

Workforce Development: How the Midwest Will Equitably Meet Its Climate Goals in New Construction

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ABSTRACT

As states and municipalities across the Midwest continue to adopt significant climate and greenhouse gas emissions reduction (GHG) goals and implement policies and programs to achieve those goals, there is increasing demand for skilled workers to support the construction of more efficient buildings. Additionally, there is a need to equitably diversify the building and construction sectors' workforce so that it better embodies and reflects the region's population. This paper will present an overview of clean energy workforce development initiatives in the Midwest, with a specific focus on jobs related to energy efficiency in the construction of new buildings.

This paper will explore several key initiatives in the Midwest that are shaping the clean energy workforce. From heat pump collaboratives to supporting the development of the next generation of code officials, central themes found across these initiatives are a commitment to innovation and fostering equity. There is also a strong dedication to providing training and employment opportunities to disadvantaged and underrepresented populations. These examples can serve as practical models, illustrating effective strategies and opportunities for building a sustainable and equitable clean energy workforce in the heartland of America. This paper will highlight several examples, including challenges and opportunities, and serve as a resource for policymakers, industry leaders, and educators.

INTRODUCTION

Establishing climate goals and setting targets serve many purposes. Reducing GHG emissions helps slow the detrimental impacts of climate change and improves human health outcomes, especially for disadvantaged communities. Energy efficiency reduces operating costs for building owners and lessens burdens on the electrical grid as demand grows from new building construction. To meet established climate goals, it is important to continuously improve existing implementation programs while developing new ones to address gaps. One such identified gap is the need to build up the clean energy workforce in order to realize the desired performance of these buildings to meet adopted climate goals. There is a growing shortage of skilled labor to construct energy efficient buildings. At the same time, municipal departments are also experiencing a decline in trained building officials to review construction plans and inspect new construction for compliance with building and energy efficiency requirements. Adding to the challenges of achieving climate goals and implementing clean energy building practices across the built environment is a gap in workforce training and education to effectively incorporate new technologies, materials, and advanced construction techniques that will meet energy efficiency requirements in new construction. This paper explores climate goals and action plans adopted in the Midwest, the major trends in clean energy and climate workforce, and the

workforce initiatives and incentive programs that are essential to address this gap and effectively realize the nation's climate goals.

CLIMATE GOALS AND ACTION PLANS

Globally, the building and construction sector is the largest contributor to overall GHG emissions, accounting for roughly 40 percent of global emissions (UNEP 2022) and is not currently on track to achieve UNEP's goal of full decarbonization by 2050 (UNEP 2022). In the United States, existing residential and commercial buildings account for 30 percent of GHG emissions by electricity end use (EPA 2021). In response to the compounding impacts of climate change, many states and localities have set GHG reduction goals or established zero-energy building targets. The U.S. Department of Energy (DOE) has set targets to reduce total U.S. building GHG emissions 65% by 2035 and 90% by 2050 relative to 2005 levels (DOE 2024a). The focus being to tackle the climate crisis by creating equitable jobs as a leader in global clean energy technologies and buildings. Governments cannot meet their GHG reduction goals and reduce their vulnerabilities to the impacts of climate change without addressing buildings and thus having a robust skilled clean energy workforce to effectively carry out their building policies and advanced building construction practices.

Energy targets and emissions reduction goals have been increasingly adopted by both states and local jurisdictions to address climate change and its associated impacts. Some jurisdictions continue to expand their goals through more stringent targets, such as specific emissions reduction goals or social initiatives like environmental justice targets. The Center for Climate and Energy Solutions has developed a resource library where state climate action plans are catalogued. In the Midwest, Illinois, Iowa, Kentucky, Michigan, Minnesota, and Wisconsin, currently have statewide climate action plans. Statewide policies often focus on larger industries such as transportation, agriculture, and buildings. Found in many policies is the increased importance on engaging local jurisdictions and tribal nations to build clean energy workforce capacity through education and skills development initiatives. Jurisdictions of all sizes, from large cities to small and rural localities, are working on climate plans and initiatives which highlight the importance of setting climate targets and planning for future impacts.¹ Elemental Green's Zero Energy Project currently lists 92 Midwest Cities with Climate Action Plans.

MIDWEST STATE & CITY CLIMATE GOALS AND ACTION PLANS

This section introduces and examines the climate plans of select Midwest states and cities, shedding light on their proactive efforts to address decarbonization of their built environment and foster sustainable development within their communities.

The Milwaukee, Wisconsin Climate and Equity Plan was adopted on June 23, 2023. One of the overarching goals is to reduce 45% of community GHG emissions by 2030 and achieve net zero emissions by 2050. A core component to achieve this reduction is to “build new,

¹ Elemental Green's Zero Energy Project has a repository of municipal climate action plans that are in concept, development, or implementation phases, which is further outlined below.

affordable, and energy-efficient housing in Milwaukee by promoting infill development² and homeownership for low-moderate income buyers.” The construction of new homes in existing communities is intended to revitalize neighborhoods by removing unsafe structures and providing affordable, sustainable, and net-zero housing. Energy efficient infill buildings provide a sustainable solution by leveraging existing utilities and establishing denser communities that are more walkable. The Milwaukee Climate and Equity Plan also includes targets for improving racial and economic equity by creating green jobs that pay at least \$40,000/year and recruit local people of color. In Wisconsin, people of color represent only 30% of the energy efficiency workforce, while women represent less than 30% of the workforce (E4 Future 2022). These statistics underscore the need to diversify the local clean energy workforce.

Minneapolis, Minnesota has a history of adopting policies that address climate change, starting with the 1993 Minneapolis-Saint Paul Urban CO₂ Project Plan. In 2004, Minneapolis signed the U.S. Conference of Mayors Climate Protection Agreement. In 2023, the city adopted the Climate Equity Plan, which is an updated version of their 2013 Climate Action Plan. In the 2023 Plan, in addition to accelerating decarbonization goals, socioeconomic disparities from prior climate actions are being addressed through the prioritization of investments in “Minneapolis Green Zones”. Green Zones identify communities lacking the benefits of earlier adopted climate plans. The 2023 Plan seeks to equitably engage the entire City’s population, with a focus on Green Zones, in advancing workforce development through specialized education and training for residents to fill green construction jobs.

Illinois’ Climate and Equitable Jobs Act (CEJA) was passed into law in 2021 with several key targets, including broadening cost-saving energy efficiency programs, moving towards building electrification, and expanding economic opportunities for disadvantaged communities and people of color. The main goal of CEJA is to transition Illinois to 100% clean energy by 2050. Community organizations and energy efficiency businesses assisted in drafting the legislation, ensuring their mission and values are incorporated into the core activities of the law.

The State of Missouri has not adopted a climate action plan but is actively participating in programs that address climate change and support local climate action plans. One such effort is the Climate Pollution Reduction Grants (CPRG) program under supervision of the U.S. Environmental Protection Agency (EPA). This competitive grant program, administered by the Missouri Department of Natural Resources, has a plan to distribute grants to local jurisdictions to develop climate action plans.

Given these activities, there is an increasing need to recruit, educate, and train a robust clean energy workforce to facilitate the implementation of advanced building construction methods and practices to equitably achieve ambitious climate and emissions reduction goals.

ENERGY JOB GROWTH AND NEW WORKFORCE CAPACITY NEEDS

There has been significant progress in the growth of clean energy and climate related job opportunities as jurisdictions continue to invest their resources in achieving ambitious climate goals. Energy efficiency supported 2.2 million jobs in 2022, with the sector experiencing growth since 2021 (DOE 2023d). This includes jobs focused on designing, manufacturing, distributing,

² Infill development is the constructing of buildings on vacant lots between existing buildings; buildings may or may not have been previously located on the vacant lot.

and installing energy-efficient products and services throughout the building and construction sector. The federal government has also invested significant resources in the clean energy and climate workforce to meet the nation's climate goals through programs like the Bipartisan Infrastructure Law (BIL) and Inflation Reduction Act (IRA). The IRA is expected to create more than 303,500 jobs each year for new energy project construction and roughly 100,000 permanent jobs each year (Environmental Entrepreneurs 2023). This job creation focuses on diversification of new clean energy and climate jobs that continue to address emerging issues such as decarbonization of the construction industry (BCG 2022).

The energy efficiency workforce encompasses various roles across contracting, manufacturing, wholesale, building analytics, and related industries, involving individuals in the design, sales, and installation of measures to enhance efficiency in homes and businesses. Tasks range from installing insulation, smart lighting, and thermostats to optimizing appliances like HVAC systems, as well as managing energy systems and operating buildings for optimal savings and comfort (MacPherson and Ribeiro 2018). The implementation of advanced technologies and operation of high-performance buildings necessitate workforce skills beyond traditional training, including familiarity with sophisticated technologies, systems integration, and automation. Engineers, operations staff, and installers must adapt to new demands, potentially requiring specialized skills such as computer programming, to effectively manage energy use and ensure occupant comfort (Srivastava, Awojobi, and Amann 2020). Continuous training is essential as technology evolves, with the skill sets required for workforce operation and maintenance of energy efficient and high-performance buildings continually expanding.

GAPS IN THE ENERGY AND CLIMATE WORKFORCE

Enacting climate goals and subsequent workforce development programs to meet the needs of emerging issues across the Midwest is important, but their effective implementation requires infrastructure to realize these goals. With new energy and climate career opportunities continuing to expand, which require knowledge of energy efficiency, building science principles, and advanced building construction, many existing workers will require upskilling through additional training and education on advanced clean energy construction practices.

A 2015 report published by the National Institute of Building Sciences (NIBS) and International Code Council (ICC) illuminates the troubling trajectory of workforce decline among building code professionals, revealing an anticipated 80% retirement rate between 2015 and 2030. This statistic underscores the imminent challenge posed by aging demographics within the profession, necessitating urgent measures to bolster the workforce and ensure continuity in safeguarding the built environment. Additionally, the report identifies key barriers to attracting younger individuals to the field, including limited awareness of career opportunities and misconceptions about the role of code officials. The study underscores the importance of professional development and education in preparing future code officials to meet evolving demands in the built environment, such as energy and climate related competencies. Addressing these challenges requires collaborative efforts among industry stakeholders, educational institutions, and government agencies to implement effective recruitment strategies and provide robust professional development and education opportunities for aspiring code officials (NIBS 2015). In essence, the findings of this report underscore the critical need for proactive measures

to mitigate the impact of workforce decline and sustain the integrity and safety of our built environment for future generations.

According to the U.S Bureau of Labor Statistics (BLS), the United States is experiencing a shortfall in skilled workers in the energy efficiency industry, with the aging workforce retiring and younger generation of workers not transitioning into skilled labor careers. Adding to the shortage of trained workers, according to the BLS “2022-2032 Employment Projections”, skilled job openings are anticipated to increase. As a sampling of this data, mechanical technicians and construction worker job openings are anticipated to increase by approximately 4%. As reported by energy efficiency employers, anticipated job growth was expected to be 1.7% over the previous year, however, the actual growth of energy efficiency jobs was 2.3% -- 45% greater than expected (BLS 2022). These statistics highlight a clear imbalance between job availability and the clean energy workforce established to fill the growing availability of energy efficiency jobs.

On the construction side, the annual U.S Department of Energy (DOE) Energy & Employment Report (2023) concluded that 30% of construction companies find it difficult to recruit efficiency workers (DOE 2023d). And, according to a 2021 homebuilding market overview in the November 9, 2021 edition of *Professional Builder*, home construction primarily slowed down due to a growing shortage of skilled construction workers. The National Association of Home Builders also analyzed data from the BLS report and calculated a shortage of an additional 740,000 construction workers to meet the housing demand between 2022 and 2024, including general, electrical & HVAC laborers, skilled trade laborers, and construction managers and operators. This gap provides an opportunity to train new workers in the construction industry on emerging techniques and technologies that will support more efficient buildings and achieve established climate targets.

Advanced building construction practices require facility managers, operators, engineers, and technicians to possess updated skills and knowledge. Skill deficiencies among these professionals can hinder the ability to fulfill climate goal promises, negatively affecting energy savings, indoor environmental quality, cost-effectiveness, and long-term sustainability (Srivastava, Awojobi, and Amann 2020). The Interstate Renewable Energy Council (IREC) gathered industry experts to determine high priority career paths in the energy efficiency space. The Green Building Career Map is a build out of IREC’s stakeholder engagement, in collaboration with DOE, and identifies the most in-demand jobs in the energy efficiency industry, as captured in *Figure 1*. From this compilation of energy efficiency jobs, trained individuals are required to construct, evaluate, and inspect new energy efficient buildings to meet robust climate targets. To ensure the building industry meets established climate goals, it is imperative to recruit, train, and retain a skilled energy workforce equipped with the knowledge and expertise to implement sustainable and energy-efficient practices.

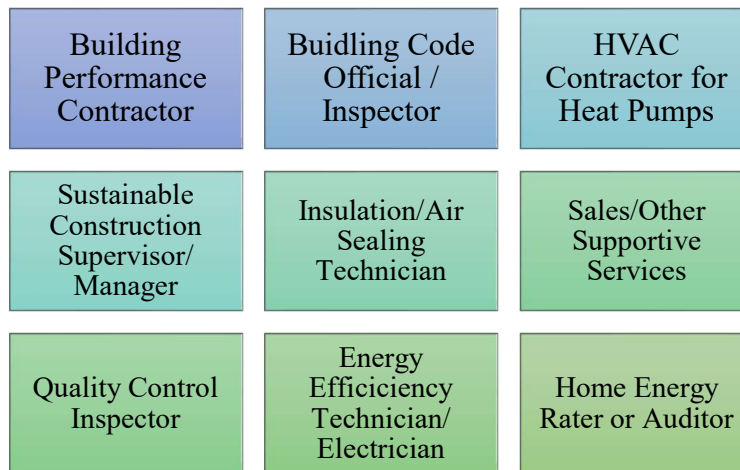


Figure 1. Energy Efficiency Career Paths. *Source:* Green Building Career Map. U.S. DOE Office of Energy Efficiency & Renewable Energy, IREC.

WHY WORKFORCE DEVELOPMENT PROGRAMS ARE IMPORTANT

Workforce development programs provide an avenue to ensure the existence of a present and future skilled workforce. A key component of achieving energy efficient and decarbonized buildings is having a robust building energy workforce, which includes energy code professionals. Regardless of the energy code version or incentive program adopted, energy savings and carbon reductions will not be realized without professional enforcement. As building systems and codes advance to include new and innovative technologies, and achievement of low carbon goals are further integrated into the model codes, the professionals responsible for adoption, implementation, and compliance must have the knowledge and skillset required to enforce them. Establishing a diverse and comprehensive workforce will allow jurisdictions to better prepare for the implementation new technologies and advanced building construction practices.

Prior to establishing a workforce development plan, it is important to analyze the current landscape of the existing workforce, what educational programs are available, and whether they provide the education, certification, or degree necessary to begin a clean energy or climate career in the built environment. With over 25 areas of discipline to choose from in the building code sector, and much of the job requiring expertise on local rules and regulations, it is important to determine the current needs of the jurisdiction and develop a specific plan for outreach and education around those needs. There is also an opportunity to collaborate with neighboring jurisdictions to identify areas of overlap and peer-to-peer education opportunities. It is key to consider the current economic situation of the jurisdiction, the availability of current staff to participate in educational opportunities, and the gaps in education.

It is expected that in the coming years, many current building professionals will be retiring, taking their institutional knowledge with them. While new career disciplines continue to emerge, it is glaringly obvious that investing in the future workforce now is critical to making a seamless transition.

To ensure effective implementation of modern building energy codes, it is imperative to focus on training existing code officials, particularly in states that lack mandatory certification.

Although about two-thirds of states require code official certifications, only 7 states require certification on energy code provisions. DOE residential code compliance field studies have demonstrated that adequate training is key to effective implementation—after training and education in those 7 states, annual energy costs due to varying levels of code compliance decreased by an average of about 45% (DOE 2019). Assessing the current construction practices, establishing compliance and enforcement goals, and accessing intake plan review inspection tools are the first steps to successful compliance and enforcement. Training and credentialing requirements are equally important. The gap between the efficiency levels required in energy codes and those achieved in the field is influenced by the extent of code official training on the energy code.

Several exemplary training program models address the need for expanded building performance skills by providing technical education on energy efficiency, building science principles, and advanced building construction through a combination of in-class instruction, hands-on learning, and practical training (Srivastava, Awojobi, and Amann 2020). These programs employ two main approaches: providing foundational knowledge for industry newcomers and upskilling existing building professionals to fill knowledge gaps and learn new technologies (Srivastava, Awojobi, and Amann 2020). Utilities, labor unions, and other organizations offer continuing education opportunities, while apprenticeships and programs in community colleges and universities focus on developing building performance skills from the ground up, including areas such as data analytics, systems measurement, and verification.

Skills needed to fill energy efficiency jobs can be learned through apprenticeship programs, construction trade association apprenticeships, vocational certificate programs, high school or community colleges, and technical trade school programs. As discussed in the next section, many free or low-cost energy efficiency training programs are available across the Midwest. Professionals can learn new skills or improve existing skills in all disciplines—from air and duct sealing and heat pump installation to remote virtual inspections (RVI). As new technologies are introduced and demand for high-performing and zero-energy buildings increases, building trades need to be ready to meet the demands. Jurisdictions can learn from peers through workshops, case studies, and best practices to advance the knowledge and skillset of the existing and growing clean energy and climate workforce. The following sections will explore national and Midwest-specific workforce development programs and initiatives that are paving the way to implement effective energy efficient and advanced building construction practices to meet the nation’s climate goals.

WORKFORCE PROGRAMS & INITIATIVES

The 2020 U.S. Energy and Employment Report stated that 80-90% of the efficiency employers reported difficulty in hiring workers. Preparing the future workforce for energy efficiency jobs requires recruitment and training. Programs are being implemented at regional and national levels, with more programs actively being developed, to train existing workers and those professionals entering the energy workforce—such as energy auditors, energy inspectors, energy raters, heat pump installers, building officials, and weatherization specialists. States, municipalities, and energy efficiency organizations are participating in these efforts. A few notable and replicable examples are outlined below.

SELECT NATIONAL WORKFORCE PROGRAMS

At the national level, the International Code Council's (ICC) signature Safety 2.0 initiative focuses on the next generation of professionals to advance the workforce and support the growth and implementation of the building safety profession. The Safety 2.0 program consists of various workforce development initiatives including technical training, career path development, and leadership and mentorship. A core component of Safety 2.0, the Technical Training Program (TTP) teaches the International Residential Code® to high school, college, and construction trades program students. TTP provides an opportunity for students to obtain different stackable and transferable Certificates of Completion in five disciplines: building, energy, electrical, mechanical (HVAC), and plumbing. The program is structured to enable technical schools to integrate one or more disciplines of the program into its current construction trade curricula to better prepare students for careers in the construction and energy efficiency fields.

Another national-level program is the EMPOWERED (Empowering the Future Workforce in Renewable Energy, Power Systems Engineering, and Distributed Generation) program, initiated by IREC through a \$2.1 million DOE funding stream, which stands as a pivotal effort in addressing the evolving needs of the energy sector. This program aims to cultivate a skilled and diverse workforce capable of navigating the complexities of renewable energy, power systems engineering, and distributed generation. The program focuses on fostering inclusivity, aiming to increase representation from underrepresented communities in the clean energy workforce.

Partnering with educational institutions, industry stakeholders, and workforce development organizations allows this program to provide academic knowledge, technical expertise, and practical skills required to work in renewable energy. A key component of the EMPOWERED program's outputs aimed at advancing the energy workforce was the establishment of the Clean Energy Clearinghouse (Clearinghouse), offering free educational resources related to solar, energy storage, high-performance buildings, electric vehicle (EV) charging equipment, and permitting and inspection. This online platform serves as a centralized hub for resources, best practices, and collaborative opportunities within the clean energy sector. The platform also encourages collaboration among industry experts, educators, policymakers, and students, facilitating the sharing of innovative ideas and solutions to address the evolving challenges facing the energy workforce. Through the Clearinghouse, EMPOWERED provides continuous learning, skills development, and professional growth within the clean energy sector.

SELECT MIDWEST CITY, STATE & REGIONAL WORKFORCE PROGRAMS

At the local level, the City of Milwaukee's 2023 climate action plan incorporated the Green Jobs Accelerator Program. Originally established as a partnership with DOE in 2020, the program was designed to build interest and awareness, streamline workforce pathways, and improve skills for Milwaukeeans interested in careers in energy efficiency. With federal funding allocated to train and educate contractors on energy efficiency and building electrification, Milwaukee plans to leverage the funding to rollout the Accelerator Program. The program is to be led by the City of Milwaukee and the Milwaukee County Workforce Development Board, in partnership with Milwaukee Public Schools and other private organizations. The focus areas for

training that were determined necessary to fill existing workforce gaps include electricians, plumbers, heating-air-conditioning-and-refrigeration mechanics, and insulation workers.

The 2023 Minneapolis Climate Equity Plan is supported by the Minneapolis Employment and Training (MET) office within the Community Planning and Economic Development (CPED) Department. MET assists residents obtain and retain clean energy jobs. In addition, the City of Minneapolis manages a Green Careers Exploration program, which is a public-private partnership designed to help K-12 students and young adults of color prepare for green energy and environmental jobs. The program provides STEM and environmental education, allows participants to earn certificates of education, and assists with green job placements. Since 2020, over 1,000 students and young professionals have engaged with the program.

The State of Illinois' work through CEJA highlights the importance of embedding workforce development strategies into climate goals. The Clean Jobs Workforce Network Program (Workforce Hubs) is currently setting up thirteen hubs across the State of Illinois. These Workforce Hubs offer training, certification preparation, and skills development for entry-level jobs in various clean energy related industries, including energy efficiency. The Pre-Apprenticeship Program establishes up to three regional hubs serving the Chicago metropolitan area, Northern/Central Illinois, and Southern Illinois. Another component of the Pre-Apprenticeship Program is the Energy Transition Navigator Program, which focuses on outreach, recruitment, and enrollment to grow the clean energy workforce across the state..

The State of Missouri Climate Pollution Reduction Grants program will focus on workforce challenges and opportunities in two initiatives. First, due to feedback from building officials, a Workforce Analysis and Development Strategy is set to start in late summer 2024. Building officials across the state have already indicated that workforce deficits exist amongst building officials, home energy raters, and mechanical contractors, and knowledge gaps exist for heat pump installations. The second initiative under Missouri's Climate Pollution Reduction Grants program will establish technical assistance to support local jurisdictions' climate goals and action plans. The Mid-America Codes Collaborative (MACC), a partnership between the State of Missouri, the State of Kansas, Kansas City, and many state and local organizations, was formed to expand the workforce to design, construct, test, and inspect energy efficient buildings. The project will collect data on workforce growth to assess the program's effectiveness.

The Midwest Air Source Heat Pump Collaborative, led by non-profit energy efficiency organizations, was formed in 2022 to accelerate air source heat pump adoption and implementation across the Midwest. Workforce development is a core pillar of the collaborative, providing the industry with relevant education on best practices and training on key competencies to ensure effective air source heat pump implementation throughout the region. Workforce-related resources, like local government toolkits, are provided to relevant stakeholders such as local jurisdictions, contractors, and building owners, ensuring further expansion of the technology's effective use.

EQUITY WITHIN THE FRAMEWORK OF WORKFORCE PROGRAMS

As energy efficiency training programs are developed in response to climate action plans, proactive engagement with underrepresented communities is necessary to ensure equity across the building and construction sector. Residents of historically underserved communities may not be aware of training opportunities due to passive communication approaches. There may also be

a lack of trust in free training and education from corporate and government leaders. To ensure intentional inclusion and successful participation of underrepresented communities, it is essential for workforce program developers and implementers to work directly with community groups, local trade associations, religious institutions, and other community organizations that have already established relationships and partnerships with these identified populations. The following are examples of equity components of the highlighted workforce programs described above.

Milwaukee's workforce program has established processes to track employment rates by race, which is used to determine their success in meeting the Justice 40 Initiative goal of 40% employment by people of color. As discussed previously, the program also ensures competent salaries for disadvantaged community members, provides subsidized transitional jobs during training, and promotes Black and Brown business development as a co-benefit of the program. Career guidance, certifications, credentials, and internships are also provided to program participants to establish longevity and security in their new green career.

The City of Minneapolis 2023 Climate Equity Plan includes the formation of an Environmental Justice Task Force, which utilized the 2017 designated Green Zones to inform a citywide climate change vulnerability assessment. The assessment analyzed eight key characteristics of socioeconomic inequity, including housing, jobs, and health outcomes. The Task Force ensures green job training is provided to Green Zone residents, while other MET programs provide services for low-income adults, laid-off workers, and youth. In addition, the Minneapolis Health Department established a green career program to help young students of color prepare for green careers.

The Illinois CEJA workforce program prioritizes participation from communities that historically face economic and environmental inequity. The program seeks to bolster a diverse workforce and help clean energy businesses grow. Illinois CEJA has provided funding for various career development opportunities including: the Craft Apprenticeship program, the Multi-cultural Jobs program, and the Energy Transition Community Grants program that support individuals of color, low-income, and re-entry. CEJA prioritizes disadvantaged businesses, provides training and job placement opportunities for clean energy jobs, and allocates grant funding for community programs. CEJA Workforce Hubs will be built in historically disadvantaged social, economic, and environmental communities. Community-based non-profit organizations with a history of serving low-wage or low-skilled individuals from disadvantaged communities have been installed as Energy Transition Navigators to manage the pre-apprenticeship program. According to CEJA Central Regional Administrator Nate Keener of the Illinois Department of Commerce and Economic Opportunity (DCEO), CEJA's focus on equity is at the heart of its workforce programs (N. Keener, DCEO CEJA Central Regional Administrator, pers. Comm., April 2024). CEJA works to ensure the benefits of this generational shift reach all communities that have suffered from historical disinvestment and environmental injustice.

In Missouri and Kansas, the MACC seeks to partner with CBOs to build up the energy efficient buildings workforce. Once work of the MACC begins, the collaborative will leverage its diverse multistate network of approximately 30 regional, state, and local community partners to build the energy efficiency workforce in the building industry throughout rural and disadvantaged communities across Missouri and Kansas. Each partner has a unique connection

to various underrepresented communities and will work to meet community needs. The MACC will assist individuals identify careers within the construction industry and disseminate community input regarding best practices for engaging new and existing workers. Project partners with expertise in workforce recruitment will then help guide individuals through training and job placement.

The Midwest Air Source Heat Pump Collaborative is fostering an Equitable Partner Collaboration Cycle, which takes an apprenticeship approach to skills development and job placement in the mechanical trades. Workforce development market actors involved in the program include community colleges, technical institutes, trade schools, manufacturers, distributors, trade associations, community-based organizations, non-profits, and contractors. A core mission of the Collaborative is recruitment of women and individuals from historically marginalized groups.

Integrating equity into the development of the energy efficiency workforce is paramount to effectively address climate goals, particularly considering the disproportionate burden that marginalized communities bear from the impacts of climate change. By prioritizing equity, initiatives can ensure that disadvantaged populations have access to training and employment opportunities in the clean energy sector, thereby fostering economic empowerment and resilience in communities most affected by climate change. This approach not only enhances social equity but also strengthens the workforce's capacity to implement sustainable solutions, ultimately contributing to more inclusive and effective strategies for mitigating and adapting to climate change.

WORKFORCE FUNDING ASSISTANCE

A key component to advancing the skilled labor force is how to fund its development. Under the Biden Administration, the passage of the Bipartisan Infrastructure Law (BIL) and Inflation Reduction Act (IRA) marked a historic moment in the United States, ushering in unprecedented funding programs dedicated to the advancement of the energy workforce within the building industry. These legislative initiatives not only signify a substantial financial commitment but also underscore the government's strong determination to bolster the workforce, support sustainable energy practices, and achieve ambitious climate goals established across state, local, and national governments.

BIL includes several programs specifically aimed at advancing workforce development in the energy sector. One such program is the Clean Energy Workforce Training Program, which allocated \$72 million to establish assessment centers at trade schools, community colleges, and union training programs to bolster the development of highly skilled professionals in various facets of the clean energy sector (DOE 2022). This includes funding opportunities aimed to address pressing workforce needs related to renewable energy, energy efficiency, and grid modernization. By investing in training programs tailored to emerging clean energy technologies and practices, the initiative seeks to equip individuals with the expertise necessary to develop sustainable and long-term clean energy careers. Additionally, BIL established the Energy Auditor Program, which allocates \$40 million to train the clean energy workforce, aiming to bolster expertise in renewable energy, energy efficiency, and grid modernization (DOE 2024b). With a focus on expanding access to high-quality training programs, this initiative seeks to equip

individuals with the skills needed to meet climate goals while also transitioning to a clean energy economy.

Additional workforce programs established through BIL include the State-Based Home Energy Efficiency Contractor Training Grants, or Residential Energy Contractors (TREC) program, and Career Skills Training program administered by DOE's Office of State and Community Energy Programs. The TREC program allocates \$200 million to state energy offices for training, testing, and certifying residential energy efficiency and electrification contractors, often in collaboration with nonprofit organizations, to facilitate the adoption of clean energy technologies in homes (DOE 2023c). DOE distributed over \$36 million in formula funding during July 2023 to Midwest states through the TREC program, which allows states to leverage contractors trained under TREC to undertake projects funded by the DOE's Home Energy Rebates Programs.^{3,4} The Career Skills Training program allocates \$10 million to foster nonprofit-led partnerships between industry and labor organizations, enabling students to gain industry-related certifications through concurrent classroom instruction and on-the-job training in energy-efficient building technologies (DOE 2023a). It aims to enhance collaboration between industry and labor, focusing on best practices for career skills training, industry credentialing, and recruiting individuals from disadvantaged communities for careers in the energy sector.

BIL also established the DOE-led program, Resilient and Efficient Codes Implementation (RECI), to award competitive grants for sustained cost-effective implementation of updated energy codes. RECI provides \$225 million—\$45 million annually from 2022 to 2026—to support implementation of updated building energy codes. A major pillar of the program is focused on activities that support energy code workforce development. In July 2023, DOE allocated \$90 million in competitive awards spanning 27 projects in 26 states. Of the awards, five projects covering the Cities of Fort Collins and Denver in Colorado, Kansas, Missouri, Pennsylvania, and Louisiana established workforce development programs and initiatives to advance the effective implementation of building energy codes to support governments' climate and energy goals (DOE 2023b).

IRA also includes targeted measures to address workforce development challenges exacerbated by inflationary pressures. One key program under IRA is the Climate Workforce Investment Program, which provides funding for workforce training and retraining programs in sectors critical to advancing climate and energy objectives. These programs focus on areas such as renewable energy deployment, energy efficiency upgrades, and grid modernization efforts.

At the municipal level, the Milwaukee Climate and Equity Plan was awarded a \$25,000 EPA grant to establish a demand-side financing strategy for the purchase of net-zero, off-site constructed housing. In addition, \$1 million in American Rescue Plan Act (ARPA) funding was allocated to this net-zero, off-site constructed housing project.

OPPORTUNITIES

As previously noted, the shortage of workers in various sectors of the construction industry provides an opportunity to establish a well-trained, skilled workforce who are devoted

³ The TREC [Administrative and Legal Requirements Document](#) (July 2023) includes a breakdown of formula funding allocations by state.

⁴ The Rebates Program offers rebates to eligible residents for energy-saving retrofits and appliance upgrades.

to the delivering energy efficiency and clean energy solutions. Workforce programs, like the programs established through CEJA in Illinois, focus on the different needs of each community. CEJA Central Regional Administrator Nate Keener of the Illinois DCEO highlighted noticeable momentum as new partnerships are formed through these workforce programs. Mr. Keener went on to note that CBOs are an important part of any workforce program that intends to reach underrepresented communities (N. Keener, DCEO CEJA Central Regional Administrator, pers. Comm., April 2024). While many CBOs have a learning curve in joining a large statewide workforce program, by providing services to help build their capacity to participate, many doors are opened for all represented parties.

Developing cross-cutting workforce programs that emphasize collaboration and diverse partnerships is crucial for equitable workforce development in the building energy sector. These initiatives ensure that all stakeholders are included and benefit from the transition to sustainable energy practices.

CONCLUSION

This paper underscores the critical importance of developing a skilled and diverse clean energy workforce in the Midwest to support the region's ambitious climate and greenhouse gas emissions reduction goals. By highlighting various workforce development initiatives, this paper illustrates the importance that a commitment to innovation, equity, and inclusivity has in shaping a sustainable future. Addressing challenges such as the shortage of skilled labor and trained building officials is essential for successfully implementing clean energy building practices and achieving climate targets. Working together to equitably enhance the workforce for the greater good to address climate change will also uplift economies in the affected communities. As policymakers, industry leaders, and educators continue to collaborate and invest in workforce training and education, these efforts will play a pivotal role in realizing the full potential of clean energy technologies and advancing environmental and social sustainability in the heartland of America.

REFERENCES

- BCG (Boston Consulting Group). 2022. "Potential for US Competitiveness in Emerging Clean Technologies" (revised October 2022). <https://thirdway.imgix.net/pdfs/override/Potential-for-US-Competitiveness-in-Emerging-Clean-Technologies.pdf>.
- Center for Climate and Energy Solutions. 2023. "U.S. State Climate Action Plans." November. <https://www.c2es.org/document/climate-action-plans/>.
- City of Milwaukee Environmental Collaboration Office. 2023. "Milwaukee Climate and Equity Plan (File #221233)." June 23. <https://city.milwaukee.gov/climate/ClimatePlan#:~:text=The%20Milwaukee%20Climate%20and%20Equity%20Plan%20is%20the%20result,2030%20and%20achieve%20net%20zero%20emissions%20by%202050>.
- City of Minneapolis, Minnesota. 2023a. "2023 Climate Equity Plan." https://www2.minneapolismn.gov/media/content-assets/www2-documents/government/MPLS-CEP_Report-2023-Digital.pdf.

- City of Minneapolis, Minnesota. 2023b. “Minneapolis Employment and Training”.
<https://www2.minneapolismn.gov/government/departments/cped/economic-development/minneapolis-employment-training/>
- City of Minneapolis, Minnesota. 2023c. “Green Careers Exploration”.
<https://www.minneapolismn.gov/government/programs-initiatives/environmental-programs/green-careers/>
- DOE (Department of Energy). 2019. “Single-family Residential Field Study: Phase III Data and Findings.” Building Technologies Office.
https://www.energycodes.gov/sites/default/files/2019-09/NECC19_D2S1_Williams.pdf
- DOE (Department of Energy). 2020. “U.S. Energy and Employment Report 2020 (USEER).”
<https://www.usenergyjobs.org/>
- DOE (Department of Energy). 2022. “New Clean Energy Workforce Training Funding Available.” Office of State and Community Energy Programs.
<https://www.energy.gov/eere/iedo/articles/new-clean-energy-workforce-training-funding-available>.
- DOE (Department of Energy). 2023a. “About the Career Skills Training Program.” Office of State and Community Energy Programs. https://www.energy.gov/sites/default/files/2023-08/career-skills-training-fact-sheet_082023.pdf.
- DOE (Department of Energy). 2023b. “Meet BTO’s Newest Projects to Support More Resilient and Efficient Building Codes.” Building Technologies Office.
<https://www.energy.gov/eere/buildings/articles/meet-btos-newest-projects-support-more-resilient-and-efficient-building>.
- DOE (Department of Energy). 2023c. “State-Based Home Energy Efficiency Contractor Training Grants.” Office of State and Community Energy Programs.
<https://www.energy.gov/scep/state-based-home-energy-efficiency-contractor-training-grants>.
- DOE (Department of Energy). 2023d. “United States Energy and Employment Report 2023”. U.S. Department of Energy, www.energy.gov/policy/us-energy-employment-jobs-report-user.
- DOE (Department of Energy). 2023e. “United States Energy and Employment Report: 2022 County Energy Jobs.”
https://view.officeapps.live.com/op/view.aspx?src=https%3A%2F%2Fwww.energy.gov%2Fsites%2Fdefault%2Ffiles%2F2023-08%2F2023%2520USEER%2520County%2520Data_1.xlsx&wdOrigin=BROWSELINK.
- DOE (Department of Energy). 2024a. “Decarbonizing the U.S. Economy by 20250: A National Blueprint for the Buildings Sector.” <https://www.energy.gov/eere/decarbonizing-us-economy-2050-national-blueprint-buildings-sector>.
- DOE (Department of Energy). 2024b. “Energy Auditor Training Grant Program.” Office of State and Community Energy Programs.
<https://www.energy.gov/scep/energy-auditor-training-grant-program>.
- E4 The Future. 2022. “Energy Efficiency Jobs in America.” December.
https://e4thefuture.org/wp-content/uploads/2022/12/EE-Jobs-in-America_All-States_2022.pdf.
- Elemental Green, Zero Energy Project, 2024 “All Cities with Climate Action Plans.”
<https://zeroenergyproject.com/all-cities-with-climate-action-plans/>

- Environmental Entrepreneurs. 2023. “Clean Economy Works: An Economic Impact Analysis of Major Clean Energy Projects Announced In Year One of the Inflation Reduction Act” (October 2023). https://e2.org/wp-content/uploads/2023/10/E2- BW-Clean-Economy-Works-_-Economic-Impact-Report-FINALpdf.pdf.
- EPA (U.S. Environmental Protection Agency). 2021. “Sources of Greenhouse Gas Emissions.” <https://www.epa.gov/ghgemissions/sources-greenhouse-gas-emissions>.
- Illinois Department of Commerce & Economic Opportunity. 2021. “Climate and Equitable Jobs Act (CEJA, P.A. 102-0662).” (Signed into law September 15). <https://dceo.illinois.gov/ceja.html>.
- MacPherson, M. and D. Riberio. 2018. “Through the Local Government Lens: Developing the Energy Efficiency Workforce.” American Council for an Energy-Efficient Economy. <https://www.aceee.org/sites/default/files/publications/researchreports/u1805.pdf>.
- Mason, M. 2014.. “Localized Climate Change: A Glance At The Minneapolis Climate Action Plan.” University of Minnesota Law School, *LawSci Forum*. <https://mjlst.lib.umn.edu/2014/04/22/localized-climate-change-a-glance-at-the-minneapolis-climate-action-plan/>.
- Midwest Air Source Heat Pump Collaborative. 2023. “Equitable Workforce Development in the Midwest.” July 20. <https://www.mwalliance.org/midwest-ashp-collaborative>.
- Missouri Department of Natural Resources. 2023. “Climate Pollution Reduction Grants (CPRG) Program”. <https://dnr.mo.gov/air/what-were-doing/climate-pollution-reduction-grants-cprg-program>.
- NIBS (National Institute of Building Science). 2015. “Raising the Profile, Filling the Gaps: Report from a Town Hall Meeting on the Future of Code Officials.” Washington, D.C. https://www.nibs.org/files/pdfs/NIBS_FutureCodeOfficials_2015.pdf.
- Rosario, I. L. 2021. “How the Skilled Labor Shortage is Slowing New Home Development.” *Professional Builder*, November 9.
- Srivastava, R., M. Awojobi, and J. Amann. 2020. “Training the Workforce for High-Performance Buildings: Enhancing Skills for Operations and Maintenance.” Washington, DC: American Council for an Energy-Efficient Economy. <https://www.probuilder.com/how-skilled-labor-shortage-slowing-new-home-development>
- UNEP (United Nations Environment Programme). 2022. “Global Status Report for Buildings and Construction: Towards a zero-emissions, efficient and resilient buildings and construction sector.” Nairobi.
- (BLS) U.S. Bureau of Labor Statistics. 2022. “Employment Projections: 2022-2032.” <https://data.bls.gov/projections/occupationProj>.
- U.S. Department of Energy Office of Energy Efficiency & Renewable Energy, Interstate Renewable Energy Council. 2024. “Green Buildings Career Map.” <https://greenbuildingscareermap.org/>.