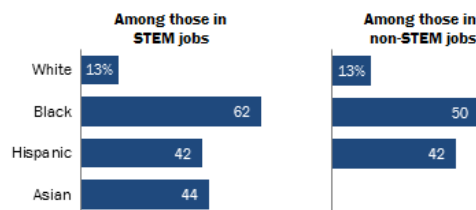
Furthermore, these underrepresented groups are often underemployed, meaning they frequently occupy positions that do not fully utilize their skills or qualifications. This underemployment can lead to cycles of economic instability and limited career advancement, particularly affecting stigmatized populations, including LGBTIQ+ persons. Workplace discrimination often contributes to LGBTIQ+ individuals being unemployed or underemployed, compelling them to accept jobs that are below their level of education or expertise (Human Rights Campaign, 2021). This is compounded by the fact that such positions often lack formal labor protections and offer precarious earnings, characteristic of the informal economy where LGBTIQ+ persons are disproportionately represented due to their relative ease of entry. To counter these challenges, it is crucial for organizations to implement inclusive hiring practices, provide equitable career development opportunities, and enforce robust anti-discrimination policies, ensuring all employees can access meaningful work that corresponds to their capabilities.

² Based on 2022 BLS national employment matrix for selected industries. Selected occupations include two- to six-digit SOC codes, based on variability within industries: installation, maintenance, and repair occupations (490000); production occupations (510000); food processing workers (513000), plant and system operators (518000), power plant operators (518013), water and wastewater treatment plant and system operators (518031); electrical power-line installers and repairers (499051); plumbers, pipefitters and steamfitters (472152); and paper goods machine setters, operators, and tenders (519196). Wage data obtained from the Job Center of Wisconsin.

3.1.3 Workforce Inclusion

Inequities in the workplace can lead to a lack of inclusion in workforce culture – limiting the sense of belonging felt by underrepresented groups and leading to higher turnover and workforce retention challenges. BIPOC workers often report discrimination in STEM jobs. A survey administered by Pew Research Center found that 62 percent of Black or African American workers, 44 percent of Asian workers, and 42 percent of Hispanic or Latino workers in STEM reported experiencing discrimination because of their race or ethnicity. Black and African American STEM workers reported forms of discrimination, such as being treated as if they were not competent (45 percent), felt isolated in their workplace (29 percent), earned less than a coworker doing the same job (27 percent), and received less support from senior leaders than a coworker (27 percent).

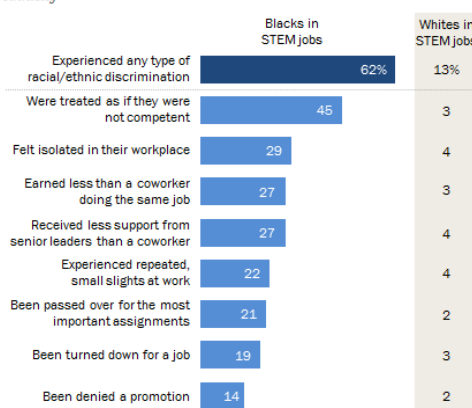
% of employed adults who say they have experienced any of eight forms of discrimination in their workplace due to their race or ethnicity



Note: Whites, blacks and Asians are non-Hispanic only; Hispanics are of any race. There were not enough Asian respondents working in non-STEM jobs in the sample to be broken out into a separate analysis. Respondents who gave other responses or who did not give an answer are not shown. STEM stands for science, technology, engineering and math.
Source: Survey of U.S. adults conducted July 11-Aug. 10, 2017.
"Women and Men in STEM Often at Odds Over Workplace Equity"

Figure 4. Percentage of STEM and non-STEM workers that reported they experienced discrimination by race and ethnicity (Credit: Pew Research Center).

% of those in science, technology, engineering and math jobs who say each of the following has ever happened to them at work because of their race or ethnicity

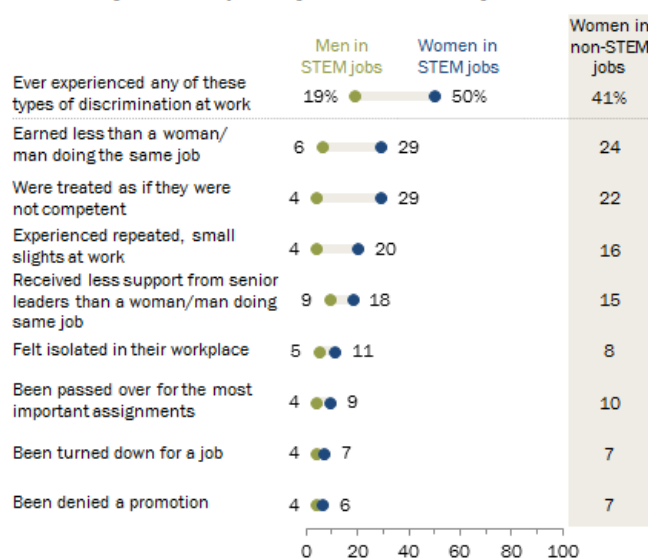


Note: Whites and blacks are non-Hispanic only. Respondents who gave other responses or who did not give an answer are not shown.
Source: Survey of U.S. adults conducted July 11-Aug. 10, 2017.
"Women and Men in STEM Often at Odds Over Workplace Equity"

Figure 5. Forms of discrimination STEM workers reported experiencing in the workplace by race and ethnicity (Credit: Pew Research Center).

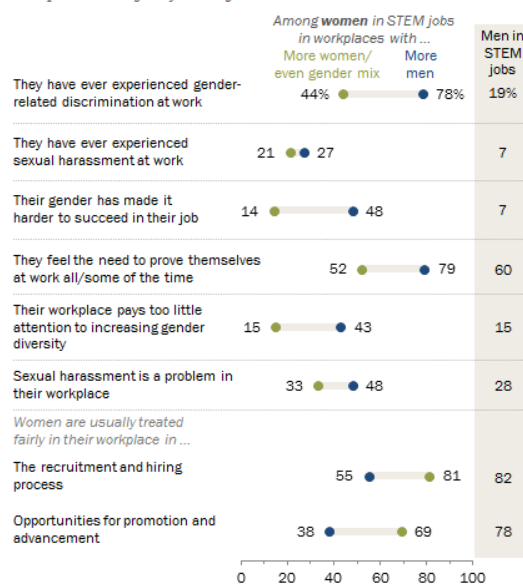
The same survey found that 50 percent of women experienced discrimination at work because of their gender. Examples of discrimination included earning less than a man doing the same job (29 percent of respondents), being treated as if they were not competent (29 percent), experienced repeated, small slights at work (20 percent), and receiving less support from senior leaders than a man doing the same job (18 percent). The degree of perceived discrimination was even higher in majority-male workplaces. Women were more likely to feel like they needed to prove themselves at work and that their gender has made it harder to succeed in their job. Women also reported a greater prevalence of sexual harassment in their workplace in majority-male workplaces compared to those with more women or with a more even gender mix.

% of those in science, technology, engineering and math jobs who say they have ever experienced the following at work due to their gender



Note: Respondents who gave other responses or who did not give an answer are not shown.
Source: Survey of U.S. adults conducted July 11-Aug. 10, 2017.
"Women and Men in STEM Often at Odds Over Workplace Equity"

% of those in science, technology, engineering and math jobs in each type of workplace who say the following



Note: Experience of gender-related discrimination based on combined responses to eight items. Respondents who gave other responses or who did not give an answer are not shown.
Source: Survey of U.S. adults conducted July 11-Aug. 10, 2017.
"Women and Men in STEM Often at Odds Over Workplace Equity"

Figure 6. Forms of discrimination STEM workers reported experiencing in the workplace by gender (left) and for workplaces with more women/even gender mix vs. workplaces with more men (right) (Credit: Pew Research Center).

Discrimination against LGBTQ+ workers is also significant. Cech and Waidzun (2021) performed a survey of 21 STEM professional societies to understand LGBTQ+ inequality that showed workforce retention is a continued challenge for LGBTQ+ workers because of this discrimination. The survey sampled 25,324 STEM workers, 1006 of which identified as LGBTQ+, and showed that LGBTQ+ were significantly more likely to report they have thought about leaving their STEM job or plan to leave the STEM profession. This is particularly concerning as 7.6 percent of adults identify as LGBTQ+, and 20 percent of 18- to 23-year-olds identify as LGBTQ+ (Jones, 2022). Finding ways to help build pathways to the STEM workforce and foster workplace inclusion for LGBTQ+ populations will be important to ensure they are fairly

represented in the workforce. This can also play a key role in addressing systemic inequities for these populations.

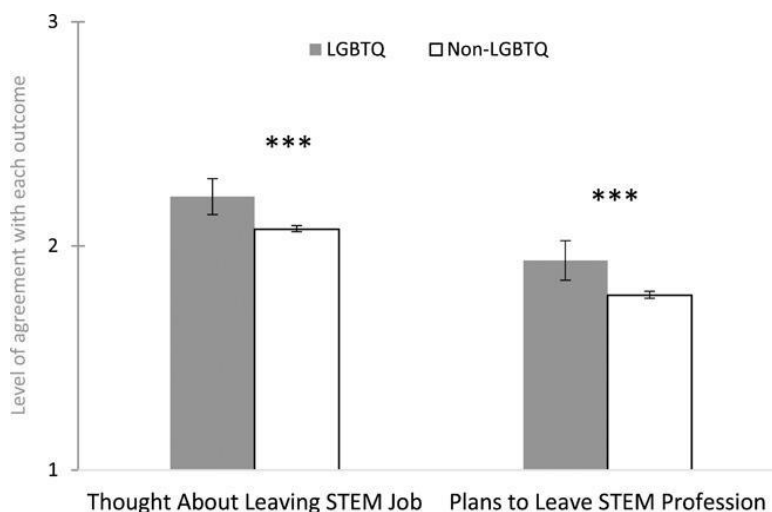


Figure 7. Level of agreement from a survey of STEM workers who thought about leaving a STEM job or that plan to leave their STEM profession for LGBTQ+ and non-LGBTQ+ workers (Credit: Cech & Waidzunus, 2021)

3.1.4 Workforce Accessibility

Another key barrier to achieving diversity, equity, and inclusion in the workforce is a lack of accessibility for persons with disabilities.

In 2021, nine percent of the U.S. population reported having one or more disabilities, while only 3 percent of people employed in a STEM occupation reported having one or more disabilities (National Center for Science and Engineering Statistics, 2023) (Figure 8). This notable underrepresentation in STEM fields is concerning, as these sectors are crucial for innovation and economic growth. The rate of reported disabilities is higher among BIPOC populations: “When combined, Hispanics, Blacks, and American Indians or Alaska Natives—collectively referred to as underrepresented minorities—made up 31% of the total population and 24% of STEM workers in 2021” (National Center for Science and Engineering Statistics, 2023) (Figure 9).

This data highlights the intersectional challenges faced by these groups, who encounter compounded barriers due to overlapping social identities such as race and disability, further complicating their access to equitable opportunities in high-impact fields. Addressing these disparities is essential for fostering a diverse and inclusive workforce that can drive forward technological and scientific advancement.

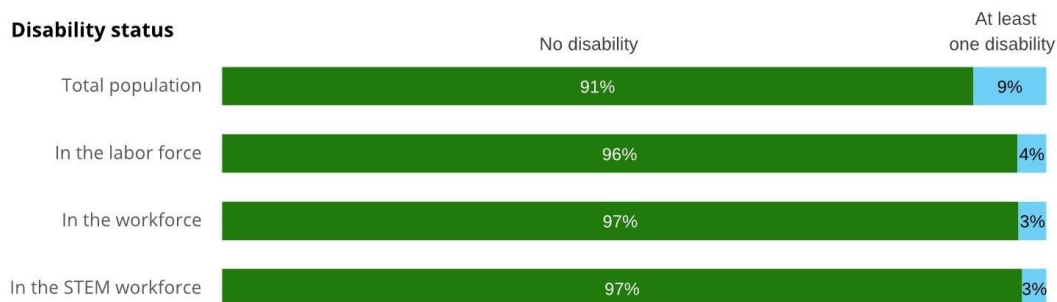


Figure 8. Disability status in the STEM workforce
(Credit: National Center for Science and Engineering Statistics, 2023)

Unemployment rate of the workforce ages 18–74 in STEM and non-STEM occupations, by sex, ethnicity, race and disability status: 2019 and 2021

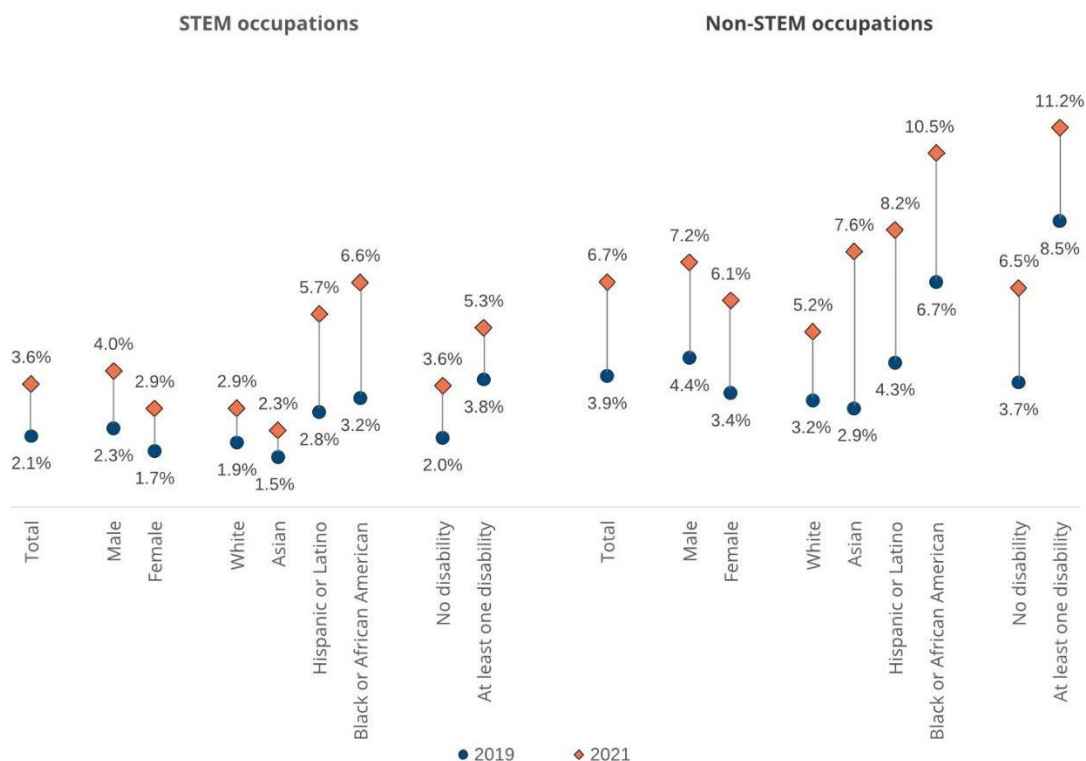


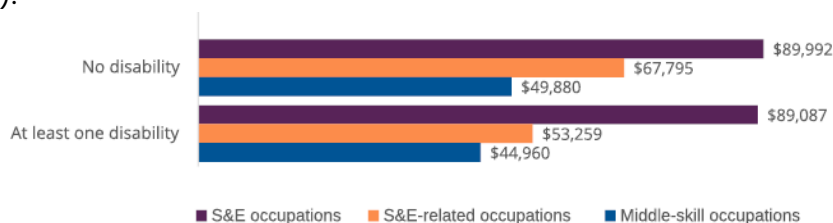
Figure 9. Unemployment rates for STEM vs. non-STEM workforce by demographics
(Credit: National Center for Science and Engineering Statistics, 2023)

Another challenge for employers is that persons with disabilities may not report their disability status or request needed accommodations due to perceived stigma and fears of discrimination, especially for people with invisible (or non-visible) disabilities. An estimated 43 percent of people with less visible disabilities do not report them to employers (Bupa, 2022). The most frequent reasons are that they do not want to “cause a fuss” (30 percent) or be treated differently (25 percent). These disabilities like anxiety, depression, and PTSD not

only make it difficult to complete everyday tasks but they can also limit individuals' ability to form relationships in the workplace and fuel feelings of lack of inclusion.

Addressing the root causes of these disparities involves not only recognizing systemic barriers but actively removing them through trauma-informed practices. Trauma-informed approaches in the workplace recognize the profound impact of inaccessible and non-inclusive environments on individuals with disabilities, particularly when it comes to job application processes. The lack of accessibility on many Fortune 100 career sites, as noted by Smith (2019) and expanded upon by Ben Eubanks, exacerbates unemployment among persons with disabilities, effectively sidelining a significant pool of talented candidates. This systemic exclusion serves as a form of trauma, perpetuating cycles of underemployment and impacting economic stability and self-esteem.

In STEM and trade-type occupations, where functional income equality could be a possibility, the inaccessibility of career entry points often blocks the realization of these opportunities, contributing to the ongoing marginalization of disabled persons in high-impact careers. This is evident when examining disparities in income for people with and without disabilities; persons with at least one disability earned 24 percent less than persons with no disability (Figure 10).



*Figure 10. Income by disability status in the STEM workforce
(Credit: National Center for Science and Engineering Statistics, 2023)*

Adopting trauma-informed practices means proactively identifying and dismantling these barriers. This involves implementing accessible design in online career platforms and embedding principles of inclusivity and equity across all organizational practices. By doing so, workplaces can prevent the perpetuation of trauma and create inclusive environments that value and support diversity, enhancing overall innovation and productivity in the workforce.

3.2 Water + Energy Workforce Needs in the Engine Region

W+E Forward is in the process of developing a comprehensive assessment of the local water and energy workforce across the region – in eastern Wisconsin and northern Illinois. The analysis found that water utilities had the fastest growth in job demand, with an average annual growth of 30 percent over the past two years. There are 35 roles that were documented, and the top occupations (by wage) were billing and posting clerks (\$50/hr), control and valve installers and repairers (\$38/hr), civil engineers (\$33/hr), first-line supervisors of production and operating workers (\$31/hr), and water and wastewater

treatment plant and system operators (\$27/hr). Seventy-four percent of utility jobs had on-the-job training requirements, such as apprenticeships (6 percent) and short-, moderate-, and long-term training (37 percent, 20 percent, and 11 percent, respectively).

Manufacturing had the most job opportunities without educational requirements (19 percent) with a total of 171 total occupations. These jobs are fairly evenly spread across the W+E Forward's four subregions: 27 percent in southeast Wisconsin, 25 percent in central eastern Wisconsin, 25 percent in northeast Wisconsin, and 23 percent in northeast Illinois. Top occupations by wage included computer numerically controlled tool operators (\$24/hr), welders, cutters, solderers, and brazers (\$24/hr), paper goods machine setters, operators, and tenders (\$23/hr), engine and other machine assemblers (\$23/hr), and fiberglass laminators and fabricators (\$22/hr).

Energy utilities had the highest average wages (\$40/hr) and 40 total roles. The top paying occupations included general operations managers (\$50/hr), nuclear engineers (\$50/hr), electrical engineers (\$49/hr), nuclear power reactor operators (\$48/hr), and electrical power-line installers and repairers (\$46/hr). Educational requirements included a high school diploma or equivalent (45 percent), associate's degree (10 percent), and bachelor's degree (45 percent).

4. Policy Drivers of Workforce Inclusion

4.1 Federal Policy

There are several federal policies driving a greater emphasis on diversity and inclusion across grant programs like the NSF Regional Innovation Engine program. One driving policy is the Department of Labor's (DOL's) **Good Jobs Initiative**. The aim of this initiative is to provide essential information to workers, employers, and government agencies to enhance job quality and ensure equitable access to good jobs, free from discrimination and harassment, for all individuals in the workforce. The initiative places particular emphasis on supporting underserved communities, including BIPOC individuals, LGBTQ+ individuals, women, immigrants, veterans, persons with disabilities, rural residents, those without a college degree, individuals in recovery from substance use disorders, justice-involved individuals, and opportunity youth. "Good jobs" are defined based on eight principles developed by the Department of Commerce and DOL with input from various stakeholders, such as workers, businesses, labor unions, advocates, researchers, and government entities:

1. **Recruitment and Hiring:** Qualified applicants – and especially those from underserved communities – are actively recruited. They receive equal treatment and are evaluated based on relevant skills, while unnecessary educational or experience requirements are minimized.

2. **Benefits:** Full-time and part-time workers receive family sustaining benefits – such as health insurance, a retirement plan, workers’ compensation, and work-family benefits – to enhance economic security and mobility.
3. **Diversity, Equity, Inclusion, and Accessibility:** All workers receive equal opportunity and are treated with respect, empowerment, and fairness. Systemic barriers do not hinder individuals from underserved communities.
4. **Empowerment and Representation:** Workers can form and join unions, engaging in protected activity without fear of retaliation and contributing to decisions about their work, how it is performed, and organizational direction.
5. **Job Security and Working Conditions:** Workers enjoy a safe, healthy, and accessible workplace, shaped by input from workers and their representatives.
6. **Organizational Culture:** All workers belong, are valued, and contribute meaningfully to the organization, and they are engaged and respected – especially by leadership.
7. **Pay:** All workers receive a stable and predictable wage, not factoring in overtime, tips, and commissions.
8. **Skills and Career Advancement:** Workers have access to equitable opportunities within and outside of their organizations. Workers receive increases in wages tied to increased skills or experience.

The **Increasing Access to Good Jobs Guidance**, issued by the DOL, builds upon the Good Jobs Initiative by offering detailed strategies for workforce systems to integrate and implement good job principles effectively. It specifically targets State and Local Workforce Development Boards and State Workforce Agencies, encouraging them to embed these principles within their Workforce Innovation and Opportunity Act (WIOA) operations and planning. The guidance emphasizes the formation of long-term partnerships with employers and the development of strategic career pathways that respond to local labor market demands, facilitating a pipeline of skilled workers who can progress from entry-level to advanced positions. Additionally, it highlights the importance of sector-based partnerships and underscores the necessity for continuous measurement and improvement of job quality within the workforce system to adapt to changing job market needs and ensure equity across all demographics. By providing comprehensive recommendations for workforce engagement, the guidance aims to enhance job quality and ensure that workforce development boards effectively partner with employers to create and sustain good jobs.

In addition to the Good Jobs Initiative, the DOL's **Infrastructure Workforce Framework** is designed to enhance workforce development under the Bipartisan Infrastructure Law (BIL).³ This strategy aims to prepare a workforce capable of managing significant federal investments by fostering high-quality infrastructure jobs with fair labor practices, including unionization opportunities. It calls on workforce stakeholders to actively develop and

³ BIL is the largest long-term investment ever made in the nation’s infrastructure, providing \$500 billion in appropriations for infrastructure investments from FY 2022–2026. BIL includes appropriations of over \$57 billion for clean energy and power infrastructure and over \$63 billion for water infrastructure investments.

implement proven workforce strategies, focusing on comprehensive planning, partnership development, and equity-driven community needs. The framework emphasizes building strong partnerships with state and local governments, community colleges, non-profits, labor organizations, and industry associations to ensure effective training pathways. It prioritizes job quality and equity, ensuring that all Americans, particularly those from underserved communities, can access new job opportunities. It also outlines various funding sources, such as DOL formula funds and competitive grants, to support infrastructure-related training and employment, promoting a multi-stakeholder approach to meet the growing demand for skilled labor.

Another significant initiative from the Department of Labor is the **Registered Apprenticeship Program (RAP)**. This program provides a structured, industry-led career pathway, enabling employers to cultivate their future workforce. It offers participants paid work experience, classroom learning, and progressive wage increases, all culminating in a nationally recognized credential. Each program is reviewed by the U.S. Department of Labor or State Apprenticeship Agencies to ensure it meets high-quality standards and effectively aligns with industry requirements. There are a few key Features of RAPs:

1. **Industry-Led:** Ensures that training aligns with the skills needs of industries and that apprentices are prepared for high-demand roles.
2. **Paid Job:** Apprentices earn wages while they learn, with wage increases as their skills and productivity grow.
3. **Structured On-the-Job Training:** Apprentices receive hands-on training under the guidance of experienced mentors.
4. **Supplemental Education:** Classroom learning complements on-the-job training, tailored to specific employer needs.
5. **Diversity and Inclusion:** Programs are designed to be inclusive and accessible, reflecting community demographics and ensuring equitable opportunities.
6. **Quality and Safety:** Apprentices are protected under stringent safety standards and quality controls throughout their training.
7. **Credentials:** Completing an apprenticeship results in a portable, recognized credential signifying skilled, competent labor.

RAPs provide significant benefits and incentives to employers, including access to a skilled labor pool trained to industry standards, potential tax credits, technical assistance, and other federal resources. For veterans, additional benefits such as GI Bill stipends may apply.

The DOL's **Apprenticeship Readiness Programs**, or "pre-apprenticeships," extend the Registered Apprenticeship Program (RAP) by providing preparatory training designed to make apprenticeships more accessible and inclusive. These programs focus on foundational skills and removing entry barriers for underrepresented or disadvantaged groups, thereby facilitating a smoother transition into formal apprenticeships and increasing diversity within

RAPs. They align with federal standards like the Equal Employment Opportunity (EEO) in Apprenticeship and the Workforce Innovation and Opportunity Act (WIOA) to broaden access to RAPs. The initiative promotes sustainable development through partnerships with industry and educational institutions, offering comprehensive training that mirrors actual workplace conditions, and providing supportive services to address both personal and systemic challenges. It also prioritizes equity and access by actively recruiting and supporting underserved communities, ensuring they receive the necessary training and support to succeed. Additionally, the initiative encourages collaboration between workforce development boards and educational partners to enhance pre-apprenticeship practices and align with federal efforts to advance racial equity and support underserved communities, aiming to effectively prepare participants for formal apprenticeships and promote equitable workforce development.

Labor-Management Partnerships (LMPs) are another collaborative framework where employers, unions, workforce development entities, community colleges, and community organizations work together to develop workforce training programs directly connected to employment opportunities. These partnerships are designed to align training with the real needs of the workplace, ensuring that the training provided leads to good jobs and meets the competitive demands of industries. There are several key aspects of LMPs:

1. **Collaborative Frameworks:** LMPs involve multiple stakeholders, including employers, labor unions, and educational institutions, to design sector-specific training that is demand-driven. This collaboration ensures that training programs align closely with the actual needs of industries and provide meaningful career paths for workers.
2. **Worker-Centered Approach:** These partnerships focus on creating training programs that are centered around the needs and involvement of workers. This includes worker participation in developing curricula, training delivery, and program administration.
3. **Supportive Services:** LMPs often integrate supportive services to address systemic barriers that workers might face, such as dependent care and transportation. These services are crucial in enabling participants to successfully complete their training and move into apprenticeship or employment.
4. **Union Involvement:** The Biden-Harris Administration supports the involvement of unions in these partnerships, emphasizing that union representation gives workers a collective voice to engage constructively on workplace issues. The administration also expects employers benefiting from government programs to support workers' rights to unionize.
5. **Quality Jobs:** The partnerships aim to create good jobs that offer family-sustaining wages, benefits like health insurance and retirement plans, and other quality elements such as predictable scheduling and safe working conditions.
6. **Equitable Opportunities:** LMPs are designed to lower barriers to entry and ensure that employment opportunities are accessible and equitable. This includes efforts to

recruit and retain underrepresented populations and ensure diverse workforce participation.

The Biden Administration also created the **High Road to the Middle Class (HRMC)** map to facilitate connections between individuals and high road training programs (HRTPs), which are designed to advance job quality, equity, and worker voice through demand-driven workforce strategies. These HRTPs, focusing on sectors like infrastructure, clean energy, and manufacturing, work closely with employers and labor to provide training that is both worker-centered and industry-driven. The HRMC map serves as a critical resource for stakeholders including employers, labor unions, federal grant recipients, and job seekers, helping them identify training programs aligned with the Investing in America agenda. It emphasizes the development of equitable pathways through partnerships, particularly benefiting communities seeking federal funding or embarking on significant projects. The map includes programs that meet specific criteria such as relevance to Investing in America projects, utilization of evidence-based training models like Registered Apprenticeships, and active partnerships with employers and worker organizations. Additionally, the map is designed to be accessible to all, including individuals with disabilities, with the DOL providing necessary support to ensure accessibility.

There are several federal policies and frameworks that emphasize the importance of diversity and inclusion for the nation's water and energy workforce. Building this workforce requires not only practices to help recruit and maintain this workforce but also those to build the talent pipeline and increase participation of disadvantaged business enterprises. Embedding diversity and inclusion across these elements will help W+E Forward to not increase its competitiveness to secure federal funding, but it will also help to strengthen the local and regional economy in Wisconsin and beyond.

4.2 State Policy

At the state level, there has been a growing recognition of the need for policies that promote diversity, equity, and inclusion (DEI) within state government. This led to the introduction of Governor Tony Evers' Executive Order #59 in November of 2019, which initiated DEI policies across the state. This order requires all state agencies to develop and implement equity and inclusion action plans and ensures that the Wisconsin Department of Administration provides mandatory equity and inclusion training for all state employees. These efforts reflect a larger movement toward inclusive governance, similar to national policies such as the Department of Labor's Good Jobs Initiative, aimed at serving and reflecting the state's diverse population effectively.

Following this order, the "Equity and Inclusion Strategic Planning Process and Procedure Manual" was created to systematically guide Wisconsin state government agencies. The manual outlines several phases—Preparation, Plan Development, Communication, Implementation, Evaluation, and Reporting—to integrate equity and inclusion thoroughly into

agency operations. It emphasizes key elements such as training, community engagement, and ongoing interaction with the Bureau of Equity & Inclusion, aligning agency practices with the needs of the community and the changing standards of DEI.

This guidance has encouraged various state departments to adopt DEI programs. For example, the Wisconsin Department of Administration has initiated its Equity and Inclusion Plan for 2024–2026, which focuses on improving recruitment processes to build a diverse workforce and enhancing retention by better understanding employee experiences. Similarly, the Department of Natural Resources has developed its own Equity and Inclusion Plan, aimed at fostering a welcoming workplace culture and increasing workforce diversity through fair hiring practices and proactive outreach programs.

However, the implementation of statewide DEI policies is a complex and ongoing discussion with varied levels of support across different sectors. This reflects a broader conversation about the role of DEI in government operations. Despite these challenges, there are notable developments at the local level, as seen in cities like Milwaukee, Madison, and Racine. Racine County, for example, has committed to providing ongoing equity and inclusion training to all Human Services staff, focusing on collaborative safety and trauma-informed care to address a wide range of social challenges.

These efforts across different levels of government show a strong commitment to creating environments where diversity is actively supported and valued. This is crucial for enhancing the effectiveness of state operations and building inclusive communities, ensuring that DEI principles are deeply integrated into all aspects of governmental activity in Wisconsin.

5. Best Practices for Diversity & Inclusion in the Water + Energy Sectors

5.1 Workforce Development

It is critical that workforce development initiatives are rooted in DEIA to ensure investments in innovation address system inequalities rather than amplify them. The following best practices support culturally competent workforce development that emphasize diversity and inclusion.

Employment pathways programs bridge the gap between education and the workforce by providing specific training and support to prepare individuals for career fields. These programs are important because they address skills shortages in key industries, enhance employability, and align educational outcomes with labor market needs. They also support underserved populations by helping overcome barriers to employment, promoting economic equality and social inclusion.

Maintaining and expanding partnerships is crucial to successful workforce development. Community-based organizations are particularly important to connect with diverse, lower-income community members, but educational institutions, labor groups, economic development practitioners, and public and private employers all play pivotal roles in equitable workforce development programs (Francis et al., 2020; Kane & Tomer, 2023).

Collaborating with private water technology corporations such as A. O. Smith and Badger Meter to implement targeted training programs is essential for addressing skills shortages and enhancing employability. These companies play a crucial role in advancing diversity and inclusion by providing stable, well-paid jobs and creating opportunities for underrepresented groups. Training initiatives could include apprenticeships, internships, and certification courses tailored to the specific needs of the water technology sector. These programs prepare underrepresented groups for careers in this field, helping to build a diverse talent pipeline and promoting economic equality and social inclusion. By focusing on private sector partnerships, we ensure that the benefits of diversity and inclusion extend beyond public utilities, fostering a more inclusive industry culture and setting a precedent for other sectors facing similar workforce challenges.

Wrap-around services for workforce development participants can remove barriers to participation like childcare or transportation (Biu et al., 2023; Kane & Tomer, 2023). Institutional barriers often disproportionately impact racial and ethnic minorities and women.

Intentional, inclusive recruitment allows workforce development programs to better reach traditionally underrepresented populations. Leveraging partners with existing relationships in the community is a key element of diversity-oriented recruitment, but it also includes using culturally sensitive language in outreach material and holding recruitment events in strategic locations that emphasize access for target participants (McKelvy et al., 2018).

Building an inclusive workplace for persons with disabilities can help to increase their feeling of inclusion and workforce retention. This includes practices such as educating staff on disabilities (especially invisible disabilities) and normalizing the need for “reasonable accommodations” (e.g., flexible working models and schedules), creating employee resource group(s) for persons with disabilities, using inclusive language (e.g., avoiding language like “normal” or “regular” when referring to persons without disabilities), and implementing assistive technologies (e.g., closed captioning for videos, providing written instructions). There are similarly many trauma-informed workplace practices that can help create a culture of inclusion for these individuals, such as the practices described in the toolkit, “Trauma-Informed Workplace: Concepts, Strategies, and Tactics to Build Workplaces that Support Well-Being” (Campaign for Trauma-Informed Policy & Practice, 2023)

Trauma-informed workplace practices refer to organizational strategies and policies designed to recognize, understand, and respond to the effects of trauma on employees. These practices involve creating a supportive work environment where employees feel safe,

respected, and valued. Implementing trauma-informed practices include training staff to recognize signs of trauma, offering support resources, and cultivating a culture of empathy and understanding. This approach is crucial for diversity and inclusion as it ensures that all employees, particularly those from marginalized or historically underserved communities, have the necessary support to succeed. By addressing the unique challenges that trauma survivors face, organizations can create a more inclusive, equitable, and productive workplace.

Incorporating soft skills training into workforce development curricula may help workforce development participants with their job placement and, once hired, success in their new position (Francis et al. 2020; The Annie E. Casey Foundation, 2018). These general career-readiness skills should also include education about employee rights and preparation for navigating biases that may be encountered (McKelvy et al., 2018; Workforce Matters, 2021).

5.2 Talent Pipeline

Developing and maintaining a diverse talent pipeline inherently supports broader DEIA strategies. Across disciplines, many argue that a lack of diversity and inclusion stems not from a lack of available talent but biased recruiting and hiring practices (Asare, 2018; Chow, 2021). For example, the unemployment rate for Black STEM workers with at least a bachelor's degree in 2021 was more than double that for white STEM workers with at least a bachelor's degree (National Center for Science and Engineering Statistics, 2023). Nonetheless, particularly for sectors with increasing worker demand and/or skills gaps, equitably investing in the talent pipeline is a key element of an overall workforce strategy. Best practices for pipeline development are discussed below.

Education on the types and benefits of jobs in the water and energy sectors can help students and job seekers better understand the availability (and stability) of these jobs. Early outreach that builds awareness of these opportunities and specifically encourages underrepresented demographics to consider these careers can, over time, build an enhanced talent pipeline (Hegde, 2020; Pearl-Martinez & Stephens, 2016).

Engaging with community colleges is essential for building a diverse and inclusive workforce. As highlighted in recent reports, community colleges are emerging as vital partners in the National Science Foundation's Regional Innovation Engines (Palmer, 2024). Community colleges are often seen as pathways for underrepresented populations, supplying the workforce required to operate facilities implementing new technology solutions. Expanding partnerships with community colleges will help reach more underrepresented groups and ensure their transparent participation, enhancing the inclusivity of workforce development initiatives.

Professional development and mentorship opportunities can support talent retention and pipeline maintenance. Training or professional development helps employees expand their

technical and leadership skills that support career advancement (Hegde, 2020; Olutimehin et al., 2024). Mentorship opportunities can be valuable for both professional development and a sense of belonging (Olaniyan et al., 2022).

Creating a culture of inclusion in the workplace also supports employee retention. Steps to build an inclusive work culture may vary by field but include practices or strategies like openly prioritizing diversity and inclusion, hosting affinity groups (i.e., Employee Resource Groups or ERGs) that include support from leadership and ensuring work environments are considerate of employee needs (e.g., have appropriate restroom facilities, appropriate uniforms, lactation rooms) (Center for Energy Workforce Development, 2022).

Flexible working models such as remote/hybrid options, childcare support, and job-sharing programs, strongly support inclusive work cultures, particularly benefiting LGBTQ+ workers, women, and those with health conditions or disabilities (Hughes-Plummer et al., 2023). This is especially crucial for women, who according to United Nations data, perform 2.6 times more unpaid domestic labor than men. By providing flexibility in working arrangements, these models help women effectively balance their professional and home responsibilities, enhancing their ability to participate fully in the workforce. These models also enhance productivity and well-being by allowing caregivers and individuals with health conditions to tailor their work environments and schedules. Additionally, remote work options offer LGBTQ+ individuals safer spaces for expressing their identities. Furthermore, a Future Forum survey reveals that a significant majority of underrepresented groups (81% Hispanic/Latinx, 82% Asian/Asian American, 79% Black) prefer flexible working arrangements over traditional setups, underscoring its importance in attracting and retaining diverse talent. Thus, flexible working not only meets individual needs but also advances organizational goals of diversity, equity, and inclusion.

Ensure that job requirements truly align with the position's needs to avoid creating unnecessary barriers to workforce entry. Employers have used degrees as a proxy for specific skills, despite reporting that, for positions with both college graduates and non-graduates, there is limited to no improvement in productivity or performance for graduates over non-graduates (Fuller et al., 2017). Hiring specifically for the skills and competencies required broadens the talent pool (Center for Energy Workforce Development, 2022; McKelvy et al., 2018).

5.3 Small and Medium Business Participation

Small and medium business participation is often an emphasis in economic development, but equitable investment in minority- and women-owned business enterprises (MBE and WBE, respectively; MWBE collectively) is paramount to the impact of small and medium business participation initiatives. The following are best practices for increasing participation of small and medium businesses, particularly from underrepresented backgrounds.

Separate MBE and WBE subcontracting goals can help address race and gender discrimination, which is a fundamentally different challenge than the barriers that non-MWBE small businesses face (Griffin & Strong, 2023). A reserve program that establishes certain contracts that only small businesses can bid on can replace SBE goals to continue to support SBE development without creating goals that may continue the overutilization of non-MWBEs.

Proactive outreach and communication with prospective bidders, including targeted outreach, can help small and medium businesses prepare to bid and engage with potential teaming partners (Griffin & Strong, 2023). Forecasting bids in advance may level the competition, as firms with access to informal networks may otherwise be aware of future bids before they are released to the public.

Right-sizing bonding and insurance requirements may reduce barriers for smaller businesses, including MWBEs. Bonding and insurance requirements should be reviewed on a project-specific basis to ensure that the limits in the bid are necessary for the project, and adjusted as needed (Griffin & Strong, 2023).

Contractor training programs like mentor-protégé initiatives, are designed to develop the skills of disadvantaged businesses, enabling them to compete for new bids and succeed in the market. These programs promote diversity and inclusion by providing small and minority-owned firms with essential training, resources, and support. For example, Prince George's County's Mentor-Protégé Program builds the financial, technical, and overall performance capacity of small and minority businesses through long-term relationships with larger, successful firms. Additionally, it offers specialized training, such as teaching landscapers to install and maintain green infrastructure, helping these businesses overcome specific barriers and seize new opportunities.

6. Conclusion

The water and energy sectors are pivotal to the functioning of modern society, yet they remain significantly underrepresented in terms of diversity. The level of representation for Women, BIPOC workers, LGBTQ+ individuals, and persons with disabilities do not reflect the national workforce, particularly in leadership positions. The lack of diversity in these sectors is not just a statistical concern but a fundamental challenge that hinders innovation, adaptability, and the ability to serve diverse communities effectively. This emphasizes the importance of ensuring inclusion at all levels for the aspiring NSF Regional Innovation Engine, W+E Forward. The landscape review presented in the report provides a preliminary overview of the current state of diversity and inclusion in the nation's water and energy sectors and identifies best practices that W+E Forward can employ to support diversity and inclusion outcomes in these sectors in Wisconsin and beyond.

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