

Through the Local Government Lens: Developing the Energy Efficiency Workforce

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Executive Summary

ACEEE's 2017 *City Energy Efficiency Scorecard* highlights the extent to which local governments across the United States are ramping up their energy efficiency efforts. The success of local efficiency policies and programs is inextricably linked to the availability of a strong, capable workforce to carry out the upgrades needed to achieve energy savings and program goals. While energy efficiency policies can create jobs, the state of the local workforce determines the scale and quality of implementation. Local governments and skills-training providers can work together to ensure that a trained workforce is available to capitalize on efficiency investments.

A trained local energy efficiency workforce simultaneously helps residents realize energy savings and benefit from new jobs. Equitable workforce development programs and targets extend these benefits to underserved community members who traditionally have not reaped energy efficiency's full benefits.

REPORT SCOPE

Energy efficiency workforce development helps individuals by preparing them for employment or career advancement. It also supports employers and industry by identifying and dealing with worker skill gaps. It typically encompasses workforce training, job placement activities, and job access strategies. Workforce development programs, particularly those led at the local level, ensure the existence of a skilled workforce to support local industries.

This study's focus is on the energy efficiency workforce for new and existing public and private buildings. We concentrate on local government actions and initiatives that leverage the activities of state governments, nonprofits, utilities, unions, and other stakeholders. We aim to inform the decisions of local policymakers and advocates who are increasingly prioritizing energy efficiency.

OVERVIEW OF ENERGY EFFICIENCY WORKFORCE

The energy efficiency workforce comprises diverse job types and includes employees in contracting, manufacturing, wholesale, and building analytics. The 2018 *US Energy and Employment Report* found that 2.25 million individuals in the United States work either in part or in full on energy efficiency as of 2017.¹ Most industry employees (about 1.27 million) work in construction, either building energy-efficient structures or installing energy-efficient products. Their work typically relates to traditional heating, ventilation, and air-conditioning (HVAC) technologies and high-efficiency heating and cooling equipment.²

¹ National Association of State Energy Officials and Energy Futures Initiative, *US Energy and Employment Report, May 2018* (Washington, DC: NASEO and EFI, 2018). www.usenergyjobs.org/s/2018-US-Energy-and-Employment-Report-6akj.pdf

² NASEO and EFI 2018 count a job as an energy efficiency job if any amount of time is spent on energy efficiency activities. For example, they count HVAC installers who spend only a fraction of their time installing efficient units as workers in the energy efficiency industry. This is consistent with the Bureau of Labor Statistics methodology for estimating jobs by industry.

Professional and business services is the second-largest portion of the energy efficiency industry, with 449,800 jobs that support the industry through software development, finance, management, and legal services. Manufacturing is another sizeable portion of the industry, with 315,600 jobs. Most of these jobs support the manufacture of ENERGY STAR®-created appliances or projects such as energy-efficient building and lighting services (NASEO and EFI 2018). More than 70% of energy efficiency firms are small businesses with 10 or fewer employees (E2 and E4F 2016).

CHALLENGES

While businesses working in the energy efficiency industry are optimistic about prospects for job growth, the industry also faces challenges. For example, the majority of employers report having at least some difficulty in finding qualified job applicants for open positions. The leading reasons for hiring issues are insufficient qualifications, certifications, and education, as well as a lack of experience, training, or technical skills.

The process of developing a workforce for energy efficiency projects has its own particular set of challenges.

Creating demand for energy efficiency. Cities need to spur demand for these jobs through sound energy efficiency policies and programs.

Replacing a retiring workforce. Many energy efficiency businesses will face difficulty finding qualified younger workers to replace experienced retiring building performance professionals including code officials and operations and maintenance staff.

Funding uncertainty. Communities may face funding challenges for energy-efficiency-related trainings and other workforce development efforts. Cities have spent down American Recovery and Reinvestment Act funding for green-jobs training, and workforce investment boards fear that federal Workforce Innovation and Opportunity Act funding will decline.

Coordinating stakeholders. Given the various technologies and services for which workers in the energy efficiency industry are trained, there is no single education or skills path for the industry to pursue. It is also difficult to identify all of the relevant public and private actors and determine the extent to which it makes sense to coordinate efforts with them.

Increasing diversity. White male employees dominate the energy efficiency workforce. Women, who make up 47% of the national workforce, make up only 23% of the energy efficiency workforce; Black and African American workers are also underrepresented.

STAKEHOLDERS

Developing the energy efficiency workforce is a complicated process and involves many stakeholders. To achieve their goals, local governments can collaborate across the public, private, and nonprofit sectors. Among their options are the following:

- Collaborate with *community-based organizations and nonprofits* to identify and design energy efficiency training opportunities that meet the needs of community members, focusing on those from underserved populations
- Work with *community colleges* to identify skill needs for workers in emerging efficiency initiatives, as well as connect the colleges with local workforce investment boards and chambers of commerce so they can update coursework to reflect local industries’ needs
- Coordinate with *associations that support the energy efficiency industry* to determine local efficiency workforce needs, and use this information to inform city strategies and facilitate relationships among state and national trade association chapters and community colleges
- Promote existing *utility-administered* energy efficiency training opportunities and work with utilities to develop new training programs as needed
- Learn about available *union-led* training programs and work with unions to determine energy efficiency workforce needs and inform city strategies
- Work with *state government* to promote and coordinate with state-led building energy code compliance trainings, energy efficiency incentives, and workforce development programs
- Publicize *weatherization provider* training opportunities through one-stop career centers

STRATEGIES

Cities take various approaches to workforce development for energy efficiency. In some cases, green-job goals guide a city’s activities. In such cases, policymakers consider energy efficiency to be an aspect of the green-jobs workforce – that is, they nest energy efficiency workforce development within broader green-jobs efforts. Other cities focus on energy efficiency job creation tied more explicitly to particular local programs, facilitating the training of contractors who retrofit or manage energy use in buildings because those activities align with local policy priorities. Table ES1 categorizes workforce development efforts.

Table ES1. Local workforce development activities by category

Category	Activity
Workforce development goals	Align energy efficiency and workforce development goal-setting efforts
Training programs	Offer workforce development programs alongside energy efficiency policies
	Sponsor, promote, and/or facilitate third-party training opportunities
Job access strategies	Enact inclusive procurement and contracting processes for energy efficiency projects
Miscellaneous activities	Support clean energy accelerators and hubs
	Form community partnerships

In addition to these strategies, cities can use a crosscutting strategy to encourage the growth of the energy efficiency workforce – that is, they can encourage a demand for energy efficiency workers by creating efficiency policies and programs.

EXAMPLES

In this report, we highlight several city-led energy efficiency workforce development programs. For example, Boston is actively working with both National Grid and Eversource (the city's gas and electric utilities, respectively) to leverage energy efficiency dollars for energy efficiency training. Utilities will reimburse tuition costs for eligible local government facilities staff for the 74-hour Building Operator Certification training. In New Orleans, the Office of Supplier Diversity is raising awareness of city energy efficiency projects among small and disadvantaged businesses. APTIM (Entergy New Orleans' efficiency program administrator) supports contractor training initiatives in partnership with diverse local organizations. In Los Angeles, the Cleantech Incubator aims to help the city achieve its goal of attracting \$100 million of private-sector investment. The Incubator currently supports more than 30 companies, including some related to energy efficiency.

RECOMMENDATIONS

Local leaders working to create a robust and diverse energy efficiency workforce should take four key steps:

- Engage key stakeholders
- Align training programs with city- or third-party-led efforts to generate demand for energy efficiency
- Include diversity and equity in their strategies by considering the needs of those traditionally not employed in the energy efficiency sector
- Cultivate close partnerships with energy efficiency businesses

The roadmap to an economically and environmentally sustainable future has many viable paths. By investing in the local energy efficiency workforce, cities save energy, reduce pollution, and create and sustain high-quality jobs for their residents. Local governments are in the driver's seat.

Introduction

Local governments across the United States are taking an increasing number of policy steps to prioritize energy efficiency. Findings from the *2017 City Energy Efficiency Scorecard* highlight the extent to which cities have ramped up their efficiency efforts. Over the past two years, eight communities included in the report have adopted policies to make energy use in large buildings more transparent. Columbus, Ohio, for example, has benchmarked over 18.8 million square feet of commercial building space, and Atlanta has benchmarked more than 90% of government building square footage (ACEEE 2017b, 2017a). Municipalities are also codifying targets for energy savings and reductions in greenhouse gas emissions. Some cities, including Los Angeles, New York, and Orlando, require retrofits or retrocommissioning in some of their largest buildings (Ribeiro et al. 2017).

The success of these local policies and programs is inextricably linked to a strong, capable energy efficiency workforce. While energy efficiency policies can create jobs, the available local workforce determines the scale and quality of implementation. For cities to achieve their energy savings and individual program goals, an energy efficiency workforce must exist to carry out upgrades and other efficiency investments. For example, Boston, a city with a robust policy environment for energy efficiency, has a sizeable energy efficiency workforce. In 2015, the Boston metro area's energy efficiency employment was 47,722, which was equivalent to 7% of Boston's population at that time (E2 and E4F 2016; Census Bureau 2016). Local governments and skills-training providers can work together to ensure that a trained workforce is available to capitalize on energy efficiency investments.

A trained local workforce can also help communities retain energy efficiency's economic development benefits, allowing residents to realize energy savings and benefit from new jobs. Furthermore, with equity-focused energy efficiency workforce development programs and targets, cities can extend these benefits to underserved community members who have not traditionally reaped the full benefits of energy efficiency. For example, energy efficiency jobs can be an opportunity to create employment for low-income communities and communities of color. Encouraging local hiring and diversity in the energy efficiency sector can help engage those underserved by efficiency investments and increase equitable outcomes as the clean energy economy grows.

This research is the first step in improving our understanding of how local governments have engaged in activities to encourage the growth of a robust energy efficiency workforce. We provide examples and discuss the role that equity considerations have or could play in each.

Scope and Methodology

DEFINING WORKFORCE DEVELOPMENT

In this report, we define workforce development as a broad approach to helping individuals – including youth; unemployed, underemployed, or low-skilled adults; and members of the incumbent workforce – by preparing them for employment or career advancement. It can also involve supporting employers and industry by working to identify worker skill gaps. Typically, workforce development is a multipronged strategy to increase economic development that encompasses aspects of the following:

- *Workforce training.* Training helps bring new individuals into a job segment or supplements the skill sets of existing workers to fulfill new or unmet market demand in their industry.
- *Job placement.* Placement puts qualified workers into the workforce. Efforts to place workers may include activities such as soft skills training.
- *Job access.* This aspect of workforce development aims to address hiring equity and ensure opportunities for individuals and businesses in all communities, including those where people are struggling to find full-time employment. Activities will typically include targeted programs for workers from low-income households and communities of color (Martín et al. 2013; Martinson, Stanczyk, and Eyster 2010).

Workforce development programs, particularly those led at the local level, ensure the present and future existence of a skilled workforce to support local industries. These workforce development activities can take place across multiple industries or within targeted industry sectors, such as energy efficiency. In the following sections, we describe the types of workforce development activities underway in the energy efficiency sector, the challenges they seek to meet, and the stakeholders involved. As this discussion shows, local governments across the country have taken initial steps to unify energy efficiency and workforce development goals, programs, and interests; however there is considerable opportunity to expand these efforts.

REPORT SCOPE

This study focuses on the energy efficiency workforce for new and existing public and private buildings. Jobs associated with industrial processes or transportation-related energy efficiency (such as planners, transit operators, and efficient vehicle manufacturers) are outside the scope of this report. We also limit our analysis to local government workforce development initiatives. Developing the energy efficiency workforce is a complicated process and involves many stakeholders. Although each stakeholder has a vital role to play, our research does not address all stakeholder roles. We focus on local government actions and local government initiatives that leverage the activities of others, including state governments, nonprofits, utilities, and unions.

Our focus on local action aims to inform the decisions of local policymakers and advocates who are increasingly prioritizing energy efficiency. For cities to successfully administer programs and deliver on goals, it is important that policymakers and advocates understand how to encourage the availability of a qualified workforce to deliver energy savings. Furthermore, by taking an active role in energy efficiency workforce development, local governments can use the strategies we discuss to encourage a local, diverse workforce, allowing their communities to keep more of the wealth and economic development benefits.

We found that much of the existing research on energy efficiency workforce development focuses on levers for states, trade or industry-support organizations, utilities, or universities to train and maintain this workforce, and less on the role of local governments (Goldman et al. 2010). We focus on local government actions and initiatives for energy efficiency workforce development. At the same time, many of their strategies also leverage the activities of key partners such as state governments, nonprofits, utilities, and unions.

Finally, while wage is clearly an important determinant of the quality of an energy efficiency job, evaluating wages for jobs across this industry fell outside the scope of this report. The energy efficiency workforce consists of a range of high-, middle-, and low-skill jobs at varying pay levels (Martinson, Stanczyk, and Eyster 2010). Given the variety of job types and wage levels, which likely vary widely across cities, we did not evaluate opportunities for local governments to increase energy efficiency wages.

RESEARCH METHODOLOGY

To review the landscape of local workforce development efforts, we undertook a literature review and interviewed experts and city staff in several communities. The literature revealed little information on best practices in local workforce development strategies for energy efficiency. Most research to date has offered a descriptive look at the energy efficiency workforce's scale and scope, along with job figures for states and some cities. Given this lack of relevant literature, we primarily relied on our interviews to gather information for this research.

We conducted 26 interviews in two phases. We first interviewed a range of stakeholders knowledgeable about local workforce development, workforce development for energy efficiency, or both. We talked with staff from nonprofit organizations, trade associations, unions, community colleges, energy efficiency certification companies, and an energy utility. After completing initial interviews, we began outreach to municipalities interested in sharing their experiences. As part of these conversations, we engaged city staff in Boston, Los Angeles, Milwaukee, New York City, Portland, Sarasota County, and Vancouver, as well as third-party administrators serving Baltimore and New Orleans. We selected these cities based on independent research and recommendations from our initial stakeholder interviews. In this second round we sought to document the extent to which these municipalities had tried to encourage and cultivate the energy efficiency workforce serving their communities.

We did not focus on a particular job type or energy efficiency certification. Rather, we sought to understand how local governments are developing any aspect of the energy efficiency workforce in their communities. We also gauged the extent to which these municipalities' strategies aimed to cultivate a more diverse workforce and draw workers from low-income communities, communities of color, and other populations typically underrepresented in this field to ensure that all residents have an opportunity to benefit from a growing energy efficiency workforce and clean energy economy. After completing discussions, we did follow-up research based on the information that interviewees provided.

The next section offers an overview of the energy efficiency workforce, describing its makeup and scale. The sections that follow identify critical stakeholders for local governments to engage and strategies that cities have pursued to encourage the energy efficiency workforce. The report concludes with final thoughts for city governments.

Energy Efficiency Workforce

SCOPE

The energy efficiency workforce is comprised of diverse job types, with employees in contracting, manufacturing, wholesale, building analytics, and other industries. It includes people who design, sell, and install measures that make our homes and businesses more efficient. Some workers might install insulation, smart lighting, and thermostats, or work to make our appliances and equipment, such as HVAC systems, run better. Others may use energy management systems and operate buildings to maximize energy savings and comfort. The wide range of jobs contributing to energy efficiency can make it challenging to define the efficiency workforce's parameters. The US Department of Energy (DOE) defines energy efficiency employment as "the production or installation of energy efficiency products certified by the Environmental Protection Agency's ENERGY STAR® program or installed pursuant to the ENERGY STAR® program guidelines or supporting services thereof" (DOE 2017b). This definition covers those who produce energy efficiency products and provide services to reduce energy consumption, but only for ENERGY STAR.

Because the energy efficiency workforce includes such an array of job types, it can be challenging to estimate the exact number of employees (Barrett 2017). However recent analyses by BW Research Partnerships attempt to quantify the US energy efficiency workforce. Researchers replicated the Department of Labor's procedure to estimate jobs in other industries in order to estimate jobs in the energy efficiency workforce (NASEO and EFI 2018; E2 and E4F 2016). The 2018 *U.S. Energy and Employment Report* identified 2.25 million individuals working either in part or in full on energy efficiency as of 2017 (NASEO and EFI 2018).³ Figure 1 breaks down these 2.25 million individuals by industry sector.

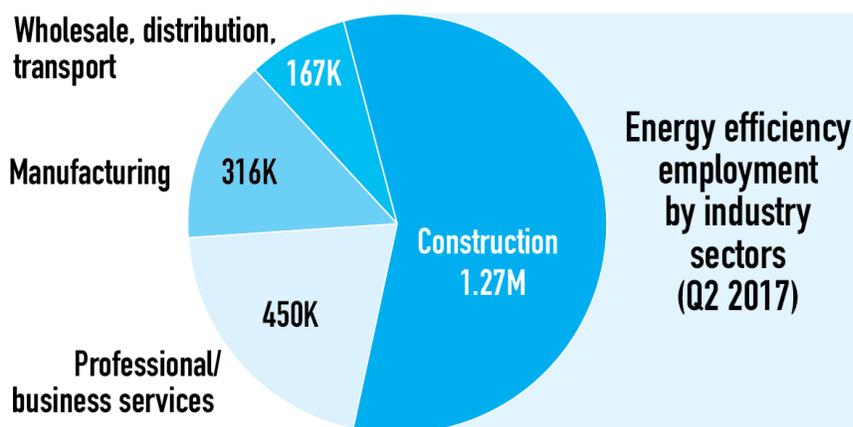


Figure 1. US energy efficiency employment by industry sectors. Source: ACEEE 2018; underlying data from NASEO and EFI 2018.

³ NASEO and EFI 2018 count a job as an energy efficiency job if any amount of time is spent on energy efficiency activities. For example, they count HVAC installers who spend only a fraction of their time installing efficient units as workers in the energy efficiency industry. This is consistent with the Bureau of Labor Statistics methodology for estimating jobs by industry.

Most of the energy efficiency jobs occur in construction, with approximately 1.27 million employees. These employees, which represent about 18% of the 7.1 million construction jobs across the United States, support the construction or installation of energy-efficient technologies.

Professional and business services is the second largest industry sector, with 449,800 jobs that support the energy efficiency industry, primarily through software development, finance, management, and legal services. Manufacturing is next, with 315,600 jobs that support the manufacture of ENERGY STAR-rated appliances or other projects such as energy-efficient building and lighting services (NASEO and EFI 2018).

Table 1 provides a more detailed breakdown of the energy efficiency workforce by technology and industry sector.

Table 1. Energy efficiency technology employment by industry sector

Energy efficiency technology	Construction	Manufacturing	Wholesale trade	Professional services	Other	Total
ENERGY STAR appliances	86,154	16,918	12,046	40,461	4,242	159,821
LED, CFL, and other efficient lighting	182,537	45,489	34,903	86,015	3,169	352,113
Traditional HVAC goods, control systems, and services	313,280	33,547	50,562	145,684	15,503	558,576
ENERGY STAR/high-efficiency heating and cooling equipment	270,263	72,404	25,512	40,774	4,443	413,396
Renewable heating and cooling (including solar thermal)	79,962	7,593	7,305	28,453	766	124,079
Advanced building materials/insulation	201,150	73,314	20,628	53,581	2,246	350,919
Recycled building materials	48,191	11,778	2,678	17,508	2,871	83,026
Reduced water consumption products and appliances	58,303	6,087	5,172	20,151	1,292	91,005
Other	35,134	48,448	8,686	17,172	6,151	115,591
All	1,274,974	315,578	167,492	449,799	40,683	2,248,526

NASEO and EFI 2018 count a job as an energy efficiency job if any amount of time is spent on energy efficiency activities. For example, they count HVAC installers who spend only a fraction of their time installing efficient units as workers in the energy efficiency industry. This is consistent with the Bureau of Labor Statistics methodology for estimating jobs by industry. See Barrett (2017) for further information.

Source: Recreated from table 19 of NASEO and EFI 2018.

The energy efficiency workforce also supports small businesses across the country. In fact, most energy efficiency firms are small businesses; more than 70% report having 10 or fewer employees (E2 and E4F 2016).

DEMOGRAPHIC DIVERSITY

As shown in figure 2, the energy efficiency workforce traditionally has been less diverse in terms of gender and race than the national workforce.

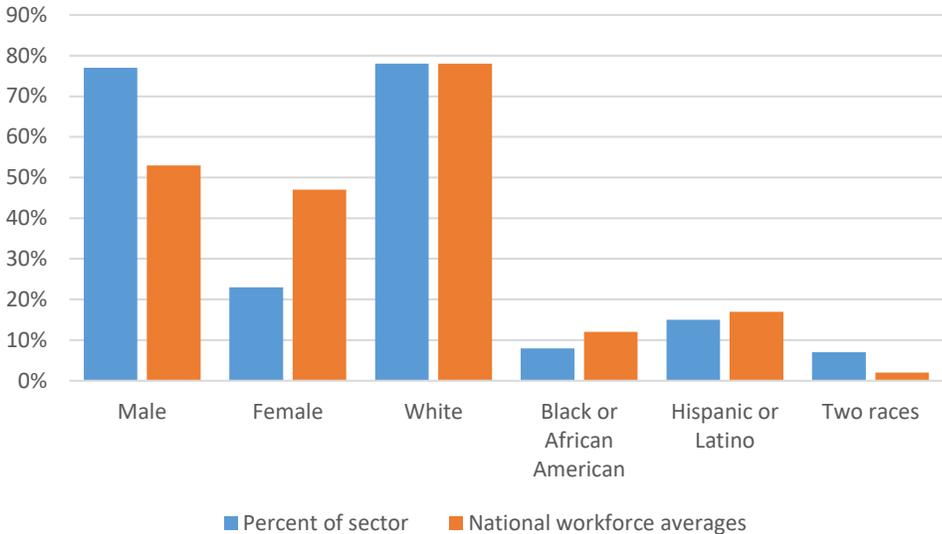


Figure 2. Demographic data for the energy efficiency workforce. Source: NASEO and EFI 2018.

White male employees typically dominate the energy efficiency workforce. Although women make up 47% of the national workforce, they make up just 23% of the energy efficiency workforce. Black and African American workers are also underrepresented, making up 8% of the energy efficiency workforce as compared to 12% of the national workforce. Hispanic and Latino workers are also underrepresented but to a lesser extent (NASEO and EFI 2018).

CHALLENGES

Businesses working in the energy efficiency industry are optimistic about the prospects for job growth. In the most recent energy employment survey, employers across the industry said they expect the energy efficiency workforce to grow by 9% in 2018, with the construction industry projecting a higher growth rate of 11% (NASEO and EFI 2018).

While the industry is poised to grow, it also faces challenges. In terms of hiring, 80% of energy efficiency employers report difficulty in finding qualified job applicants to fill open positions (NASEO and EFI 2018); this was true across all energy efficiency jobs, including construction, manufacturing, wholesale trade, distribution, transport, and professional and business services. The leading reasons for hiring issues are a lack of experience, training, or technical skills. Energy efficiency employers said that technicians, technical support, and installation workers were the most difficult positions to fill (NASEO and EFI 2018).

Finding trained employees may also be a challenge for emerging energy efficiency fields such as smart building technologies. To properly analyze smart building data, individuals need in-depth knowledge of both smart building technologies and buildings operations. This expertise is not yet prevalent in the energy efficiency workforce, which may be one of the largest barriers to leveraging smart building data on a greater scale (Perry 2017).

Replacing a Retiring Workforce

Interviewees in various energy efficiency businesses expressed concern that it will be difficult to find qualified younger workers to replace older retirees, including experienced building performance professionals (T. Carter, executive director, Efficiency First, pers. comm, November 2017; A. Beley, vice president, contractor services, Pearl Certification, pers. comm., January 2018). While expected retirement data for employees across the energy efficiency workforce are sparse, data from parts of that workforce show the magnitude of planned retirements. For example, in 2014, 30% of the building code professional workforce expected to retire within five years and 80%, within 15 years (ICC and NIBS 2014). In New York State, approximately 20% of the building operations and maintenance workforce is scheduled to retire by 2021 (NYSERDA 2017). In the electric and natural gas utility sector, 2015 survey results indicate that 45% of the workforce is expected to retire by 2024; those forecasted retirements have decreased over the past two years, however, as the workforce has gotten younger (CEWD 2016, 2018).

Finally, hiring challenges may be particularly pronounced for small energy efficiency businesses, which typically have fewer resources to invest in a robust recruitment and hiring process.

Increasing Diversity and Local Hiring

As figure 2 shows, white male employees dominate the energy efficiency workforce. Increasing diversity within the energy efficiency industry brings value to workers and communities. Because minority households spend a greater portion of their monthly income on their utility bills on average, they particularly stand to benefit from energy efficiency investments (Drehobl and Ross 2016). Moreover, members of minority communities can serve as trusted messengers who are well equipped to deliver energy efficiency programs to community members. The City of Knoxville, for example, partnered with its utility, a local nonprofit, and other local organizations to hire youth ambassadors from neighborhoods across the city to educate local residents, churches, and businesses on efficiency and enroll them in a retrofit program. The program worked to hire youth ambassadors that reflected the demographics of the neighborhoods they canvassed, yielding greater racial diversity at its consumer energy efficiency workshops (R. Held, community engagement director, SEED, pers. comm., January 2018). As another example, APTIM, on behalf of Entergy New Orleans, has partnered with multiple small, minority, and/or disadvantaged firms to deliver energy efficiency to community members, yielding greater gender and racial diversity in the local energy efficiency marketplace (N. Chokran, project management specialist, APTIM, pers. comm. May 2018).

Workforce diversity not only brings value to the workers – it also corresponds to higher performance for companies. The electric utility industry, for example, benefits from working with diverse suppliers because doing so helps introduce new products and services to the

industry, promote innovation, and showcase a company's commitment to equitable economic growth (EEI 2018). Further, an international survey of large companies found that institutions with more women and ethnically and culturally diverse individuals in leadership positions were more profitable than other companies in their industries. Those with the least-diverse leadership teams were less likely to achieve above-average profitability (Hunt et al. 2018).

Balancing Worker Supply with Energy Efficiency Demand

One of the most prominently mentioned challenges was the need to balance the supply and demand for energy efficiency services. While demand for energy efficiency jobs is projected to grow nationally, this growth may not occur uniformly across the country. Several cities emphasized the importance of not only developing the energy efficiency workforce, but also spurring demand for those jobs through sound energy efficiency policies and programs. These policies can help communities reap the benefits of energy efficiency job creation.

As figure 3 shows, energy efficiency creates jobs and lowers energy costs across many domestic industries. When energy efficiency measures are installed, whether through government incentives or private sector investment, they create a demand for skilled labor. Efficiency projects not only require skilled craftspeople to build and maintain projects, but they also need teams of planners, engineers, and financiers to execute and complete them.⁴

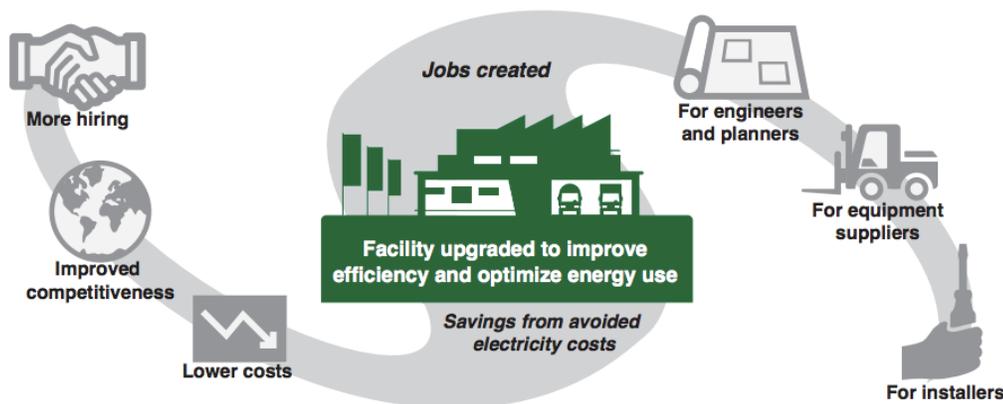


Figure 3. How energy efficiency creates jobs

As an example, staff members in Portland's Bureau of Planning and Sustainability indicated that the city's Home Energy Score Policy helped to encourage demand for residential energy efficiency and signaled to local employers that energy efficiency would remain a cornerstone of local policy (K. Diesner, climate action program coordinator, City of Portland, pers. comm., December 2017). A national survey of the home performance industry, which focuses on retrofitting existing homes, echoed the value of policy signals. Of the more than 1,200 survey respondents, 53% indicated that better direction at the national,

⁴ To learn more, see ACEEE and the North America's Building Trades Unions's fact sheet at aceee.org/sites/default/files/ee-jobs-pollution_1.pdf.

state, and local levels would help address critical challenges or barriers in their businesses (Acadia 2017). Further, in our interviews, representatives from community colleges reported that their institutions hesitate to invest in energy efficiency programs without a clear demand for efficiency jobs. As at other community colleges, their institutions seek to align the training they offer with the needs of local businesses and employers.

Uncertainty of Funding for Energy Efficiency Workforce Development

Another challenge communities may face is the availability of and funding for local energy-related trainings. The American Recovery and Reinvestment Act (ARRA) allocated \$500 million to the Department of Labor for green-jobs training for the energy efficiency and renewable energy industries (Goldman et al. 2010). While communities have already spent their ARRA funding, most workforce investment boards continue to receive some federal funding through the Workforce Innovation and Opportunity Act (WIOA) and other federal programs. However most of these local, quasi-public boards expect a decrease in these funds and are pursuing additional local, state, federal, and private resources (NAWB 2017). Further, while many cities have sustainability offices that offer robust energy efficiency programs and incentives, many cities and counties lack the capacity or resources to act on energy efficiency or sustainability.

Difficulties with Stakeholder Coordination

The energy efficiency workforce includes a wide array of job types – from home energy auditors to energy efficiency financiers (DOE 2017b). Given the variety of technologies and services for which workers in the energy efficiency industry are trained, there is no single education or skills path for the industry to pursue. As a result, the landscape of energy efficiency associations, unions, and industry training providers is wide-ranging and expansive. Moreover, the workforce development strategies employed will depend largely on the intended energy efficiency improvement. At the local level, various agencies independently implement workforce development programs and do not always coordinate these efforts. Furthermore, city sustainability planning processes might not necessarily engage or include local workforce development boards. Identifying all of the relevant public and private actors and determining the extent to which it makes sense to coordinate is a difficult undertaking.

Local governments are well equipped to address diversity in the energy efficiency workforce because they are witnessing firsthand the growth and diversification of city populations. As cities work to save energy and encourage a robust workforce, the most effective workforce development strategies will include all community residents. We now describe some of the strategies and challenges around hiring diverse employees and businesses in the energy efficiency sector, as well as how cities can leverage energy efficiency to improve economic vitality for all residents. Demand for energy efficiency, the resources available to invest in workforce development, and the landscape of industry players all vary widely by locality. Local governments have both a bird’s eye view of these obstacles and the power to overcome them. In the following sections, we discuss how.

Role of Local Governments

City-led energy efficiency, workforce development, and business support programming can come from several different local government agencies. Many cities have sustainability

offices that oversee energy efficiency and clean energy projects and planning. Often, this work includes establishing citywide energy savings, or greenhouse gas reduction goals or administering energy efficiency incentives for community members. City sustainability offices often have dual energy efficiency and economic development priorities. They can help local residents and businesses install and afford energy efficiency improvements by offering incentives or technical support. In parallel, they sometimes work to ensure the readiness of the local energy efficiency workforce by identifying or initiating local training opportunities.

Local, state, and regional workforce development boards also deliver an array of workforce services, although their structure varies widely. These government and nonprofit-administered entities usually focus on connecting employers and prospective hires. They also seek to support industry and employers, for example, through human resource services and recruiting support; some offer customized business services such as business audits or employer training. Most workforce development boards work with multiple industries including the manufacturing and construction sectors, both of which encompass many energy efficiency jobs. For individual workers, boards often coordinate a one-stop career center in partnership with a government entity, for-profit corporation, nonprofit corporation, or local service provider (NAWB 2017). One-stop centers, established through the WIOA, offer job seekers and workers career, support, education, and training services and help businesses find skilled workers and education and training opportunities (DOL 2015)

Local Energy Efficiency Workforce Development Stakeholders

While working to build out their energy efficiency workforce, local governments can simultaneously drive energy savings and economic well-being for local residents. They can do this by facilitating partnerships across the public, private, and nonprofit sectors. From sustainability offices to workforce development boards, municipal agencies have multifaceted relationships and skill sets that present unique energy efficiency workforce development opportunities.

Before diving into these strategies, local governments must understand other stakeholders' distinct workforce development capabilities. Through the lens of a local government, table 2 lists some key stakeholders, distills their contributions to energy efficiency workforce development, and describes how they interact with one another. Some of these stakeholders, such as employers and trade associations, drive demand – that is, job availability – for energy efficiency workers. Others, such as workforce investment boards and community colleges, guide the supply of available workers (White, Dresser, and Rogers 2012).

Table 2. Key workforce development stakeholders for local governments

Stakeholder group	Local government opportunities
Energy utilities	<ul style="list-style-type: none"> Promote existing utility-administered energy efficiency training opportunities and incentive programs Work with utilities to develop training programs as needed
Unions	<ul style="list-style-type: none"> Determine which union-led energy efficiency training programs are available Work with local unions to determine local energy efficiency workforce needs and use findings to inform city strategies
Energy efficiency industry-support organizations	<ul style="list-style-type: none"> Coordinate availability of local energy efficiency workforce to support implementation of existing and upcoming policies and programs Facilitate relationships between state and national trade association chapters and community colleges so they can coordinate around jobs, skill set gaps within the industry, and industry-led teaching opportunities
State government	<ul style="list-style-type: none"> Promote and coordinate with state-led building energy code compliance trainings, energy efficiency incentives, and workforce development programs
Community-based organizations and nonprofits	<ul style="list-style-type: none"> Work with community-based organizations and nonprofits to identify and design energy efficiency training opportunities that meet the needs of community members, particularly from underserved populations
Community colleges	<ul style="list-style-type: none"> Identify skill needs for workers in emerging efficiency initiatives and leverage students' relevant expertise to deliver city-led energy efficiency programs Connect community colleges with local workforce investment boards and chambers of commerce so they can update coursework to reflect local industries' needs
Weatherization providers	<ul style="list-style-type: none"> Publicize weatherization training opportunities through one-stop career centers

While table 2 lays out the universe of key stakeholders, state and local considerations will determine which stakeholders are best suited for partnerships with municipalities. For example, if utilities are not running energy efficiency programs or offering training opportunities, municipalities might not prioritize partnerships with utilities. Further, right-to-work laws might affect the offerings of union training and apprenticeship programs.⁵

ENERGY UTILITIES

Many utilities procure energy efficiency as a resource, using ratepayer dollars to deliver electric and natural gas energy efficiency programs to their customers. In 2016, utilities across the United States invested approximately \$7.6 billion in energy efficiency and saved approximately 25.4 million megawatt-hours (Berg et al. 2017). Utilities will sometimes

⁵ Through right-to-work laws, states determine whether or not employers can require union membership of their employees. In 28 states and Guam, workers are allowed to join unions and employers are prohibited from making membership mandatory. For state-by-state right-to-work laws see: www.ncsl.org/research/labor-and-employment/right-to-work-laws-and-bills.aspx#add.

sponsor training for contractors and other program implementers.⁶ For example, some utilities offer courses to prepare workers for the Building Operator Certification (BOC), as described in the “Strategies” section below. Utilities or their third-party program administrators sometimes train and qualify select contractors, or *trade allies*, to market and deliver their energy efficiency programs. This coordination helps ensure that trade allies meet utility program requirements as they market to customers and install energy efficiency measures. Utilities also sometimes partner with community colleges to provide curriculum, instruction, and employment or internship opportunities (R. Ebbage, director, energy management and water conservation, Lane Community College, pers. comm., November 2017; J. Rich, manager, workforce education and training, Pacific Gas & Electric, pers. comm., November 2017).

Cities can support utility-led energy efficiency training and certification activities or jointly offer such programs. Pacific Gas & Electric, for example, works with city and county sustainability and energy departments in California to train local building energy code officials on compliance with and enforcement of new energy codes (J. Rich, pers. comm., November 2017). As another example, the City of New Orleans and APTIM, Entergy New Orleans’ efficiency program administrator, use energy efficiency education and training programs to drive participation in the city’s Downtown Energy Challenge and Entergy New Orleans’ Energy Smart program (N. Chokran, pers. comm., March 2018). Even if utilities and cities do not partner on programs, local governments can promote utility-led energy efficiency training efforts to residents and businesses.

UNIONS

Unions represent individuals in trades across many industries and use their collective bargaining power to uphold skill and wage standards, working to ensure access to high-quality jobs. Unions often offer competitive apprenticeship programs, sometimes in conjunction with employers and community colleges, to train workers for a particular craft. These programs set workers on a direct career trajectory and provide them with the concrete skills they need to succeed in a specific field.

For example, North America’s Building Trades Unions (NABTU) operates more than 1,600 Joint Apprenticeship Training Committees (JATCs) with construction employers. Through these programs, NABTU trains 74% of all construction apprentices in the United States (DOE 2017a). To generate exposure to each of the trades, NABTU State and Local Building Trades Councils, JATCs, local government agencies, schools, community groups, and construction contractors offer a multicraft core curriculum (MC3) to young or transitioning adults (NABTU 2017). Often these programs will enable workers to “earn and learn” by balancing time in the classroom with time in the field.

⁶ The Center for Energy Workforce Development (CEWD) is a nonprofit consortium of electric, natural gas, and nuclear utilities, utility associations, the International Brotherhood of Electrical Workers (IBEW), and the Utility Workers Union of America, AFL-CIO (UWUA). CEWD works to address workforce shortages in the utility industry; however the extent of its focus on energy efficiency workforce development is unclear. See CEWD’s 2017 *Gaps in the Energy Workforce Pipeline* survey to learn more about changes in the electric utility workforce: www.cewd.org/surveyreport/2017CEWDSurveySummary-FNL.pdf.

Unions often have local chapters that can train members for in-demand local services. The San Francisco Building and Construction Trades Council, for example, offers a pre-apprenticeship training program for local residents in the construction industry. Cities can work with these local union chapters to determine workforce development needs in order to fill any existing gaps.

ENERGY EFFICIENCY INDUSTRY-SUPPORT ORGANIZATIONS

Energy efficiency industry-support organizations represent member businesses and workers. These organizations and associations advocate for federal, state, and local policies that encourage market adoption of energy-efficient technologies and take multiple approaches to training the energy efficiency workforce. Several, like Efficiency First, use state and city-based chapters to advocate and expand market demand for energy efficiency improvements in buildings. Others, like the Association of Energy Engineers and Building Performance Institute, coordinate training and certification programs to reflect industry trends and skill needs.

Some association and organization chapters also offer training programs to correspond with local demand for energy efficiency services and technologies. For example, the Los Angeles US Green Building Council chapter teaches building owners about the city's new residential and commercial benchmarking ordinance. Further, some groups funnel course material, technical support, and job opportunities to teachers and students at community colleges.

The extent of engagement between industry-support organizations and local governments varies widely, but there is opportunity for them to collaborate more closely around the needs of local energy efficiency businesses. Cities can help connect trade associations with local community colleges that have an energy efficiency curriculum so they can coordinate around in-demand job skills and employment opportunities.

STATE GOVERNMENT

Several state government entities lead energy efficiency workforce development trainings, including state energy offices, departments of labor, workforce investment boards, public universities, and quasi-public research institutions. Some state agencies work with state-level energy efficiency trade associations to survey the state's energy efficiency workforce and training providers. Moreover, some states connect universities and clean energy companies with K-12 schools interested in offering clean energy-focused courses to students. For example, the Tennessee Department of Environment and Conservation leads the Tennessee Energy Education Initiative, a collaborative of energy organizations that provide training and educational tools on energy efficiency and other energy topics to students and cities (TDEC 2018).

Other state agencies also support energy efficiency workforce development programming. State departments of community affairs sometimes offer trainings for local code officials in enforcing state-adopted building energy codes. State research and development entities, funded by taxpayer and ratepayer dollars and housed within economic development agencies or public universities, may connect job seekers and employers and coordinate statewide energy efficiency trainings. The Massachusetts Clean Energy Center, for example,

partners with local career training organizations to help low- and moderate-income women enter the clean energy industry (Mass CEC 2018).

Cities could leverage and promote state efficiency incentives and training programs to community members. Where such programs do not exist, city sustainability offices can communicate directly with state energy offices to share success stories and identify unmet needs. Finally, as we describe later in the “Strategies” section, cities can coordinate workforce development programs and policy agendas led by state, regional, or workforce development boards.

COMMUNITY-BASED ORGANIZATIONS AND NONPROFITS

Community-based organizations play a crosscutting, collaborative role in convening individuals and organizations across the public, private, and nonprofit sectors around energy efficiency opportunities. With a distinct and hyper-local understanding of the area’s economy and employment landscape, these organizations connect community members with city- and industry-offered jobs and trainings. These local nonprofits can also help contractors understand how to access public- and private-sector energy efficiency projects.

For example, the nonprofit YouthBuild uses its network of 260 programs, managed by local nonprofits, community colleges, and public agencies in 44 states, to teach low-income young people construction skills by building affordable housing and community assets in their neighborhoods (YouthBuild 2018a). Through its Green Initiative, YouthBuild introduces students to careers in green building design and weatherization and prepares them for industry-recognized credentials (YouthBuild 2018b).

Because many community-based organizations work in low- and moderate-income areas, they can help local governments design and implement energy efficiency workforce development programs inclusive of all community members. Emerald Cities San Francisco, for example, partners with labor, businesses, workforce training organizations, and others to build demand for energy efficiency and other clean energy technologies and support small minority-, woman-, and veteran-owned contractors and disadvantaged workers. YouthBuild, Conservation Corps, and other local workforce organizations coordinate pre-apprenticeship training to women, veterans, and other community members to support placement into energy careers (D. Fairchild, president/chief executive officer, Emerald Cities Collaborative, pers. comm., April 2018).

Cities can work with community-based organizations to identify and design energy efficiency training opportunities that meet the needs of local communities, including those with households facing high energy cost burdens.

COMMUNITY COLLEGES

Many community colleges offer career and technical programs to train the next generation of building performance professionals and other trades that require advanced skills. These colleges coordinate closely with industry to understand local job demand and provide students with the career and technical skills needed to fill those gaps. This often involves preparing students for national certifications, offering training in conjunction with local union chapters, or offering credit for union-led educational efforts. The City University of

New York, for example, offers course credit to participants in a high-performance green building program coordinated by local chapter 94 of the International Union of Operating Engineers (IUOE), a trade union for construction workers (M. Bobker, executive director, Building Performance Lab, pers. comm., January 2018; NYSERDA 2008).

Community colleges also often coordinate with local chambers of commerce or workforce development boards to ensure that course content reflects local industry needs. Some community colleges incorporate energy-efficiency-focused coursework into broad building science and electrical engineering programs or into more focused educational tracks.⁷ Teachers at publicly funded two- and four-year colleges with building energy efficiency programs can coordinate content in partnership with the Building Efficiency for a Sustainable Tomorrow (BEST) Center, supported by Laney College in Oakland, California, and the National Science Foundation (BEST n.d.). To meet the growing demand for trained technicians to operate, maintain, and manage high-performance buildings, BEST provides building technician education programs with model curricula, offers professional development to instructors, and develops career pathways for students and career-changers (BEST 2018).

Community colleges also help connect students with job opportunities, for example, with engineering firms, local government, utilities, and contractors. Some cities partner with community colleges to train students to deliver city-led energy efficiency programs. Los Angeles, for example, is working to develop a benchmarking training and practical application course for students at the Los Angeles Trade Tech College. The course will pair students with local nonprofit building owners who are required to benchmark their energy and water in accordance with the city's Existing Buildings Energy and Water Efficiency program (R. Rasmussen, infrastructure policy analyst, City of Los Angeles, pers. comm., January 2018).

Finally, some community colleges take a career-pathways approach by developing links with nearby K-12 schools and four-year institutions. Through these programs, community colleges create more opportunities for students to enhance their employability through technical certificates, applied degrees, and sharper soft skills (A. Beer, senior policy analyst, Association of Community College Trustees, pers. comm., April 2018).

WEATHERIZATION PROVIDERS

Through the Weatherization Assistance Program (WAP), the DOE provides funding to weatherize low-income households. DOE allocates grants to state agencies, including departments of housing, social services, economic development, and energy. These state agencies deliver weatherization services with community action agencies or other local organizations such as energy-focused nonprofits and local governments. DOE requires all weatherization workers to adhere to Standard Work Specifications that are uniform

⁷ Jobs in the building performance space could include building automation/controls technician; building operator/engineer; commissioning/retro-commissioning agent; energy auditor; energy engineer/manager; facilities manager; HVAC/R installation and service technician; indoor air-quality specialist; lighting systems and controls technician; and measurement and verification specialist (BEST 2017).

nationwide and updated in coordination with industry experts. DOE provides funding to state WAP grantees and their local subgrantees to train and certify workers through local and regional training centers. Local governments can publicize and leverage WAP-funded training opportunities through one-stop career centers.

Strategies for Local Government Workforce Development

Through interviews with local government staff, we learned that cities take various approaches to energy efficiency workforce development. We group these activities into four categories: workforce development goals, training programs, job access strategies, and miscellaneous activities.

In some cases, green-job goals guide city activities. In such cases, policymakers view energy efficiency as an aspect of the green-jobs workforce – that is, they nest energy efficiency workforce development within broader green-jobs efforts. In other cities, energy efficiency job creation is tied more explicitly to particular initiatives that align with local policy priorities, such as programs to train contractors who retrofit buildings or manage energy use in buildings. Job access strategies seek to address equity in hiring and ensure that energy efficiency employment opportunities are available to individuals and businesses throughout communities. Finally, miscellaneous activities are non-program-related strategies that cities use to influence the energy efficiency workforce. Table 3 lists each activity by category.

Table 3. Local workforce development activities

Category	Activity
Workforce development goals	Align energy efficiency and workforce development goal-setting efforts
Training programs	Offer workforce development programs alongside energy efficiency policies
	Sponsor, promote, and/or facilitate third-party training opportunities
Job access strategies	Enact inclusive procurement and contracting processes for energy efficiency projects
Miscellaneous activities	Support clean energy accelerators and hubs
	Form community partnerships

As table 3 shows, cities can focus on different components of workforce development. Those running or facilitating training programs can help bring new individuals into energy efficiency or supplement the skill sets of those already in the industry. Such activities can assist employers experiencing hiring difficulties by helping to develop more qualified workers. Those prioritizing job access strategies, including inclusive procurement and equity standards, can ensure that the workforce is robust by encouraging diversity and local hiring. Our research did not identify many local government initiatives aimed at job placement.

Although not mentioned in table 3, there is a crosscutting strategy cities can use to support growth in the energy efficiency workforce: they can encourage demand for these workers by enacting energy efficiency policies and programs. As we discussed earlier, several

interviewees addressed the need to balance the supply and demand for energy efficiency services by developing energy efficiency programs or otherwise promoting energy efficiency services. Each strategy discussed here will be most successful when paired with efforts to generate demand for energy efficiency services.

Our goal is to present, rather than prioritize, workforce development strategies. Local governments interested in pursuing workforce development will need to select activities most appropriate to their local context, based on local priorities, resource availability, and other considerations. Finally, the following list is not exhaustive, as it was informed mostly by our interviews. Other approaches and strategies likely exist in other local jurisdictions.

We now discuss each of the strategies summarized in table 3.

ALIGN ENERGY EFFICIENCY AND WORKFORCE DEVELOPMENT GOAL-SETTING EFFORTS

Many cities use community-wide sustainability or climate action plans to address long-term local priorities such as energy and water use and transportation planning. Through these plans, cities will often set a vision for policies and programs that address energy use across the community (Ribeiro et al. 2017). Philadelphia, for example, outlines energy and climate goals in its Greenworks plan and reports on these goals annually (Philadelphia 2016). Similarly, many workforce development boards develop local workforce development plans. Through the WIOA, the US Department of Labor requires local workforce development boards to develop a four-year action plan that describes their program plans and their alignment with parallel efforts at regional and state levels (DOL 2016). These goals sometimes include specific targets for the number of community members to train. Among the job training targets in Philadelphia, for example, is a goal to help 8,000 job seekers in the public workforce system secure job benefits by 2020 (Philadelphia 2018).

Recognizing the importance of setting long-term goals that support both economic and environmental prosperity, cities sometimes include economic or workforce development goals in their sustainability or climate action plans. Cities often use sustainability plans to articulate their energy efficiency policies and programs, e.g., a building energy benchmarking requirement. Cities can set goals to generate a specific number of energy efficiency or green jobs by a target year, or they can set a priority to support existing local energy efficiency businesses. For example, the City of Los Angeles prioritized energy efficiency workforce development in its sustainability plan by establishing goals to generate green jobs through energy efficiency, water, solar, and transit investments: 20,000 by 2017, 72,500 by 2025, and 150,000 by 2035 (Los Angeles 2015). To set themselves up to most effectively measure progress, cities can establish goals with specific baselines, determine target dates for achieving those goals, and outline a process for regular monitoring.

Whether a city is developing a workforce development plan or a sustainability plan, it is important to conduct an extensive public outreach process. Cities should coordinate closely with industry to get a better understanding of actual workforce needs. This will give companies advance notice of potential upcoming policy changes – such as an update to the building energy code – that might affect their work. As part of the sustainability and climate planning process, cities can examine the existing workforce’s availability to implement these efforts and consider strategies for filling any gaps. Finally, to embed equity in their targets

and the resulting local agency implementation actions, cities can define equity-focused goals and metrics, as well as job standards.

Milwaukee

In 2013, the City of Milwaukee released its first sustainability plan, ReFresh Milwaukee. As the city conducted public outreach, three topics emerged as top priorities: access to jobs, quality educational opportunities, and safer neighborhoods. To ensure that the sustainability plan's goals and strategies support these priorities, the city describes how actions across eight main themes, including buildings and energy, create jobs, increase access to education, and make the city safer. As a result, ReFresh Milwaukee also includes a goal to grow its cluster of energy-efficient and clean tech companies to create local jobs and clean energy exports.

The plan highlights the growing and untapped potential for energy efficiency improvements in Milwaukee's aging building stock and the need for local, qualified labor to meet this demand. To work toward this target, Milwaukee's Environmental Collaboration Office supported a cluster of energy, power, and control companies called the Smart Energy Hub, which includes plans for a new Energy Innovation Center to connect prospective workers with the clean tech industry (Milwaukee 2013).

OFFER WORKFORCE DEVELOPMENT PROGRAMS ALONGSIDE ENERGY EFFICIENCY POLICIES

Many cities have energy efficiency policies, programs, and incentives that help local residents and businesses save money on their utility bills and improve the comfort of their buildings. For example, the Milwaukee Energy Efficiency (Me2) program offers rebates to homeowners for energy efficiency upgrades, including improved insulation, new heating equipment, and efficient lighting. A strong, capable energy efficiency workforce is vital to many local policy efforts.

To ensure that the workforce is available to deliver energy efficiency services, cities can offer energy efficiency training programs and link them to specific energy efficiency initiatives. For example, through the NYC Retrofit Accelerator, the city offers building managers, building superintendents, and operators training on efficient building operation practices. This helps building management staff comply with Local Law 87, which requires them to complete an energy audit and retro-commissioning measures once every 10 years (New York City 2018).

The proliferation of benchmarking and transparency policies may be another opportunity to collaborate on workforce development. These policies call on select building owners to benchmark and disclose building energy use. Benchmarking policies can spur additional investment in energy efficiency improvements and provide post-implementation information about their impact. Because these policies are increasingly common, a growing number of cities have data on the energy use intensity of public, multifamily, and commercial buildings. Local governments can work with community colleges and local union chapters to ensure that adequate benchmarking training exists, especially if requirements call for audits for select buildings.

A benefit of aligning workforce development activities with efficiency programs is that it helps spur both supply and demand for energy efficiency services: the local policy or program channels the demand for energy efficiency products and services, while the workforce development initiative helps ensure a supply of workers to fulfill this need.

Vancouver

In 2016, the City of Vancouver adopted its Zero Emissions Building Plan in consultation with the construction industry, energy utilities, professional associations, academic institutions, and nongovernmental agencies. The plan contains goals to reduce emissions from new buildings 90% by 2025 (from 2007 levels) and achieve zero emissions for all new buildings by 2030. The plan also requires that, by 2018, all new city-owned and Vancouver Affordable Housing Agency projects be certified by the Passive House standard or an alternative zero-emission building standard.

Vancouver then launched several initiatives to teach builders the skills required to construct energy-efficient buildings. The city plans to subsidize Passive House training for builders and developers. Training on Passive House can be particularly important in the North American market, because Passive House construction is still an emerging practice. Vancouver will also contribute funds to the Zero Emissions Building Centre of Excellence, a nonprofit-operated center that will work to compile and disseminate educational resources to the local building industry to help them design, permit, build, and operate zero-emission buildings in British Columbia (B. Badelt, acting assistant director, City of Vancouver, pers. comm, January 8, 2018) .

SPONSOR, PROMOTE, AND FACILITATE THIRD-PARTY TRAINING OPPORTUNITIES

As the examples above show, cities can directly connect workforce development initiatives to existing or planned locally led energy efficiency programs. Local governments can also leverage third-party training programs and incentives, including energy utilities and state governments. Cities can mobilize and aggregate these existing opportunities to help encourage a more robust energy efficiency workforce. Cities can also consider opportunities to support local skills-training providers and nonprofits already offering energy efficiency training programs, for example, by providing them building space for classrooms.

Partnering with existing energy efficiency certification and training programs can help local governments stretch often-limited taxpayer dollars and leverage external funding. Cities can sponsor and promote training classes associated with various certifications like BOC or facilitate the creation of training initiatives. This option reduces the burden on municipalities to administer and fund workforce development initiatives themselves. For example, as part of New Orleans' Downtown Energy Challenge, the city teaches the principles of high-performance construction to people who build, renovate, and maintain buildings through the Green Professional Operations and Maintenance (GPRO) Essentials course. The city directs this program at individuals from local workforce development organizations such as the Urban League of Louisiana (ULL). The city also targets the staff of Energy Smart, an energy efficiency program led by Entergy New Orleans, teaching them how to train and certify trade allies in the GPRO.

Reviewing third-party training opportunities before developing city-administered programs also ensures that cities do not duplicate existing training efforts. Close coordination between local government staff and third parties allows municipalities to prioritize training on energy efficiency services and technologies that are not already offered by industry, community-based organizations, or other local entities.

Boston

The Renew Boston program is a partnership between the City of Boston and its two energy utilities, Eversource (for electricity) and National Grid (for natural gas). The effort aims to help Boston residents and businesses learn about utility-administered energy efficiency programs and increase participation in them. Through this initiative, the city and its utilities have developed a strong working relationship, which has yielded benefits beyond promoting energy efficiency programs. City staff credit this relationship-building as instrumental in a workforce development effort the city is currently pursuing (A. Jacobs, climate and buildings program manager, City of Boston, pers. comm., January 2018).

Staff in Boston's Department of Environment worked with both Eversource and National Grid to develop a BOC training pilot based on a similar program by National Grid in Rhode Island. Utilities will pay all of the tuition for facilities staff from Boston, Cambridge, and other municipalities in the Greater Boston area for the 74-hour BOC training. This will be the first BOC training offered in Boston in many years due to lack of demand. By working with other municipalities to identify interested staff, Boston and partner municipalities are generating enough demand to support the course. The City of Boston is hosting the training in its own Central Library at Copley Square. If the pilot is successful, the program may be expanded to building engineers working in both the private and public sectors throughout Massachusetts. The city introduced this pilot to the Director of Green Communities Division in the Massachusetts Department of Energy Resources; that division is now developing three other potential BOC training programs for local government facilities staff on Cape Cod and in central and western Massachusetts.

IMPLEMENT INCLUSIVE PROCUREMENT AND CONTRACTING POLICIES

The local government procurement process – which is used for publicly funded construction and infrastructure projects in and beyond energy efficiency – is designed to increase business access to government contracts. Many local governments work to improve the energy efficiency of public buildings to save energy and reduce operating costs. To drive these savings, they often adopt energy efficiency procurement and construction policies (Ribeiro et al. 2017). They may then undertake a public procurement process to select the contractors and suppliers best suited to install energy efficiency measures such as upgrading to LED lights or high-efficiency appliances.⁸ In addition to their work on public

⁸ While this strategy focuses on the diversity of the contractors who deliver local government-funded energy efficiency projects, city sustainability offices can also apply an equity lens to their internal hiring practices. To learn more about strategies for increasing equity, diversity, and inclusion for city sustainability staff, visit this Urban Sustainability Directors Network's resource: www.usdn.org/uploads/cms/documents/usdn-equity-in-recruitment_hiring_retention.pdf.

buildings, cities may also fund, administer, and contract for energy efficiency projects in local homes and businesses.

Research has found that minority contracting firms sometimes have difficulty accessing these projects. A survey of minority contractor hiring in state and local government revealed strong disparities in the value of contracts awarded to minority and women business enterprises (MWBEs) and those awarded to non-MWBEs. The construction industry, which accounts for the highest employment in the energy efficiency economy, has particularly large disparity ratios for African-American-owned businesses (DOC 2016).

Among the most common and difficult barriers to MWBE participation in public procurement processes is a government tendency to work with familiar, established companies, as well as MWBEs' lack of awareness about specific project opportunities (DOC 2016). Many MWBE firms are also small business enterprises (SBEs), and these smaller firms employ the majority of energy efficiency workers (E2 and E4F 2016). Because such a wide array of local government agencies is involved in procurement processes, small or less experienced contracting firms can find it difficult to navigate local government infrastructure projects (Lohrentz 2014).

Although states and utilities can enact inclusive procurement policies for energy efficiency programs (Fairchild and Rose 2018), cities have been taking the lead on these efforts. A survey of 40 US cities and counties found that nearly 90% have procurement programs to increase business development and employment opportunities for MWBEs, SBEs, or both (Lohrentz 2014). Cities have several options for making energy efficiency procurement and contracting processes accessible to disadvantaged firms. They can establish equity and worker standards, develop local procurement policies, streamline compliance processes, track disparities, and offer energy efficiency information and training.

Cities can set standards around the quality and diversity of workers they employ for energy efficiency projects in public buildings and for city-funded and/or administered residential and commercial energy efficiency incentives. To do so, many cities use community workforce agreements (CWAs). A CWA is a binding agreement negotiated between a public or private construction project owner, the local Building Trades Council, and prime contractors for all public and/or private construction projects in the city. Most CWAs contain some (if not all) of the following provisions:

- Goals to hire workers and/or contractors from specific populations or community-based organization trainings
- Job-quality standards
- Support for businesses during the project bidding process
- Estimates for workers needed over a given time period
- Compliance enforcement mechanisms (Lujan, Balisteri, and Soggs 2013)

Cities can also develop local procurement policies like MWBE subcontracting requirements or race-conscious programs that preferentially score bids received by MWBE firms. In addition, cities can run SBE-focused programs that focus on businesses in low-income areas

and may include subcontracting requirements, project reserves to which only these firms can apply, and bid preferences (Lohrentz 2014).

However some states prohibit race- and gender-conscious policies by public entities. In these states, cities can address race and gender among contractors without mandating participation (Lohrentz 2015). Local governments can run race-neutral programs that require a minimum number of MWBE bidders or set voluntary MWBE hiring goals (Lohrentz 2014). Seattle, for example, requires prime contractors to make a commitment to hiring a self-determined percentage of MWBE subcontractors (Fairchild and Rose 2018). Cities can also encourage MWBEs to participate by stepping up business development efforts and simplifying agency coordination, compliance, and reporting (Lohrentz 2014; Fairchild and Rose 2018). To align with the goals of municipalities in which they hope to expand, private-sector employers who invest in green construction projects may also set inclusive procurement standards for contractors (Fairchild and Rose 2018).

At a minimum, local procurement programs can track MWBE participation and can conduct disparity studies to document MWBE utilization rates community-wide or in specific local industry such as energy efficiency. They can also provide MWBEs and SBEs construction and energy efficiency businesses information as well as training in green building practices to help them get up to speed on new industry standards (Fairchild and Rose 2018).

NEW ORLEANS

In 2013, the New Orleans City Council passed a goal of having 35% of all publicly funded projects work with companies certified as disadvantaged business enterprises (DBEs). This ordinance also requires that the city create and maintain a publicly available registry of all businesses or individuals certified as DBEs by the city or a city designee (New Orleans 2018). In early 2017, New Orleans kicked off a disparity study to examine the percentage of city contract dollars awarded to minority- and women-owned businesses (MBE/WBEs). In the draft study, released for public comment in early 2018, a consultant for the city found disparities for MBE/WBEs in city utilization, rates of business ownership (particularly for African and Hispanic Americans in the construction industries), access to capital to start and expand businesses, and business failure rates.

The draft study also recommends expanded city support for these firms through the New Orleans' State and Local Disadvantaged Business Enterprise Program.⁹ The study offered recommendations on how the city can increase opportunities for small businesses, including MBE/WBEs, through city contracts and by working with the private sector. Through partnerships with US Green Building Council (Louisiana) and Delgado Community College, the City Office of Supplier Diversity works to train small and disadvantaged businesses on green economy initiatives, including a test preparation class for the Leadership in Energy and Environmental Design exam (New Orleans 2017).

New Orleans' emphasis on the diversity of its energy efficiency providers can also be seen in its local utility's programs. The New Orleans City Council's Energy Smart energy

⁹ noladisparitystudy.com/images/KeenIndependentNOLADisparityStudySummaryReportDraft02282018A.PDF

efficiency program is administered by Entergy New Orleans and provides incentives to residents, businesses, and public entities for reducing energy and demand. APTIM has worked to increase supplier diversity by providing local businesses with the necessary experience to thrive and grow in the energy efficiency sector. To ensure that the Energy Smart program reflects the communities it serves, APTIM built an implementation team with more than 50% minority-owned, women-owned, and/or disadvantaged businesses as delivery partners.

The program also partners with nonprofits that are ineligible for supplier diversity certifications, such as ULL, which works to empower African Americans and other community members to secure economic self-reliance, parity, and civil rights. ULL also partners with Energy Smart to provide targeted workforce development and outreach support. Further, Energy Smart engages with local stakeholders such as The Greater New Orleans Housing Alliance (GNOHA) and the city's Office of Resilience and Sustainability (N. Chokran, pers. comm., March 2018). The program has engaged with GNOHA to help identify ways to extend Energy Smart incentives to affordable housing developers in the region. The program also works collaboratively with the city's Office of Resilience and Sustainability to support their mutual efforts to deliver energy efficiency across Orleans Parish.

PORTLAND, OREGON

The City of Portland leveraged federal Recovery Act Energy Efficiency and Conservation Block Grant funds alongside city dollars and private financing to offer residential loans for energy efficiency improvements. The pilot program, called Clean Energy Works Portland (CEWP), included a goal to reduce energy consumption 10–30% in 500 homes between mid-2009 and late-2010. It was the first efficiency retrofit program in the country to include a CWA (known in Portland as high-road outcomes), to generate quality jobs and maximize long-term economic development from efficiency projects. The CWA required participating contractors to hire 80% of their employees locally, partner with designated training programs, and have 30% of work hours completed by employees of color, women, and low-income residents (ACEEE 2011).

CEWP surpassed its goal of sending at least 20% of total contract dollars to historically disadvantaged or underrepresented people. To increase local contractor capacity, CEWP partnered with a local contractor-improvement organization to provide business support services to historically underutilized construction businesses (Ho and Hays 2011). In 2011, Portland garnered additional funding and tasked Enhabit, a nonprofit, with expanding and implementing the program statewide. Enhabit has carried forward CEWP's high-road standards and continues to target minority- and women-owned contracting firms (T. Miller, chief executive office, Enhabit, pers. comm., December 2017).

SUPPORT CLEAN ENERGY ACCELERATORS AND HUBS

Several communities have planned, launched, or supported the launch of accelerators, incubators, or hubs for clean energy. Although such efforts may have somewhat different aims city to city, the general goal is to help start-ups and entrepreneurs grow their businesses and make a transformative impact in their communities. Clean energy accelerators and hubs aim to focus on outcomes that affect energy use and the environment.

The energy efficiency sector is not the sole focus of any of the clean energy accelerators, incubators, or hubs that we reviewed. These initiatives seek to nurture cleantech industries surrounding cities, including companies focused on renewable energy, recycling, and food recovery. So, while companies that participate in these efforts do not aim to train building contractors for retrofits or building operators for energy management, some accelerators do include energy efficiency companies focused on emerging energy-saving technologies or data analytics.

These initiatives generally aim to achieve wide-scale change in the green-job industry, and we are not aware of any efforts to track their impact on energy efficiency employment. The other workforce development strategies discussed above generally support existing, traditional energy efficiency businesses working on established energy efficiency measures; in contrast, accelerators support newer, more disruptive businesses and technologies. With their focus on new technologies and businesses, it is unclear whether accelerators will primarily impact employment in these emerging business areas or whether they will also support more traditional efficiency jobs.

Los Angeles

The Los Angeles Cleantech Incubator (LACI) supports more than 30 companies by bringing them together with engineers, scientists, and policymakers. It is one route to the city's goal of attracting \$100 million in private-sector investment (Los Angeles 2017). Some of the companies that work at LACI focus on energy efficiency technologies. BK Litec, for example, is developing a new LED lightbulb for outdoor and industrial uses that would make it easier to convert to LED lighting. Chai Energy provides a web-app to help users better understand their energy use, and Current EV Concierge Service is working to simplify the electric and hybrid vehicle purchasing process in the Los Angeles area (LACI 2018). The Los Angeles Department of Water and Power lends building space to the incubator.

Projects similar to LACI exist in several cities. For example, Potential Energy DC aims to assist energy and sustainability-focused start-ups in Washington, DC (PEDC 2018), while Milwaukee has a goal to grow the city's cluster of energy efficiency and cleantech companies through the Midwest Energy Research Consortium (E. Shambarger, environmental sustainability director, City of Milwaukee, pers. comm., December 2017).

FORM COMMUNITY PARTNERSHIPS

Because such a variety of agencies, organizations, and companies work to implement energy efficiency programs and bolster the local economy, cities can convene all involved parties to facilitate collaboration. Many cities have local workforce development boards that administer government-funded employment and training services in partnership with other state and local agencies, nonprofits, employers, and skills-training providers. Ideally, these groups coordinate closely to understand the skill set of the local population, the skill needs of employers, and the landscape of local workforce development programs (Eyster et al. 2016). Local governments can also focus workforce development efforts on specific sectors to increase an industry's competitiveness and expand employment opportunities for low- and middle-income workers (Eyster et al. 2016). For workforce development efforts organized around a specific set of technologies and services, such as building energy

efficiency, workforce development stakeholders can engage with members of the industry they are working to support.

Although many local governments have active workforce development boards, the extent to which these agencies focus on the energy efficiency sector is unclear. Cities can look to this model to cultivate and maintain productive relationships with members of the local energy industry, including state and local energy efficiency trade associations, utilities, and local union chapters. Through these avenues, cities can understand the current skill set of energy efficiency workers, discuss the needs of energy-sector employers, and develop programs that fill any gaps. Cities can also use these working group meetings to discuss how all participants can better engage and serve members of underserved communities.

Knoxville

Through the Knoxville Extreme Energy Makeover program (KEEM), the City of Knoxville and its program partners contracted with Socially Equal Energy Efficient Development (SEED), a local nonprofit, to provide grassroots energy efficiency outreach. Leveraging its Career Readiness Training program, SEED trained young adults on general concepts related to energy efficiency and weatherization, as well as communications skills. SEED then hired some of these students as “youth ambassadors” to provide door-to-door canvassing in targeted neighborhoods to engage residents directly in conversations about energy efficiency. The youth ambassadors helped raise awareness about KEEM programs, while also practicing their career and communication skills. SEED also worked with the students to host neighborhood energy efficiency workshops, with many of them directly teaching attendees energy-saving tips. By hiring young people from the communities targeted for outreach, SEED helped KEEM partners increase workshop participation and attract more diverse attendees. Moreover many attendees followed up by applying for energy retrofits offered through the KEEM program (R. Held, pers. comm., January 2018; SEED 2014). This successful outreach model demonstrated the effectiveness of engaging underserved residents through grassroots outreach, as well as the win-win strategy of providing outreach services to strengthen employment pathways for young adults.

Recommendations

As exemplified by the variety of strategies described throughout this report, local government-led energy efficiency workforce development activities can take many forms. Cities can align energy efficiency and workforce development goal-setting efforts to ensure coordinated and streamlined progress toward environmental and economic priorities. They can offer training programs or support those of local companies and nonprofits to fill skill gaps. They can increase local workers’ access to quality energy efficiency job opportunities and support businesses by providing building space or facilitating introductions across local industries.

While the list of strategies in this report is not all-inclusive, we hope it will provide more cities a launch pad for initiating their own energy efficiency workforce development programs. As local leaders begin laying the foundation for such projects, the following considerations and questions can guide their efforts to create a robust, diverse, and local energy efficiency workforce.

Engage key stakeholders. By working in partnership with stakeholders across the public, private, and nonprofit sectors, local governments can amplify the effect of their workforce development efforts. This report outlines several types of stakeholders that local governments might engage as part of their workforce development activities for energy efficiency. Differences in local context will mean that the optimal stakeholder partnerships may differ from city to city. Building relationships with a core set of partners may be a good first step.

Align training programs with city-, utility- and third-party-led efforts to generate demand for energy efficiency. Understand the landscape of city-, state-, and utility-funded energy efficiency incentives and align training programs around these offerings. For example, in establishing a building energy audit program or energy benchmarking requirement, consider the availability of the local workforce to provide these services. In developing residential energy efficiency incentives, engage the local home performance industry so that it is ready to conduct retrofits, upgrade energy-efficient appliances, or install other key efficiency measures. Leverage citywide energy and sustainability planning processes to align current and future demand and supply-side programming.

Include diversity and equity as part of your strategies by considering the needs of those underrepresented in the energy efficiency sector. A robust energy efficiency workforce is equitable and trains and employs a diverse pool of local residents. Consider how to target low-income community members with city- or industry-led training, for example, through coordination with community-based organizations that work in and understand the needs of these communities. Make procurement processes for energy efficiency improvements in public buildings accessible to minority- and women-owned contracting firms. Look to weatherization providers for their lessons learned in delivering efficiency and job training to underrepresented populations.

Cultivate close partnerships with energy efficiency businesses. Entice contracting firms to participate in city incentive programs by demonstrating how doing so can help their businesses grow. Articulate city equity and quality hiring standards to contracting firms and connect them with community-based organizations and community colleges that can funnel to them the skilled workers they need. Work to understand the needs of these businesses, structure city programs in a way that encourages firms to participate, and streamline compliance processes. Likewise, gather information on the manufacturing of energy-efficient building products and the training needs those companies may have—or even offer. Look to industry for feedback on emerging energy efficiency technologies, such as building automation systems, and the skill sets they need to keep pace with these advancements.

Areas for Future Research

This report is a first step in cataloging local government strategies and increasing the dialogue around local workforce development for energy efficiency. Our research did not find robust data or existing literature on best practices in local workforce development strategies for energy efficiency. The research typically offered a description of the scale and scope of the energy efficiency workforce and job figures for states and some cities. We relied on interviews with city staff to gather information for this study.

As we conducted our interviews and literature review, we also identified numerous questions that fell beyond the scope of this study but would be useful topics for additional research. These include the following:

- Which metrics (e.g., job creation, unemployment rate, economic output) are most accurate and realistic for measuring the success of energy efficiency workforce development programs?
- How might the effectiveness of workforce development strategies vary based on location, local government jurisdiction, city size, and target customer segment?
- What defines a quality energy efficiency job (e.g., livable wages, worker benefits, job longevity)? How can local governments and partner organizations best stimulate quality energy efficiency jobs and make them accessible?
- To what extent are most energy efficiency jobs sustainable, long-term jobs?
- How often does the cost of energy efficiency certification programs prohibit participation, particularly by low-income or disadvantaged individuals?
- To what extent are state-specific energy efficiency certifications transferable across jurisdictions? What role can local governments play in crafting or supporting credentials that align with those promulgated at the federal level or in other states?
- How can cities streamline energy efficiency and renewable energy workforce development programs?
- What skills will emerging energy efficiency and energy management technologies require?

While we do not have answers to these questions, it is clear that the roadmap to an economically and environmentally sustainable future has many viable paths. By investing in the local energy efficiency workforce, cities can save energy, reduce pollution, and sustain high-quality jobs for their residents. Local governments are in the driver's seat and can use their power to make these goals a reality.

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