Building a More Diverse, Equitable, and Inclusive Energy Efficiency Workforce

Sarah Truitt, Juliana Williams, and Ardelia Clarke

National Renewable Energy Laboratory

NREL is a national laboratory of the U.S. Department of Energy
Office of Energy Efficiency & Renewable Energy
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Acronyms

BBWA	Better Buildings Workforce Accelerator
BEST	Building Efficiency for a Sustainable Tomorrow
BLS	Bureau of Labor Statistics
BTO	Building Technologies Office
CPUC	California Public Utilities Commission
DOE	U.S. Department of Energy
ECC	Emerald Cities Collaborative
EFI	Energy Futures Initiative
ELP	Environmental Leadership Program
FOA	funding opportunity announcement
GCF	Green City Force
HVAC	heating, ventilating, and air conditioning
KHC	Kentucky Housing Corporation
LGBTQ	lesbian, gay, bisexual, transgender, and queer
MassCEC	Massachusetts Clean Energy Center
NABTU	North America's Building Trades Unions
NASEO	National Association of State Energy Officials
NYSERDA	New York State Energy Research and Development Authority
NISE	National Informal STEM Education Network
NREL	National Renewable Energy Laboratory
OJT	On-the-Job Training
QCI	quality control inspector
PEMP	Program Evaluation and Management Plan
SBST	Sustainable Building Science Technology
STEM	science, technology, engineering, and math
USEER	U.S. Energy and Employment Report
WAP	Weatherization Assistance Program

Executive Summary

The U.S. Department of Energy (DOE) Building Technologies Office (BTO) envisions a future where the U.S. building industry leads globally in delivering quality efficiency products and services to American consumers and businesses. One barrier to achieving this vision is the difficulty reported by energy efficiency employers in finding qualified candidates (NASEO and EFI 2020). However, this barrier also presents an opportunity for the industry to expand in a way that invites and supports a more diverse, equitable, and inclusive workforce. The scope of energy, climate, and technology challenges the country faces will require the talents of all Americans. The purpose of this study therefore is to identify key factors to creating successful workforce development and inclusion programs that will support the future of the building industry. These factors can be applied to individual companies, training programs, or broader industry efforts.

This study first reviews what is meant by the terms equity, inclusion, and belonging, and the importance of addressing all these elements in any workforce programming. To achieve true equity and inclusion, standard recruitment and retention practices require complementary approaches addressing differences in communication methods, mentoring and networking access, career pathways, and wrap-around or non-technical services. It is also important to establish diversity, equity, and inclusion baselines, set measurable goals, track progress, and adjust as needed to ensure that programs are responding appropriately to worker needs.

The study then shifts to methods for cultivating the future workforce by effectively engaging with students and young professionals. The construction sector, a vital part of the building industry, has had difficulty appealing to students, in part due to a negative perception of careers in the field. This report describes how the building industry can help shift this perception if it can appeal to millennial and Generation Z desire for purpose in their careers, connection to lifestyle values, and application of technology in the workplace. In addition, the industry needs to better illustrate to parents, students, teachers, and counselors the different pathways into and through the building industry, all of which can lead to a stable, well-paying career.

Included in this study are many examples of programs seeing success in workforce engagement and inclusion. These case studies show how equitable and inclusive workforce development activities can broaden the applicant pool by attracting more students and historically underrepresented groups to building industry careers. Taken together, these activities will prepare the U.S. workforce to meet the needs of the future built environment, and reduce energy use across the economy.

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1 Introduction and Background

The Biden Administration has set priorities for the U.S. Department of Energy (DOE) to focus its work: combating climate change, creating clean energy union jobs, promoting equity and diversity in STEM within clean energy industries, and promoting energy justice. Embedded in these priorities is an acknowledgement that communities of color and low-income communities have borne the brunt of air, water, and soil pollution, and that the clean energy revolution must lift the communities that have been left behind and make sure those who have suffered the most are the first to benefit. This has included launching the Justice40 Initiative, which is a plan to deliver 40% of the overall benefits of climate investments to disadvantaged communities and inform equitable research, development, and deployment within DOE (DOE 2022).

In support of these goals, DOE's Building Technologies Office (BTO) and the National Renewable Energy Laboratory (NREL) recognize that a large and diverse workforce is necessary for achieving the mission to make the United States a global leader in delivering quality energy efficiency and clean energy products to American homes and buildings. BTO focuses its workforce development efforts on students and professionals who are vital for designing, constructing, installing, and operating energy-efficient buildings and technologies. This national effort is aimed at creating the jobs needed to build a modern, sustainable infrastructure and to deliver an equitable clean energy future, support workers affected by the energy transition, and ensure no communities are left behind.

The purpose of this study is to identify key factors to create successful workforce recruitment and retention programs that help increase diversity and equity within the building energy efficiency industry. These factors can be applied to individual companies, training programs, or broader industry efforts.

Today, the existing energy efficiency workforce does not fully represent the diversity of the United States. DOE, the National Association of State Energy Officials (NASEO), and the Energy Futures Initiative (EFI) have been publishing data on the energy efficiency workforce since 2016 in the *U.S. Energy and Employment Report* (USEER). According to the USEER, after several years of job growth, energy efficiency employment[1] contracted by more than 11% in 2020 to 2.1 million workers across a range of professions in construction, manufacturing, wholesale trade, professional, and other services. This was almost entirely a result of COVID-19 challenges, and employers were also optimistic that these losses would be largely erased in 2021 (NASEO and EFI 2021). These job losses disproportionately impacted Hispanic and Latino workers (E2 et al. 2020).

Exacerbating the workforce shortage is hiring difficulty experienced by a large majority of energy efficiency employers. The 2021 USEER found that a majority of energy efficiency employers had difficulty finding qualified candidates because of a lack of technical skills, small

[1] The energy efficiency workforce is defined as "employment [that] covers both the production and installation of energy-saving products and the provision of services that reduce end-use energy consumption" (NASEO and EFI 2021). The USEER energy efficiency employment figure does not include direct employees of utility companies who supervise, design, or implement utility energy efficiency programs. These workers are counted as utility employees in the 2021 USEER.

applicant pool, and lack of industry-specific knowledge (NASEO and EFI 2021). Industry and organizational workforce development activities can help address these areas by designing opportunities that broaden the applicant pool by attracting more students and historically underrepresented groups to building efficiency careers, and linking them to resources to improve their skills and industry knowledge.

The scope of energy, climate, and technology challenges the country faces will require the talents of all Americans, including those who have been underrepresented or disproportionately impacted by COVID-19. Employing strategies to attract a diverse workforce is especially important in sectors that are positioned to have a dramatic shift in the use of technology or that otherwise face a significant transition because diverse perspectives provide the benefit of challenging conventional thinking and developing innovative approaches. Many new technologies, program designs, and business models are poised to re-innovate the efficiency sector, including robots that perform high-risk or repetitive tasks on construction sites, digital building twins to aid in building design, and augmented and virtual reality to streamline project planning (Deloitte 2020).

Studies have found that a more diverse workforce also delivers measurable benefits. The body of evidence supporting the correlation between the diversity of a company's workforce and its financial performance is well established. McKinsey and Company's 2015 "Diversity Matters" report found a statistically significant correlation between gender and ethnic diversity and company performance. McKinsey identifies the most important drivers as (1) advantages in recruiting the best talent, (2) stronger customer orientation, (3) increased employee satisfaction, and (4) improved decision-making (Hunt et al. 2015). Likewise, the report notes that companies in the top quartile for women leaders are 15% more likely to have above average financial returns. This correlation suggests that companies/industries are more successful when they are committed to diverse leadership. Gender diversity in the energy sector workforce is essential to promote more innovative and inclusive solutions that can help make clean energy accessible to the entire population (IEA 2020).

Additionally, racial and ethnic minorities are expected to make up more than half of the U.S. population by midcentury, with millennials and Generation Z[2] accounting for 44% and 48% of this population, respectively (Frey 2018). The development of strategies that attract top talent from diverse gender and ethnic groups will necessitate an emphasis on equity, inclusion, and belonging as the demographics of the workforce shift. Redefining what "the best and the brightest" means via a diversity and inclusionary lens is necessary to create a company culture accepting of innovative solutions from diverse perspectives. The addition of gender diversity, racial and ethnic minorities, millennials, and Generation Z within the demographics of the building efficiency workforce helps ensure that the best and the brightest employees are hired, thereby strengthening American innovation and competitiveness in the sector for decades to come. Steps taken now to increase the diversity of the efficiency workforce and provide good

[2] Generation Z includes people born after 1996, millennials were born between 1980 and 1995, according to https://www.kasasa.com/articles/generations/gen-x-gen-y-gen-z.

wages, benefits, and worker protections will ensure that companies cultivate loyal employees and have a strong financial foundation.

Many businesses, nonprofits, training organizations, labor organizations, and government agencies have been working to address diversity and equity gaps in the workforce. This paper identifies many examples—but is by no means exhaustive—to help contribute to our collective understanding and support replication of successful models.

1.1 Scope and Definitions

This study reviews programs, processes, and general approaches to workforce development that create equitable and inclusive work environments, and successfully attract and retain workers in the building and energy efficiency industries. For the purposes of this report, the National Renewable Energy Laboratory (NREL) defines "building energy efficiency careers" as those careers critical to the expansion of high-performance buildings, including research and manufacturing, architecture, construction and engineering, facilities management, energy ratings, and real estate professionals. Energy efficiency and building energy efficiency are used interchangeably throughout this report.

1.2 Report Organization

This paper begins with a brief overview of diversity statistics for the energy efficiency workforce and workforce diversity programs, discusses student interest in these careers, and concludes with a discussion of workforce diversity best practices. Additional workforce programs reviewed for this study are described in Appendix A.

1.3 Limitations

Defining and tracking the building efficiency workforce is challenging because energy efficiency is often part, but not all, of a person's job. This study is therefore structurally limited by the lack of data available to measure the energy efficiency workforce. In fact, there are no NAICS codes in the U.S. Department of Labor's industry classification system to identify efficiency careers; thus, the Bureau of Labor Statistics (BLS) does not track or report on the workforce in the efficient building technologies sector. To fill this void, the Office of Energy Efficiency and Renewable Energy within DOE commissioned the first USEER, published in 2016. USEER provides year-over-year statistics on "energy efficiency" careers. Diversity data measured in the 2021 USEER and BLS include gender, age, race/ethnicity, and veteran status.

While the USEER provides some insight into the state of diversity within the energy efficiency sector, many elements were not measured in this survey, including socioeconomic factors, or participation by the lesbian, gay, bisexual, transgender, and queer (LGBTQ+) community or other groups, such as formerly incarcerated individuals. Because more than half of those considered to be "energy efficiency employees" in the USEER work in the construction industry, diversity data from the broader construction industry are used to fill in some of the data gaps in the first section.

Currently available data on diversity in the efficiency workforce do not provide a comprehensive or granular enough view to fully understand diversity within the building efficiency sector. For instance, data are lacking on wage rates or occupations within the energy efficiency sector for

various demographic groups. Additional data gathering techniques that allow for greater segmentation and cross analysis will help us better understand the state of diversity within this workforce.

2 Diversity Within the Efficiency Workforce

Demographics measured in the USEER show that women and Black or African American workers are notably underrepresented in the building energy efficiency sector when compared with their representation in the national workforce averages (NASEO and EFI 2021).

Table 1. Energy Efficiency Workforce Demographics (Q4, 2020)

Source: 2021 USEER

Demographic	Employees	Percent of Sector	National Workforce Averages
Male	1,581,959	75%	52%
Female	525,215	25%	48%
Hispanic or Latino	321,831	15%	17%
Not Hispanic or Latino	1,785,343	85%	83%
American Indian or Alaska Native	28,012	1%	1%
Asian	127,772	6%	7%
Black or African American	173,840	8%	13%
Native Hawaiian or other Pacific Islander	22,874	1%	0%
White	1,614,213	77%	76%
Two or more races	140,464	7%	2%
Veterans	187,898	9%	6%
55 and over	275,350	13%	23%
Union Coverage	210,717	10%	6%

Beyond this imbalance in the energy efficiency sector broadly, the demographics can be even more divergent for specific careers within the workforce. For example, although women account for 48% of the total U.S. workforce, they make up less than 2% of the heating, ventilating, and air-conditioning (HVAC) workforce (Electric & Gas Industries Association 2018).

A review of 2020 BLS data, illustrated in Figure 1, shows that key professions in the building energy efficiency industry, namely architecture, engineering, and construction, are predominately white men. For comparison, while managers in energy efficiency fields follow this trend, management professionals overall have an almost balanced gender split and approximately double the minority representation, consistent with their representation in the working-age population overall (BLS 2020).

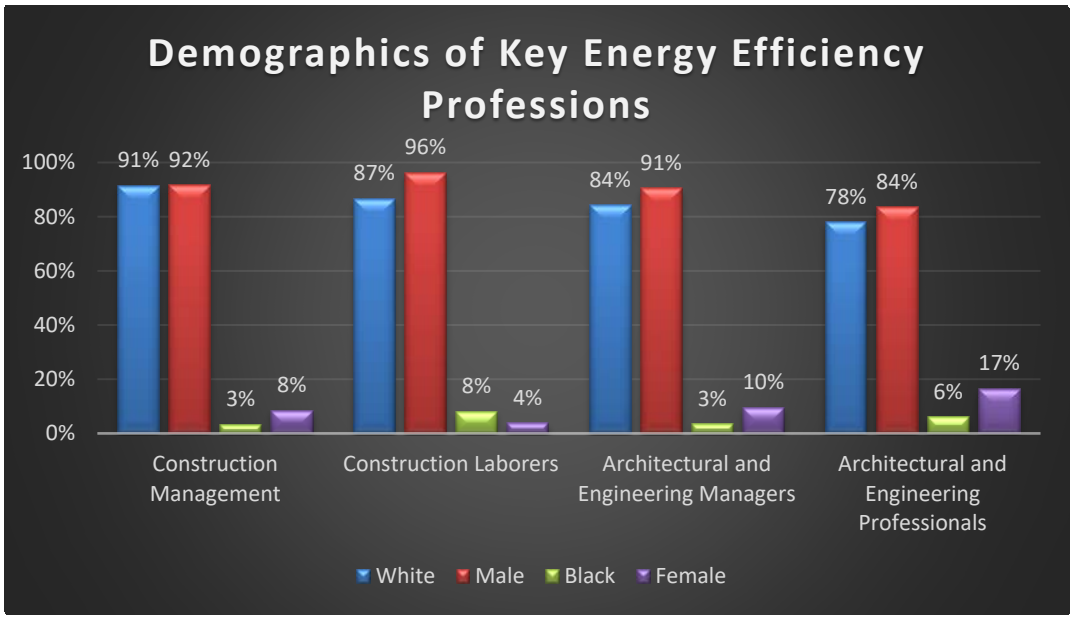


Figure 1. Demographics of key energy efficiency professions by job type

Source: Data from BLS 2020

According to McKinsey & Company, "The construction industry historically has a poor record of achieving gender parity in its workforce. The shift from manual labor, which is typically male-dominated, to new technology-enabled ways of working could mean increased interest from women. Construction needs to diversify its sources of talent to attract the best people, and higher female participation is a large opportunity" (Barbosa et al. 2017).

2.1 Workforce Diversity, Equity, and Inclusion Overview

The Interaction Institute for Social Change published a cartoon in 2016 that illustrates a central point in many discussions around diversity, equity, and inclusion, shown in Figure 2.

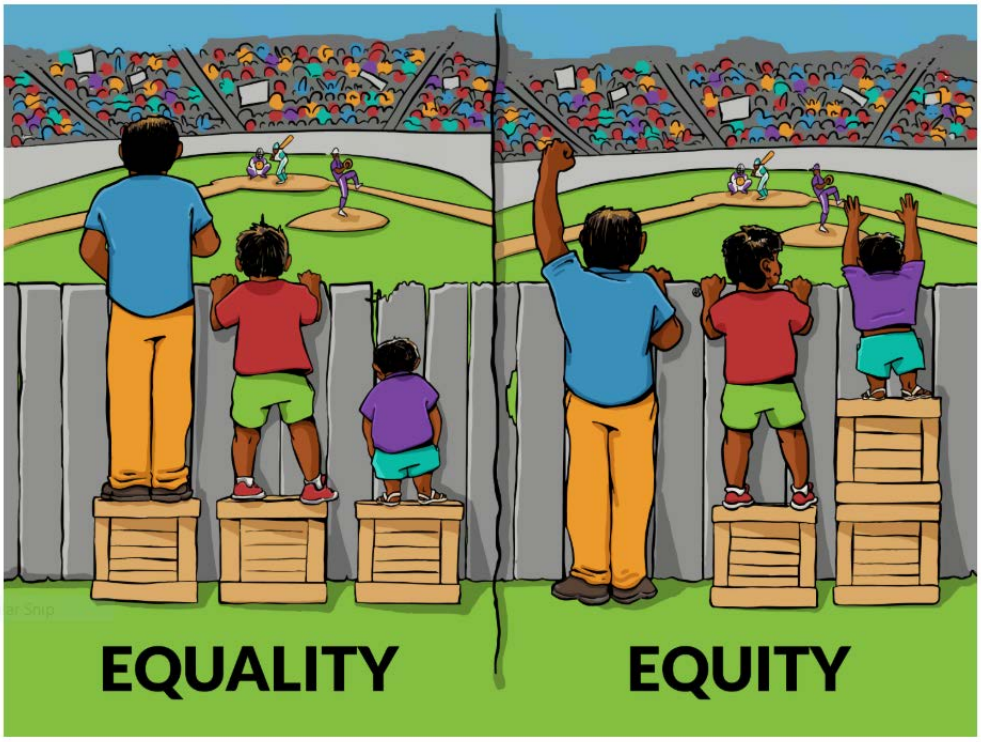


Figure 2. Equality versus equity illustrative cartoon

Source: Interaction Institute for Social Change. Artist: Angus Maguire.

According to the Interaction Institute for Social Change, equity (e.g., seeing the game in Figure 2) is not achieved by simply giving each individual an equal block to stand on. Similarly, workplaces cannot achieve equity without considering what each population (e.g., minority, majority, and underserved) may need to be successful in the workplace. The concept of inclusion takes this a step farther, actively cultivating an environment that promotes direct participation and a sense of belonging. Understanding the range of different populations' needs and providing services that support their success is essential for creating an equitable and inclusive workforce.

Unlike the people in the cartoon, who are "unequal" because of an intrinsic personal feature (their height), workplace inequity is often a condition resulting from many years of unconscious bias[3] imposed on historically disadvantaged groups. Addressing unconscious bias requires a holistic approach within a workplace and cannot be overcome by simply offering diversity training. A review of organizational practices surrounding recruitment, hiring, employee development, company culture, promotions, and retention are needed to address biases among employees, managers, and organizational systems. The first step in addressing workforce diversity leading to equitable inclusion is to work with your Human Resources department to analyze underrepresentation.

[3] The Kirwan Institute for the Study of Race and Ethnicity defines unconscious bias as attitudes or stereotypes that impact our understanding, actions, and decisions in an unconscious manner such that self-reflection does not reveal them.

Designing successful workforce diversity programs requires a holistic approach that includes both employees and employers. The many programs reviewed for this paper, described in Section 2.2 and Appendix A, have uncovered common practices for designing and implementing successful workforce inclusion programs.

2.2 Workforce Development Programs for Underrepresented Groups

The following workforce programs illustrate many of the key factors for success described in Section 2.3 of this paper. The highlighted programs are not an exhaustive list of available programs but represent a subset of the workforce diversity, equity, and inclusion programs studied for this paper. Additional programs reviewed are included in Appendix A.

Community Hub for Opportunities in Construction Employment

In March 2019, North America's Building Trades Unions (NABTU) partnered with the Community Hub for Opportunities in Construction Employment and the Baltimore Black Worker Union Center to produce an event titled, "From Girls in the Hood to Women in Construction." Approximately 50 attendees were encouraged to consider careers in the construction trades by attending panel sessions with Black women with careers in the construction industry, meeting with recruiters, and networking with the local trade union. The Community Hub for Opportunities in Construction Employment is an initiative launched by the Clinton Global Foundation with NABTU in 2014. It included a five-year commitment by NABTU to increase diversity within the construction trades.

Environmental Leadership Program Roger Arliner Young Diversity Fellowship Program

The Environmental Leadership Program (ELP) runs the Roger Arliner Young Diversity Fellowship Program to address the challenges of college graduates from diverse backgrounds gaining employment in the clean energy field (Environmental Leadership Program n.d.). The Diversity Fellowship Program offers a two-year paid fellowship for recent college graduates from diverse backgrounds to work with clean energy nonprofit organizations. ELP recruits employers and assists them in developing inclusive job descriptions and screening fellowship applicants. ELP works with employers prior to hiring fellows to address issues that employees may face, including microaggressions, imposter syndrome, and unconscious bias. ELP helps employers create safe spaces to address these diversity and inclusion issues within the organization. All fellows are employed in full-time, living-wage positions with benefits (paid for by the employer) and receive a $1,000 stipend for professional development (paid for by ELP). ELP also provides monthly coaching and access to ELP's mentorship network. A typical cohort consists of 10–12 fellows. A major barrier preventing the program from expanding is the time and effort required to develop relationships with employers willing and able to participate in the program (King 2020).

Kentucky Housing Corporation

As part of the federal Weatherization Assistance Program (WAP), local agencies (subgrantees) are required to have all weatherized homes inspected by a quality control inspector (QCI) certified by the Building Performance Institute. In late 2017, Kentucky had 23 subgrantees implementing WAP, 7 of which did not have a QCI on staff, with a single QCI contractor attempting to serve 6 of those agencies. QCI certification requires energy auditor certification, in

addition to taking QCI training and passing a test. The Kentucky Housing Corporation (KHC), which manages WAP at the state level, received feedback from multiple interested individuals who reported barriers to participation in training, which included the cost of the training, lost wages during the 11 weeks of training, and costs of travel to attend the training. To address the shortage of QCIs and anticipated retirements from existing QCIs, KHC aimed to recruit, train, and upskill new QCIs from outside the WAP network. KHC secured a $49,000 grant from the Kentucky Energy and Environment Cabinet to support the training of four new QCIs. To address the identified barriers, KHC covered the cost of training, provided a $15 per hour stipend for each week spent in training, and covered the cost of travel for students within 50 miles of the training site or the cost of lodging and per diem for students more than 50 miles from the training site (McCord 2020). Additionally, if an employer was willing to commit to employing a new QCI to work on WAP jobs for two years, KHC paid the stipend to the employer to offset the cost of keeping employees fully employed during the training. The QCI training was scheduled to be completed in spring 2020, but the pandemic delayed the final week of training and subsequent testing.

Massachusetts Clean Energy Center Clean Energy Internship Program

The Massachusetts Clean Energy Center (MassCEC) Clean Energy Internship Program is a utility-rate-payer-funded program that addresses the challenges faced by students who cannot afford to take unpaid internships. MassCEC is not involved in the selection of interns, but rather facilitates the connection between prospective interns and employers and reimburses the host company up to $7,600 per student (Massachusetts Clean Energy Center 2020a).

After the program was first launched in 2011, MassCEC recognized that the majority of the initial cohorts were largely white males from private universities and therefore took a two-pronged approach to increase the diversity of the program (Jacques 2020). First, they increased the number of interns a company could hire through the program from two to three, if the third student came from a community college. Second, MassCEC targeted recruitment efforts at public schools and community colleges. These efforts have proven effective, with 42% of the current cohort of interns composed of women or minority students. Since its inception, the program has placed over 3,600 interns at nearly 470 companies, with 784 interns receiving offers for full-time or part-time employment at their host company following the internship (Massachusetts Clean Energy Center 2020a).

Building on the success of the Clean Energy Internship Program, MassCEC also launched the Vocational Internship Program to help place students (rising juniors and seniors) from vocational high schools in paid clean energy internships during the academic year (Massachusetts Clean Energy Center 2020b).

New York State Energy Research and Development Authority On-the-Job Training for Energy Efficiency and Clean Technology

The New York State Energy Research and Development Authority's (NYSERDA's) $14 million On-the-Job Training (OJT) for Energy Efficiency and Clean Technology program provides wage subsidies to eligible businesses to help reduce the financial risk of hiring and training new workers (NYSERDA 2020). In partnership with the New York State Department of Labor, the program pays employers half of the wages for a new hire up to $16 per hour, with a cap of

$100,000 per employer. The wage payment is for four months for new hires who are not included in NYSERDA's priority populations, and for six months if the new hire is from one of the following priority populations: veterans, Native Americans, individuals with disabilities, low-income individuals, unemployed power plant workers, previously incarcerated individuals, youth participating in designated work preparedness programs, and residents in designated environmental justice communities. The New York State Department of Labor assists participating businesses in developing OJT training plans and in assessing skills necessary for a position and identifying potential interviewees. As of May 2020, approximately 26% of the new hires in the OJT program were from these priority populations, and since the beginning of 2019, approximately 80% of all new hires were retained by employers following the wage subsidy period (Ferranti 2020). By lowering the financial risk to train new employees, the OJT program creates an additional incentive for employers to diversify their hiring and provide opportunity for nontraditional workers.

The Build Out Alliance Promotes Equity in the Workplace for LGBTQ Professionals in the Building Design and Construction Industries

The Build Out Alliance is a nonprofit organization with a mission to promote and advocate for LGBTQ people working openly in the building design and construction industry and strives to make the industry more welcoming to LGBTQ professionals. The organization certifies corporations that have taken steps to be inclusive of the LGBTQ community. The Build Out Alliance has certified 1,428 businesses, has 260 corporate partners, and 60 chapters nationwide as of June 2020.

50K Coalition Focuses on Graduating 50,000 Diverse Engineering Students Yearly

In 2015, the American Indian Science & Engineering Society (AISES), the National Society of Black Engineers (NSBE), the Society of Hispanic Professional Engineers (SHPE), and the Society of Women Engineers (SWE) formed a coalition to focus on producing 50,000 engineering graduates from underrepresented groups annually by 2025. The 50K Coalition includes 40 partners in 2020 using the Collective Impact framework to drive collective action to achieve the national goal. The comprehensive strategy includes common agenda strategies, shared metrics and measurement, continuous communication strategies, and backbone support and governance strategies.

2.3 Key Success Factors for Workforce Diversity, Equity, and Inclusion Programs

The workforce programs described in Section 2.2 show various approaches for addressing underrepresentation in a range of buildings-related industries. Common elements are outlined in Table 2 and discussed in subsequent sections. In particular, establishing a diversity, equity, and inclusion baseline and setting a measurable goal, designing a program for success, tracking progress, and adjusting where needed will increase the likelihood of achieving an organization's workforce inclusion goals.

Table 2. Key Success Factors for Successful Workforce Diversity, Equity, and Inclusion Programs

Category	Steps	Outcome
Organization or Industry Assessment	Review diversity, equity, and inclusion statistics	Establishes a baseline for diversity, equity, and inclusion efforts. Uncovers where gaps lie within a company or industry.
	Review company/ industry practices	Identifies gaps and may indicate where bias is present in hiring, promotion, and retention programs within the company/industry. Identifies how/where the value of diversity connects to enhanced organizational performance. Identifies what inclusive programs, such as employee resource groups (ERGs), may be needed to create an inclusive company culture and enhance employee retention.
	Establish diversity, equity, and inclusion goals and make a commitment	Aligns the organization around specific actions to meet diversity, equity, and inclusion goals and enables the organization to track progress. Considers multiple pre/during-employment strategic programs for each population group represented in the company/industry. Connects diversity, equity, and inclusion efforts to broader company/industry goals and benchmarks.
Program Design and Implementation	Understand different underrepresented groups' needs	Guides the design for a successful workforce diversity, equity, and inclusion program to support specific underrepresented groups.
	Understand the talent pipeline ecosystem	Opens multiple avenues for talent acquisition and development such as student internships, guest lectures, and partnerships between industry and training and education organizations.
	Design programs that address barriers for underrepresented groups	Increases accessibility for underrepresented groups to enter and grow in a meaningful career, and contribute to the evolution of the program/industry.
Program Evaluation and Refinement	Track diversity, equity, and inclusion metrics	Enables program managers to determine whether a particular program is successful and make adjustments if needed. Correlate success to innovative approaches (e.g., R&D, patents, inventions) developed or enhanced through a more diverse workforce.
	Report progress	Reporting progress of business objectives and diversity, equity, and inclusion efforts strengthen transparency and an organizations' commitment to diversity, equity, and inclusion.

2.3.1 Organizational/Industry Assessment

Successful workforce diversity, equity, and inclusion programs start with an assessment of existing demographics within an industry or organization. The steps shown in Table 2 can be applied at the organizational level or to an industry overall. Once existing demographics are known, an organization/industry can assess whether aspects of policy or process are creating

barriers to a more inclusive environment. Reviewing organizational or industry recruiting, hiring, promotion, and retention practices are a vital step for identifying where bias may exist within the system. Consider recruitment efforts, interview questions, promotion criteria, partnering practices, and retention strategies to determine whether they are equitable for underrepresented groups. Likewise, a transparent review regarding whether the organization's culture is accepting of diverse approaches from underrepresented groups is vital prior to recruitment to ensure high retention rates. Finally, establishing goals for workplace diversity, equity, and inclusion will help align an organization or industry to take actions that result in a more diverse and inclusive workforce.

It should also be noted that individual companies or organizations can be supported by community organizations supporting underrepresented populations. For example, nearly all the programs summarized in Section 2.2 and the Appendix developed relationships with employers to solicit guidance on needed workforce skills and worked with their jobseekers to develop in-demand skills. By serving as a bridge between jobseekers and employers, community-based organizations can help companies facilitate intended employment outcomes.

2.3.2 Program Design and Implementation

Community organizations can also help employers understand the cultural aspects of integrating underrepresented employees into their workforce, thereby guiding the design and implementation of effective diversity, equity, and inclusion programs. Working with various underrepresented populations may require different yet fluid approaches to recruitment and retention based on economic status, cultural values, or prior experience. Understanding barriers to entry for diverse gender and racial groups allows programs to be intentionally designed to support a specific underrepresented population.

Common Elements in Workforce Diversity, Equity, and Inclusion Programs Include:

- *Initial Communication*. Different avenues of communication should be explored when approaching underrepresented populations. It is important to develop a personal connection with diverse populations to ensure successful engagement. For example, just emailing and assuming the recipient received the information is not sufficient.
- *Wrap-Around Services*. Many of the organizations highlighted in this report (Section 2.2 and Appendix A) emphasized the need to have "wrap-around" support for participants. These services may include financial assistance for attending pre-employment training, such as subsidizing the cost of training, providing a stipend for lost income during training, and assisting with transportation and childcare. Wrap-around services can lower the barriers to entry that some underrepresented groups face to participating in energy efficiency careers.
- *Nontechnical Support*. Many of the programs provide resume development and interview preparation services. Some programs offer support such as instruction in financial literacy, writing, and cross-cultural interactions. For example, a virtual boot camp with these elements could develop pre-employment skills to help underrepresented groups become more competitive applicants.
- *Mentorship and Networking*. Several programs reported that providing participants with opportunities to learn from experienced individuals from similar diverse backgrounds was critical to participant engagement and retention in the programs. Additionally, peer cohorts

and alumni networks were cited as useful features for dealing with workplace cultural dynamics and navigating the energy efficiency industry.

- *Employer Support*: Understanding the employment opportunities for participants in workforce development programs for underrepresented groups is an important element for their success. This analysis can help programs ensure that sufficient employment or contract opportunities are available once participants complete a program and determine whether employers need additional educational or financial support to successfully employ and retain employees who participate in these programs.
- *Career Pathways*. Lasting workforce development efforts expand the career pathways for new employees and avoid limiting entry-level professionals to low-skill positions. Exposing new energy efficiency professionals to a range of technologies, job roles, and industry players through on-the-job and apprenticeship-based training, along with nontechnical support, can support career mobility for entry-level workers. Internships through 2- and 4-year education institutions can also expose students to entry-level positions. Many workforce development programs build employer relationships and serve as a bridge between job seekers and employers.

2.3.3 Program Evaluation

Grounding workforce diversity, equity, and inclusion programs in data allows organizations to track progress toward specific goals and adjust or wind down programs as appropriate. Examples of metrics include matching the racial/ethnic, gender, and socioeconomic demographics of a local area, measuring progress against an industry or organizational baseline, tracking retention, and tracking upward mobility of underrepresented groups compared with the majority population. Assessing the number of inclusion activities such as employee resource groups, surveys to staff, and seminars and activities that celebrate diverse backgrounds can indicate the level of inclusivity in an organization.

Intel Corporation is best-in-class in terms of transparency regarding its workforce demographics. The corporation measures race and gender (options include male, female, and unknown) for all employees from entry level to senior leadership and tracks retention rates and upward mobility of underrepresented groups. Figure 3 shows Intel's diversity metrics measured between 2014 and 2016 to show year-over-year progress. Underrepresented gender and racial groups such as women, Asian, Hispanic/Latino, and Black/African American employees saw an increase in senior hires (green) from 2015 to 2016. Intel's transparency regarding workforce demographics demonstrated positive contributions toward a more equitable workforce for all.

SENIOR GRADE ONLY (grades 10 & 11)

SENIOR GRADE Representation

	Numbers			Percentages				Change in #	
SENIOR GRADE ONLY	Dec 2014	Dec 2015	Current: Dec 2016	% of pop. Dec 2014	% of pop. Dec 2015	Current: % of pop. Dec 2016	Percentage Point change since Dec '15	# Change since Dec '15	% Change in # since Dec '15
Female	432	594	685	14.1%	16.5%	18.8%	2.37%	+91	15.3%
Male	2,639	3,014	2,951	85.9%	83.5%	81.1%	-2.40%	-63	-2.1%
Unknown Gender	-	1	2	0.00%	0.03%	0.05%	0.03%	+1	100.0%
Gender Total	3,071	3,609	3,638	100.0%	100.0%	100.0%		+29	0.8%
White	2,043	2,352	2,239	66.5%	65.2%	61.5%	-3.63%	-113	-4.8%
Asian	848	1,020	1,119	27.6%	28.3%	30.8%	2.50%	+99	9.7%
Hispanic/Latino	108	133	151	3.52%	3.69%	4.15%	0.47%	+18	13.5%
Black/African American	38	58	70	1.24%	1.61%	1.92%	0.32%	+12	20.7%
Native American	13	18	23	0.42%	0.50%	0.63%	0.13%	+5	27.8%
Pacific Islander	-	2	3	0.00%	0.06%	0.08%	0.03%	+1	50.0%
Multiracial	14	17	12	0.46%	0.47%	0.33%	-0.14%	-5	-29.4%
Unknown Race	7	9	21	0.23%	0.25%	0.58%	0.33%	+12	133.3%
Ethnicity Total	3,071	3,609	3,638	100.0%	100.0%	100.0%		+29	0.8%

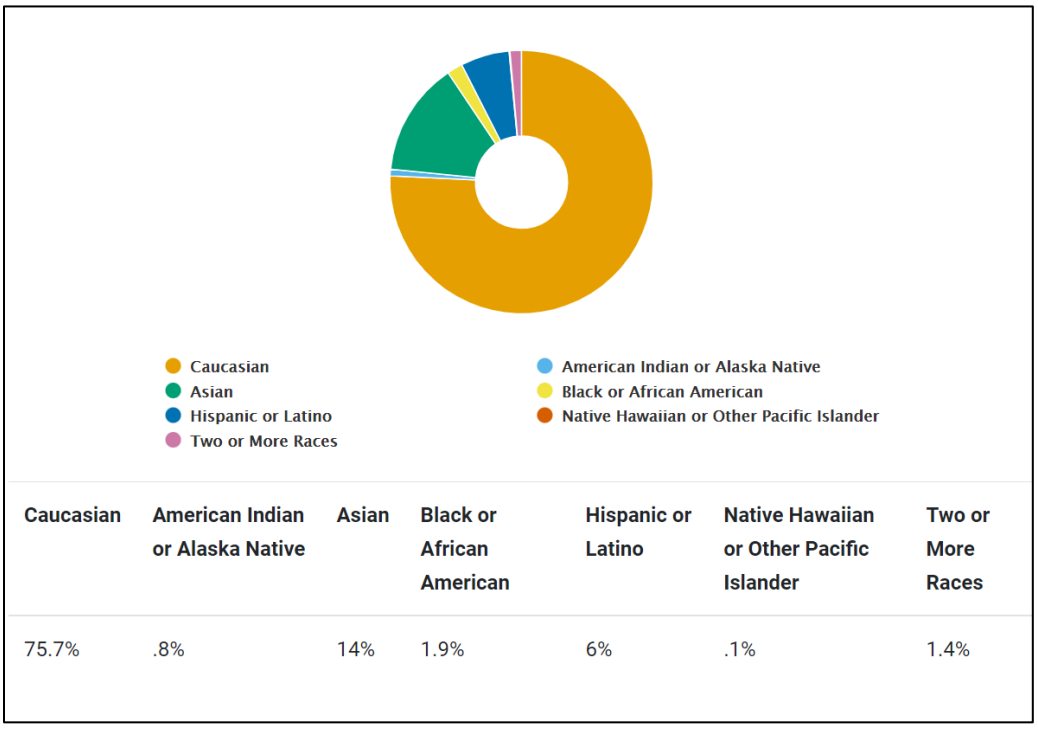
SENIOR GRADE Hires and Exits

	Numbers		Percentages	
SENIOR GRADE	Dec 2016 YTD HIRES	Dec 2016 YTD EXITS	Dec 2016 YTD % of HIRES	Dec 2016 YTD % of EXITS
Female	38	92	22.8%	15.3%
Male	127	509	76.0%	84.7%
Unknown Gender	2	0	1.20%	0.00%
Gender Total	167	601	100.0%	100.0%
White	86	425	51.5%	70.7%
Asian	53	139	31.7%	23.1%
Hispanic/Latino	7	20	4.19%	3.33%
Black/African American	7	10	4.19%	1.66%
Native American	-	4	0.00%	0.67%
Pacific Islander	-	0	0.00%	0.00%
Multiracial	1	3	0.60%	0.50%
Unknown Race	13	0	7.78%	0.00%
Ethnicity Total	167	601	100.0%	100.0%

Figure 3. Intel diversity and inclusion metrics 2014–2016

Source: Intel 2016 Annual Diversity and Report Addendum

Figures 4 and 5 demonstrate the transparency of some of the national laboratories regarding their workplace demographics for NREL and Sandia, respectively. For example, despite the low percentage numbers within different racial groups, the transparency of both examples in representing all groups within their workforce rather than displaying only the underrepresented minorities helps to illustrate their diversity and inclusion goals to future professionals. Sandia National Laboratories further expresses their transparency by showing the matriculation of women and different racial populations into various positions within their company (Figure 5).



Caucasian	American Indian or Alaska Native	Asian	Black or African American	Hispanic or Latino	Native Hawaiian or Other Pacific Islander	Two or More Races
75.7%	.8%	14%	1.9%	6%	.1%	1.4%

Figure 4. National Renewable Energy Laboratory's race/ethnicity workplace demographics in 2021

Source: National Renewable Energy Laboratory 2021 Interactive Demographics

Women	URM	OPC	2 or more races	African American/ Black	American Indian/ Native Alaskan	Asian	Hispanic/ Latino	Pacific Islander/ Native Hawaiian
Senior Leadership *(Director/President, Deputy Director/Vice President, Associate Lab Director)*								
28.6%	14.3%	0.0%	0.0%	7.1%	0.0%	0.0%	7.1%	0.0%
Research/Technical Management (first-line and mid-level) *(Engineering Management, Research Management, Technical Management)*								
24.1%	15.9%	7.8%	1.6%	1.7%	0.7%	6.0%	13.5%	0.2%
Operations (or Research Support) Management *(Business Management, Computer Systems, Communications, ESHQ, Facilities Ops, HR, Legal, Tech Transfer, Strategic Plannings)*								
44.0%	39.6%	4.7%	0.7%	3.7%	1.2%	3.7%	34.7%	0.2%
Technical Research Staff *(Non-management: Researchers, Scientists, or Engineers)*								
19.1%	22.7%	10.0%	2.4%	1.9%	1.3%	7.5%	19.5%	0.1%
Operations Support Staff *(Non-management: support roles)*								
53.4%	41.8%	6.3%	2.4%	2.0%	1.7%	3.7%	37.5%	0.2%
Post Doctoral *(Post-doc employees)*								
20.6%	10.8%	23.5%	4.8%	1.3%	0.3%	18.7%	8.6%	0.0%
Graduate Student *(Funded by Lab)*								
29.5%	26.4%	13.0%	4.9%	2.7%	1.3%	8.2%	22.5%	0.0%
Undergraduate Student *(Funded by Lab, do not include undergrad student funded by DOE directly [i.e., SULI])*								
39.8%	34.6%	17.5%	5.1%	2.4%	1.9%	12.3%	30.3%	0.2%

Figure 5. Sandia National Laboratories' workplace demographics in 2021 for various positions

Source: Sandia National Laboratories 2021 Interactive Demographics

3 Student Engagement

Attracting students to efficiency careers is an important element of increasing workforce diversity within the sector. Racial and ethnic minorities are expected to make up more than half of the U.S. population by midcentury, with millennials and Generation Z[4] accounting for 44% and 48% of the population, respectively (Frey 2018). Employers must understand the context in which the younger generations want to live and work in order to attract young people to building efficiency careers. It is important to attract students early on, from K-12 through post-secondary educational institutions.

3.1 Shifting Preferences and Values

In addition to being more racially and ethnically diverse, millennials and Generation Z tend to be more environmentally conscious and technology savvy than preceding generations. Like generations before, they value money to provide for their basic needs, but want to find meaning and purpose in a career (Gallup 2019) and expect a diverse and inclusive workplace (O'Boyle 2021). The following sections describe the preferences of Generation Z and millennials regarding technology, sustainability, and careers.

Technology. The use of technology is important to the younger generations. A PwC study published in 2012 about the future workplace states "Millennials will expect a workplace technology ecosystem that includes social networking, instant messaging, video-on-demand, blogs and wikis. These social tools will enable this generation to instantly connect, engage, and collaborate with cohorts and managers in ways that are natural to them, leading to better productivity across the enterprise" (PwC 2012). Similarly, a survey of more than 12,000 Generation Z students between the ages of 16 and 23 found that 91% of respondents indicated that technology would influence their job choice among similar employment offers (Dell 2019). As digital natives, millennials and Generation Z will view a workplace without digital technology as outdated and unappealing.

Sustainability. Millennials and Generation Z tend to be more health conscious and environmentally aware than the older generations. In addition, the younger generations are more likely to believe that humans are causing climate change (Figure 6) (Parker, Graf, and Igielnik 2019). Numerous surveys also show that both generations value meaning and purpose in their careers. A Dell Technologies survey found that 43% of Generation Z agree that "work has meaning and purpose beyond getting paid" (Dell 2019). Therefore, millennials and Generation Z are more likely to want to have an impact on the state of climate change and may be interested in careers in clean energy sectors.

[4] Generation Z includes people born after 1995, millennials were born between 1980 and 1995, according to https://www.kasasa.com/articles/generations/gen-x-gen-y-gen-z.

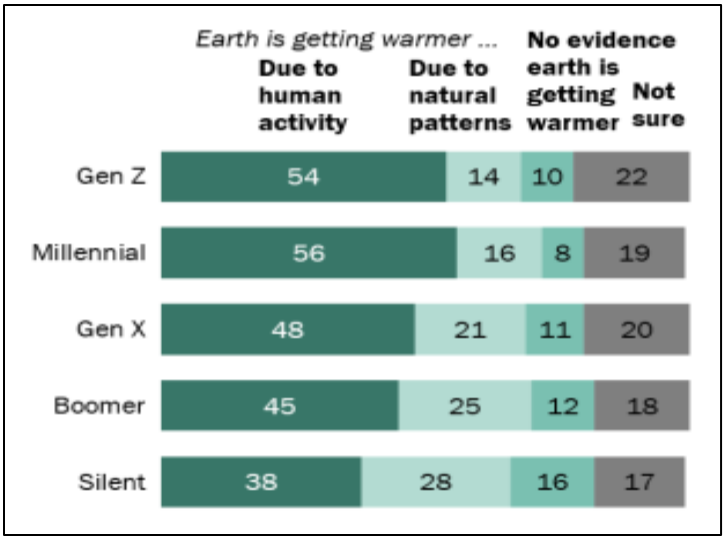


Figure 6. Views on climate change and its causes across generations

Source: Pew Research Center 2019

When considering these values, it is reasonable to conclude that the younger generations are more likely to support sustainability in all aspects of their lives and work. Evidence of this is presented in a 2019 article published by Constructor Magazine that states, "Generation Z will be motivated about features such as lighting controls and window coverings that automatically adjust with the sun's position; HVAC systems whose fans operate only when motion is detected; and plumbing systems that optimize water flow based on usage. Those amenities will no longer be a value-add for residents—they will be expected."

Career Preferences. While millennials have been known to change jobs frequently, fueling the success of the gig economy (Adkins 2016), Generation Z tends to be more risk averse when it comes to choosing a career path. A 2019 Newsweek article reported that among University of Georgia students, the most desirable trait in a future employer was job stability, followed by professional development and work-life balance. The article suggests that Generation Z students about to enter the workforce were children during the 2008 recession and experienced or witnessed parents losing jobs and savings (Piore 2019). During a global pandemic, job security is likely a very desirable trait that a future employer can showcase as Generation Z is newly entering the workforce. When faced with choosing a particular industry in energy, Generation Z is more interested in careers in renewable energy than in traditional oil and gas industries, as shown in Figure 7 (Morning Consult 2020). However, the survey did not ask Generation Z respondents about their interest in a career in energy efficiency.

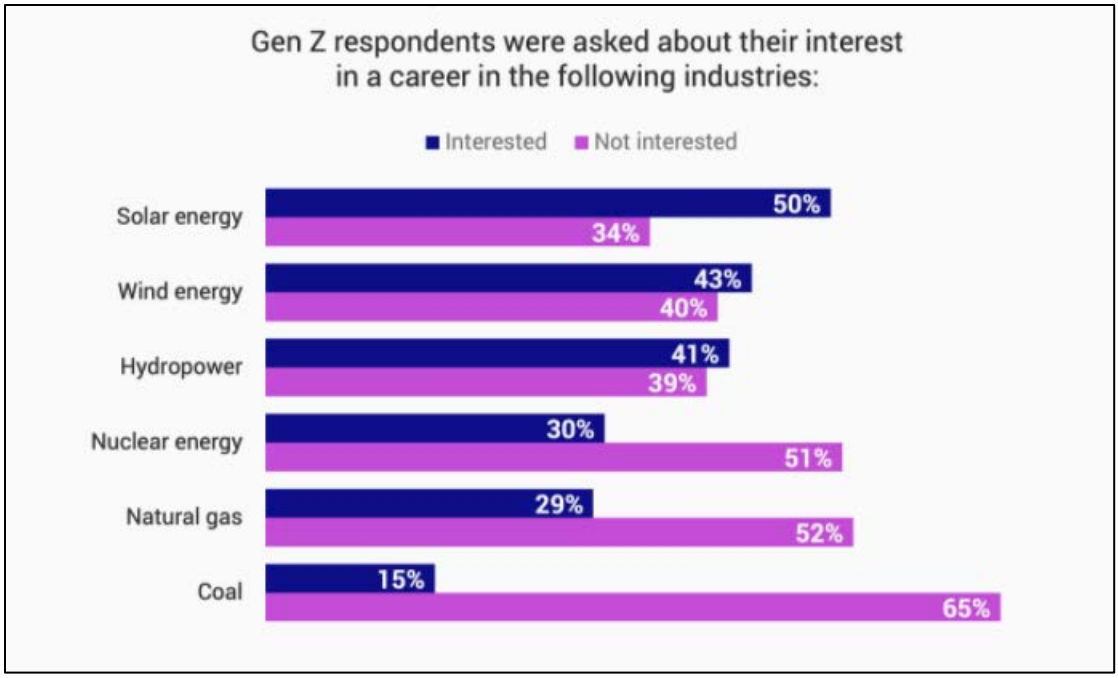


Figure 7. Survey responses indicating interest in energy careers

Source: Morning Consult 2020

3.2 Shifting the Negative Perception of Construction Careers

The construction industry, a vital part of the building energy efficiency sector, has had difficulty appealing to students, in part due to a negative perception of careers in the field. McKinsey & Company's *Reinventing Construction* report (2017) states that, "the [construction] industry has an image of being dull among the latest generation of top-talent engineers and interdisciplinary managers who can run projects of substantial complexity." Another study found that 71% of students surveyed describe themselves either "definitely not" or "probably not" interested in pursuing a career in HVAC, although a majority of parents state that they would likely be supportive of HVAC as a career choice for their children (Figure 8) (Electric & Gas Industries Association).

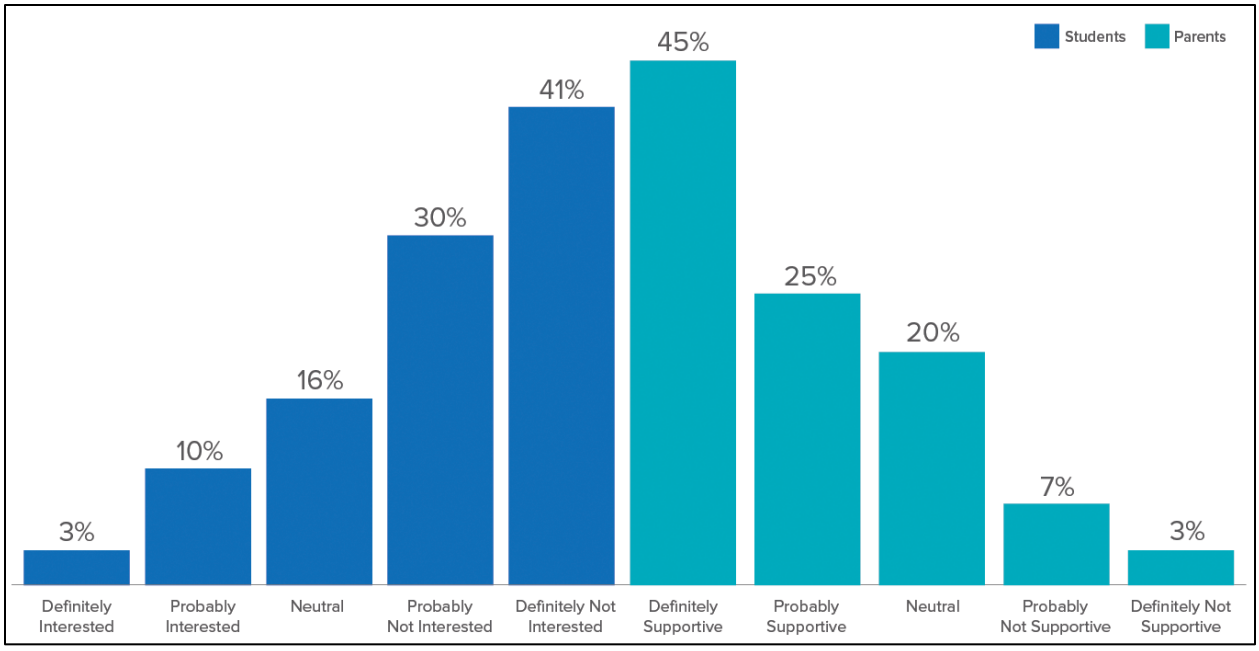


Figure 8. Survey responses regarding HVAC career perceptions

Source: Electric & Gas Industries Association 2018

Employers in the building energy efficiency sector must overcome the negative perception that students, from K-12 through college, have of the construction trades in order to attract top talent. The research and programs provided in the following two sections offer examples of how this could be achieved.

The agriculture industry, which has faced similar perception challenges, has been successful in attracting new and younger farmers to the sustainable agriculture industry in recent years. According to the AgAmerica Lending, millennial farmers now make up 8% of U.S. farmers. In addition, new entrants to agriculture, or "beginning farmers" with 10 years or less in the industry, made up one-fifth of all U.S. farmers in 2018 (Cubbage 2019).

A career in sustainable agriculture may be appealing to younger generations for a variety of reasons. It offers purpose and impact beyond oneself and connects to millennial values for healthy and sustainable living. Furthermore, the agriculture industry is embracing technology for numerous applications, from the use of drones for aerial imagery to robotic milking technologies that increase the productivity of farms and the quality of goods.

The building efficiency industry is poised to experience a similar shift in perception if it can also appeal to millennial and Generation Z's desire for purpose in their careers, connection to lifestyle values, and application of technology in the workplace. In addition, it may be seen as a more stable industry than it has been in the past because it remained one of the essential industries allowed to continue operations during the COVID-19 pandemic, even if the construction industry suffered record job losses (Lawrence 2020).

3.3 Student Engagement Programs and Approaches

The following student engagement programs include many of the key success factors listed in Section 3.1. The highlighted programs are a subset of the workforce diversity programs studied for this paper. Additional programs reviewed are included in Appendix A.

Agriculture in the Classroom

Agriculture in the Classroom is a long-standing program funded by the U.S. Department of Agriculture to encourage teachers to educate students about the role agriculture plays in our economy and society. The effort includes an online database that lists hundreds of pre-K through 12th grade educational materials about agriculture.

Joint Science and Technology Institute

The Joint Science and Technology Institute, provided through the Oak Ridge Institute for Science and Education, is a fully funded, two-week residential program for middle and high school students and teachers that includes hands-on experiments with U.S. Department of Defense (DoD) researchers in DoD schools around the world. The purpose of the program is to expose students and teachers to science, technology, engineering, and math (STEM) careers and increase STEM competencies. In 2019, the program educated 35 high school students, 32 middle school students, and 8 teachers from the United States, Germany, and South Korea.

Mead Energy Academy

The Mead Energy Academy in Longmont, Colorado, is a program that allows high school students to focus on energy-related topics while earning their high school diploma. The academy serves students whose career interests are related to the energy field (such as engineering or welding) and those interested in fields that support the energy industry (such as law or marketing). The academy is open to all students and prepares them for careers in the energy field, whether they plan to attend a trade school, earn a four-year college degree, or immediately join the workforce. Cross-curricular courses in math, science, social studies, language arts, business, and more are taught with an energy focus.

Frankford High School Bright Solar Futures Academy

Frankford High School in Philadelphia, Pennsylvania, serves a student body with 91% racial minorities, where 99% of students are eligible for free lunch (Frankford High School 2020). In 2018, Frankford High School established the Bright Solar Futures Academy, which is a first-in-the nation high school career and technical education solar program (Frankford High School 2020). In addition to training students in solar installation, the three-year curriculum for high school students also covers energy efficiency technologies, electricity, and construction basics. The program includes hands-on experience with equipment and paid summer internships in the new Frankford Solar Laboratory. The program was in part funded by a $1.25 million grant from the U.S. Department of Energy's Solar Energy Technologies Office, as well as from PECO, the local utility, which contributed funding for the construction of the new solar laboratory at Frankford High School (Philadelphia Energy Authority n.d.). The project team developed a list of solar competencies needed for graduation, approved by a local solar industry occupational advisory committee. Although initially envisioned to focus on solar technologies, the program has expanded to include energy efficiency, which provides additional career pathways beyond solar installation. The program was motivated in part to develop the workforce to meet the

demand for solar driven by a local city rebate and the Solarize Philly effort (Philadelphia Sun 2019).

Build Your Future

Build Your Future aims to catalyze recruiting the next generation of craft professionals. One of their signature programs, Power UP Loud, is aimed at getting young women interested in construction careers using game-like technology. In addition to traditional training, participants experience the construction industry via simulators and virtual reality headsets that mimic some of today's most popular video games.

Block Kids Building Competition

The Block Kids Building Competition is a national competition sponsored at the local level by National Association of Women in Construction chapters and other organizations.
The competition, open to elementary children in grades K–6, introduces children to the construction industry to help create awareness and promote careers in the industry. The competition involves the construction of various structures with interlocking blocks and three of the following additional items: a small rock, string, foil, and poster board.

Minecraft Lesson Plans for Teachers

Minecraft Lesson Plans for Teachers, developed by Mojang Studios and Xbox Game Studios, is an educational program for teaching a range of topics through Minecraft, including science and math, along with a database of 500 lesson plans focused on renewable energy and resourcefulness in STEM curricula. Developed by Disco Learning Media, these lesson plans are aligned with state educational standards in multiple states and help teachers build challenges for students to complete. Educators can adapt and edit lessons after the first year of experience with Minecraft Education Edition, providing the opportunity to deepen the lessons and refine their students' learning experience.

Tech Kids Unlimited

Tech Kids Unlimited is a not-for-profit educational organization focused on kids with special needs. The organization teaches project-based workshops on coding, game design, video editing, animation, and 3D printing. The programming for teens includes introductory coding and computer skills. An independent evaluation showed advancements in technology and work-based skills as well as in social/emotional learning. Tech Kids Unlimited reports that positive results were most pronounced in improved self-esteem, self-advocacy, technology skills, and digital literacy. Parents and counselors reported that 77% of youth participants indicated significant gains in technology skills after one week, and 73% of parents believed their child gained skills to help secure future employment.

3.4 Key Success Factors in Student Engagement Programs

Attracting more students to building energy efficiency careers can be achieved by cultivating interest while children are in primary and secondary school and exposing them to the variety of pathways into and through the industry. While there is no prescriptive path for how one might enter the energy efficiency workforce, there are distinct educational pathways and requirements for different professions within the building energy efficiency sector, shown in Table 3.

Table 3. Building Energy Efficiency Career Paths

Category	Careers/Job Functions	Educational Pathway
Building Trades	Builders, Construction Laborers, Specialty Trades, Equipment Installation, and Maintenance Workers	Vocational Programs, Apprenticeship Programs
Professional Services	Architecture, Design, Engineering, Real Estate Professionals, Building Operators, and Managers	Higher Education and/or Professional Certifications

Understanding that any pathway into the building efficiency sector can lead to a stable, well-paying career is vital for parents, students, teachers, and counselors. The National Association of Homebuilders reported that median wages in construction grew more than national median wages in 2018 (3.2% versus 2.5%, respectively), with even larger increases for specific laborers and helpers, ranging from 6.7% for roofing helpers to 3.6% for construction laborers (NAHB 2018). In addition, the Bureau of Labor Statistics expects construction jobs to continue to grow 0.4% annually from 2019 to 2029, although at a slower rate than the pre-pandemic 10-year forecast of 1.1% annual growth (BLS 2018, 2019).

Many of the careers shown in Table 3 require a strong foundation in STEM subjects and pay higher than average wages, according to a Pew Research study conducted in 2017 (Kennedy, Hefferon, and Funk 2018). However, even with the promise of higher wages, many students are not pursuing STEM degrees. The 2017 study indicates that students believe that STEM subjects are not useful for their careers (23%), or they think these subjects are too boring (12%) to pursue as a course of study (Kennedy, Hefferon, and Funk 2018).

Some parents augment their children's in-school exposure to STEM by engaging in after-school programs. Outside the classroom, STEM programs reach approximately 11 million students nationwide each year, according to the National Institute for STEM Education (NISE 2019). An extensive internet search showed many options for after-school STEM programs that focus on robotics and computer coding, but very few with a focus on construction or building sciences. One notable exception is the Block Kids Building Competition, described in Section 3.3. Infusing building industry skills into informal and after-school STEM programs may help increase awareness and engagement with STEM and building efficiency careers.

3.4.1 Engage Students in STEM Early and Connect STEM to Building Efficiency Careers

A 2018 Center for Childhood Creativity study found that experiences from infancy through third grade form the foundation for development of one's critical thinking skills, including curiosity and inquiry, skepticism and questioning, and assessment and analysis—all vital skills for success in STEM careers (Hadani and Rood 2018). Therefore, activities that support development of skills for STEM careers should be included in primary education.

Keeping students engaged in STEM activities is important throughout middle and high school to encourage their continued interest in STEM in college. A 2006 literature review conducted by ITEST Learning Research Center identified key success factors for any program designed to

encourage the pursuit of STEM degree programs. The research indicated that for students to pursue STEM careers, they must:

- Be prepared and confident in their abilities to meet the demands of STEM degree programs
- Identify a tangible STEM career that resonates with them
- Have sufficient access to education and support within their family and peer networks
- Experience motivation and interest in, and enjoyment of STEM topics (Dorsen, Carlson, and Goodyear 2006).

STEM subjects are foundational to many trades involved in the building industry. For example, insulators and HVAC technicians should understand thermodynamics, pipefitters and welders should understand pressure dynamics, and technology such as computer-aided design and building information modeling are becoming increasingly common in construction projects. Organizations such as Build Your Future provide information and classroom resources to educate students, teachers, and parents about careers in construction.

3.4.2 Engage School Counselors and Teachers to Promote Benefits of a Building Efficiency Career

A study published in *The Professional Counselor* indicates that students begin developing career awareness in primary school, explore various careers pathways during middle school, and engage in career preparation and planning in high school (Sanders, Welfare, and Culver 2017). Teachers and school counselors are influential in guiding students on career opportunities and pathways, but they need information and support from industry to do so. In fact, 9 out of 10 school counselors surveyed at the American School Counselor Association conference held virtually in July 2020 indicated they do not have sufficient materials to expose students to building energy efficiency careers (NREL 2020). Presentations by professionals in the field followed by social media were reported to be the most effective pathways for engaging students. Salary information followed by videos describing and showing the profession were cited as the most compelling information for students to receive about an industry (NREL 2020).

3.4.3 Connect Energy Efficiency to Digital and Gaming Skills of Children and Young Adults

Efforts to teach children about energy efficiency through digital tools and gaming continue to evolve. Multiple projects funded by the European Union have resulted in games and interactive online tools that aim to make changes in consumer behavior as easy as possible. Research by Wright and Weidman in 2018 demonstrated that students who showed the most significant interest and understanding of construction were those who did not have parents working in construction industries, and who had more interest in digital hobbies (e.g., video games). The overwhelming theme from researchers' interviews with students was that the students had not considered that their digital interests would be of value in the construction industry, or that the skills they had in designing 3D models would be useful (Wright and Weidman 2018).

3.4.4 Consider Internships as a Valuable Component of Construction Management Education

The National Center for Construction Education and Research emphasizes the benefits of an internship for construction management students. A 2020 blog posted on the organization's website states that the ideal internship program helps students learn how to work in a team environment while gaining knowledge of the craft. In addition, internships can help students learn to take initiative, communicate effectively, and learn practical skills such as cost-estimating and time management. Construction management internships should benefit the company and the intern, allowing each party to determine whether there is a good fit for future employment (Johanasen 2020).

3.4.5 Appeal to Millennial and Generation Z Values

A Gallup Poll and report titled "How Millennials Want to Live" indicates that millennials emphasize purpose over a paycheck (Gallup 2019). In other words, millennials must find meaning in their work, and the organizations they choose to work for must have a compelling mission and purpose. As was described in the previous section, appealing to younger generations' values surrounding climate change, sustainability, and job security by promoting the energy efficiency savings of high-performance buildings and illustrating how the construction sector continued during the COVID-19 pandemic will help attract students to building energy efficiency careers.

4 Conclusion

The building energy efficiency sector has an opportunity to expand its labor force by intentionally recruiting from a more diverse pool of applicants that match the demographics of the nation. Successful recruitment of diverse populations must be followed with thoughtful retention policies that support the needs of various populations. Actively pursuing diversity, equity, and inclusion in workforce programs and policies can grow the building energy efficiency, sector, support local communities, and improve the lives of underserved Americans.

Communities, employers, education and training organizations, and others can use the processes and best practices described in this report to develop organizational strategies to increase diversity, equity, and inclusion within their spheres of influence. A national effort aimed recruiting and retaining diverse and historically underserved populations for building energy efficiency careers will enable the United States to build a modern, sustainable infrastructure while simultaneously delivering an equitable clean energy transition, ensuring no communities are left behind.

Appendix: Additional Workforce Diversity Examples

The following workforce diversity programs serve as additional examples of the types of efforts currently being implemented around the country. This is not intended to provide a comprehensive survey of workforce diversity efforts, but rather to showcase a sample of effective programs. The individual workforce diversity programs featured below may focus on one or several underrepresented populations. While there are differences in engaging each of these communities, many of the approaches used by successful workforce diversity programs are applicable across populations. Programs are arranged in alphabetical order by title.

California Public Utilities Commission General Order 156

In 2014, the Institute for Research on Labor and Employment at the University of California Berkeley conducted a study of workforce issues for California investor-owned utilities, which included a summary of utility and public policies that promote workforce inclusion in the energy efficiency sector (Zabin et al. 2014). The following examples demonstrate some of the models for increasing participation of diverse businesses in the efficiency sector.

Procurement: California Public Utilities Commission (CPUC) General Order 156, issued in 1988, requires utilities of a certain size to develop and implement programs to increase the utilization of women-, minority-, and service-disabled veteran-owned businesses. The procurement goals for each affected utility specify that 5%, 15%, and 1.5% of procurement dollars go to women-, minority-, and service-disabled veteran-owned contractors, respectively (Zabin et al. 2014).

In 2015, the CPUC added LGBTQ-owned firms to its supplier diversity program, which includes women-, minority-, and disabled veteran-owned businesses. In 2018, the CPUC reported that 0.11% ($38.8 million) of contracting work from utilities operating in California went to LGBTQ-certified firms through the program.

Since 2008, various agencies within Los Angeles adopted “community career” policies that require developers and contractors who build projects with public funding to meet hiring goals and sign a project labor agreement. The policies require 30%–40% of work to be completed by priority populations (residents in high-unemployment or high-poverty zip codes) of which 10% must be completed by disadvantaged workers (from low-income households, homeless, receiving public assistance, lacking a GED or high school diploma, history in the criminal justice system, single parents, or suffering from chronic unemployment) (Zabin et al. 2014). Similar contractor sourcing policies have been implemented at the California High Speed Rail Authority, City of San Francisco, City of Portland, Energy Trust of Oregon, City of Seattle, and Cuyahoga County, Ohio (Zabin et al. 2014).

Contractor Training: From 2013 to 2014, the Southern California Regional Energy Network and Los Angeles County aimed to implement $30 million in energy efficiency retrofit projects while promoting local, small contractor participation (Zabin et al. 2014). The county partnered with the Emerald Cities Collaborative (ECC) to run the E-Contractor Academy, a seven-week training program to help contractors be successful in bidding on and completing public works projects. Workshop topics included how to bid on energy efficiency projects, certifications, safety, labor compliance, bonding, and estimating. The E-Contractor Academy was successful in training and

pre-qualifying small contractors, including those that did not focus on energy efficiency. However, there was an insufficient project pipeline to keep the number of trained contractors engaged in the program (Soto 2020). Additionally, the small contractors struggled to access sufficient bonding capacity to be able to bid on large projects.

ComEd Diverse Service Provider Incubator Program

ComEd, the investor-owned utility in the Chicago area, retains a contractor network for installing technologies that save energy through its business energy efficiency programs (ComEd 2020). In 2018, ComEd launched its Diverse Energy Efficiency Service Provider Incubator Program with the intention of recruiting contractors from underrepresented populations (Doyle 2020). ComEd provides funds for local organizations, such as the local Hispanic American Construction Industry Association, to recruit participants from minority-, women-, and veteran-owned businesses, as well as those with a Diverse Business Enterprise certification. The program consists of a series of workshops on energy efficiency, ComEd's rebate offerings and processes, employment lead generation, and relationship development with financial institutions for small business loans and lines of credit. Participants also receive mentorship and engage in networking opportunities.

Massachusetts Clean Energy Center Successful Women in Clean Energy Program

Each year, the Massachusetts Clean Energy Center (MassCEC) collects data on the demographics of the clean energy workforce in Massachusetts. The data inform targeted programs to support underrepresented groups. When findings indicated that women comprised only 26% of clean energy hires, MassCEC implemented the Successful Women in Clean Energy program in 2016 to address specific barriers women might face in accessing clean energy careers (Fitzpatrick 2014). The program supported 2 cohorts of 12 participants who received 15 weeks of training, enrollment in a higher education course, and placement in a six-month paid fellowship with an employer in the clean energy industry. MassCEC partnered with a training provider to run the program and address specific challenges faced by the participants, including coaching on financial literacy and soft skills. As of 2020, 50% of all program participants are still employed in the clean energy industry (Jacques 2020).

Green City Force's AmeriCorps

Green City Force's (GCF's) ServiceCorps is an AmeriCorps program that works with young adults ages 18–24 who reside in the New York City Housing Authority to prepare them for green economy careers through service. Being part of the ServiceCorps requires a full-time commitment that includes service, training, and skill-building experiences related to sustainable buildings and communities. GCF takes a holistic approach and provides training in a range of areas from composting to energy efficiency.

GCF includes alumni initiatives to build inroads into specific careers within the green economy, such as solar and energy efficiency. GCF believes that young New York City Housing Authority residents are uniquely positioned to catalyze change in public housing communities while building skills, earning certifications, and gaining experience to help achieve economic prosperity. GCF emphasizes partnerships with residents, agencies, local and citywide organizations, funders, and employers to realize the change they envision.

Laney College Building Efficiency for a Sustainable Tomorrow Center

The Laney College Building Efficiency for a Sustainable Tomorrow (BEST) Center, funded in part by the National Science Foundation's Advancing Technological Education Award, was created to support the professional development of instructors in building science technician education programs (National Science Foundation n.d.). The BEST Center coordinates a model curriculum, hosts teach-the-teacher events, supports the development and use of instructional laboratories at community colleges, and provides student resources such as career pathways and job boards (BEST Center n.d.). By focusing on instructors, the BEST Center helps community and technical college programs around the country stay current with industry research and technology and provides networking opportunities across institutions to help leverage instructor expertise and resources.

The BEST Center partners with Lawrence Berkeley National Laboratory and industry partners to provide access to state-of-the-art building technology and energy management tools for instructional use. Participating programs gain access to a network of similar programs and industry advisors, best practices for classroom instruction, curriculum and program design exchange, project- and problem-based learning opportunities, teaching laboratory specifications, workshops and networking events, and other benefits. The resources provided by the BEST Center allow instructors and community college and technical programs to maintain and update their curriculum, though access to appropriate laboratory equipment can still be a barrier for developing programs.

South Seattle College Sustainable Building Science Technology Program

South Seattle College offers a Bachelor of Applied Science in Sustainable Building Science Technology (SBST), which is a 90-credit program designed for working professionals (South Seattle College n.d.). Tuition is approximately $25,000 over the two-year program, and students often receive assistance from their employers, scholarships, or veterans' benefits. Veterans without benefits from the U.S. Department of Veterans Affairs pay half-priced tuition. The SBST program partners with local organizations, such as Apprenticeship & Nontraditional Employment for Women, to recruit participants.

The courses are offered in a combined online and face-to-face format to minimize interference with work schedules. Courses meet in person one weekend per month and typically involve field trips and hands-on experiences with industry partners. Students are required to earn 19 credits via internships and work experience practicums. The SBST program works with local industry partners to provide internship placements based on student capabilities and employer needs. The program is designed to help students develop technical knowledge (such as building and energy science), technological skills (via hands-on experience with building equipment), and professional skills (such as networking, resume, or portfolio development, along with using LinkedIn).

Students are recruited through local partners that work with diverse populations, and the 2020 cohort is more than 50% nonwhite and 25% female, with strong representation from veterans (Abercrombie 2020). The SBST program's active technical advisory board of buildings industry representatives helps guide the program to address industry needs and provides connections for internship placements. Typical cohorts consist of 12–20 students, although the program aims to expand over the next few years. Resources that would support expansion include access to

hands-on building equipment, virtual or 3D models of buildings to identify equipment performance, building data to support curriculum development, and assistance to help instructors deepen their expertise.

Workforce Development Council of Seattle-King County Upskill/Backfill Vocational Training

A 2016 study from the Seattle Jobs Initiative estimated worker shortages in various industries, including a shortfall of 676 workers in the electrical, HVAC/refrigeration, and plumbing/pipefitting trades (Klaeysen 2016). Based on this projection, the Emerald Cities Collaborative (ECC) secured a grant from the Workforce Development Council of Seattle-King County, along with leveraged funds to "upskill" workers to operate HVAC and electrical, plumbing, and mechanical systems in high-performance buildings and to train entry-level employees for newly created positions (Workforce Training and Education Coordinating Board 2018). ECC worked with industry partners to adapt a one-year HVAC/refrigeration curriculum into a five-month evening and weekend training program. The effort also included partnerships with local employers and community organizations to provide hands-on learning and recruit and refer participants.

The first cohort aimed to upskill 22 incumbent building operators in tools and techniques to improve energy and water efficiency and enroll in the "Building Operation Certification 1" issued by the Northwest Energy Efficiency Council. The second cohort provided 32 entry-level trainees with HVAC/refrigeration training for building operators and helped participants earn certificates of completion from the Construction Industry Training Council of Washington (Emerald Cities Collaborative 2019). Across the two cohorts, 52% of the trainees were people of color, and all of the trainings in the second cohort were required to meet Workforce Innovation and Opportunity Act criteria: underemployed or unemployed, very low-income, formerly incarcerated, limited English, or other Workforce Innovation and Opportunity Act characteristics. ECC partnered with Seattle Jobs Initiative to provide a career navigator to help trainees prepare resumes, apply for employment, or secure promotions. By August 2019, 81% of the entry-level participants completed the trainings, with 38% hired or promoted between March and August 2019.

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