Assessment of Workforce Development Needs and Opportunities to Advance Energy Efficiency and Building Electrification in New York State

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Assessment of Workforce Development Needs and Opportunities to Advance Energy Efficiency and Building Electrification in New York State

Final Report

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Abstract

This assessment examines workforce development needs and opportunities associated with the continued growth of energy efficiency and building electrification (EE/BE) in New York State and identifies strategies to strengthen the workforce pipeline through 2035. The research combines employment modeling aligned with the 2025 New York State Energy Plan, surveys of 122 EE/BE employers and 394 current workers and job seekers, 44 stakeholder interviews, and statewide inventories and geographic analyses of training programs and workforce-related wraparound services.

The assessment finds that New York State has a substantial workforce development infrastructure, but projected EE/BE growth will create targeted occupational and geographic challenges. The State Energy Plan modeling estimates demand for approximately 23,400 additional EE/BE workers between 2025 and 2035, with concentrated needs in residential building activities and several construction, weatherization, and installation occupations. Workforce constraints are compounded by limited hands-on experience among job candidates, small-contractor capacity constraints, competition for workers from other industries, uneven regional access to training, and gaps in transportation, childcare, and other supportive services. The assessment identifies opportunities to expand experiential learning, target investments toward priority occupations, strengthen coordination among workforce stakeholders, improve access to wraparound services, and tailor workforce strategies to regional labor market conditions.

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Acronyms and Abbreviations

2026–2030 EE/BE Orders	The NYS Public Service Commission's Order Authorizing Non-Low- to Moderate-Income Energy Efficiency and Building Electrification Portfolios for 2026–2030 and Order Authorizing Low- to Moderate-Income Energy Efficiency and Building Electrification Portfolios for 2026–2030
BLS	Bureau of Labor Statistics
BOCES	Board of Cooperative Educational Services
CTE	career and technical education
CUNY	City University of New York
DACs	Disadvantaged Communities
DOL	New York State Department of Labor
DPS	New York State Department of Public Service
EE/BE	Energy Efficiency and Building Electrification
ESD	Empire State Development
ESD Regions	Empire State Development Regions (interchangeable with REDCs)
HVAC	heating, ventilation, and air conditioning
HVAC/R	heating, ventilation, air conditioning, and refrigeration
LQ	location quotient

M/W/DBEs	minority-/women-/disadvantaged-owned business enterprises (i.e., Contractors)
NYCEIR	New York Clean Energy Industry Report
NYPA	New York Power Authority
NYS	New York State
NYSERDA	New York State Energy Research and Development Authority
OJET	Office of Just Energy Transition (at the New York State Department of Labor)
RA	registered apprenticeship
RABA	Regional Assessment and Barriers Analysis
REDC	Regional Economic Development Council (interchangeable with ESD Regions)
SBS	small business services
SOC	Standard Occupational Classification
SUNY	State University of New York
USEER	U.S. Energy and Employment Report

Definitions

Disadvantaged Communities	Includes those individuals who meet the criteria established by the Climate Group under the Climate Leadership and Community Protection Act to identify disadvantaged communities (DACs). The criteria identify individuals based on a geographic component or an income component (New York State [NYS] Climate Justice Working Group n.d.).
Wraparound Support	Includes resources or services that reduce barriers to accessing training and job opportunities, including but not limited to career coaching and counseling, transportation, childcare, mental health services, financial education and assistance, housing support, English language support, and legal services (New York State Energy Research and Development Authority [NYSERDA] n.d.-h).
Empire State Development Regions	Includes ten distinct regions in New York State (ESD n.d.-e).
Priority Populations	Includes: • Veterans • Individuals with disabilities

- Low-income individuals, whose household's total income is below or at 60% of the State Median Income/Area Median Income, whichever is higher in the county of residence, or whose household has been determined eligible for or is receiving assistance through the Home Energy Assistance Program, Temporary Assistance for Needy Families, SNAP, or other human service benefit programs
- Incumbent or dislocated fossil fuel workers
- Justice involved individuals
- 16- to 24-year-olds who are enrolled in or have completed a comprehensive work preparedness training program, such as those offered by BOCES, technical high schools, Conservation Corps, YouthBuild, and AmeriCorps. The training program must include a combination of rigorous clean energy education with hands-on technical training. Eligibility for work preparedness programs under this category shall be considered on a case-by-case basis.
- Individuals experiencing homelessness
- Single parents
  (NYSERDA n.d.-h)

Summary

The New York State Public Service Commission Orders Authorizing Energy Efficiency and Building Electrification Portfolios (EE/BE) for 2026–2030 ordered this Workforce Development Needs Assessment to "assess the workforce training and employment needs and opportunities across New York State's Energy Efficiency and Building Electrification ecosystem" and "inform the development of Energy Efficiency and Building Electrification workforce development strategies in 2026–2030."

To achieve this, the assessment analyzes New York State employment data and forecasts, catalogs existing training assets, and draws on surveys and interviews with hundreds of employers, training organizations, and workers to identify needs across the EE/BE workforce development ecosystem. It also examines practices from other jurisdictions to identify potential strategies and solutions for addressing those needs.

New York State's EE/BE workforce represents a significant share of its clean energy workforce. It includes workers engaged in a range of activities related to the research, manufacturing, sales, installation, repair, and professional services of EE/BE technologies, from heating, ventilation, and air conditioning (HVAC) systems, insulation, and advanced building materials to high-efficiency appliances, lighting systems, and other energy-saving solutions in residential and commercial buildings.

S.1 Summary of Key Findings and Recommendations

The assessment found that New York State has a substantial workforce development infrastructure, though projected EE/BE growth will heighten observed workforce challenges. Many of the barriers between EE/BE employers and job seekers are structural, often intertwining economic, geographic, and societal barriers. While workforce development programming alone cannot fully resolve these barriers, the State *can* continue to work toward alleviating some of these frictions. This will require greater coordination, cooperation, innovation, and braiding of funds across a range of public, private, and community-based organizations. This assessment primarily focuses on the single-family and small multifamily residential sector because workforce challenges are most acute in this sector; however, these challenges and identified solutions are often relevant to the EE/BE industry more broadly. Key findings and recommendations are as follows.

S.2 Current and Forecasted Energy Efficiency and Building Electrification Workforce

The 2025 New York State Energy Plan estimates a need for 23,400 additional EE/BE workers through 2035. While the resulting cumulative growth (17% over ten years) does not exceed historical growth trends (22% growth from 2016–2024), much of the employment growth is forecasted to occur in parts of the EE/BE sector that already face workforce challenges.

- The EE/BE sector can be thought of as two different sectors. The first sector is comprised of large multifamily and commercial buildings, which large contractors typically service with a workforce that is more likely to be unionized. Most existing EE/BE workers (78%) are employed by large firms with ten or more employees, which tend to offer higher wages and stronger benefits to attract and retain workers.

  The second sector consists of single-family homes and some smaller multifamily buildings, which small firms with fewer than ten employees commonly service. This residential sector faces persistent constraints that limit its ability to scale—a particularly significant challenge, given the residential retrofit activities called for in the 2025 New York State Energy Plan.
- Small businesses play a central role in residential EE/BE activities. However, they hire far less frequently, often lack the administrative capacity to engage with training providers or state programs, and have less infrastructure and capacity to train workers on the job than large employers do.
- Macroeconomic factors may also hinder growth in the EE/BE workforce. There is significant projected demand in other industries in New York State, including renewables, nuclear, transmission, transportation, and non-energy-related construction. This creates competition for the same set of workers.
- Although clean energy jobs in New York State typically pay a premium compared to nonclean energy jobs, premiums in EE/BE are often lower than in other clean energy sectors. The pool of available and already-skilled workers to meet new demand is likely to be limited in EE/BE, where comparatively lower wages and benefits may make it more difficult to attract and retain workers relative to other industries. New workforce entrants are more likely to be the typical job seeker considering a career in EE/BE. These new entrants are typically younger workers with little relevant experience and/or individuals with multiple barriers to training and employment, including instability in housing, transportation, childcare, and other critical needs.

- Current job seekers across New York State, who are considered potential EE/BE workers in this assessment, are largely unaware of the EE/BE industry, in name and by the definition provided, as an industry in which they could build a career. Half (48%) of surveyed job seekers stated that they had heard of the EE/BE industry but did not know much about the industry or its job opportunities, and an additional 40% stated they had not heard of the EE/BE industry at all.

S.2.1 Bolster the Energy Efficiency and Building Electrification Workforce Development Ecosystem

New York State already supports several coordinating mechanisms around EE/BE workforce development, including the Department of Labor (DOL), Regional Clean Energy Hubs, industry intermediaries, and training organizations. Still, stakeholders reported that the growing workforce development ecosystem can be difficult to navigate, with some EE/BE workforce efforts fragmented or overlapping.

The following recommendations address how the EE/BE workforce development ecosystem can better address identified engagement barriers to expanding the EE/BE workforce.

- Support and fund workforce development ecosystem facilitators who are dedicated to convening employers and training partners, maintaining and bridging relationships, strengthening information sharing, and supporting system-wide collaboration.
- Increase employer interest and utilization of existing workforce programs and resources by offering services that are most appealing to employers and providing additional programming geared toward small businesses.
- Integrate established good practices around small business engagement, such as support for incumbent-worker upskilling, leadership development for EE/BE contractors, enabling employer participation in convening activities, and having separate convenings for different types of building stock.
- Explore opportunities for common guidance, templates, and tracking mechanisms of workforce funding and program outcomes. This would make it easier for employers, workers, and training providers to access resources and for stakeholders to understand where investments are producing results.
- Continue to support targeted public communications strategies that connect traditional trades to EE/BE, highlight the relationship to broader clean energy opportunities, and make EE/BE jobs more visible, understandable, and attractive to a range of potential workers, including priority worker populations and women.

S.3 Training Assets for the Energy Efficiency and Building Electrification Workforce

This assessment includes a statewide review of nearly 800 training and education programs and almost 300 sites that offer wraparound support services related to workforce development. A companion database is available at www.nyserda.ny.gov/All-Programs/Clean-Energy-Workforce-Development-and-Training/For-Job-Seekers.

- New York State has built a robust EE/BE workforce development ecosystem in support of the State's energy workforce and equity goals, with many engaged stakeholders, significant workforce funding, and expansive programming.
- The supply and demand of EE/BE workers are not distributed evenly across New York State, suggesting a need for tailored regional workforce development strategies.
- A lack of certifications and technology-specific knowledge and skills was not identified by surveyed EE/BE employers among the most significant barriers to hiring. However, relevant hands-on experience applying technical or technology-specific expertise in simulated or real work environments is the greatest reported hiring challenge among all EE/BE employers surveyed for this assessment.

S.3.1 Expand Experiential Learning

Expanding opportunities for experiential learning, typically a component of apprenticeships, on-the-job training, or other opportunities for hands-on experience, is essential for helping EE/BE job seekers to secure employment. Recommendations include:

- Limit new worker training program funding to only those programs that incorporate on-the-job training, work-readiness, and hands-on experience.
- Support registered apprenticeship (RA) infrastructure for EE/BE in line with market demand. RAs are often considered the gold standard for providing valuable on-the-job training experience. Shared apprenticeships or group training schemes, additional support for apprentices to boost completion rates, and administrative support for apprenticeship hosts can all facilitate EE/BE apprenticeship graduates to meet market demand.
- Expand programs that fund mobile equipment purchases, such as mobile training trailers and accompanying equipment, to address geographic training gaps and provide experiential learning in underserved areas at a lower cost than constructing new training facilities.

S.4 Occupational Impacts

- Half (50%) of the growth in projected EE/BE jobs will be concentrated in 13 occupations, nearly all of which are trades, construction, and installation roles. General construction knowledge and abilities are core to the most common EE/BE jobs, though weatherization-specific knowledge and skills remain a relative gap in existing training programs.
- Weatherization occupations face high demand for workers, relative to supply, a trend that will likely continue through 2035.
- Emerging workforce gaps are also expected among plumbers, HVAC workers, carpenters, and construction managers, based on their projected demand, current employment, and historical supply capacity.
- The analysis of anticipated EE/BE workforce demand compared to existing training programs revealed some regional gaps in training, particularly within rural regions.

S.4.1 Key Occupational Investments

Recommendations to assist job seekers in gaining both general construction and weatherization-specific knowledge include:

- Promote interagency collaboration among the New York State Energy Research and Development Authority (NYSERDA), New York State Department of Public Service (DPS), New York State Department of Labor (DOL), Empire State Development (ESD), New York Power Authority (NYPA), and other State agencies to fund general construction workforce programs as a way to support the EE/BE talent pipeline.
- Dedicate workforce funding to the specific training, recruitment, and retention strategies needed for high-demand EE/BE occupations that the research identified as requiring urgent focus or having emerging gaps, including weatherization technicians and insulation workers; plumbers; HVAC workers; carpenters; and construction managers.
- Develop a workforce strategy specific to weatherization jobs. One strategy to address the worker supply challenge in weatherization is to embrace training and job placement systems that treat weatherization jobs as a structured entry point into longer-term EE/BE career pathways.
- Bolster the number of training programs that serve rural areas, particularly for pre-apprenticeship and general construction training.

S.5 Wraparound Services to Reduce Workforce Barriers

Training providers frequently cited poverty as a barrier to participation in the EE/BE industry, and they expect this to continue as macroeconomic factors attract skilled workers to other industries. For EE/BE workforce development, and especially new entrants who face multiple barriers to training and employment, access to wraparound support services is important to address barriers related to transportation, childcare, finances, and language access.

- While workforce barriers and wraparound service needs vary across different regions of the State, there is a consistent shortage of wraparound services for workforce development available in rural areas, with notable disparities in childcare and transportation support.
- Continuing to address job seekers' barriers to employment and recognized wraparound service programming gaps, while closing identified coordination gaps among workforce development stakeholders, is key to growing the EE/BE workforce.

S.5.1 Improving Access to Wraparound Services

EE/BE demand creates new workforce opportunities for job seekers from disadvantaged communities (DACs) and priority populations, but only if workforce programs are equipped to address commonly faced barriers. To improve the connection between EE/BE and wraparound services:

- Maintain and implement regional strategies tailored to local labor market conditions, training capacity, and supportive service needs**.**
- Treat wraparound supports as a core workforce strategy, not a supplemental service. This includes incentivizing training providers to offer wraparound services and/or find additional funds for these supports.

1. Introduction

According to the New York State (NYS) Public Service Commission's Orders Authorizing Energy Efficiency and Building Electrification (EE/BE) Portfolios for 2026–2030 (2026–2030 EE/BE Orders), workforce development is a key component of maximizing energy efficiency and building electrification (EE/BE) implementation (NYS Department of Public Service [DPS] 2025a, 2025b). This includes training new workers and upskilling the existing workforce to advance their careers and take on more complex roles in EE/BE construction activities.

> *"Workforce development is a critical market development function and a linchpin of New York State's ability to scale the adoption of EE/BE solutions and benefit Disadvantaged Communities."—2026–2030 EE/BE Orders*

This EE/BE workforce development assessment responds to direction from the NYS Public Service Commission (the "Commission") in its 2026–2030 EE/BE Orders set on May 15, 2025. The research questions from the 2026–2030 EE/BE Orders addressed in this assessment include:

- Evaluate how well "training curricula and program designs align with contractor needs [to] create a pipeline of trainees that can be hired by EE/BE contractors."
- "Consider existing workforce development offerings in the sector, industry needs, the ability of existing programs to meet future demand, and gaps to be prioritized for NYSERDA Workforce Program investments."
- "Identify needs and opportunities to address workforce development and training challenges for these communities more broadly."
- Explore "regional variation in the availability of training and demand for workers."

This assessment examines New York State's ability to meet the expected demand for EE/BE jobs and details the various barriers to entry for prospective EE/BE workers, especially for those living in disadvantaged communities (DACs). This assessment informs a set of recommendations to strengthen workforce development programming across the New York State workforce system, as well as additional recommendations to support occupation-specific workforce development and ecosystem building. Please see Appendix B for selected case studies and good practices highlighted in the research.

Quantitative data for this assessment were collected from the 2025 State Energy Plan modeling data (New York State Energy Planning Board 2025) and from surveys of EE/BE employers, current EE/BE workers, and job seekers, resulting in 516 total completions. Forty-four interviews were held with training providers, community-based organizations, labor representatives, utilities, and other stakeholders.

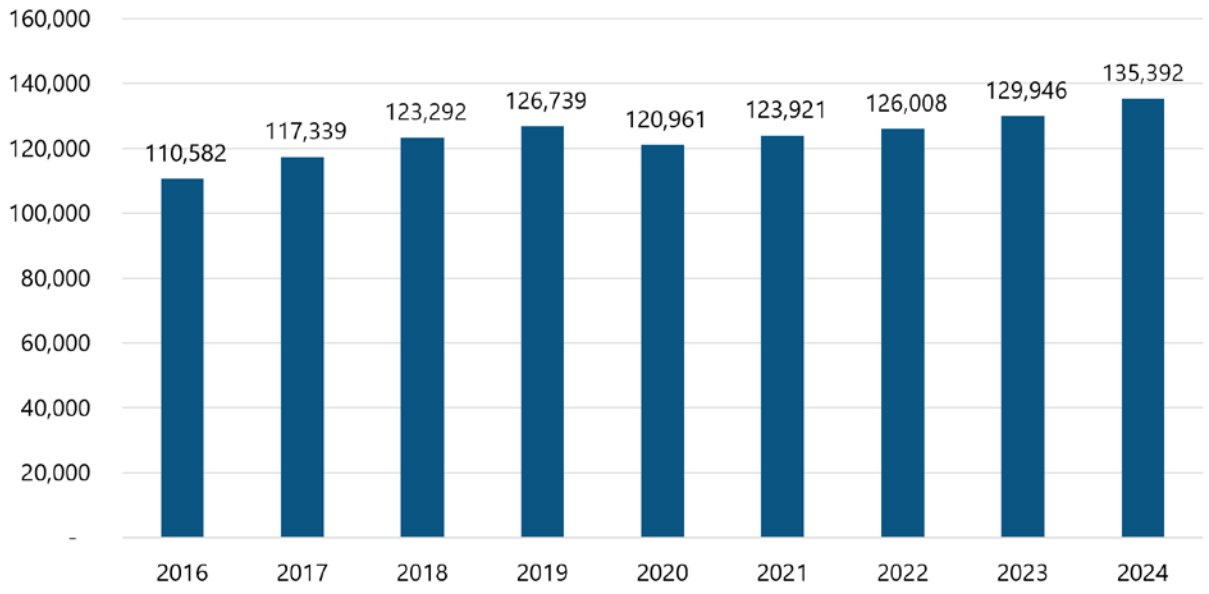
For more information on the research and analysis methodology, please refer to Appendix C: Priority Occupations Gap Analyses and Appendix D: Methodology.

2. Current State of Energy Efficiency and Building Electrification Workforce

New York State's EE/BE sector employed 135,400 workers at the end of 2024, accounting for 73% of the State's clean energy workforce (NYSERDA 2025).[1] Since 2016, the workforce grew by 22%, and from 2023–2024 alone, over 5,400 jobs were added in this sector (Figure 1).

Figure 1. Energy Efficiency and Building Electrification Employment, New York State, 2016–2024

Source: NYSERDA 2025

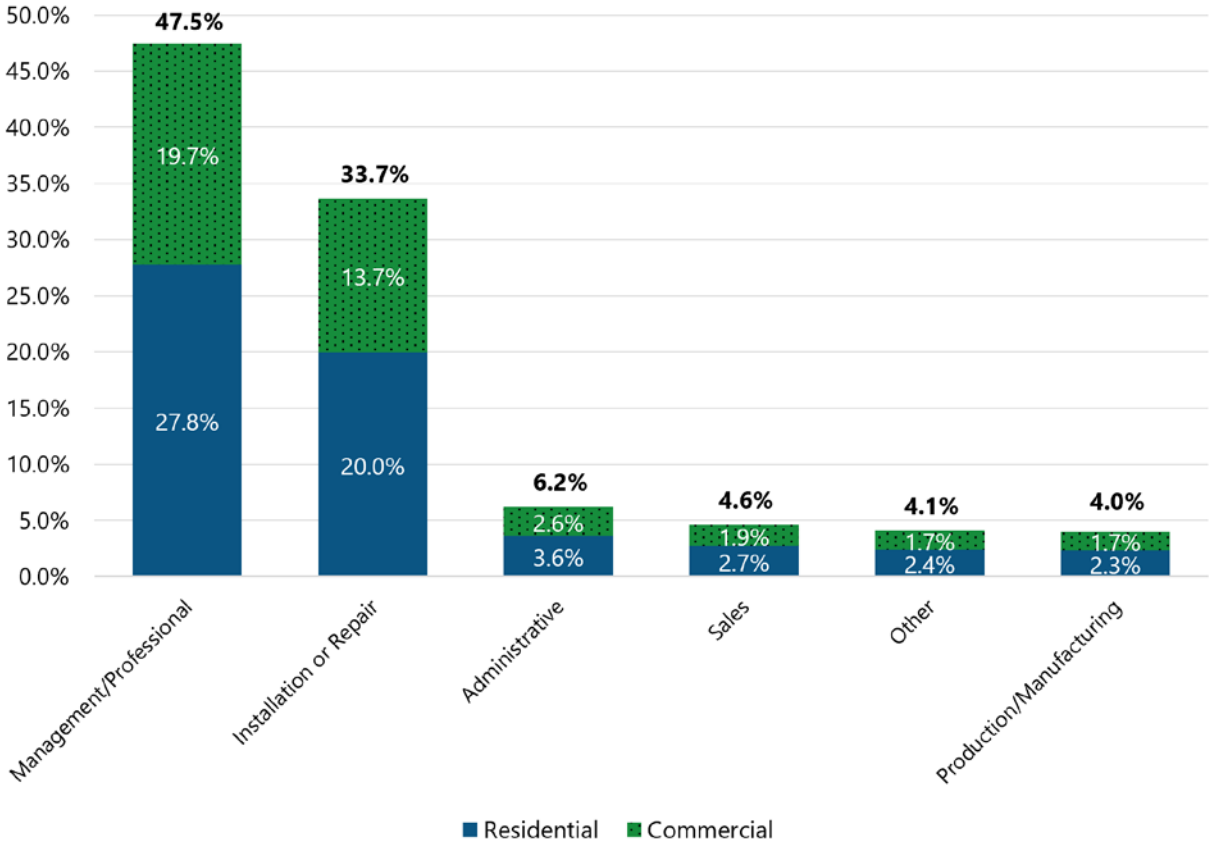


Workers are engaged in a range of activities related to EE/BE, such as research, manufacturing, sales, installation, repair, and professional services. Most are in management or professional[2] and installation or repair[3] roles.

This EE/BE workforce is primarily employed in two market sectors: the residential sector and the commercial sector (Figure 2).[4] The residential market includes properties where people reside, such as single-family detached homes, as well as both small (i.e., low-rise) and large (i.e., high-rise) multifamily buildings housing more than one family.[5] Buildings in which business is conducted are included in the commercial market.[6]

Figure 2. Share of 2025 EE/BE Employment in New York State, by Occupational Group and Market Sector

Source: New York State Energy Planning Board 2025.



This assessment also considers two types of employers in New York State's EE/BE industry:

1. **Small Businesses—**Small businesses with fewer than ten employees that most commonly work in the residential sector, primarily single-family and small multifamily residential buildings.
2. **Large Businesses—**Large businesses with at least ten employees that more frequently work in the commercial sector or in large multifamily buildings.

Four in five (78%) of all businesses surveyed are small businesses that employ fewer than ten workers (Figure 3),[7] and the majority (60%) have between one and four employees.[8] Roughly six in ten (59%) of firms with fewer than ten employees stated that single-family residential buildings were their primary sector, compared to 41% of businesses with 25 or more employees and 26% of those with 50 or more employees. Larger businesses tend to be more prominent in the commercial sector (Figure 4).[9]

"The system is very fragmented, which makes it harder to learn about smaller and medium-sized contractors and connect with them."

—Regional Clean Energy Hub representative

Figure 3. "How many permanent employees (including all full-time and part-time employees) work at or from your current office location or facility?"

Source: Surveyed EE/BE firms.

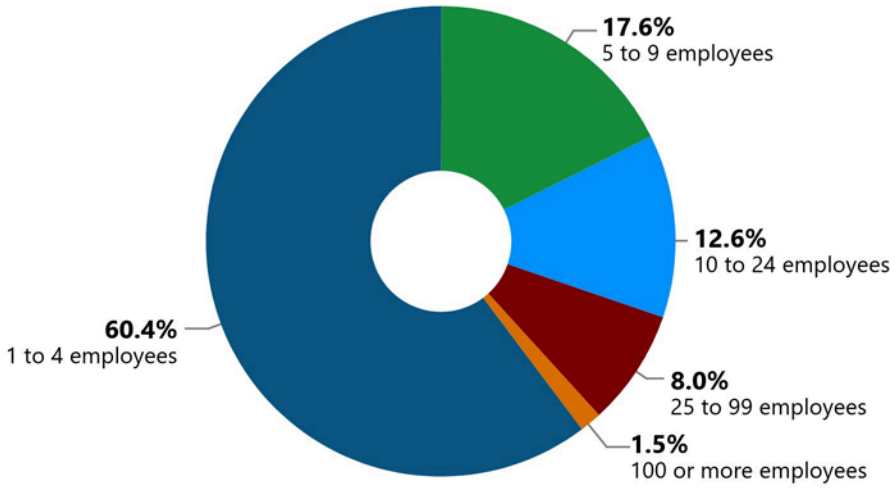
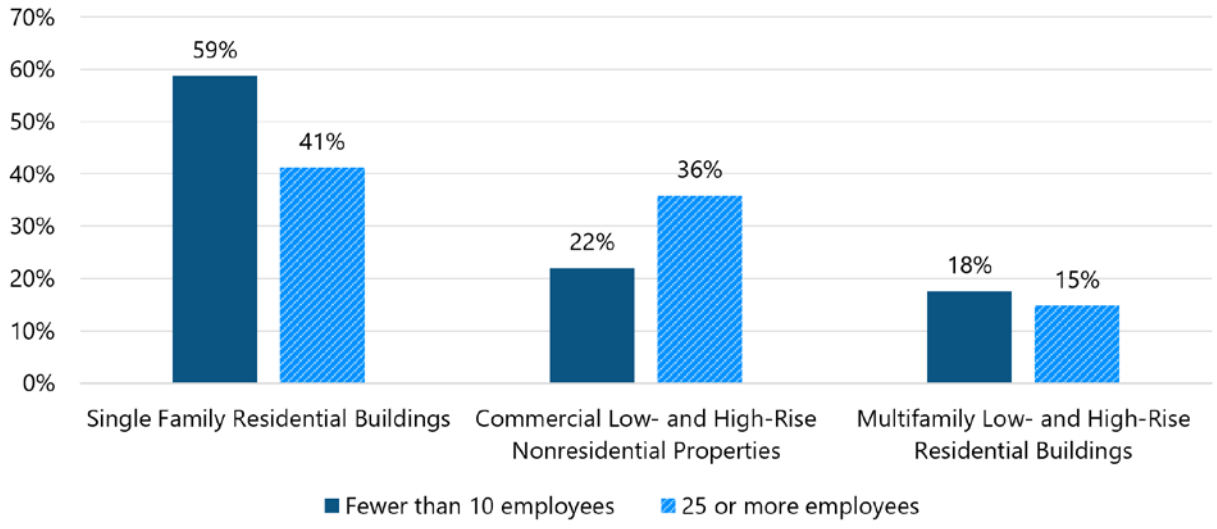


Figure 4. "Which types of buildings does your firm primarily work on?"

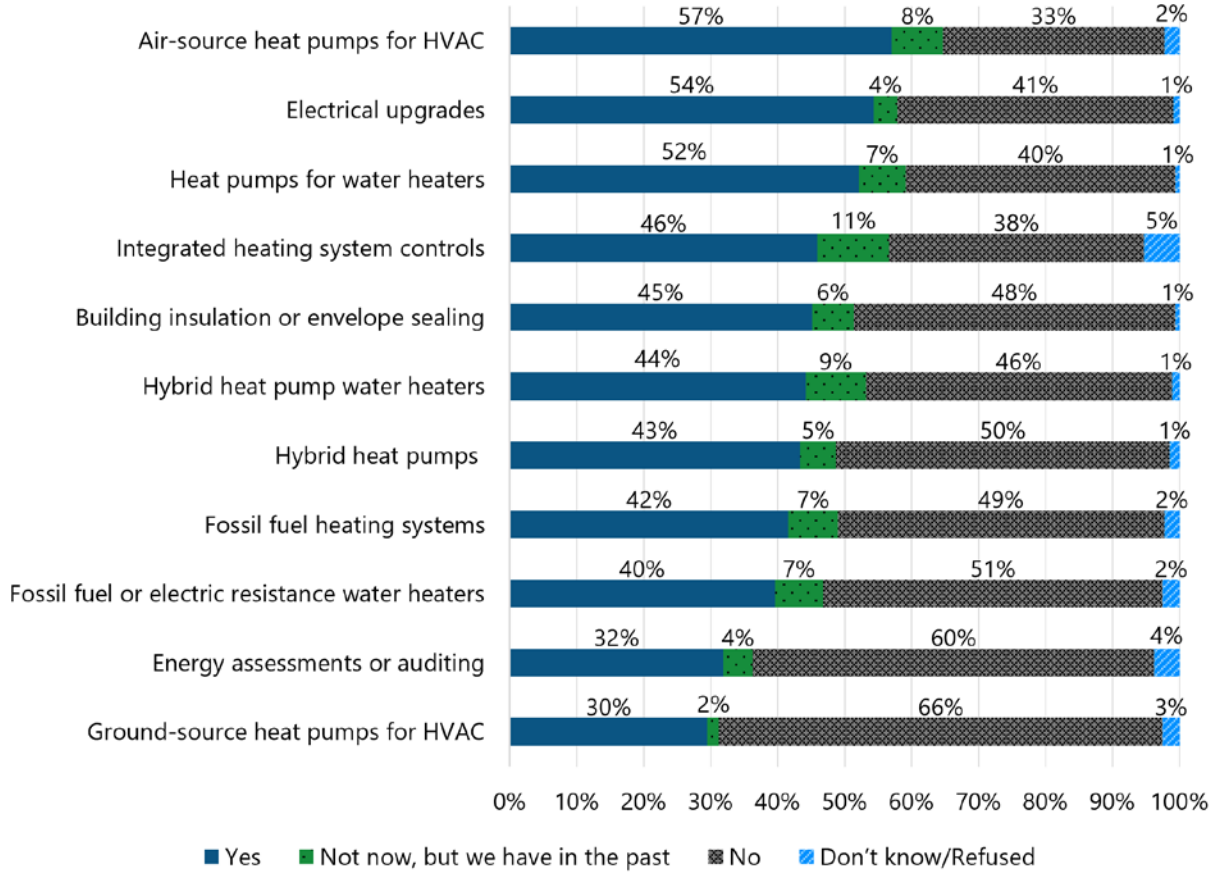
Source: Surveyed EE/BE firms.



Surveyed EE/BE employers work across multiple EE/BE technologies, with three-quarters (75%) of them offering more than one EE/BE product or service. The most common EE/BE products or services provided by these employers include air source heat pumps (57%), electrical upgrades (54%), heat pump water heaters (52%), integrated heating system controls (46%), building insulation (45%), hybrid heat pump water heaters (44%), hybrid heat pumps (43%), and fossil fuel heating systems (42%) (Figure 5). When asked about which products or services are most important to their businesses, air-source heat pumps (60%) and building insulation or air sealing (48%) were reported as most important to surveyed EE/BE firms that offer those services.

Figure 5. "Which of the following products, technologies, and services does your firm provide for your clients?"

Source: Surveyed EE/BE firms.

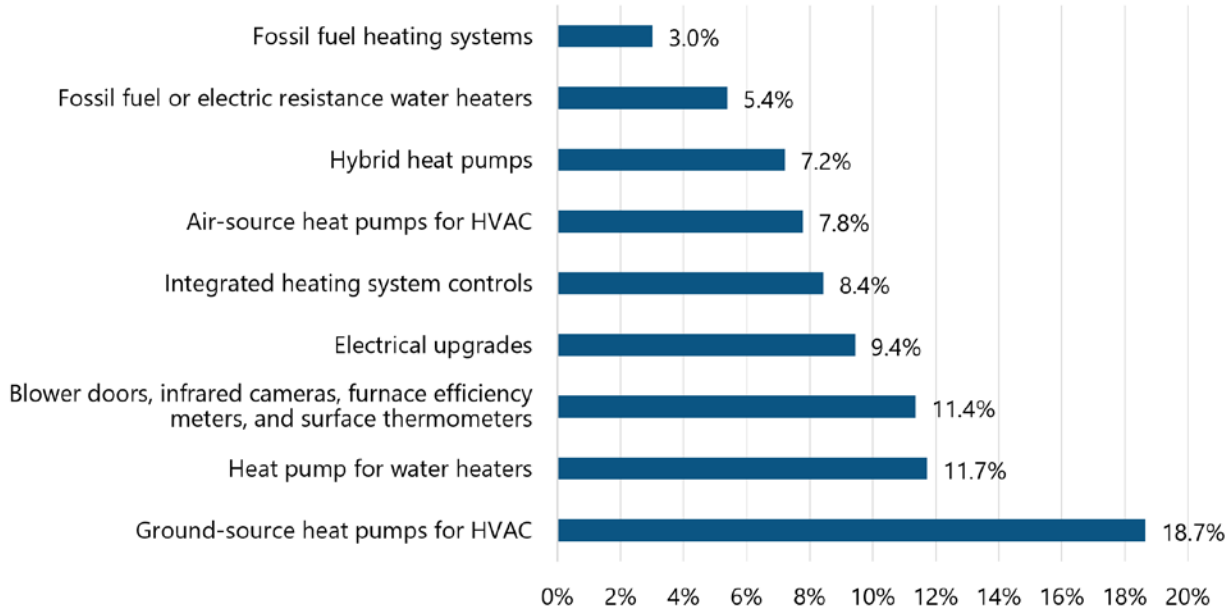


Fewer than 20% of employers indicated they were unable to provide a service or install a specific technology due to a lack of trained workers (Figure 6). Stakeholders in interviews similarly expressed little concern about integrating newer EE/BE technologies. Importantly, this means that expansions or innovations in other EE/BE technologies do not currently appear to pose a high-risk workforce constraint, based on survey results and stakeholder interviews.

"Everything is getting more complicated over time, but we're not seeing a bottleneck yet. Heat pumps that we're starting to see in the northeast are common in other places, like Europe and the southern tier of the US. Contractors can go out and achieve what they need to learn in other places."—Electric and gas utility employee

Figure 6. "Are there any products, technologies, or services that you DO NOT currently provide, that you want to provide but do not have enough trained workers to support that technology or service?"

Source: Surveyed EE/BE firms.



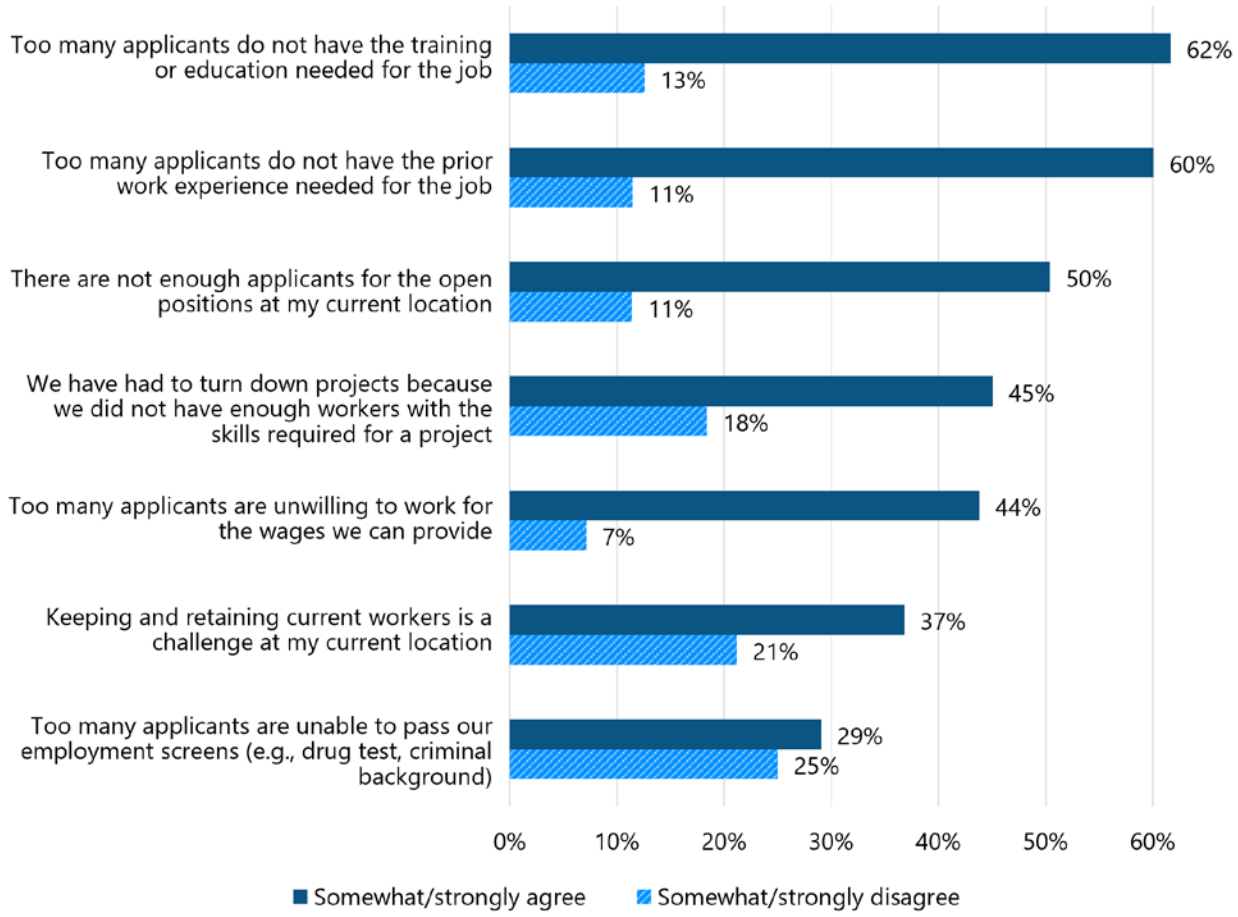
When EE/BE employers reported hiring difficulties, they attributed them to applicants lacking training, education, and experience. Approximately three-quarters (76%) of surveyed employers reported experiencing "some" or "great" difficulty hiring qualified workers. Three in five (62%) of those employers agreed that applicants do not have the training or education needed for EE/BE work, and a similar share (60%) agreed that applicants lacked relevant work experience (Figure 7).

"In all construction jobs, they want two years of job experience, but [we] don't know how people can get this experience."—Training provider

"Once they graduate from programs, if they have previous experience, it works out, but if they don't, it's tough."—Municipality representative

"Hands-on experience: This is the number one need. Employers can't train a brand-new person."—Training provider

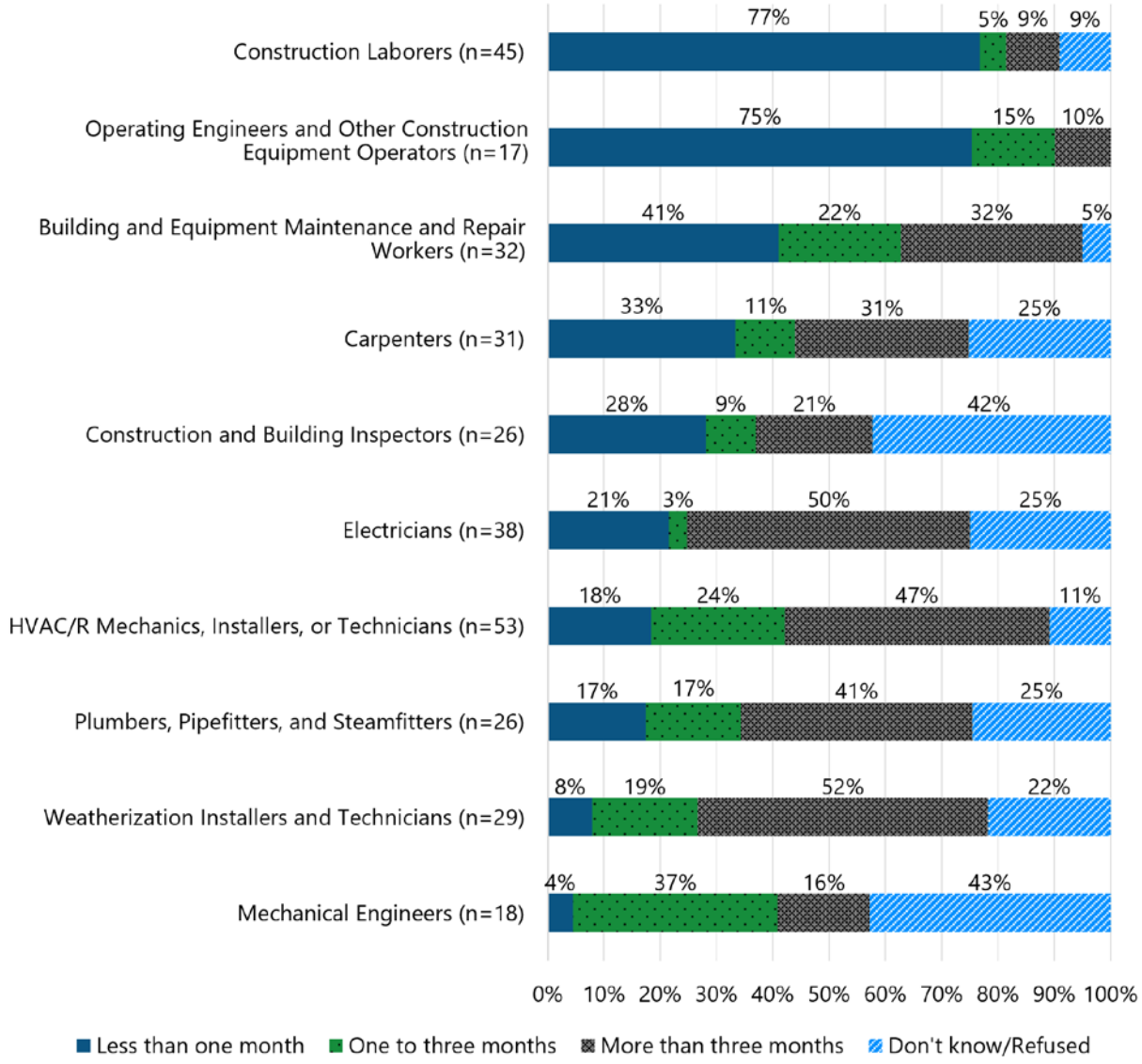
Figure 7. Surveyed EE/BE Firms' Level of Agreement with Each of the Following Statements about Hiring Potential Workers



Skilled trades and technical positions take longer for employers to fill. Roughly half of EE/BE firms reported hiring timelines of more than three months for electricians, heating, ventilation, air conditioning, and refrigeration (HVAC/R) mechanics, plumbers/pipefitters/steamfitters, and weatherization installers. In contrast, firms generally fill construction laborer and operating engineer positions the fastest, as roughly three-quarters of respondents reported that they can often fill these roles in less than one month (Figure 8).

Figure 8. "How long does it typically take to find and hire a candidate?"

Source: Surveyed EE/BE firms.



2.1 Structural Differences in the EE/BE Market

Structural differences between the residential and commercial sectors of the EE/BE industry are important for workforce policymakers and practitioners to consider. Across the entire construction industry, which encompasses much of EE/BE employment, the residential sector typically offers lower wages and lower unionization rates compared to the commercial sector.

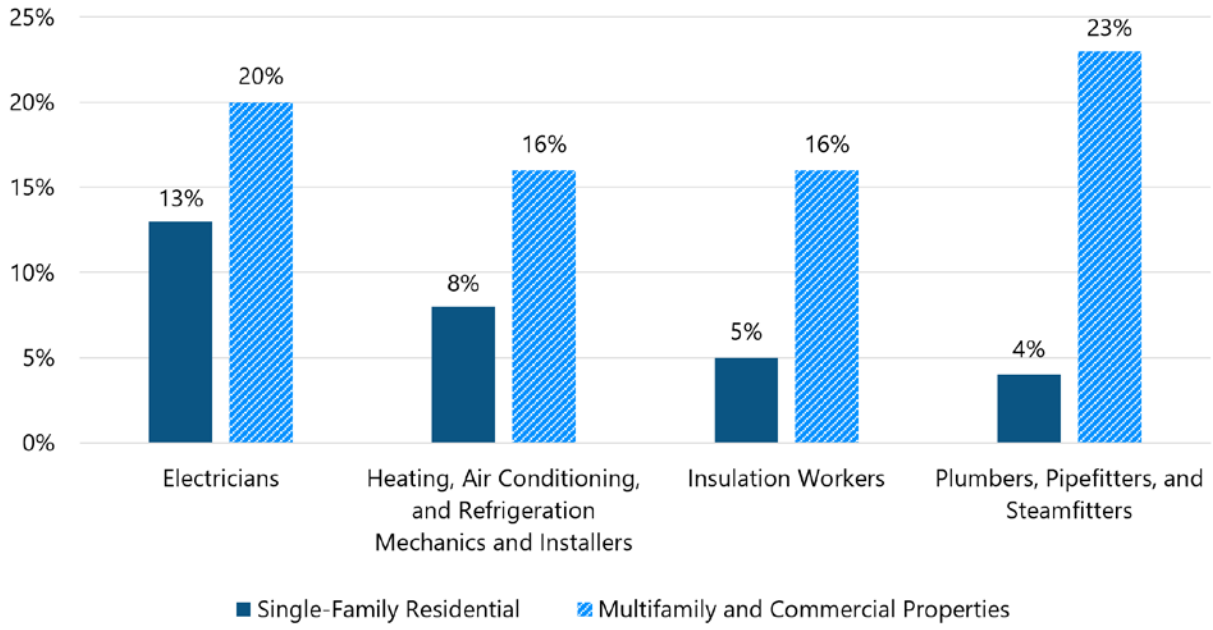
In 2025, the average wage in the residential construction sector, including single-family and all multifamily buildings, was almost $50,000 lower ($60,556 in residential compared to $109,145 in commercial) (JobsEQ 2025).

Furthermore, unionization rates within EE/BE are relatively lower in the single-family residential sector, as shown in Figure 9. This structural dichotomy within EE/BE means that current and potential workers are more likely to be drawn to the multifamily and commercial sector, where union membership is more prevalent and wages and benefits are higher.

These circumstances mean that many workforce challenges in the future are likely to be heightened within the residential sector, especially in single-family residences, which are projected to see a majority of future employment needs (see Forecasted Needs of EE/BE for more details). As such, this assessment primarily focuses on the residential sector, though many of the opportunities presented extend to the commercial sector as well.

Figure 9. Unionization by Select Occupation and Primary Property Type

Source: NYSERDA 2025.



Small EE/BE employers, which are most commonly found in the residential sector, rarely hire new workers to grow their businesses, and when they do hire, it is typically for small increases in their workforce. Among surveyed EE/BE businesses, 75% of small businesses reported no growth in the past year, compared with 51% of large businesses. When asked about anticipated workforce

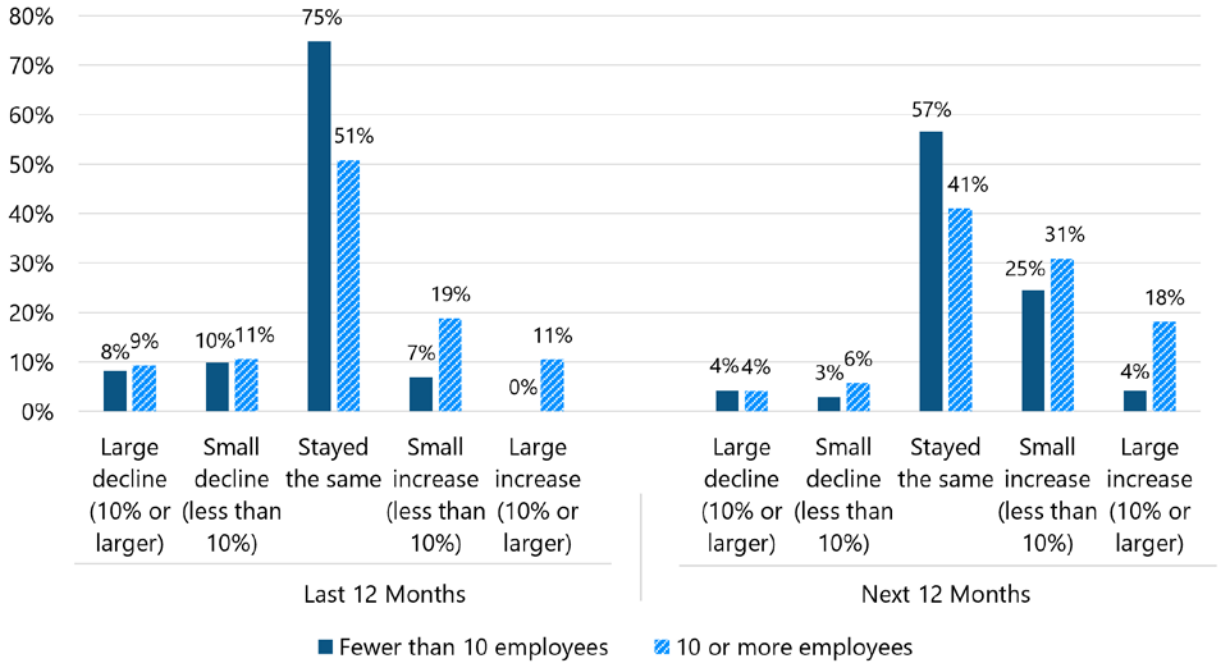
growth in the coming year, 57% of small businesses expect the same number of employees, compared with 41% of large businesses (Figure 10). These findings all suggest that elevated growth of the EE/BE workforce is likely to be difficult with a sizable employer base that typically grows at a slower pace.

> *"The specific roles in EE/BE are important, but [they are] not great entry points into jobs either because of their difficulty or because of [the] hiring patterns of (mostly) small contractors."—Education/training provider*

> *"Business service person at a workforce development board will act as an HR person to contractors in some cases, getting [smaller contractors] to take the time to build the pipeline that [they'll] need later on [while] they're busy right now with what they have in front of them."—Workforce Development Board representative*

Figure 10. "Over the last 12 months, did the total number of employees at your current location decline, stay the same, or grow?" and "Over the next 12 months, do you expect the total number of employees at your current location to decline, stay the same, or grow?"

Source: Surveyed EE/BE firms.



Small EE/BE businesses are also far less interested in partnerships and collaborations with local colleges or technical schools for recruiting and hiring than large EE/BE firms (Figure 11). Furthermore, small firms rarely work with unions for workers (3% of surveyed small businesses

said they partner with union apprenticeships to hire employees, compared to 34% of large businesses). At most, 28% of small EE/BE businesses said they partner with high schools or vocational/technical schools for hiring, compared to half (50%) of large businesses (Figure 12).

Figure 11. Surveyed EE/BE Firms' Level of Interest in Partnerships with Local Colleges or Technical Schools to Align Training Programs with Current Industry Needs

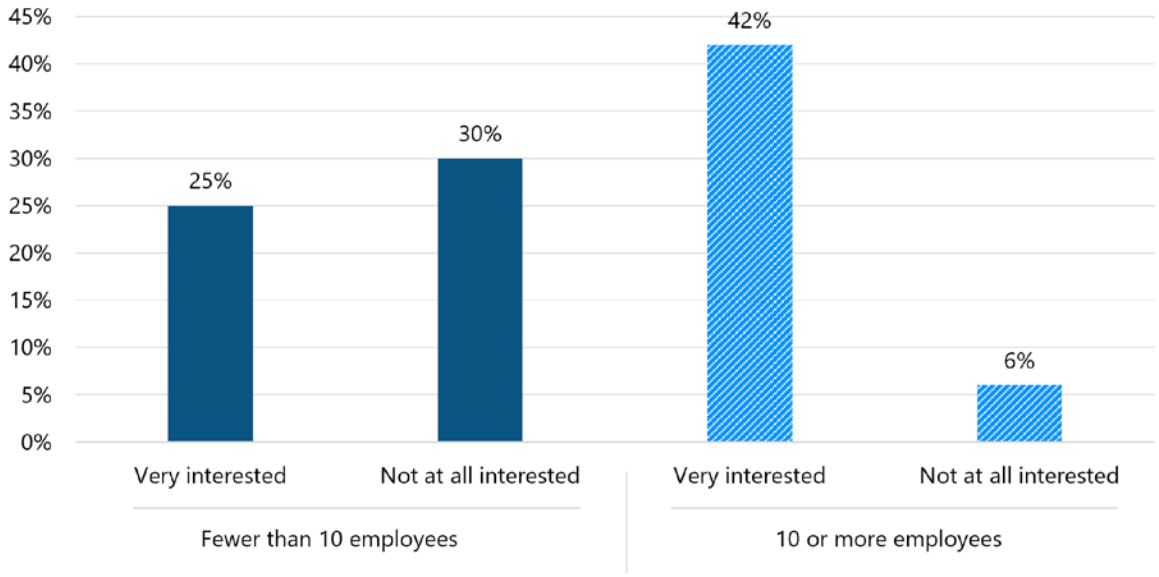
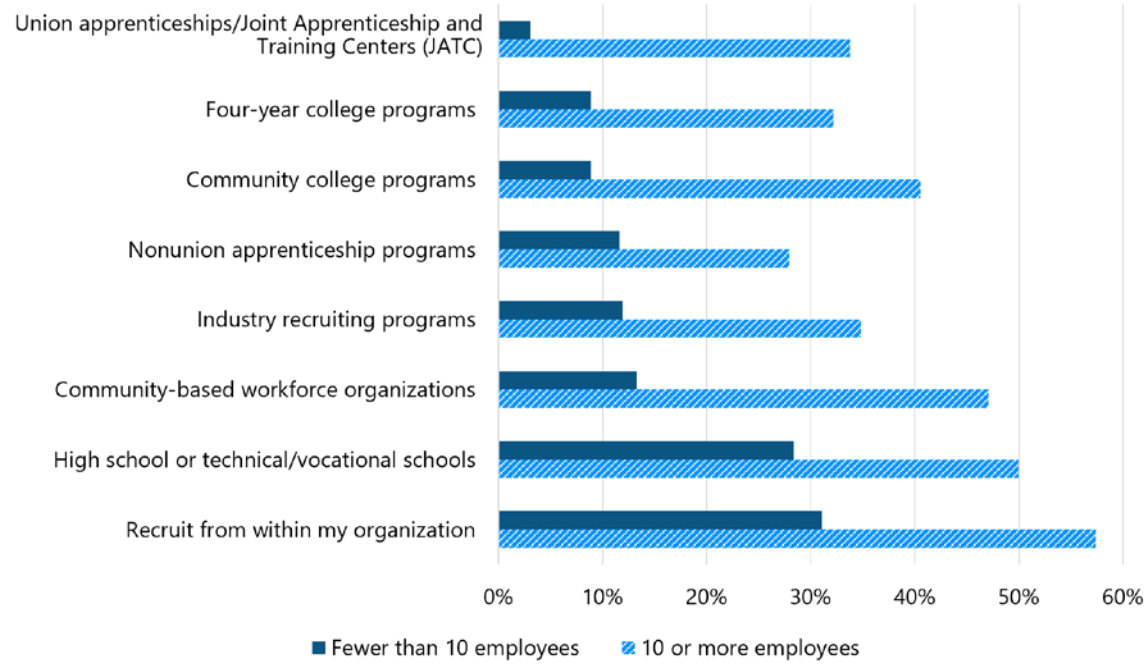


Figure 12. Surveyed EE/BE Firms' Partnerships or Collaborations with Organizations or Programs to Recruit or Hire Employees



Employers in New York's EE/BE industry are often found to be disconnected from other stakeholders in the industry. When training and education providers and other stakeholders seek feedback or input from employers about their needs, stakeholders said they often receive vague or inconsistent responses. This is unsurprising, given the lack of ongoing collaboration and the high share of small EE/BE firms that are likely to have limited capacity and resources to coordinate frequently. Furthermore, certification needs are often preferences that may be 'nice to have' rather than explicitly required. Preferences and needs also vary across firms by the markets they support, their size, and the specific type of services they offer, making a consensus view difficult to determine. If a small firm is not hiring frequently or required to meet certain specifications for specific jobs, then there is little incentive for it to stay up to date with current certifications.

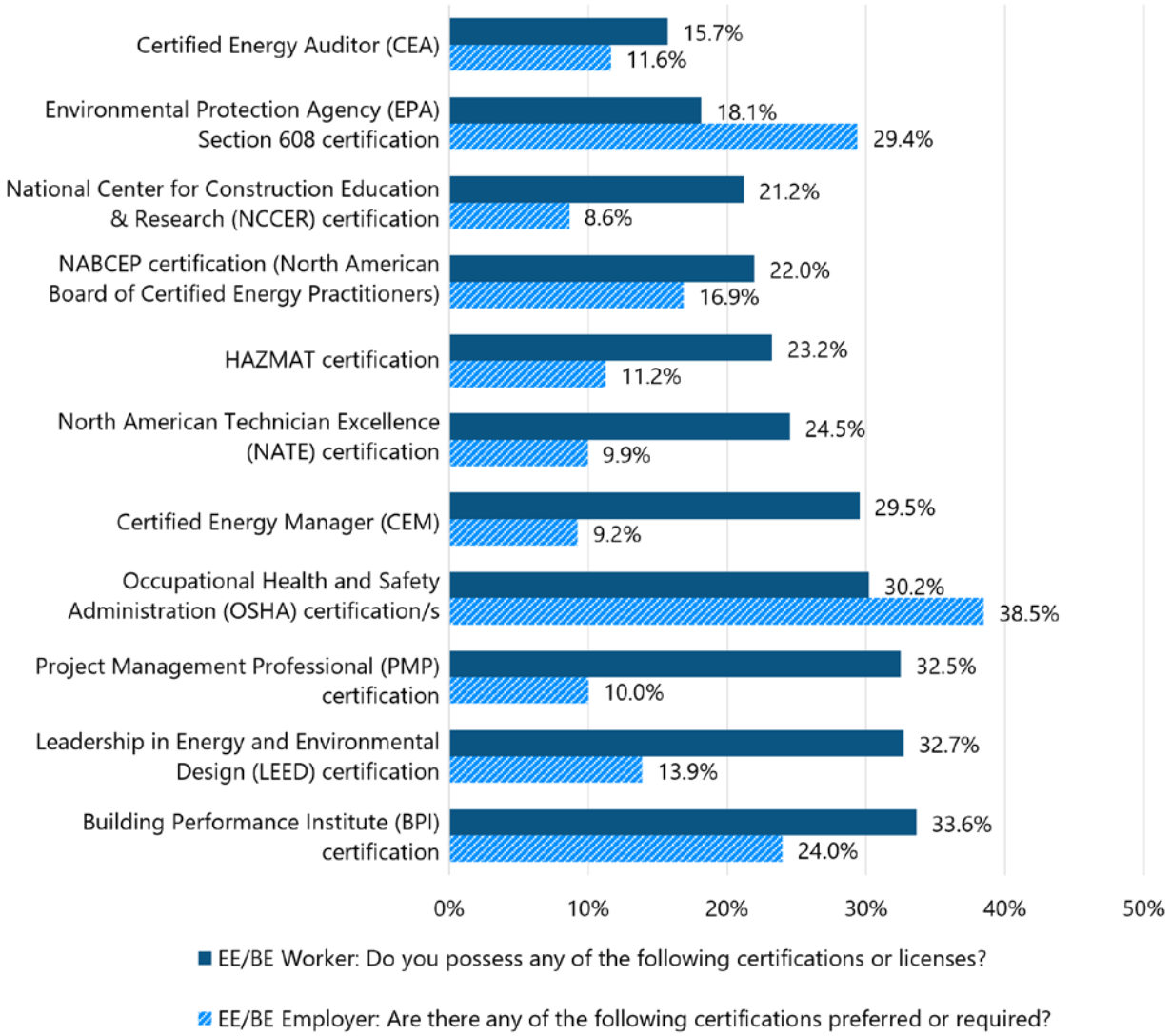
> *"One of our challenges is to even identify what certifications are the right ones, and which ones are going to help our participants stand out from employers. This was our most common conversation, and it's hard to get a straight answer, something solid. You dig a bit, and it isn't the case"—Regional Clean Energy Hub representative*

> *"It's very difficult to get info from employers. Employers, in theory, know what needs are current. But employers are guessing a lot."—Training/education provider*

A lack of workers with certifications is not the primary cause of hiring difficulty. No more than a third of surveyed EE/BE employers reported a preference or requirement for even the most-demanded certifications. Employers often prioritize Occupational Safety and Health Administration and Environmental Protection Agency Section 608 certifications, which are legally required in most cases and often preferred by insurers. A high share of current EE/BE workers held Building Performance Institute certifications, which were popular among employers as well, reflecting the need for specialized weatherization-specific knowledge. A high share of current EE/BE workers also held leadership or management-related certifications (Figure 13). [10]

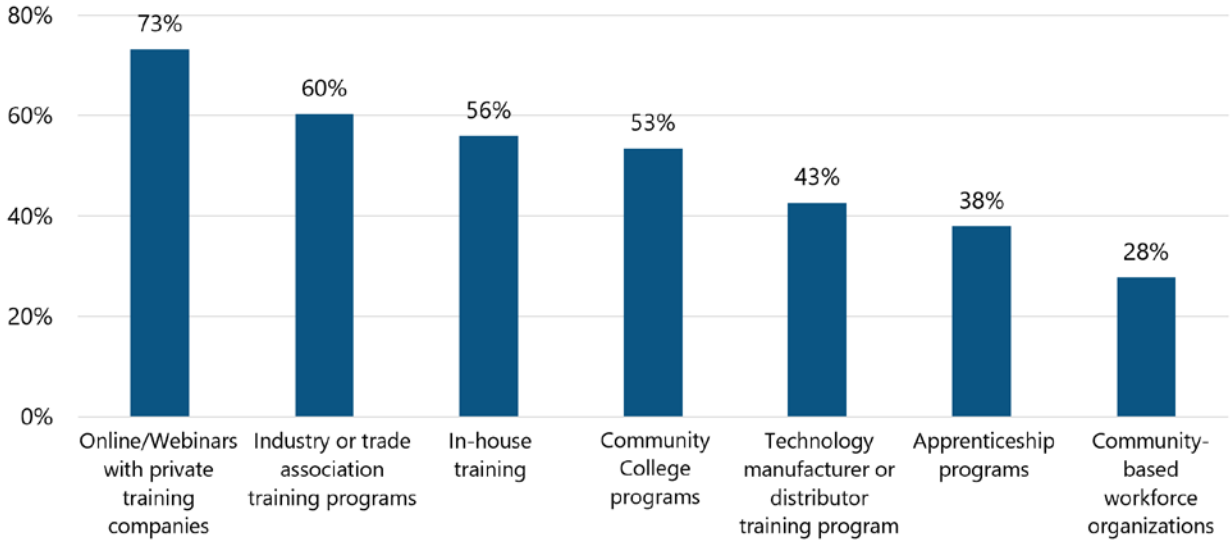
The relatively high rates of employee certifications relative to employer preferences for those certifications could be driven by survey configuration (i.e., the two survey questions were asked differently for each party), internal biasing (i.e., employers were more likely to downplay that they require a certain certification), or a reflection that certifications are relatively accessible and therefore the current labor supply is oversaturated with certifications. If this last case is at least partially true, then certifications alone hold even less value to employers if prospective job applicants do not have relevant experience. Ultimately, certifications can help job seekers build their toolkit, but they are not likely to be the primary factor that employers look for.

Figure 13. Surveyed EE/BE Employers' Certification Preferences or Requirements Compared to Workers' Certifications



Most job seekers obtain their certifications through online sources, industry or trade association programs, or employer-provided training. When results are combined across occupations, job seekers least frequently earned certifications through community-based workforce organizations, which may reflect either the number or capacity of organizations, or employer preferences (Figure 14).

Figure 14. Where Surveyed EE/BE Firms' Workers Earn Their Certifications



3. Forecasted Needs of Energy Efficiency and Building Electrification Workforce

EE/BE workers already comprise the largest portion of New York State's clean energy workforce and have experienced steady growth over the past several years. With increased investments in the State's building stock, that growth is forecasted to continue. The following section examines growth forecasts and details potential workforce gaps by occupation and region.

3.1 Modeling Outputs

New York State energy employment projections used for this study estimated the direct[11] and indirect[12] employment impacts from the 2025 State Energy Plan policy recommendations under the Additional Action scenario through 2035.[13] This assessment uses those 2025 State Energy Plan employment projections specifically for the EE/BE industry, referred to as the buildings sector in the 2025 State Energy Plan. The Additional Action scenario assumes the State pursues programs consistent with the 2026–2030 EE/BE Orders, as well as additional heat pump adoption[14] and building shell retrofits,[15] beyond current policy levels in both commercial and residential buildings. Shaped by these assumptions, EE/BE activities in New York State are expected to result in significant growth in occupations related to building shell retrofits, including painting and coating, air sealing and insulation, and doors and windows.

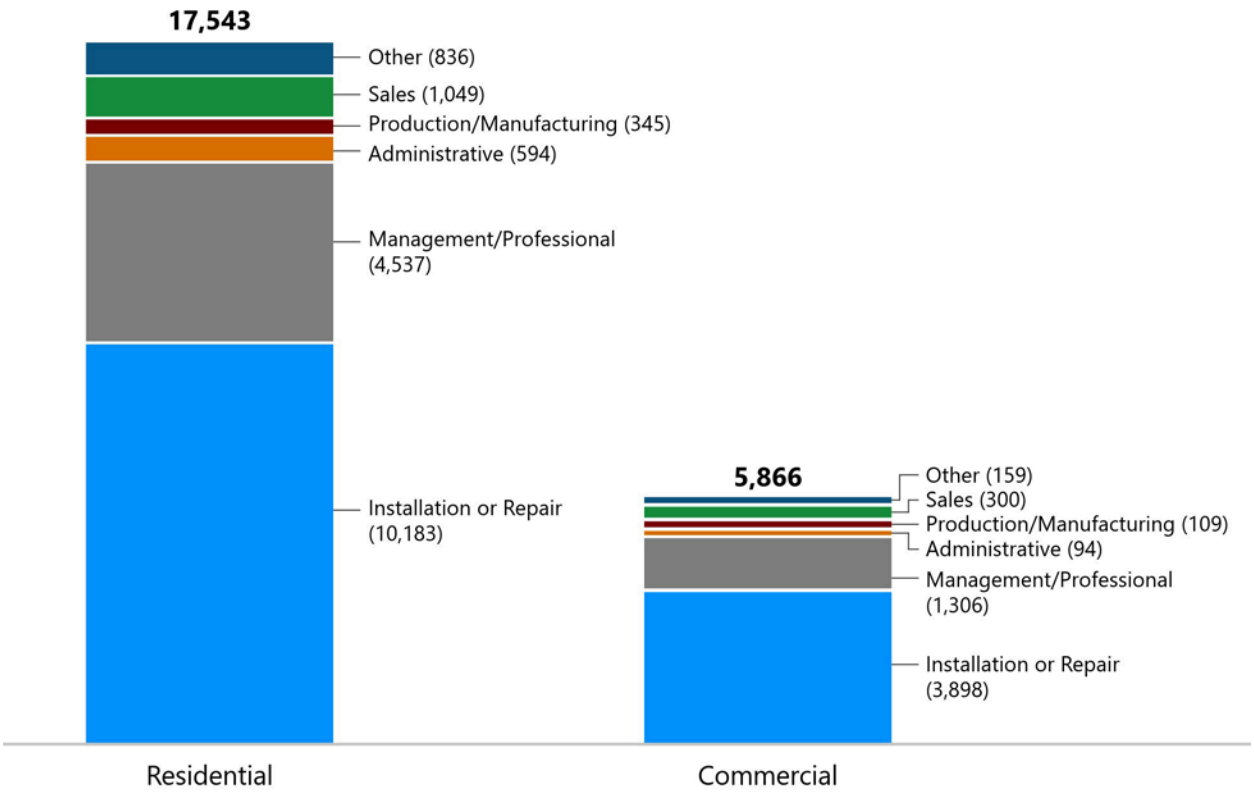
3.1.1 Industry-wide Projections

New York State's EE/BE industry is projected to support approximately 23,400 additional jobs over the next decade. Much of this growth is concentrated in the residential sector, accounting for nearly 17,500 additional jobs between 2025 and 2035. This is largely due to more market-ready EE/BE technologies and products for residential buildings compared to commercial buildings with more intensive energy needs.[16]

Growth in the installation or repair occupational group[17] will account for the largest portion (60%) of projected EE/BE employment (Figure 15).[18] This occupational group includes construction and maintenance occupations, many of which are skilled trades.

Figure 15. EE/BE Industry Net Employment Change by Subsector and Occupational Group, 2025–2035

Source: New York State Energy Planning Board 2025.



3.1.2 Regional Projections

The current distribution of EE/BE employment across New York State's ten Empire State Development (ESD)/Regional Economic Development Council (REDC) regions aligns with that of total state employment and population. New York City accounts for just over half of EE/BE workers, followed by Long Island. Mohawk Valley, the North Country, and the Southern Tier have the smallest concentrations.

Projected employment growth in the EE/BE industry, by total employment, over the next ten years, is largest in New York City and Long Island, accounting for 35% and 19% of growth, respectively. However, New York City has the lowest anticipated growth rate relative to its 2025 employment levels. While all other ESD regions have an average relative employment growth of 23%,[19] New York City's is 12%, signaling that EE/BE employment growth may place less of a strain on New York City's workforce development ecosystem than other ESD regions.

On the other hand, the largest percentage change (33%) in EE/BE industry employment is expected in the North Country, which employs a smaller share of workers compared to the other ESD regions. This region may feel more strained to grow its EE/BE workforce by nearly 500 workers over the next decade (Table 1).

Table 1. EE/BE Industry Employment by Empire State Development Region

ESD/REDC Region	EE/BE Industry Employment, 2025	Total Economy Employment, 2025[a] (U.S. Bureau of Labor Statistics 2025b)	EE/BE Industry Employment Change, 2025–2035	EE/BE Industry Employment Percent Change, 2025–2035	Regional Share of Total EE/BE Industry Growth
Capital Region	7,230	533,287	1,589	22%	7%
Central NY	4,255	340,851	992	23%	4%
Finger Lakes	7,140	548,316	1,620	23%	7%
Long Island	21,052	1,316,923	4,508	21%	19%
Mid-Hudson	13,675	948,009	3,347	24%	14%
Mohawk Valley	1,624	181,746	433	27%	2%
New York City	67,732	4,616,259	8,256	12%	35%
North Country	1,490	147,106	490	33%	2%
Southern Tier	2,747	246,460	656	24%	3%
Western NY	7,498	616,554	1,519	20%	6%
Total	**134,444**	**9,495,510**	**23,410**	**17%**	**100%**

[a] Excludes employment classified as "Unknown or Undefined," totaling approximately 225,000 workers.

3.2 Priority Occupations

Using a targeted occupational lens allows for a more rigorous assessment of where workforce gaps are most acute, how needs vary across occupations, and which barriers may require occupation-specific interventions. Narrowing the analysis in the previous section to occupations with strong relevance to EE/BE implementation can better position the findings and recommendations to inform strategic, occupation-specific workforce development efforts.

This study focuses on 13 priority occupations that are important to carry out EE/BE activities in New York State based on five benchmarks: high projected demand, livable wages, unionization, accessibility to employment opportunities, and connection to EE/BE. Summary descriptions of each occupation are presented in Table 2. Eight are construction occupations, three are installation, maintenance, and repair occupations, one is a management occupation, and one is an engineering occupation. The selection process for these priority occupations can be found in Appendix C.

Note: Weatherization installers and technicians are an important occupation in EE/BE. They improve the energy efficiency of building shells through activities such as installing insulation and sealing air leaks in doors, windows, and walls. However, this occupation is not classified under the U.S. Bureau of Labor Statistics (BLS) Standard Occupational Classification (SOC) system. **In the quantitative analysis for this assessment, weatherization technicians are represented by a related occupation: Insulation Workers, Floor, Ceiling, and Wall.**

Table 2. Priority Occupations for New York State's 2026 EE/BE Workforce Development Assessment

SOC Code	Occupation Name	EE/BE Category	Description
11-9021	Construction Managers	Supervision/ Management	Construction managers coordinate and supervise construction projects from preconstruction through completion. Their responsibilities include scheduling, cost control, contractor oversight, and compliance with building codes and safety standards, ensuring that energy upgrades are integrated effectively into construction activities.
17-2141	Mechanical Engineers	Administration/ Professional Services	Mechanical engineers apply engineering principles to design, analyze, and optimize building systems, such as HVAC, plumbing, and energy systems. In energy efficiency work, they evaluate system performance, model energy use, develop upgrade specifications, and ensure that efficiency measures meet technical standards, safety codes, and performance goals.
47-1011	First-Line Supervisors of Construction Trades and Extraction Workers	Supervision/ Management	First-line supervisors of construction trades and extraction workers oversee construction trade workers on job sites, coordinating daily activities, sequencing work, and enforcing safety and quality standards. They ensure retrofit and construction tasks are performed efficiently and in alignment with project plans and energy performance goals.

Table 2. (continued)

SOC Code	Occupation Name	EE/BE Category	Description
47-2031	Carpenters	Weatherization, General Building Construction, and Maintenance	Carpenters build, install, and repair building frameworks, as well as structural and finish components, made of wood and similar materials, including framing elements such as partitions, joists, studs, rafters, and concrete forms. Work may also include installing windows, doors, stairways, flooring, cabinets, siding, drywall, and batt or roll insulation as part of building construction or retrofits to improve structural integrity and building envelope performance.
47-2061	Construction Laborers	Weatherization, General Building Construction, and Maintenance	Construction laborers perform a wide range of physical tasks on construction and maintenance sites, including material handling, site cleanup, demolition, and assistance to skilled trades. Their flexible role supports nearly all phases of building construction and maintenance. They also support residential weatherization projects, using hand and power tools, to prepare work areas, assist with insulation and air-sealing activities, set up ladders or scaffolding, and support other skilled workers during retrofits.
47-2073	Operating Engineers and Other Construction Equipment Operators	General Building Construction and Maintenance	Construction equipment operators use heavy machinery such as excavators, cranes, loaders, and bulldozers to prepare sites, move materials, and support structural construction. Their role is essential for grading, foundation work, and large-scale material handling, enabling efficient, safe building construction.
47-2111	Electricians	Electrification, General Building Construction, and Maintenance	Electricians are a core occupation in electrification projects. These workers install, maintain, and repair electrical wiring, equipment, and fixtures in accordance with applicable codes and safety standards, including efficiency upgrades. Their work ensures safe power distribution, supports building automation and energy-efficient technologies, and enables the operation of all electrically powered building systems.

Table 2. (continued)

SOC Code	Occupation Name	EE/BE Category	Description
47-2131	Insulation Workers, Floor, Ceiling, and Wall	Weatherization	Insulation workers are key to weatherization work, installing insulation materials to line and cover building surfaces, using products such as batt, roll, or blown insulation. Workers labeled weatherization installers and technicians may perform the same or similar tasks as insulation workers; however, they may perform a wider range of weatherization activities at a less specialized level. This includes window repair, duct insulation, air sealing, and client education on conservation practices.
47-2141	Painters, Construction and Maintenance	Weatherization	Construction painters apply paint and coatings to structural surfaces using brushes, rollers, or spray equipment. Tasks may include surface preparation, including sealing holes in walls with spackling or caulking to prevent air leakage, and removing old coatings. Painting and coating are also important for weatherization to protect wood walls from climate damage and improve insulation by sealing any remaining gaps and cracks.
47-2152	Plumbers, Pipefitters, and Steamfitters	General Building Construction and Maintenance	Plumbers install, maintain, and repair piping systems that carry water, gas, and waste throughout buildings. Their work supports sanitation, heating, cooling, and energy systems, making them critical to both occupant health and building efficiency.
47-4011	Construction and Building Inspectors	General Building Construction and Maintenance	Construction and building inspectors evaluate construction activities and completed buildings to ensure compliance with building codes, safety standards, and design specifications. Energy Auditors are a type of Construction and Building Inspector who assess building envelopes and mechanical systems to identify inefficiencies, air leakage, and opportunities for energy savings and performance improvements.
49-9021	Heating, Air Conditioning, and Refrigeration (HVAC/R) Mechanics and Installers	Electrification, General Building Construction, and Maintenance	HVAC/R technicians and installers are also important to building electrification, installing, servicing, and repairing heating, ventilation, air conditioning, and refrigeration systems, including energy-efficient heat pumps. They play a central role in indoor comfort, air quality, and energy efficiency by ensuring mechanical systems are correctly sized, installed, and operating as designed.

Table 2. (continued)

SOC Code	Occupation Name	EE/BE Category	Description
49-9071	Maintenance and Repair Workers, General	General Building Construction and Maintenance	Building operators and maintenance workers oversee the day-to-day functions of buildings, performing routine maintenance, system monitoring, and repairs. They ensure HVAC, electrical, plumbing, and safety systems operate reliably, often serving as the first line of response to operational issues.

Among the 13 priority occupations, over 12,400 of these workers are currently employed as heating, ventilation, and air conditioning (HVAC) mechanics and installers, comprising around 9% of the state's total existing EE/BE workforce. This occupation is the largest in the EE/BE industry by a sizeable margin, underscoring the importance of HVAC mechanics and installers in conducting EE/BE activities. The construction laborer workforce is the second largest, with over 4,300 workers, followed by construction managers and plumbers. Construction painters and general maintenance and repair workers represent the smallest number of workers among the priority occupations. Current and forecasted employment in all priority occupations can be seen in Figure 16.

Professional Services in New York State

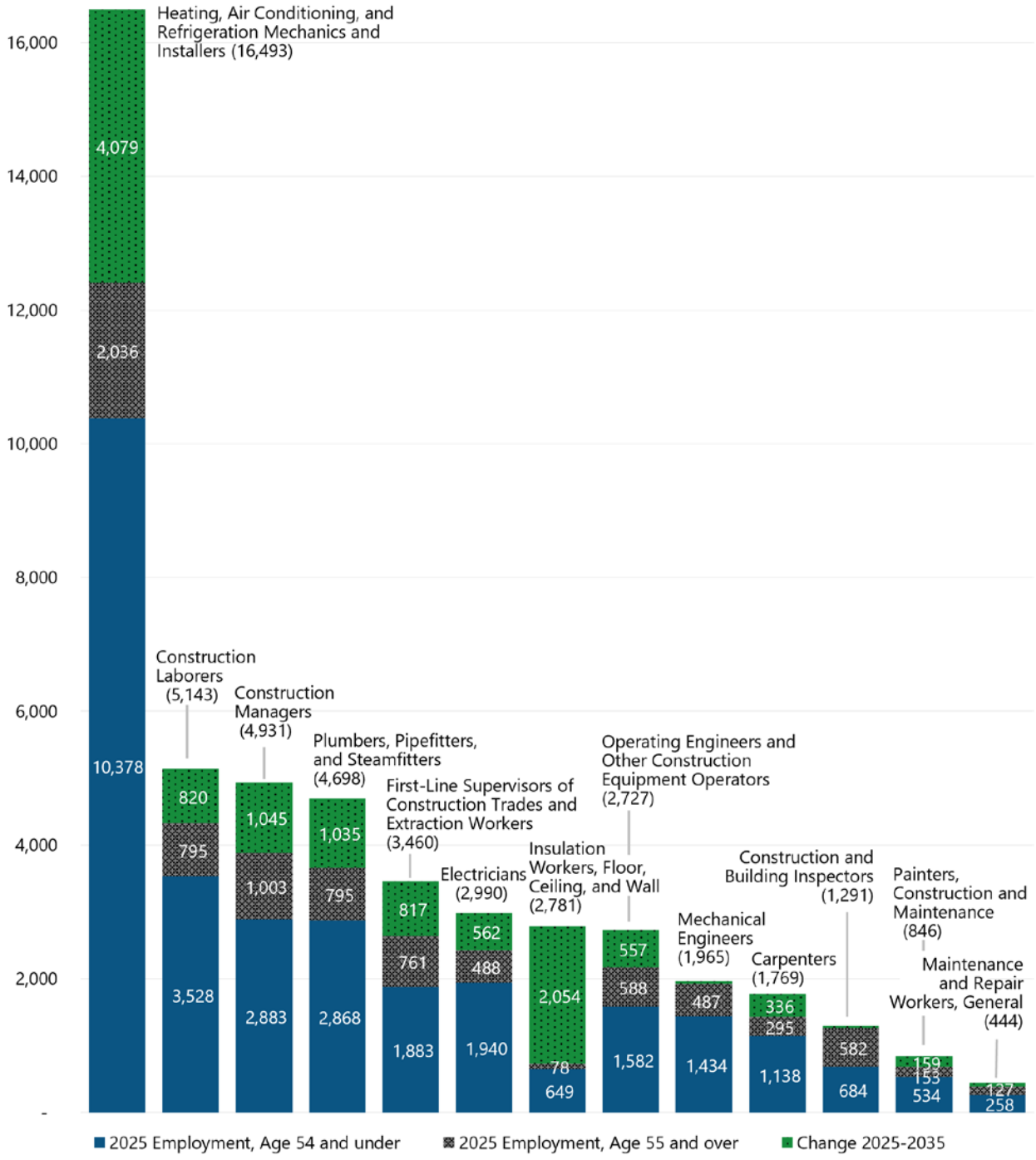
New York State's EE/BE industry includes workers employed across several value chains, such as construction or installation, manufacturing, professional and business services, and sales. Overall, the State has a relatively high concentration of employment in professional and business services. Within the EE/BE industry, professional and business services workers are 2.25 times as concentrated in New York State as they are nationally (U.S. Department of Energy 2025). While some professional and business services roles, such as general and operations managers, project management specialists, and sales representatives, currently make up a relatively high share of New York State's EE/BE industry, these occupations are not among the 13 selected priority occupations for several reasons, including their lower projected growth rates and accessibility potential, relative to other prominent EE/BE occupations. Further details on the selection process for these priority occupations can be found in Appendix C.

Many priority occupations will see strong EE/BE employment growth through 2035, accounting for half (50%) of total EE/BE employment growth. HVAC/R mechanics and installers account for the largest share of this growth, representing 35% of EE/BE employment growth among priority

occupations, adding an estimated 4,100 jobs between 2025 and 2035. Insulation workers are also projected to see strong growth, supporting an additional 2,100 jobs in 2035, or 18% of total priority occupation employment growth (Figure 16). Increased residential shell upgrades and residential HVAC work primarily drive modeled employment growth within these two occupations.

All other priority occupations show varied growth patterns, with modeled employment increasing by 1,000 or fewer jobs between 2025 and 2035. Construction managers and plumbers, pipefitters, and steamfitters see an additional 1,000 workers supported in each occupation by 2035, each comprising 8 or 9% of total priority occupation employment growth from 2025 to 2035. Employment for mechanical engineers, construction and building inspectors, and general maintenance and repair workers remains relatively unchanged from 2025 to 2035, with each occupation supporting 60 or fewer additional jobs in 2035 (Figure 16).[20]

Figure 16. EE/BE Industry Employment by Priority Occupation, 2025–2035



3.2.1 Workforce Gaps

Comparing the State's current workforce with projected worker demand in 2035 identifies potential shortages under the modeled 2025 State Energy Plan employment projections in New York State's priority EE/BE occupations.

This section also assesses current workforce conditions of the priority occupations—such as unemployment, regional worker concentrations, and the age distribution of current workers—that can affect the State's ability to meet projected employment demand.

3.2.1.1 Energy Efficiency and Building Electrification-Specific Demand Pressure

New York State's future EE/BE workforce needs can be organized into three tiers based on the severity of projected shortages detailed in the findings in the previous section: Tier 1: Urgent Focus, Tier 2: Emerging Gaps, or Tier 3: Stable Occupations. Occupations are classified based on their EE/BE-specific pressure and historical supply and placed into a tier based on the number of "severe" flags in the gap analyses.[21] The metrics that informed this gap analysis include: (a) anticipated employment growth relative to current demand, (b) anticipated growth relative to historical growth, (c) unemployment rate, (d) location quotient (concentration of the workforce in the state), and (e) the percentage of workers who are 55 years of age or older. More information on this can be found in Appendix C.

Tier 1 occupations are at severe risk for both the EE/BE-specific pressure and the historical supply capacity metrics, Tier 2 occupations show severe risk in at least one metric, and Tier 3 occupations have no indicators that suggest a severe workforce gap.[22] These tiers can help guide the scale, urgency, and type of workforce interventions.

Weatherization and insulation workers are considered an Urgent Focus occupation. While the weatherization occupation does not signal a major training need, given its lower barrier to entry, the projected demand, relative to its current employment and historical growth, signals potential strain. This suggests a greater need for workers who can complete insulation and weatherization activities in New York State.

Table 3. Tiers of Gap Severity by Priority Occupation

Tier 1: Urgent Focus	Tier 2: Emerging Gaps	Tier 3: Stable Occupations
• Weatherization Installers or Technicians (i.e., Insulation Workers, Floor, Ceiling, Wall)	• Plumbers, Pipefitters, and Steamfitters • Construction Managers • Heating, Air Conditioning, and Refrigeration Mechanics and Installers • Carpenters • Painters, Construction and Maintenance	• Construction Laborers • Maintenance and Repair Workers, General • Operating Engineers and Other Construction Equipment Operators • Electricians • First-Line Supervisors of Construction Trades and Extraction Workers • Construction and Building Inspectors • Mechanical Engineers

Additional indicators can further contextualize the availability of New York State's workforce and provide a different lens on labor supply and workforce dynamics in the state. The data on these metrics can be found in Appendix C: Priority Occupations Gap Analyses.

3.3 Competition from New York State's Economy-wide Labor Market

New York State's broader labor market context will shape the EE/BE industry's ability to recruit, train, and retain workers. Between 2015 and 2025, total statewide employment grew by 9%. Construction employment also increased over this period, growing by 6% (U.S. Bureau of Labor Statistics 2025a). While construction growth has been more modest than statewide employment growth overall, the industry continues to generate demand for many of the same workers, contractors, and training pathways that EE/BE employers rely on.

This competition is likely to intensify as New York State advances several major infrastructure, clean energy, and economic development investments. Recent state and regional announcements include:

- $78 million in Thruway infrastructure improvements in the Capital Region, Central New York State, and the Finger Lakes Region (Office of Governor Kathy Hochul 2026-b)
- More than $17 million in bridge and roadway improvements in Erie and Niagara Counties (Office of Governor Kathy Hochul 2026-a)

- Continued planning for additional nuclear capacity, including advanced nuclear generation and new nuclear power plant construction (NYSERDA n.d.-a; Office of Governor Kathy Hochul 2026-c)
- The Port Authority of New York and New Jersey's $45 billion 2026–2035 Capital Plan, which includes major transportation, airport, bridge, tunnel, and resiliency investments (Port Authority of New York and New Jersey 2025)
- New York State Homes and Community Renewal's Housing Acceleration Fund (New York State Homes and Community Renewal n.d.)

These projects will require significant construction labor, creating additional demand for many of the same workers, contractors, and training pipelines needed by the EE/BE industry.

This has important implications for EE/BE workforce development. Many EE/BE activities compete with other construction sectors for talent, which often offer union jobs. Although clean energy occupations often pay more in New York State than similar roles in other industries (NYSERDA 2025), compensation in EE/BE is typically lower than in other clean energy sectors. These other industries and clean energy sectors may offer higher wages and benefits, clearer career advancement pathways, or greater public awareness, making it difficult for small employers in EE/BE to compete. As a result, the EE/BE industry may need to rely more heavily on new entrants or workers with less prior construction experience, increasing the importance of foundational training, work-readiness preparation, wraparound supports, and clear advancement pathways.

At the same time, New York State's unemployment rate remains low by historical standards. In 2026, the estimated unemployment rate for New York State was 4.6%, compared to an average monthly unemployment rate of 6.4% since 1976 (U.S. Bureau of Labor Statistics 2026).

A low unemployment environment means that EE/BE employers and training providers have a smaller pool of job-ready, unemployed workers. As a result, workforce development strategies may need to focus on individuals who are new to the labor market, underemployed, disconnected from existing EE/BE or construction career pathways, or facing barriers to training and employment. Considering the existing demographics of workers in New York State's EE/BE and clean energy industries, there is a significant opportunity and need to better reflect the statewide labor force by hiring workers of different genders, ethnicities, and races. As of 2024, most workers are men (74%), non-Hispanic or Latine (85%), and White (72%) in New York State's clean energy workforce, of which EE/BE comprises 73% (Table 4).

Table 4. New York State Demographics, 2024

Source: NYSERDA 2025.

	New York State's Clean Energy Industry, 2024	New York State's Total Labor Force, 2024
Women	26%	49%
Men	74%	51%
Hispanic or Latine	15%	19%
White	72%	58%
Black	9%	14%
Asian	8%	9%
Native American	1%	1%
Pacific Islander	1%	0%

Viewed together, these trends suggest that EE/BE workforce strategies cannot rely solely on traditional construction recruitment pipelines. Relatively lower wages, strong competition among adjacent sectors, and historically low unemployment all point to a tighter and more competitive labor market in which finding new talent to meet EE/BE needs is more challenging.

3.4 Career Pathways and Career Awareness

Career pathways—which detail the series of "steps" that a job seeker can take as they progress throughout their career—are a crucial element to any workforce development strategy. Career pathways benefit educators and training providers, current and prospective workers, and workforce development policymakers by providing clear information on how workers can enter the workforce, train and develop new skills, and upskill into higher-paying jobs. A clear roadmap that highlights upward mobility ensures that job seekers are trained for and able to pursue long-term, fulfilling careers, rather than short-term jobs that offer limited opportunities for wage growth and career advancement and provide no benefit to job seekers in the long run.

NYSERDA currently highlights a number of helpful clean energy career maps on its website (NYSERDA n.d.-b), many of which are dynamic and allow the user to customize their own career journey. As in other industries, though especially in EE/BE, a role can have a wide range of entry points and opportunities for advancement. Furthermore, each of those options can often correspond to several routes to achieve each outcome. For example, an aspiring electrician who just finished high school may first work as a weatherization technician, an electrician

"helper," or even a more general construction laborer role. These roles have low barriers to entry, with little to no educational or credential requirements, and provide foundational building construction skills and job site experience for workers new to the industry. That individual may then seek out a registered electrician apprenticeship through a union or through a specific firm, or an electrician training program at a community college, among other options. The sheer number of possible pathways and combinations underscores the importance of dynamic and customizable career pathways tools.

The research in this assessment suggests that there are general patterns in a "typical" successful pathway, often including some combination of hands-on construction experience (i.e., working on an actual construction site) and some type of formal classroom training. Some programs, such as registered apprenticeships (RAs), feature both hands-on experience and classroom learning, though RAs are often competitive, and applicants with previous work experience often have a competitive edge.

One other element that is hard to fully capture through existing data is the opportunity for entrepreneurship. After gaining significant experience and building reliable clientele, an EE/BE professional may seek to start their own business, applying their trade and potentially hiring others to scale their business. This is a typical career endpoint in the EE/BE sector, and entrepreneurship has historically been a strong attraction for many job seekers.

The presence of career pathways that dictate clear opportunities for upward mobility is particularly important for the EE/BE industry for several reasons. First, as an industry that might not be as well-known as others with longer standing in the economy and social settings, job seekers—and even some training providers—are unlikely to know exactly what opportunities are available. Figure 18 demonstrates that awareness of EE/BE careers among potential workers is quite low.

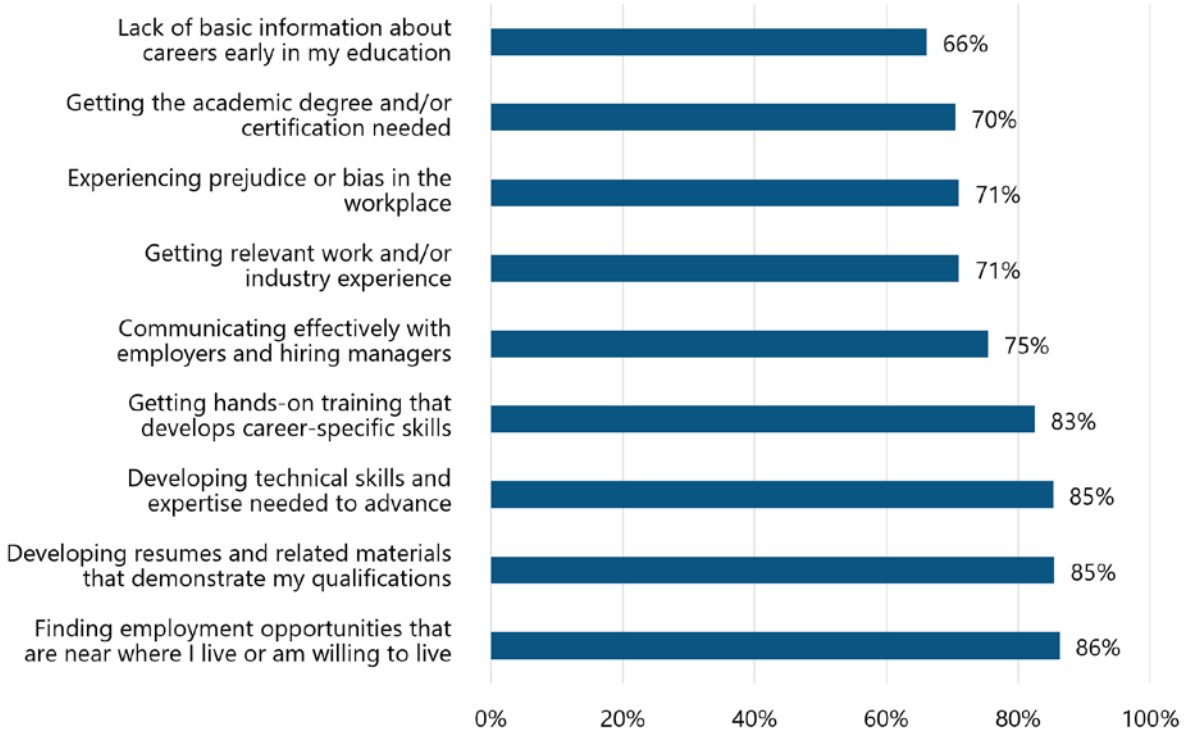
Second, clear career pathways that show upward earning potential are vital for recruitment and engagement. In an era of rising costs of living, the opportunity to earn higher wages—and an approximate timeline for when they can be achieved—is crucial information for job seekers. Third, as mentioned previously throughout this assessment, EE/BE is competing for workforce with other industries that are better known, offer higher wages, or require less physical work. Career pathways show that EE/BE careers are both relatively accessible *and* have higher earnings potential for workers in the near and long term.

"A lot of it is also exposure and understanding of EE/BE, increasing understanding of what these jobs are."—Training provider

Most (71%) current EE/BE workers aged 35 years and younger reported that gaining relevant work and industry experience was a challenge to starting their career (Figure 17).[23] It is also notable that finding employment opportunities near where one lives and developing the skill set and accompanying resume for EE/BE are the three most common barriers mentioned. Two-thirds of survey respondents agreed that all of the listed barriers were obstacles to starting their career, suggesting that frictions still exist for young job seekers across a range of fields.

Figure 17. "What were the challenges or obstacles to starting your career?"

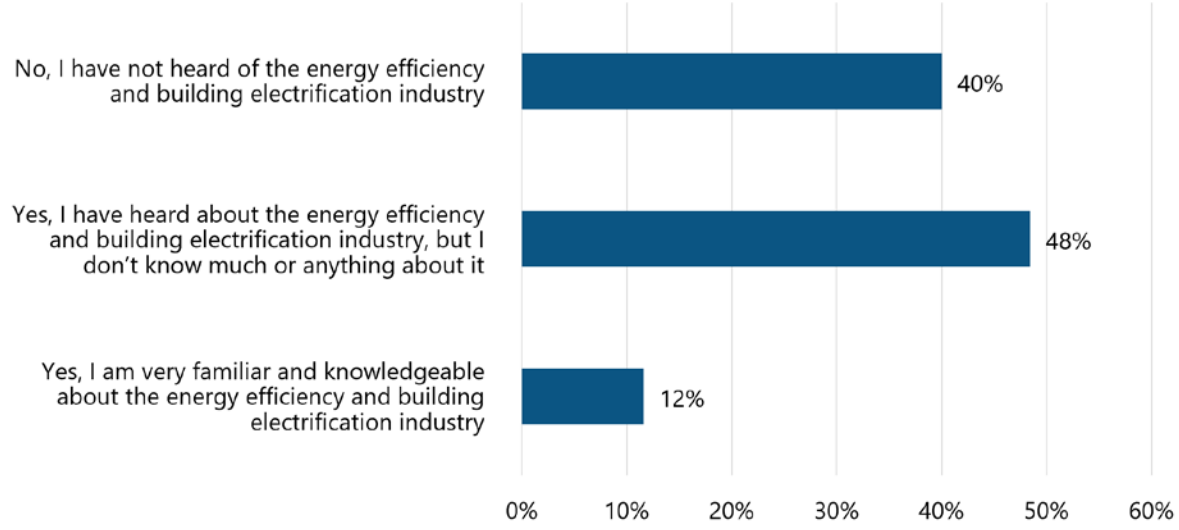
Source: Surveyed EE/BE Workers, Aged 35 Years and Younger Only.



Potential workers are generally unfamiliar with EE/BE and have little experience with the industry (Figure 18). Only 12% of potential workers (those looking for work and not currently in the EE/BE industry) reported being very knowledgeable and familiar with the industry, by name and by the definition provided. Nearly half (48%) reported that they know some high-level information about EE/BE. This suggests that a twofold awareness strategy is needed: one that includes high-level information about the industry alongside a second strategy that includes detailed information about potential career opportunities, wages, and entry-level requirements.

Figure 18. "Have you heard of the energy efficiency and building electrification industry?"

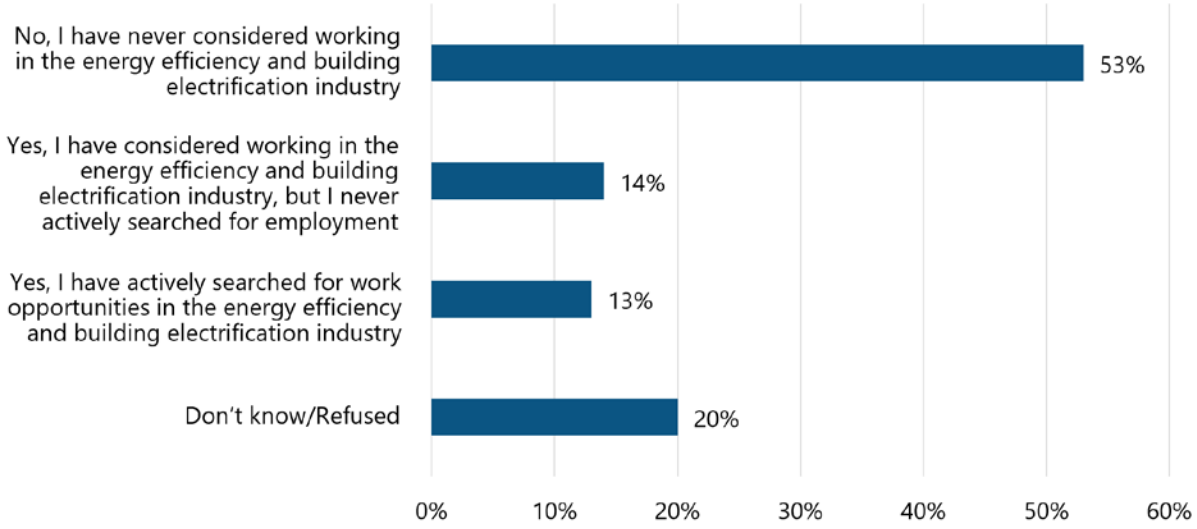
Source: Surveyed Workers, Involuntarily Unemployed Only, i.e., Looking for Work.



Most (53%) surveyed job seekers had not considered working in EE/BE. Only 13% reported actively searching for opportunities in EE/BE, and another 14% considered working in EE/BE (Figure 19).

Figure 19. "Have you ever considered and/or looked for employment in the energy efficiency and building electrification industry?"

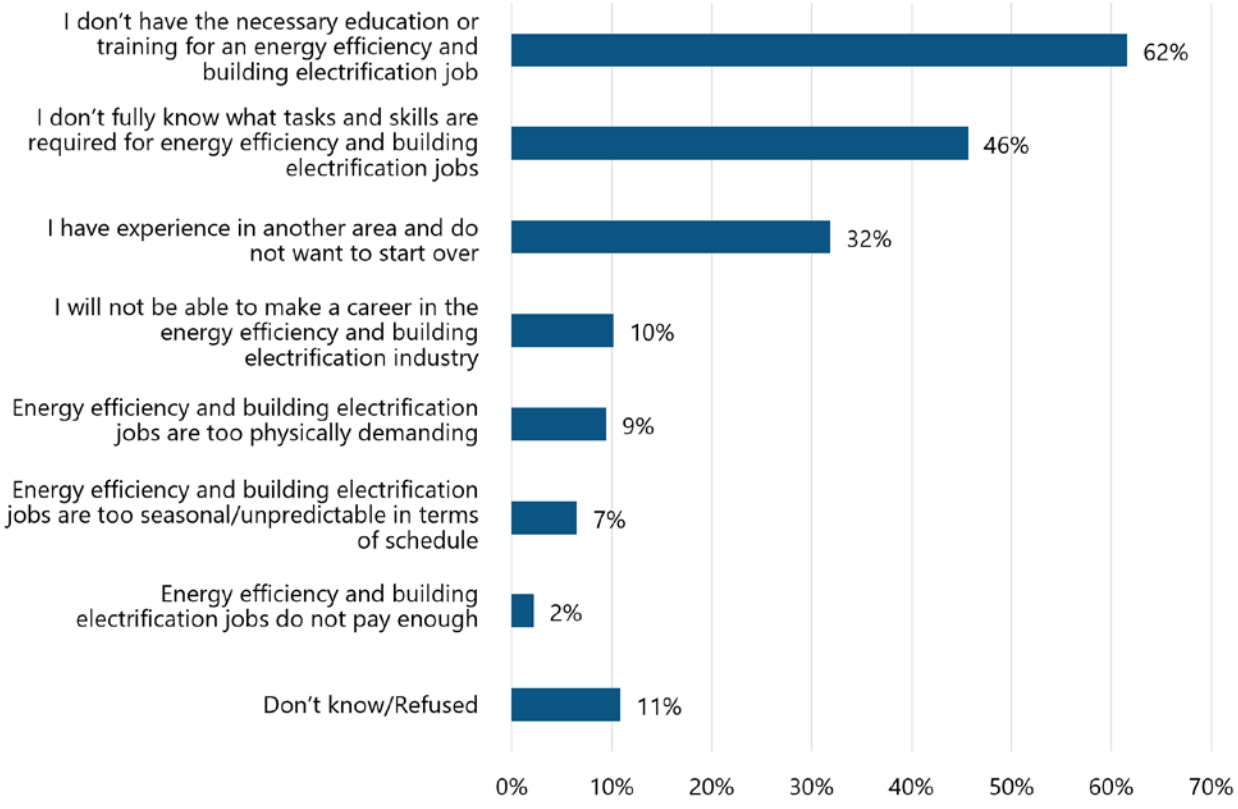
Source: Surveyed Workers, Involuntarily Unemployed Only, i.e., Looking for Work.



Not having the necessary education or skills (62%) and not knowing the necessary skills (46%) were the two most common reasons that job seekers had not considered employment in EE/BE. Concerns related to perceptions of the industry (such as not being able to make a career, endure the physically demanding work, work on a nonseasonal basis, and low pay) were cited for 10% or less of respondents (Figure 20). This suggests that among job seekers with low information about EE/BE, some feared perceptions about the industry are seemingly not widespread.

Figure 20. "Why have you not considered employment in the energy efficiency and building electrification industry?"

Source: Surveyed Workers, Involuntarily Unemployed Only, i.e., Looking for Work.



4. The EE/BE Workforce Development Ecosystem

Examining the EE/BE workforce development ecosystem is another critical step in assessing how New York State can meet the occupational workforce demand identified in the previous section. While the occupational gap analysis identifies which occupations require targeted or immediate attention, the workforce development ecosystem analysis lays the foundation to explain why certain gaps exist and where they can be addressed. This section examines the assets, constraints, and system-level conditions that influence workers' ability to enter, advance, and remain in priority EE/BE occupations. By integrating quantitative and qualitative data, the analysis connects urgent occupational needs to the underlying workforce development challenges that must be addressed to build a stronger and more equitable EE/BE talent pipeline.

Note: This overview provides a high-level framework for understanding the workforce development ecosystem and is not intended to capture every stakeholder type or nuance. Some stakeholders fall outside the major categories presented here, while others operate across multiple categories. Certain entities also have roles, responsibilities, and relationships that vary by program, geography, funding source, or institutional context and are therefore not fully reflected in this assessment.

4.1 Policymakers and State Staff

Policymakers and staff at New York State agencies and authorities are central to driving workforce development efforts through policy and regulation, funding and programming, and the convening of various stakeholders.

As a large state with a wide variety of needs across different regions, New York State agencies implement statewide policies, programs, and funding that are flexible for different populations and regions while remaining structured to meet statewide standards. Their funding and programming are used by a variety of other stakeholders in the EE/BE workforce development ecosystem, including educational institutions and training providers, businesses, consumers, and community groups.

New York State agencies and authorities offer multiple types of energy workforce funding supporting everything from career exploration to on-the-job training to wraparound support. This section provides an overview of New York State funding programs that currently or could include support for workforce development in the EE/BE industry. The programs have been grouped by the sponsoring/implementing organization.

4.1.1 Empire State Development

ESD administers several programs supporting economic development and workforce training across New York State. The Regional Council Capital Funds Program, with an annual budget of $60 million in both 2025 and 2026, supports municipalities, economic development organizations, and academic institutions for capital-based projects that create jobs, reduce unemployment, and grow economic activity (ESD n.d.-d).

The Strategic Planning and Feasibility Studies Program offers up to $1 million per annual round to commission the planning work for future investments. Cities, counties, towns, villages, business improvement districts, local development corporations, and nonprofit economic development organizations are all eligible to apply for funding (ESD n.d.-f).

Under ESD's Office of Strategic Workforce Development, the Pay for Performance Grant Program provides funding to meet the operational needs of training programs in high-demand industries such as cleantech, manufacturing, and construction, including curriculum, stipends, and wraparound services. Its total budget of $115 million is awarded over multiple rounds (ESD n.d.-c). Similarly, the $35 million Workforce Development Capital Grant Program funds the physical infrastructure required by these training programs. Both workforce programs prioritize organizations serving underrepresented populations, the unemployed, and low-income earners (ESD n.d.-g).

4.1.2 New York State Department of Environmental Conservation

The Green Jobs for Youth Grant aims to support skills training and job placement in environmental industries in partnership with employers. A total of $4 million dollars is available for community organizations, Native American Tribes, and tribal organizations serving youth ages 17–24 (New York State Department of Environmental Conservation n.d.).

4.1.3 New York Power Authority

New York Power Authority (NYPA) supports multiple programs providing clean energy workforce development and economic growth. The Clean Energy Workforce Training Initiative, a partnership between NYPA and the Department of Labor (DOL), provides up to $25 million annually for technical training, internships, and apprenticeships in the clean energy space targeted in DACs (NYPA 2026).

For students specifically, NYPA's Environmental Justice Internships Program commits $5 million to paid summer internships and fellowships, offering industry-recognized certifications in areas such as energy auditing and HVAC. Between 2021 and 2025, the program has successfully placed 225 paid opportunities (NYPA 2025a).

Similarly, the Future Energy Leaders Scholarship Program has awarded $700,000 in total, including $10,000 scholarships to academically accomplished college students in underrepresented communities pursuing careers in the energy sector. Between 2021 and 2025, scholarships were awarded to 70 academically accomplished students (NYPA 2025b).

More broadly, the Contributions and Sponsorships Program distributes around $3 million annually to support clean energy education and skills development for nonprofits, municipalities, state agencies, and tribal organizations. In 2025, funding was provided for 15 projects.

4.1.4 New York State Energy Research and Development Authority

NYSERDA offers four programs that support clean energy workforce development. The On-the-Job Training for Energy Efficiency and Clean Technology program provides up to $11,000 in wage support per new hire ($8,500 per hire from non-DACs) to eligible businesses, reducing the financial risks of hiring new workers (NYSERDA n.d.-f).

The Technical Skills Training and Upskilling Program seeks to build and expand training capacity across the State by developing and improving the technical skills and knowledge of existing clean energy workers and students in post-secondary education and career and technical education (CTE) programs. The funding is available from 2026 through 2030, with a total of $20 million; applicants can request a maximum of $500,000 per project, with a cost-share requirement. Technical training organizations, professional associations, and other entities with experience delivering clean energy technical training are eligible for funding (NYSERDA n.d.-g).

The Clean Energy Career Pathways Training provides up to $1.5 million per project (a total of $30 million in funding offered) for technical training, career preparation, and job placement for entry-level clean energy workers, with a cost-share requirement. For recipients to be eligible, at least 50% of trainees must identify as residents of DACs or members of a priority population (NYSERDA n.d.-c).

The Apprenticeship and Pre-Apprenticeship Clean Energy Training Initiative builds clean energy training infrastructure and capacity in direct entry pre-apprenticeship, registered apprenticeship and journey worker training programs. Eligible entities, including bona fide labor organizations, labor management committees/training centers, or active NYS direct-entry pre-apprenticeship training programs, can request up to $900,000, including funding for K–12 career awareness and outreach. This program also has a 50% DAC requirement for pre-apprenticeships and a 50% DAC or priority population requirement for apprenticeships and journey-level worker training (NYSERDA n.d.-e).

4.1.5 New York State Homes and Community Renewal

The Weatherization Assistance Program Training and Technical Assistance Funding provides a range of funding (up to $5 million) for training and technical assistance to the Weatherization Assistance Program subgrantees completing weatherization work, targeting heat pump manufacturers, distributors, installers, and contractors. Eligible applicants include heat pump manufacturers, distributors, installers, and contractors. Its main objective is to expand training, teach business strategies, and create a network of organizations (New York State Homes and Community Renewal 2024).

4.1.6 New York State Education Department

The Employment Preparation Education supports school districts and Board of Cooperative Educational Services (BOCES) in the provision of employment preparation programs. It is a state fund of $96,000,000 in total, eligible to school districts and BOCES to support programs leading to a high school diploma, English as a Second Language education, and occupational training for those over the age of 21 who may or may not have a high school diploma (New York State Education Department 2026).

4.2 Industry and Employers

Aside from the foundational step of providing employment opportunities, industry and employers set market standards by establishing hiring qualifications and compensation structures. They also develop the workforce pipeline by signaling to training providers and other stakeholders the worker skills and qualifications they seek and by supporting work-based learning opportunities. In the EE/BE industry, they educate consumers about their service options, deliver the products and services their customers seek, and help lower customers'

costs by participating in State incentive and rebate programs. The adoption of EE/BE technologies depends on firms and technicians trained to deploy clean technologies; otherwise, building owners and residents may not be offered clean alternatives when making equipment and upgrading decisions.

4.2.1 Small Contractors

The small residential-sector structure creates a fundamental capacity challenge for workforce development. Because many small firms hire infrequently and in small numbers, they often have limited visibility into their future workforce growth and hiring needs.

They also lack the administrative staff, time, internal systems, and technology access needed to engage regularly with training and education providers, participate in internships or other work-based learning models, pursue State funding opportunities, or develop formal upskilling pathways for incumbent workers.

> *"Small organizations do not have the support needed to access state funding, program opportunity notices, or other grants"—CTE/training provider*

> *"[Small contractors] often have to act as intermediaries between the customer and incentive programs and do all the paperwork. Small contractors do not have the capacity for this. MWBEs don't know these programs exist."—Electric and gas utility stakeholder*

These constraints also make it difficult for employers to clearly communicate their workforce needs. When small businesses can engage with training and education providers, the certifications, technical competencies, and hiring requirements they identify are often inconsistent, highly specific to individual firms, or not clearly defined. This limits providers' ability to design programs that are both responsive to employer demand and scalable across the broader EE/BE market.

As a result, capacity constraints among small employers have ripple effects across the workforce development ecosystem. They reduce employer participation in publicly supported programs, weaken feedback loops between industry and training providers, and make it harder for state agencies and education partners to design interventions that effectively reach the businesses and workers most in need of support.

4.2.2 Minority and Women-Owned Business Enterprises

Minority and Women-Owned Business Enterprises (MWBEs) are important partners for expanding workforce opportunities for workers from DACs and priority populations. These businesses frequently partner with organizations to hire a diverse workforce (46% compared to 19% for all other EE/BE employers), and most (89%) are interested in cultivating partnerships with local schools to build the workforce pipeline. They can also help potential workers from diverse backgrounds connect more effectively with the industry through shared languages, identities, and cultures.

However, MWBEs tend to have slightly greater difficulty with hiring, retraining, and retaining workers. Four in five (83%) reported experiencing at least some hiring difficulty, while 75% of all other EE/BE employers reported this. For ten out of 11 EE/BE technologies surveyed, MWBEs were less likely than other businesses to retrain or reskill staff to perform related services. These patterns may limit MWBEs' ability to grow and adapt to the rapidly expanding and advancing EE/BE industry.

4.3 Education and Training Providers

Education and training providers are key to developing a skilled workforce capable of performing services that drive progress toward state goals. These providers aim to meet employer demand for workers by educating and training the next generation of workers. They are also important entities for recruiting and increasing awareness among students and workers to expand the workforce pipeline into certain industries.

Training and education providers in EE/BE must develop new curricula and training materials for new technologies and practices entering the market. Providers that support the career pathways for the 13 priority EE/BE occupations include educational institutions, labor unions, community-based organizations, private companies, and government agencies. According to stakeholders, education and training providers in New York State are eager to expand their offerings, engage with other workforce stakeholders to better understand industry needs, and support students and job seekers to the best of their abilities.

Since 11 of the 13 priority occupations are construction and maintenance roles, many relevant EE/BE workforce programs focus on CTE, apprenticeship preparation, job readiness, and industry-recognized certifications. These programs align with the technical nature of EE/BE work and the occupational pathways most commonly associated with building construction, installation, repair, and maintenance.

While union training programs and RAs remain important parts of the broader construction workforce development ecosystem, they may not provide a sufficient or accessible pipeline for many EE/BE employers. This is especially true for small residential-sector contractors, where unionization is less prevalent and where much of the state's expected EE/BE growth is likely to occur. Unionization rates are highest among large firms and are more likely to support the commercial building sector, where specialization in a specific craft is necessary. For example, the International Association of Heat & Frost Insulators and Allied Workers has a long history of energy-efficiency projects at hospitals and industrial sites, but this skill set is different from that needed to insulate the attic of a single-family home (Insulators International n.d.).

The State University of New York (SUNY)/City University of New York (CUNY) system and the BOCES network are identified as prominent educational institutions contributing to EE/BE training and education. These institutions have strong CTE programs in key building trades, including electrical, HVAC, and plumbing. Stakeholders champion them for having exceptional training and robust programming. They are also widely accessible across the state, both geographically and financially. However, stakeholders noted how challenges with access in rural areas and during summer months, outside of the conventional academic calendar, persist. A more detailed analysis of the state's training and education providers and programs can be found in Section 6 EE/BE Training Assets.

It is also important to recognize the role of high schools and adult education programs that provide foundational instruction in areas such as math, science, and English. While these providers are not tracked in this workforce analysis, they are an important part of the EE/BE workforce development ecosystem because they build the core skills workers need to engage with technical concepts in EE/BE and the skilled trades. Rather than providing occupation- or industry-specific technical training, these programs help prepare students to enter more formal education and training pathways. In rural communities and DACs, these schools are likely to have fewer resources to support students through this type of curriculum than in other communities. Students themselves may also struggle to attain this basic education due to personal experiences, making it difficult for them to enter a specific career pathway.

4.4 Electric and Gas Utilities

Electric and gas utilities provide energy to consumers in residential, commercial, and industrial buildings. They operate and maintain critical energy infrastructure while adhering to strict safety, reliability, and environmental regulations. New York State's electric and gas utilities are important partners to state agencies as they seek to lower consumer/ratepayer costs while

ensuring reliable service. They can significantly influence consumer and energy demand growth through their programs, investments, and rate structures. They can also offer EE/BE incentive programs, similar to those of State agencies, which can reduce total energy use regardless of fuel. These EE/BE programs can also contribute to market demand for EE/BE services and affect the EE/BE workforce development ecosystem.

Utilities are uniquely able to respond to today's workforce demand while simultaneously planning for future workforce needs. They have access to a breadth of data that enables them to receive and amplify industry demand signals sometimes before employers and other stakeholders realize them. They also work with established contractor networks to implement their programs across multiple regions of the state, both residential and commercial sectors, and the various EE/BE technologies.

Utilities can have established partnerships with nonprofits and other stakeholders, as well. Utilities' contractor and installer networks support collective advancement by sharing information about new opportunities and technologies, and will be crucial partners in meeting future EE/BE workforce demand. However, with different incentive programs and contractor networks across utilities, fragmentation remains.

4.5 Regional Workforce Specialists

Workforce development boards and organizations, economic development organizations, and labor market experts support the workforce development ecosystem through research and analysis, convening stakeholders, and, at times, programming or funding.

There are over 30 local workforce development boards in New York State, one State Workforce Development Board, and several private labor market experts, given New York State's high share of professional services firms and workers, especially in or near New York City.

4.6 Nonprofits and Community Groups

Social benefits groups represent community interests by helping communities overcome barriers to social and economic opportunities. These nonprofit and community groups provide support services, connect community members to training and employment opportunities, share information, and advocate. They often depend on public funding, awards, private grants, and philanthropic donations rather than on investors or lenders seeking profits.

In EE/BE, these groups often convene educators, training providers, employers, and other entities to understand how best to guide workers and facilitate workers' access to education, training, and high-quality employment opportunities. In New York State, nonprofit and community groups operate in an environment where equity and accessibility are prioritized. The 2026–2030 EE/BE Orders underscore New York State's prioritization of workforce access for DACs and priority populations. NYSERDA's Regional Clean Energy Hubs, which are comprised of individuals from CBOs with local and technical knowledge and are formed to help individuals and businesses learn about and navigate opportunities in the clean energy economy, often rely on partnerships with other CBOs to reach priority populations.

Nonprofit and community groups are incredibly important for connecting workers and job seekers facing significant education, training, and employment barriers, especially those from DACs and priority populations, to job opportunities. Many offer job-readiness or job-training programs, as well as wraparound support services such as childcare, professional clothing, and transportation access. Of all providers identified in the state offering workforce-related wraparound services, nonprofit and community groups accounted for 74%. A more detailed analysis of the state's wraparound services and providers is available in the following section EE/BE Training Assets and Gaps.

5. Energy Efficiency and Building Electrification Training Assets and Gaps

New York State has a robust training, wraparound service, and funding ecosystem to support workforce development for both new and incumbent EE/BE workers. The State supports programs that offer multiple entry points for workers with different needs and career goals, including earn-while-you-learn models for those seeking immediate entry into the labor market, shorter-term programs for those who want credentials without committing to multiyear degrees, and longer-term academic pathways for those pursuing more advanced education. Organizations throughout the state support a range of wraparound services, including financial literacy, food assistance, housing supports, and other resources that can help workers enter and remain in training.

However, even with New York State's robust workforce development ecosystem, regional evidence shows that training location, affordability, and structural barriers continue to limit access for underserved populations. As a result of gaps and variations in resources across the state, current training and support services appear insufficient to comprehensively meet the state's weatherization workforce needs. For example, transportation remains a particularly significant gap in the wraparound service ecosystem, despite its central role in connecting workers to education, training, and employment opportunities, including job sites. Without stronger training and wraparound supports for weatherization-related occupations, the State may struggle to meet its weatherization goals and miss an opportunity to create accessible entry points into EE/BE careers for workers who have historically faced structural barriers to employment.

This section outlines a statewide review of nearly 800 training and education programs and almost 300 sites that offer wraparound support services related to workforce development. It includes analyses of program types, organizational types, outcomes, and locations, as well as maps for specific regions. NYSERDA will host a database of these EE/BE training opportunities and wraparound support services available here: https://www.nyserda.ny.gov/All-Programs/Clean-Energy-Workforce-Development-and-Training/For-Job-Seekers.

5.1 Training Assets and Gaps

New York State has 759 publicly listed training and credentialing programs that can help meet the workforce demand identified for the EE/BE priority occupations. The state's community college system, universities, CTE schools, private training companies, labor unions, and other local organizations offer these training programs. The inventory is not exhaustive and only captures publicly advertised programs, not those exclusive to memberships or other private groups. The inventory includes only programs that were active when the analysis was conducted. These data provide a point-in-time assessment.

Regional-level analyses of existing training offerings are available in Appendix A: Regional Level Findings and Recommendations.

5.1.1 Programs by Occupation

HVAC/R mechanics and installers and insulation and weatherization workers are among the occupations with the greatest anticipated demand over the next decade, but training opportunities for insulation and weatherization workers stand out as the most limited compared to the forecasted need. Training opportunities for electricians are the most common in the inventory, with 155 identified programs, followed by opportunities for construction laborers and HVAC/R mechanics and installers, with more than 100 identified training or education opportunities each (Table 5).

RAs are also the most common training opportunity for construction laborers (49%), providing thorough training in the craft and allowing them to work on public construction projects, as required by state law. Programming is more varied for HVAC/R mechanics and installers: Job-readiness training and certificate programs account for half (50%) of programs offered for the occupation, each accounting for 25%, while RAs, CTE programs or courses, and associate degree programs each represent between 10% and 15% of HVAC/R training. Distinct occupational training gaps are explored in the following section.

Table 6 presents the number of training programs for each priority occupation by program or outcome type. Over half (59%) of the training programs designed for electricians are RAs, consistent with the post-secondary education and vocational training requirements for the occupation.

The prevalence of a broad range of construction-related training programs is important. Given the age of the building stock in New York State, much of EE/BE activities will require tasks like upgrading outdated electrical and heating/cooling systems, analyzing a building's thermal weak points, and remediating those weak points with the insulation that is best suited for those conditions, all of which require specialized skill sets. Older buildings may also require remediating hazards, such as lead and asbestos, before EE/BE tasks can be completed.

Ultimately, the data in Table 6 highlight that, on an absolute statewide basis, the number of training programs is unlikely to be a significant constraint on the EE/BE workforce, as the ratios suggest that fewer than two additional seats per training program per year would more than address the future workforce needs. While this is an imperfect calculation considering that not all program participants will graduate, and not all graduates will enter the corresponding occupation, there may also be entryways and mid-career transitions that are unaccounted for in this inventory. First-Line Supervisors is one occupation with a significant training gap, though years of experience resulting in internal promotion is the most common pathway into that career. Upskilling initiatives discussed elsewhere in this assessment may help address this gap.

Table 5. Occupational Focus by Training Inventory Program and Additional Demand, 2025–2035

Occupation	Number of Training Programs	Additional EE/BE Demand, 2025–2035
Electricians	155	562
Construction Laborers	109	820
Heating, Air Conditioning, and Refrigeration Mechanics and Installers	104	4,079
Mechanical Engineer	90	43
Plumbers, Pipefitters, and Steamfitters	83	1,035
Construction and Building Inspectors	59	26
Carpenters	54	336
Construction Managers	43	1,045
Insulation Workers and Weatherization Technicians	28	2,054
Operating Engineers and Other Construction Equipment Operators	25	557
First-Line Supervisors of Construction Trades and Extraction Workers	6	817
Maintenance and Repair Workers, General	3	60

Table 6. Number of Training Programs in New York State by Priority Occupation and Outcome

Pre-App = Pre-apprenticeship; RA = Registered apprenticeship; AA/AS = Associate degree; BA/BS = Bachelor's degree; Cert = Certificates (credit or noncredit); CEU = Continuing Education Unit. Other includes microcredentials, undergraduate courses/credits, exam preparation programs, or upskilling programs.

Occupation	Pre-App.	RA	AA/AS	BA/BS	Adv. Degree	Cert. (credit or noncredit)	CEU Credits	CTE Program/ Course	Job Readiness	Other	Total
Electricians	1	91	4	-	-	12	-	27	18	2	**155**
Construction Laborers	8	53	6	1	-	9	-	15	15	2	**109**
Heating, Air Conditioning, and Refrigeration Mechanics and Installers	2	16	10	-	-	26	4	14	26	6	**104**
Mechanical Engineer	-	-	39	36	10	-	-	-	4	1	**90**
Plumbers, Pipefitters, and Steamfitters	-	57	2	-	-	5	-	5	11	3	**83**
Construction and Building Inspectors	-	-	-	-	-	44	9	-	6	-	**59**
Carpenters	3	25	2	-	-	2	-	9	11	2	**54**
Construction Managers		2	7	8	6	15	-	1	3	1	**43**
Insulation Workers and Weatherization Technicians	-	10	-	-	-	8	8	-	2	-	**28**
Operating Engineers and Other Construction Equipment Operators	-	24	-	-	-	-	-	1	-	-	**25**
First-Line Supervisors of Construction Trades and Extraction Workers	-	-	1	1	-	1	-	-	2	1	**6**
Maintenance and Repair Workers, General	-	3	-	-	-	-	-	-	-	-	**3**
Total	**14**	**281**	**71**	**46**	**16**	**122**	**21**	**72**	**98**	**18**	**759**

Although there are a substantial number of RAs for construction roles relevant to EE/BE, apprenticeship opportunities should grow alongside market demand. Nearly two-fifths (37%) of identified training programs are RAs, though many of these are sponsored by private companies, making enrollment dependent on employers' capacity and hiring trends. Furthermore, the number of apprentices that small companies can sponsor at a given time is often lower than that of large companies, colleges or universities, BOCES programs, labor unions, or other training entities. RAs, particularly union RAs, are also often highly selective and competitive, and because RAs are the "gold standard" for workforce training, the graduates of RAs are often contenders for the highest-paying construction roles, which are more likely to be in infrastructure construction than in much of the EE/BE market. This means that RA models for EE/BE require specific solutions.

Union apprenticeships must continue to be a source of RAs into EE/BE. Union RAs will continue to play an important role in supporting the construction of new efficient industrial, commercial, and residential buildings, and many construction trades unions have robust RA programs and training facilities. However, because much of the EE/BE market is comprised of small businesses with lower rates of union involvement, union apprenticeships make up one part of the EE/BE apprenticeship ecosystem.

Group sponsorship of apprentices—which utilizes pools of employers to support apprentices rather than individual companies—may be a good solution for small EE/BE businesses. Sharing the time, logistical, and material costs of hosting RAs could help reduce risk to an individual company, increase inter-industry collaboration and communication on skills and training, and facilitate robust hands-on training for EE/BE job seekers. Implementing group sponsorship of apprentices will require substantial convener infrastructure, workforce development ecosystem engagement, and support for host EE/BE companies.

Certificate programs are also common, with 122 programs identified statewide (Table 6). Most of these are noncredit-bearing certificate programs, primarily offered by private companies, nonprofit organizations, and industry or trade associations. Credit-bearing certificate programs are typically found at community colleges and 4-year colleges and universities.

General job-readiness programs comprise 13% of programs in the inventory (98 statewide). These programs familiarize students with a specific field and its foundational concepts but do not lead to occupation-specific certifications or credentials. Many of these are similar to pre-apprenticeships in that they are designed to give participants a sense of the field or

occupation before officially entering it, but do not support participants' direct entry into RAs or other training programs. These programs enable participants to make more informed decisions about their chosen career path.

Job readiness programming is a useful recruitment method because it typically involves short-term, low-cost commitments, making it easier for students and job seekers to participate. In this inventory, many are BOCES or community college programs that offer some hands-on training, and some include an Occupational Safety and Health Administration certification, which is useful for workers entering the construction industry.

Additionally, despite the large number of RA opportunities in New York State, formal pre-apprenticeship programs—which have direct pipelines to RAs—aligned with priority occupations account for roughly 2% of the inventory, or 16 programs (Table 6). Many providers appear to address similar needs through job-readiness, CTE, and some certificate training programs instead. As a result, apprenticeship preparation may be present in the broader workforce system, but it is less often structured as a formal pre-apprenticeship pathway directly connected to RAs.

5.1.2 Locations and Geography

Much of the training availability in New York State is concentrated in or near urban centers such as New York City, Rochester, and Syracuse. New York City alone hosts 153 programs, or one-fifth (20%) of the entire training inventory. Bordering New York City, the Mid-Hudson region has 83 programs and Suffolk County has 62 programs, the most training opportunities of any New York county. The leading provider in the county is Eastern Suffolk BOCES, which offers 11 training programs relevant to priority occupations. In addition to in-person training, 68 relevant online programs are available to New Yorkers regardless of county, covering topics such as building science principles and HVAC/R technician training. These online programs offer greater capacity than in-person training and are accessible via the internet without transportation needs, but typically provide less hands-on training experience (Table 7).

Table 7. Number of Identified Training Programs and Employment Change 2025–2035, by Regional Economic Development Council Region

REDC Region	Number of Training Programs	Additional Workers Needed by 2035	EE/BE Industry Employment Percent Change, 2025–2035
New York City	153	8,417	12%
Long Island	84	4,607	21%
Mid-Hudson	83	3,421	24%
Finger Lakes	73	1,657	23%
Western New York	72	1,553	20%
Central New York	65	1,015	23%
Capital Region	58	1,624	22%
Southern Tier	49	336	24%
North Country	31	336	33%
Mohawk Valley	22	443	27%
Online	68	-	-

While training availability is strong in these counties, access is not evenly distributed across the State—a significant number of counties, primarily rural, have extremely limited training programs for these priority occupations. Nineteen counties, many of them rural, have either one or zero training programs identified in the development of this inventory (mapped in Figure 21). Surveys reinforced this geographic barrier. Every surveyed EE/BE worker from the Mohawk Valley, the North Country, and Central New York regions agreed that they know what they need to do to get to the career they want and the promotion opportunities available to them, but 97% said that training and education providers are too far from their homes to access.

Figure 21. Map of Identified Training Programs in New York State Serving EE/BE Priority Occupations and Population

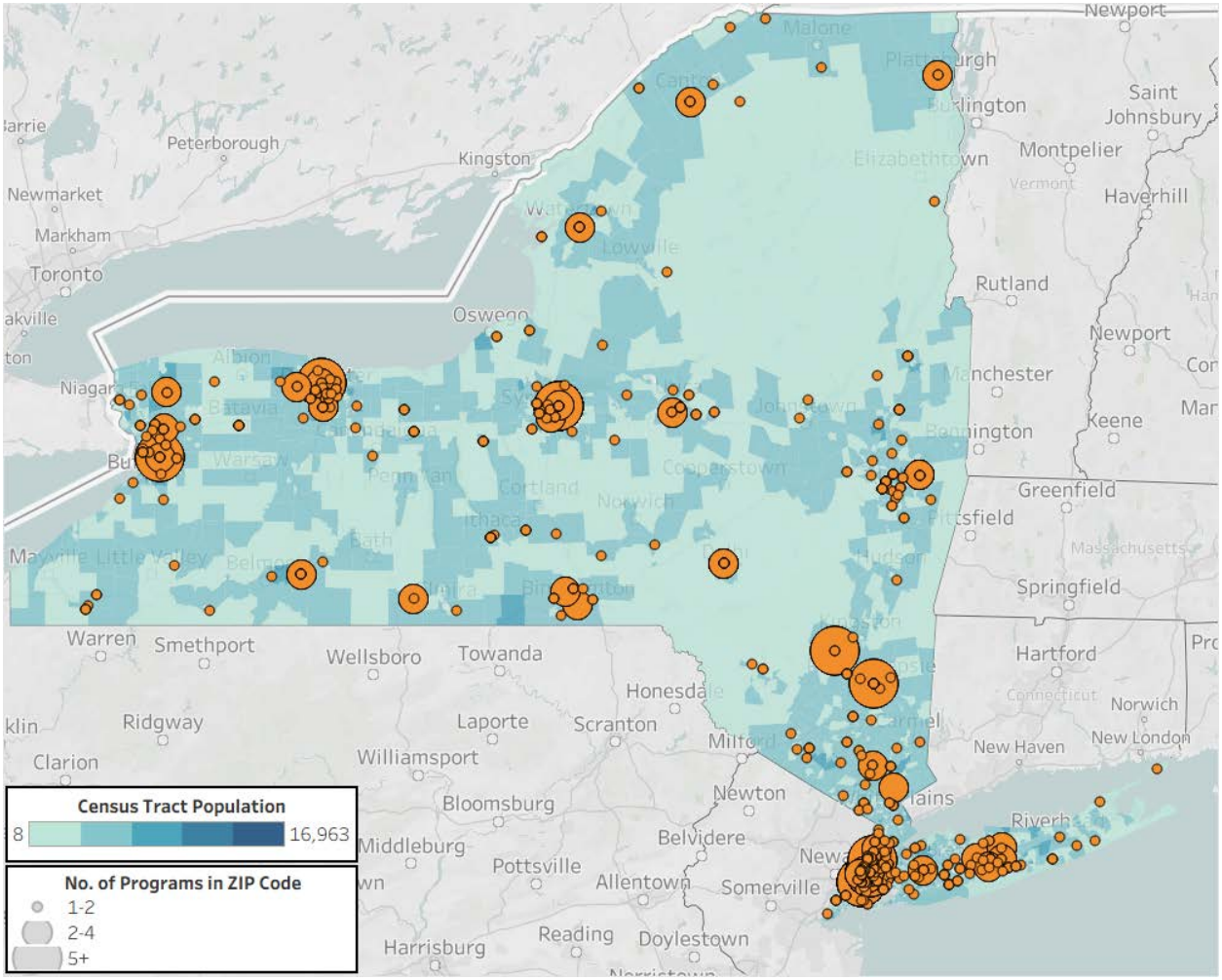
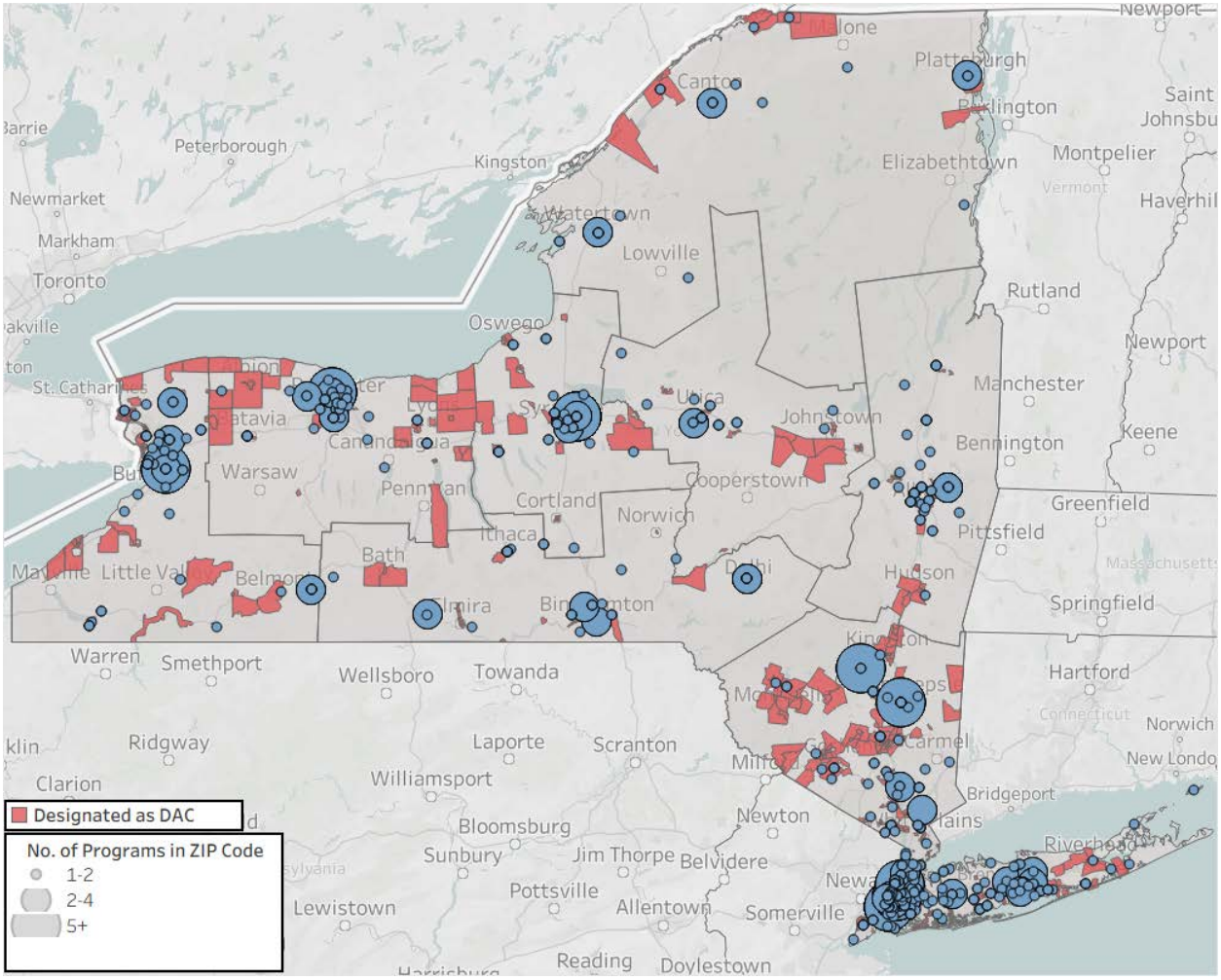


Figure 22. Map of Identified Training Programs in New York State Serving EE/BE Priority Occupations and Disadvantaged Communities



Several occupations, including insulation workers, construction managers, carpenters, and plumbers, also have geographic training gaps. For example, there are limited HVAC/R programs and nonunion plumbing programs in the Mohawk Valley. More details on regional programming gaps that may hinder the industry's growth in a certain region, and its ability to meet the state's decarbonization goals in Appendix A: Regional Level Findings and Recommendations.

The nature of residential EE/BE work, particularly in single-family residences, also makes labor union training programs less applicable to the industry pipeline in the sector. Outside of union training, geographic inequities become more pronounced in certain occupations. In the Capital Region, for example, there are two programs for insulation and weatherization workers, one of

which is union-affiliated. Workers entering the residential sector, especially those servicing single-family homes, are likely to rely on the singular nonunion program identified. Similarly, in Western New York, limited union-affiliated insulation and weatherization programming leaves a gap in the pipeline for residential insulation and weatherization workers.

5.1.3 Training-Related Barriers

Stakeholders identified the lack of qualified instructors, specifically for CTE courses, as a gap facing training providers. Recruiting and hiring instructors is viewed as more difficult than retaining them, suggesting that the primary gap is the limited supply of qualified candidates entering teaching roles. Case studies around CTE instructor recruitment and retention are included in Appendix B.

> *"[We're] going to be short on instructors soon because they are contractors as well"—Education/training provider*

> *"[There's a] big gap in having qualified instructors in this space"—CTE/training provider*

In addition, education and training providers struggle to coordinate with employers and equip workers with sufficient hands-on training. Given their busy schedules and limited capacity to train new workers, employers and contractors seek job candidates who are ready to work and require minimal on-the-job training. Three in five (60%) surveyed EE/BE employers agree that applicants lack the work experience needed for the job (Figure 7). They value hands-on training and experience over virtual training as more effective for preparing workers for the job tasks. However, without employer participation, providers struggle to offer participants this hands-on training and experience, tailored to real-world situations.

Employers similarly reported that they do not often partner with training and education providers to recruit workers, even though 89% of EE/BE firms expressed interest in partnerships, programs, and initiatives that could support workforce pipelines. This suggests that the disconnect between employers and providers is not primarily driven by a lack of interest. Instead, it likely reflects structural barriers, limited capacity, and insufficient coordination mechanisms that make sustained collaboration difficult.

This disconnect with employers also impacts job trainers' and educators' abilities to support job placement for workers. Stakeholders noted that these providers could play a stronger role in connecting program completers to employment opportunities by deepening relationships with

employers and developing more consistent job placement pathways. However, education and training providers are unable to do this effectively without buy-in and commitment from already-constrained employers.

5.1.4 Gaps and Implications for Training and Wraparound Systems

Table 8 details workforce training gaps for twelve of the priority occupations examined in-depth for this assessment. For each occupation, the number of additional workers forecasted by 2035 is listed, as well as specific regional gaps.

Table 8. Occupation-level Workforce Gaps

Occupation	General Gap	Gap Details
Carpenters **Anticipated demand 2025–2035:** 336 additional workers	Somewhat sparse geographically, with more programs concentrated downstate. Four REDC regions have limited programs. Most programs are RAs or BOCES programs, covering a range of trainings needed for both union and nonunion work opportunities.	There are prominent geographic gaps in the North Country and Central New York. In the North Country, there are limited BOCES programs, limiting options for potential workers, especially those who live far from the BOCES site. In Central New York, the few programs captured in the inventory were RAs in Onondaga County. Commute times for individuals outside of Onondaga County may deter some from pursuing carpentry training and slow EE/BE technology expansion in other parts of the region. The Finger Lakes and Southern Tier regions both had limited carpentry programs identified. BOCES supports one of the programs in each region. In the Finger Lakes, the other is a union-affiliated training program, while another program in the Southern Tier is an associate degree at a SUNY institution. These may create barriers for potential workers in the residential EE/BE sector. Carpenters trained by the union are less likely to be drawn to the residential sector, where high demand is expected. In addition, potential EE/BE workers are likely to be those facing high barriers to training, education, and employment, making a two-year degree program more difficult to recruit for.

Table 8. (continued)

Occupation	General Gap	Gap Details
Construction and Building Inspectors (incl. Energy Auditors) **Anticipated demand 2025–2035:** 26 additional workers	In-person training is extremely limited and found in only three REDC regions: Central New York, Mid-Hudson, and New York City.	Most programming for this occupation is available online (61%), increasing accessibility and flexibility for workers with varying schedules. However, online training may provide fewer opportunities to develop field-based skills and practice applying learned concepts and procedures to real-world scenarios. More in-person training opportunities are needed to complement online coursework with hands-on learning opportunities. Since workers entering this occupation are not likely to be first-time workers, these in-person opportunities could be traveling workshops or short-term trainings that are complementary to the Building Performance Institute.
Construction Laborers **Anticipated demand 2025–2035:** 820 additional workers	Concentrated around urban centers including Buffalo, Rochester, Albany, and New York City. Limited availability is only found in specific regions of the State.	In the Finger Lakes region, trainings are concentrated around Rochester, which may deter potential workers outside Rochester from pursuing this career pathway. There were also limited laborer programs in the North Country and Southern Tier, likely to limit the workforce pipeline for laborers in more rural areas of the State. Programming in the North Country included BOCES programs and a union-sponsored training. Given the smaller concentration of unions in the residential sector, partnerships between the BOCES and residential employers will be critical for helping students find employment opportunities in EE/BE.
Construction Managers **Anticipated demand 2025–2035:** 1,045 additional workers	More than half of these programs are in the New York City and Long Island regions of the state. Outside of these regions, programs are relatively sparse.	Outside of New York City and Long Island, most regions had few programs at the time the inventory was conducted. Potential workers may need to travel far to attend existing training if they live outside of New York City and Long Island. Additional Construction Manager programs closer to the center or Northern portions of the state may expand access to upward career progression.

Table 8. (continued)

Occupation	General Gap	Gap Details
Electricians **Anticipated demand 2025–2035:** 562 additional workers	Higher concentrations around urban areas but are generally spread across six of the ten REDC regions. Programming gaps are most severe in the Mohawk Valley. They are also apparent in Central New York, the Capital Region, and the North Country.	In the Mohawk Valley, electrician programs are limited, with BOCES in Herkimer County offering Electricity I-III courses. There are also relatively limited programs in Central New York, the Capital Region, and the North Country. In Central New York and the Capital Region, most training options are RAs, which means the regions rely heavily on private companies, industry associations, and unions to develop the worker pipeline. This can create a bottleneck for the residential sector, where businesses grow slowly and are often too strained to regularly participate in on-the-job training programs. On the other hand, the North Country mostly relies on BOCES programs or training at academic institutions for electricians, making partnerships with employers critical for supporting students seeking employment.
First-Line Supervisors of Construction Trades and Extraction Workers **Anticipated demand 2025–2035:** 817 additional workers	Extremely limited, with programs only in Western New York and Central New York.	First-line supervisors often complete technical training in a specific trade and then advance into supervisory positions through years of on-the-job experience. Limited training programming would therefore be expected, though the few identified programs focus on leadership development for existing trades workers. The time required to progress from trade training to field experience to supervision can create a bottleneck, limiting the industry's ability to rapidly expand its supervisory workforce.

Table 8. (continued)

Occupation	General Gap	Gap Details
Heating, Air Conditioning, and Refrigeration Mechanics and Installers **Anticipated demand 2025–2035:** 4,079 additional workers	Relatively broad geographic reach across the State. Apparent gaps in only specific regions.	Two community colleges in the Mohawk Valley had certificate and associate degree programs, but alternative avenues for HVAC training were limited at the time the inventory was conducted. Partnerships with employers to provide more hands-on opportunities will be critical for developing this workforce. All programs in Central New York are in Onondaga County, and NYS Weatherization Directors Association offers most of them. BOCES and the local union support the other few programs in this region. However, this created barriers for potential HVAC workers outside of Onondaga who will need to travel for existing programming. Similar geographic limitations for HVAC training can be seen due to limited programs identified on the eastern side of the North Country region, the southern part of the Western New York region, and the eastern part of the Southern Tier region.
Insulation Workers and Weatherization Technicians **Anticipated demand 2025–2035:** 2,064 additional workers	Extremely limited, with only a few programs in most regions.	All regions in NYS need more training opportunities for weatherization and insulation. Nearly half (45%) of projected employment growth resulting from 2025 State Energy Plan activities is in the residential shell subsector, due to the State Energy Plan's building shell retrofit goals. Given the low barriers to entry for this occupation, as well as the lower compensation and benefits, this occupation may be a strategic entry point into longer-term EE/BE career pathways. Not only will this help build workforce pipelines for multiple occupations, but also help to better position workers from DACs for long-term and higher-paying work opportunities in the construction industry and other skilled trades.

Table 8. (continued)

Occupation	General Gap	Gap Details
Maintenance and Repair Workers, General **Anticipated demand 2025–2035:** 60 additional workers	Extremely limited. A few programs were identified in only the Finger Lakes, Central New York, and Mid-Hudson regions.	The limited number of programs designed specifically for general maintenance and repair workers likely reflects the occupation's broad, cross-functional nature, as relevant training is often embedded within HVAC/R, electrical, plumbing, or other trade-specific programs. However, this gap also presents an opportunity to develop cross-trade training that prepares workers for more versatile maintenance roles across multiple building systems.
Mechanical Engineers **Anticipated demand 2025–2035:** 43 additional workers	Monitor, but no urgent actions or concerns.	Programming is generally concentrated where 4-year academic institutions or community colleges are since nearly all available programming for mechanical engineers results in an academic degree. SUNY has a statewide footprint that reaches many rural regions through community colleges, technology colleges, and regional campuses. This makes SUNY an important training and workforce development asset for rural communities, although access may still depend on transportation, program availability, and relative costs.
Operating Engineers and Other Construction Equipment Operators **Anticipated demand 2025–2035:** 557 additional workers	Mostly concentrated near urban areas, including Buffalo, Syracuse, Albany, and New York City. Almost all programs are RAs sponsored by local unions or private companies.	There were limited programs identified in the Southern Tier, the North Country, the Finger Lakes, the Mohawk Valley, and Mid-Hudson regions.
Plumbers, Pipefitters, and Steamfitters **Anticipated demand 2025–2035**: 1,035 additional workers	Similar to HVAC training, generally spread across the state, but less concentrated than electricians and construction laborers.	There were limited programs identified in the Mohawk Valley and the North Country region. In the North Country region, all the programs identified in the inventory were in Jefferson County.

6. Wraparound Services Assets and Gaps

Wraparound support services are resources that help reduce barriers to accessing workforce training and employment opportunities, such as transportation assistance, childcare, housing support, food security programs, behavioral health services, financial assistance, and veteran services.

A comprehensive inventory of 276 wraparound service sites was developed that provide wraparound support services to workers across New York State.[24] Organizations included in the inventory were identified through a review of nonprofits, community-based organizations, social service providers, religious institutions, and government agencies. Specific wraparound services offered by these organizations were cataloged. Due to the wide range of social service providers in New York State, the inventory was limited to entities that either provide their own workforce development programs, such as general education classes, career and job support, and certifications, or partner with organizations that deliver workforce development support.

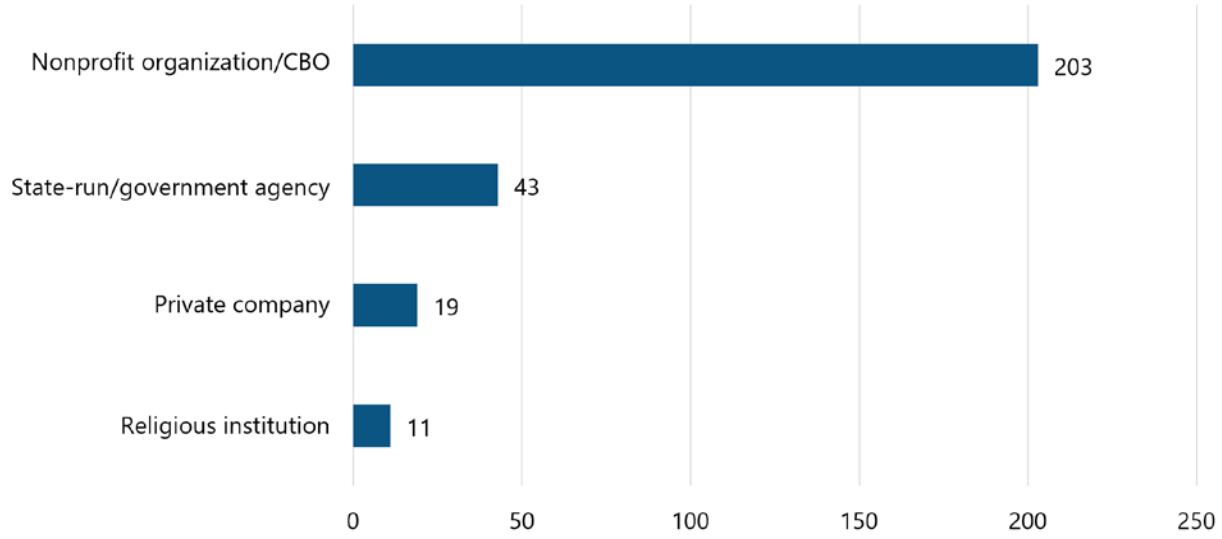
Similar to the training inventory, this inventory of wraparound services that support workforce development is a point-in-time assessment.

6.1 Organization Types

Wraparound services associated with workforce development in New York State are predominantly delivered through the nonprofits and community-based organizations (CBOs): 203 of the 276 organization locations identified. The remaining 73 organizations consist of state or local government agencies (43), private-sector organizations (19), and religious institutions (11) (Figure 23).

> *"The space for supportive services has increased over the years. Used to be, "Why do you need supportive services? But if you focus on DACs, you'd need this."*
>
> *—State agency representative*

Figure 23. Organization Locations by Type



Wraparound Service Provider Spotlight: Examples of Organizations Promoting Thoughtful Workforce Support

The **Henry Street Settlement** in New York City offers support services, internal workforce development programs, and training and certifications through partners. They offer childcare, housing, behavioral health services, financial assistance, and legal support in addition to adult literacy programs and job placement support. The Henry Street Settlement partners with SUNY ATTAIN for digital literacy training and with Stacks+Joules for building automation systems training, in addition to its other community partners (Henry Street Settlement n.d.).

The **Center for Community Alternatives** (CCA) offers robust workforce development programs and support for people impacted by the criminal legal system. CCA has locations in Syracuse, Brooklyn, Rochester, and White Plains. CCA offers education and soft skills classes, career planning and mentorship, and paid workforce training in addition to housing, food, and behavioral health services (Center for Community Alternatives n.d.).

The **Buffalo Urban League** in the Western New York region provides opportunities for underserved communities to access career-readiness training, mentorship, and employment outreach services, as well as support for housing, food, financial literacy, family services, and racial justice advocacy (Buffalo Urban League n.d.).

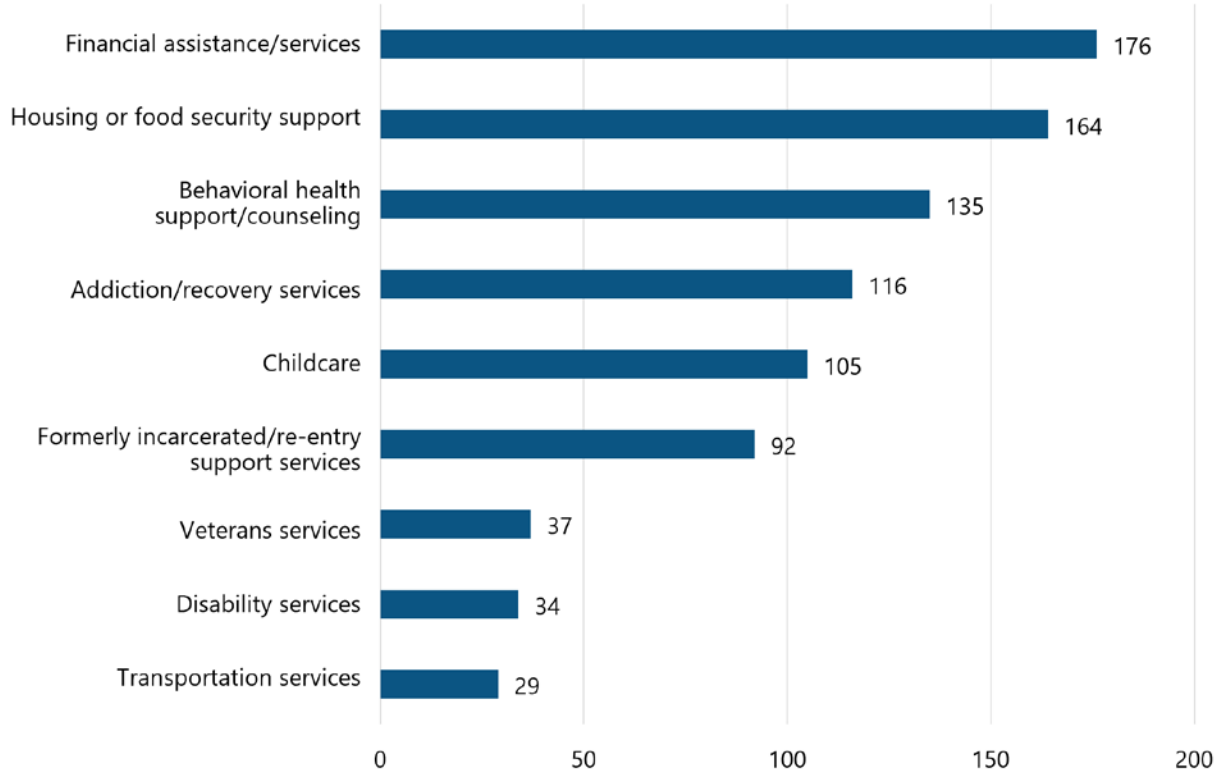
6.2 Services Offered and Locations of Providers

Structural barriers, including transportation, childcare, financial stability, and language barriers, limit workforce participation for all workers, especially those from DACs and priority populations. Wraparound services are essential to ensuring that participants can complete training or education programs and transition into employment. Without these supports, programs risk low retention even when training quality is high. However, existing gaps in these service offerings across the state can disproportionately affect certain groups' access to EE/BE opportunities.

The inventory highlights a wide range of supportive services offered, demonstrating a well-developed wraparound ecosystem capable of addressing the diverse needs of job seekers and workers in New York State. Organizations that provide financial assistance/services make up the largest concentration (64%) of wraparound providers, followed by housing or food security support (59%). By prioritizing services that address common economic and behavioral barriers, these organizations provide a foundational level of support, ensuring workers can access workforce training programs and pursue stable employment. About half of New York State regions cite housing affordability and availability as a barrier to workforce entry[25] (NYSERDA 2024). Thus, while food and housing remain persistent barriers, New York State has made progress in removing these barriers, with at least 164 organizations offering these services as part of workforce development support (Figure 24).

Additionally, technology skills and internet access in Mid-Hudson, New York City, and Western New York regions limit participation in online applications and job training. Similarly, the Mid-Hudson, New York City, and Central New York regions identify a need for general education remediation services, including literacy, writing, and math. Based on the inventory data, many of the 276 organizations offer education or technology literacy services to address this barrier (Figure 24).

Figure 24. Organization Locations by Support Services Offered



In most cases, individual organizations offer a range of supportive services spanning several of the categories identified in the inventory, as well as additional services that fall outside these classifications.

Wraparound service organizations operate across the State, with the highest concentration in the New York City region (28%), followed by Western New York (16%). In contrast, the most rural regions had the lowest concentrations of service providers. The North Country and the Mohawk Valley regions each had six providers, or 2% of the inventory (Table 9).

Figure 25 similarly shows the breakdown of service providers by REDC. The 2024 Regional Assessment and Barriers Analysis (RABA) reports, developed by the respective Regional Clean Energy Hubs through extensive research and community engagement, identify challenges and opportunities for developing each REDC region's clean energy economy and highlight the need for greater access and awareness of wraparound service providers in particular regions of New York[26] (NYSERDA 2024).

Table 9. Organization Locations by Regional Economic Development Council Region

Region	Count of Locations	Percent of Total
New York City	78	28%
Western New York	45	16%
Mid-Hudson	37	13%
Capital	35	13%
Long Island	29	11%
Finger Lakes	16	6%
Central New York	14	5%
Southern Tier	10	4%
Mohawk Valley	6	2%
North Country	6	2%

Figure 25. Wraparound Service Providers in New York State by Population, 2026

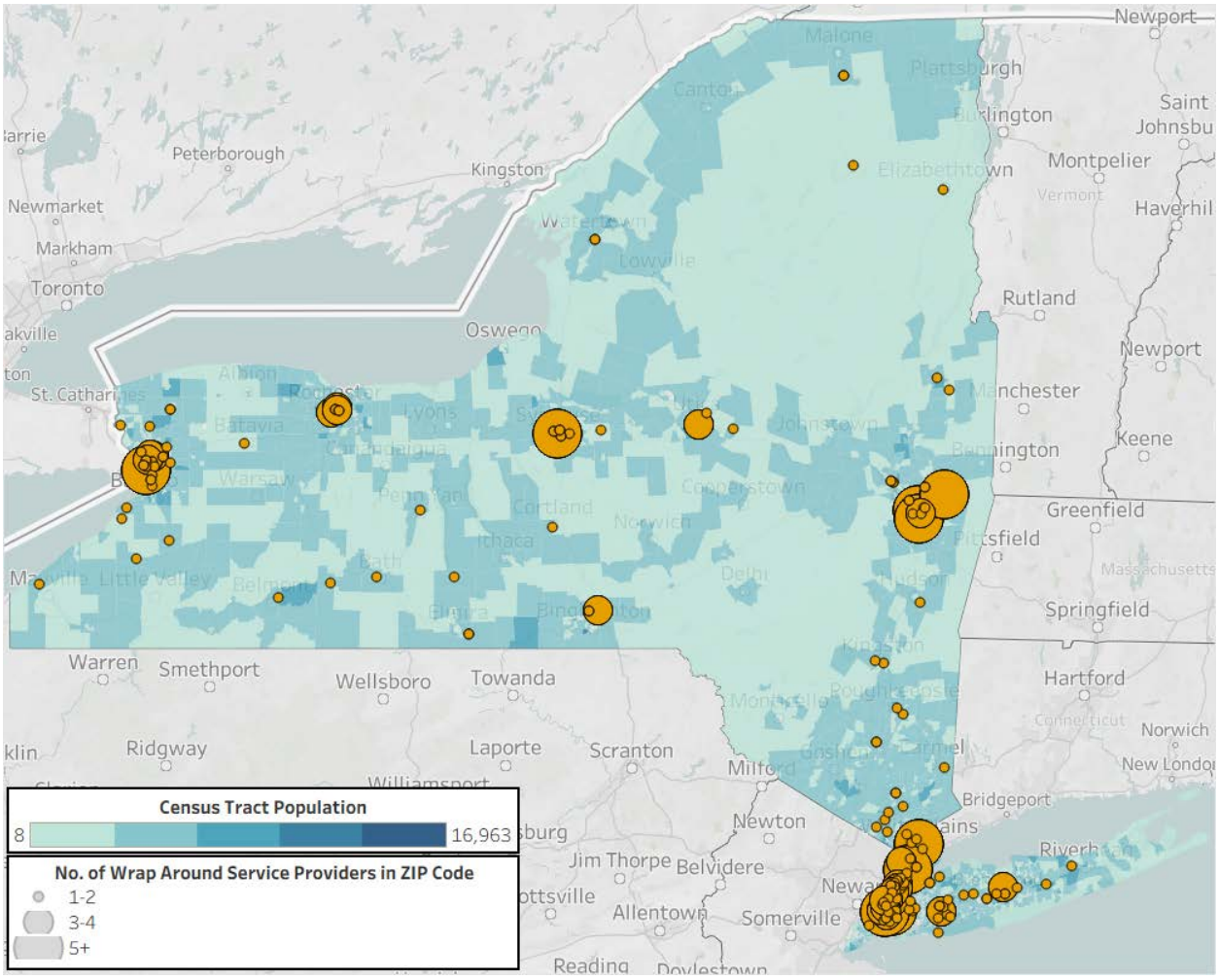
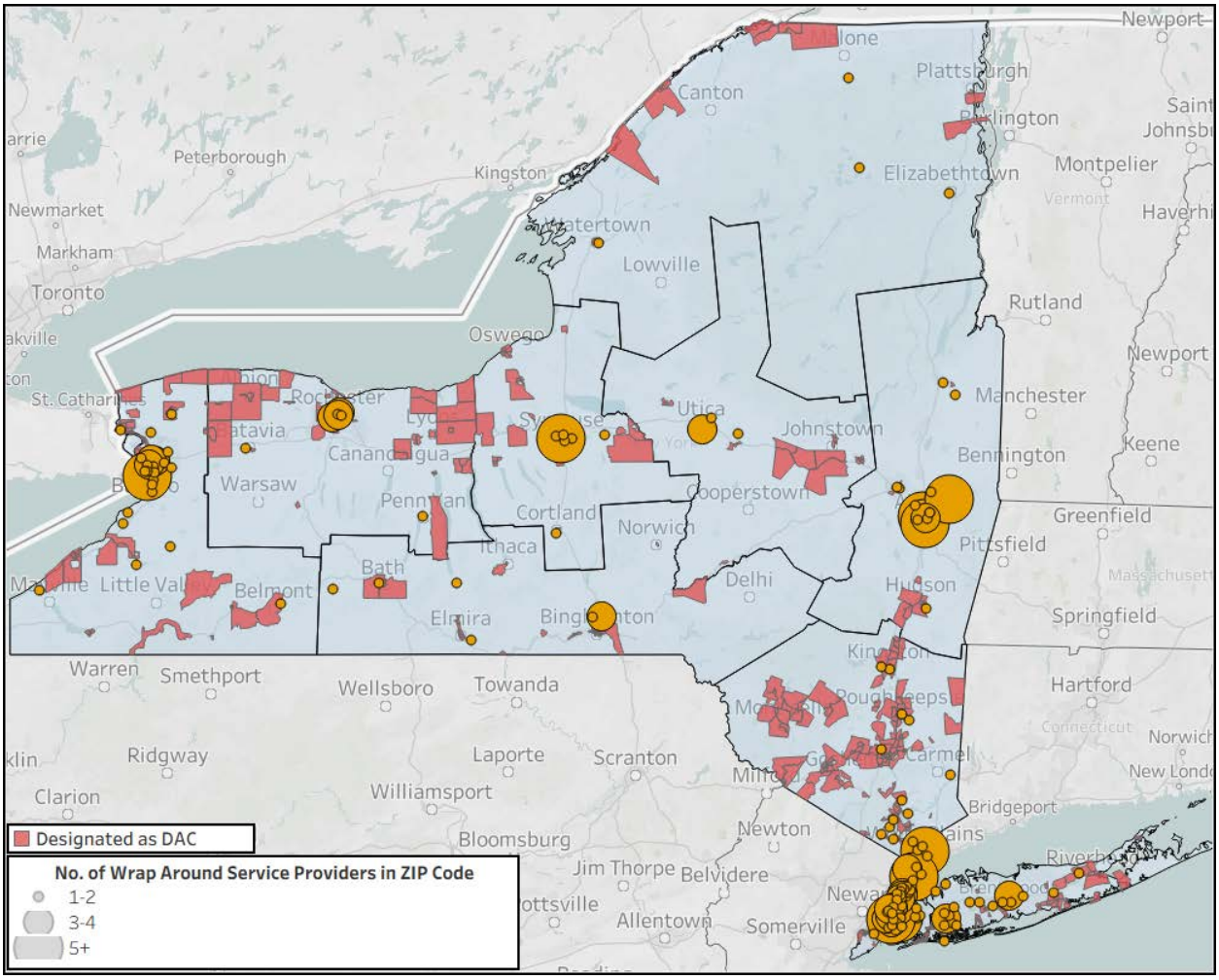


Figure 26. Wraparound Service Providers in New York State and Disadvantaged Communities, 2026



Support for specific populations appears less frequently in the inventory. Organizations providing disability services (12%) and veteran services (13%) represent two of the three least common support categories identified (Figure 24). As a result, individuals within these groups may encounter gaps in service availability, particularly in areas where these organizations are not geographically accessible.

Lack of reliable childcare is also a frequently cited barrier in New York State (NYSERDA 2024), despite a substantial share of wraparound providers offering services to address this challenge. However, further compounding this barrier is an extreme shortage and lack of access in specific rural geographies, such as the North Country (North Country Clean Energy Hub 2024) In the North Country, only two providers offer childcare as a workforce development support (one in

Essex County and one in Lewis County), and in the Mohawk Valley, there is only one provider (in Herkimer County). Childcare is one example where challenges are particularly acute within, but not limited to, EE/BE. This suggests that whole-of-government solutions will be essential to addressing many of EE/BE's workforce challenges.

Transportation assistance is the least common wraparound service identified in the inventory, with only 29 providers, despite the well-documented role that transportation barriers play in limiting access to training and employment opportunities for DACs (Urban Institute n.d.). Nearly all RABAs report that transportation costs and access limit participation in the clean energy workforce, suggesting this is a statewide issue that requires regionalized solutions. Transportation access is especially important for the EE/BE industry, where most (57%) EE/BE employers work in single-family residential buildings. With work sites changing frequently, businesses and their workers must be mobile.

In rural communities, where EE/BE work sites are more spread out than in urban areas, reaching these sites is especially challenging without reliable public transportation or ridesharing options. In rural DACs, individuals typically have fewer resources to afford reliable transportation and a driver's license, creating a major obstacle to gaining workforce opportunities in New York State's growing EE/BE industry. There is also a severe lack of access to public transportation in the North Country, Western New York, Long Island, and Mid-Hudson regions (NYSERDA 2024).

Aside from consistent transportation and childcare hurdles, workforce barriers vary significantly across New York State regions, underscoring the need for regional strategies tailored to local labor market conditions, training capacity, and support service needs. Across New York State's different regions, projected employment growth, training availability, and wraparound service capacity differ substantially. Downstate New York regions such as New York City and Long Island are projected to see strong job growth, with larger existing EE/BE workforces and more extensive training and support infrastructure. They also have the highest concentrations of Hispanic and Latine workers in the State, with 89% of surveyed Hispanic or Latine workers living in New York City or on Long Island. Of Hispanic or Latine workers surveyed, 67% agreed that language barriers prevent them from accessing the training and education necessary to support their career advancement. Language support needs will differ downstate from those in other regions of New York State. In contrast, regions such as Mid-Hudson face rapid projected EE/BE employment growth alongside a more limited selection of training options, including gaps in occupational variety, advanced technology training, and geographic access, as well as diverse wraparound support needs.

6.3 Other Wraparound Service-Related Barriers

Small contractors less frequently connect their workers to wraparound support programs. Of those surveyed, one-quarter (25%) of large businesses said they offer housing support, while only 4% of small businesses do. Similarly, 22% of large businesses provide transportation assistance, and 17% provide English language training, compared with 10% and 5% of small businesses, respectively. This is likely due to their limited capacity to secure resources and operate these programs. Without these programs, these contractors are further limited in hiring and training their workers, especially those from DACs or priority populations.

7. Building the Energy Efficiency and Building Electrification Workforce

This chapter summarizes the key challenges facing the EE/BE workforce in New York State and then presents a series of opportunities to address these challenges. The challenges that the EE/BE sector faces are not unique to EE/BE, but are particularly acute within EE/BE because of the industry's structure. New York State already has a strong foundation of EE/BE stakeholders and programs that it can leverage to work toward solving these EE/BE workforce development challenges. Better coordination of these stakeholders, adapting solutions to meet the particular needs of a market segment, and embracing a "whole-of-government" approach to these challenges can result in direct targeting and resolution of underlying challenges that are hindering the current ecosystem's abilities.

Many of the challenges and opportunities in this section focus on the residential sector, particularly single-family and small multifamily buildings, because it faces the greatest demand in the future and currently faces more intense challenges. However, the identified challenges and opportunities also apply to the large multifamily and commercial segments of the EE/BE industry.

7.1 Bolster the EE/BE Workforce Development Ecosystem

The 2025 State Energy Plan goals would drive demand for 23,400 additional EE/BE workers over the next ten years. The resulting cumulative growth (17% over ten years) does not exceed historical growth trends (22% over the past eight years alone), but much of the employment growth is forecasted to occur in parts of the EE/BE sector that already face challenges with hiring, retaining, and competing for talent from other construction industries that offer higher wages and more benefits.

Looking ahead, 83% of all EE/BE projected additional employment is in the residential sector, representing approximately 19,500 jobs out of the 23,400 estimated additional jobs created.[27] However, jobs within the residential sector are more likely to pay lower wages, offer fewer benefits, and require more travel to different job sites, especially those within the single-family home part of the EE/BE market, which accounts for 48% of the total building stock in the state (U.S. Census Bureau 2025). These factors make attracting and retaining talent difficult.

Nearly 80% of New York State EE/BE contractors are small businesses, and the overwhelming majority of these small EE/BE contractors (84%) perform work in single-family residences. Small employers hire much less frequently, often lack the administrative capacity to engage with training providers or state programs, and have less infrastructure and capacity to train workers on the job. The mismatch between anticipated growth in the residential sector and small employers' hesitancy and barriers to adding employees presents a substantial workforce bottleneck.

Macroeconomic factors may also hinder growth in the EE/BE workforce. New York State currently has historically low unemployment, which means the pool of available talent is likely to have less relevant experience and more barriers to employment. At the same time, there is significant projected demand from other industries in New York State, including renewables, nuclear, transmission, transportation, and nonenergy-related infrastructure buildout. This demand for the same types of workers as EE/BE in non–EE/BE parts of the economy will compound some of these identified EE/BE workforce challenges.

Solving the structural barriers to expanding the EE/BE workforce requires ecosystem-level solutions. New York State already supports several coordinating mechanisms around EE/BE workforce development, but stakeholders reported that the growing workforce development ecosystem can be difficult to navigate, with some efforts fragmented or overlapping. Stakeholders may have difficulty identifying where investments are producing results, which occupations face emerging shortages, or where small contractors and training resources are located.

The following recommendations detail how the EE/BE workforce development ecosystem can be realigned and supported to focus on priority areas.

- Fund ecosystem facilitators who are dedicated to convening employers, training partners, and state agencies, as well as maintaining and bridging relationships, strengthening information sharing, and supporting system-wide collaboration. A third-party facilitator is frequently highlighted as a best practice for consistently engaging and convening small employers, making these conveners especially important for EE/BE. See Appendix B.2 for case studies of third-party facilitators.

- Case studies of ecosystem development suggest that it is important to give employers a voice in the convening structure and agenda. The conveners should hold separate convenings for servicers of the different types of building stock so that employers' different needs are heard and met. 'Externships,' which facilitate trainer visitations to employer sites to build trust and share knowledge between the two parties, are another ecosystem-building exercise that could be incorporated. See Appendix B.6 for case studies and good practices for small and rural employer engagement.
- Part of the ongoing engagement and coordination process could be a regional-level summary of workforce needs, employer-identified skill gaps, unresolved barriers, promising practices, and partnership opportunities to identify regional and statewide challenges and best practices. Regional-level coordination is discussed later in this recommendations section.

- Increase employer awareness and utilization of existing workforce programs and resources by offering higher value-add services and offering additional programming geared toward small businesses. Build on programs offered through NYSERDA, ESD, the Small Business Development Centers, Regional Clean Energy Hubs, and other partners.
  - Blend economic development and workforce development funds to accomplish dual-purpose small business supports. These programs may assist small businesses with upskilling current staff, expanding contractors' range of technologies and capabilities, and reducing the risks associated with hiring. Supports could include wage subsidies, HR assistance, workforce program concierges, as well as help navigating incentives, Requests for Proposals, reporting requirements, and certifications. Utilizing funds from both workforce and economic development sources can help minimize redundancies and foster a more successful and resilient EE/BE market of employers and employees. For instance, ESD's New York State Linked Deposit Program, which is designed to support small and midsized businesses expand their capacity or capabilities, and the Entrepreneurship Assistance Centers Program, which provides technical assistance to new businesses, are two examples of economic development funding that could be blended with workforce development funding that encourages and de-risks employer-sponsored apprenticeship or other hands-on training programs (ESD n.d.-b, n.d.-a).

    - Facilitate upskilling opportunities for employers. This is particularly important for small employers, who were most interested in upskilling opportunities for their existing workers. These upskilling programs could focus on supervisory skills, project management, construction management, leadership, and emerging technology competencies into existing trade and construction programs. New York State unions often feature these programs, but they are only open to union members. New York community colleges offer construction management programs, but these are typically not focused on educating workers within EE/BE.
    - Continue to actively engage employers in hiring and training through incentives that encourage their participation in coordinating with training providers on critical skills, certification requirements, and hiring needs. Wage subsidies, internship support, and other risk-sharing mechanisms make it easier for employers to bring on new workers, particularly when firms are uncertain about the productivity or readiness of recent program graduates.
    - Identify, connect, and support intermediaries with strong employer-facing entities, such as workforce development boards, trade associations, chambers of commerce, or community-based business support organizations, to help small businesses participate more effectively in EE/BE workforce programs by facilitating knowledge transfer among contractors.
    - Promote small businesses' access to "concierges" or "caseworkers" similar to NYSERDA's existing Clean Energy Communities Coordinator program that helps these companies participate and troubleshoot barriers to workforce development ecosystem engagement (NYSERDA n.d.-d).
- Collaboration within the EE/BE workforce development ecosystem should include information sharing around available workforce funding opportunities and program outcomes, and explore opportunities for common guidance, templates, and tips for tracking mechanisms. This would make it easier for stakeholders to compare program activity across agencies and understand where investments are producing results. Other action items around data collection and sharing could include:
    - Develop more precise and interactive forecasts that project EE/BE employment at a regional level in the short term, detail differences in regional demand patterns, and integrate with other place-based data.
    - Regularly update the developed database of assets available in the EE/BE workforce system, as well as gain a better understanding of the small contractor universe.
    - Create a statewide clean energy workforce portal that organizes clean energy workforce programs and funding opportunities across state agencies, with dedicated staffing to support use of the portal.

- Share knowledge around strategic guidance, best practices, and case studies across the EE/BE workforce development ecosystem.
- Synthesize and present this data in clear, concise formats—such as one-page summaries or visual briefs—that are easily understood and usable by practitioners, employers, and job seekers alike.

7.1.1 Experiential Learning

A lack of relevant experience was the driving factor for EE/BE employer hiring difficulty, rather than a lack of certifications and technology-specific knowledge. Three-quarters of EE/BE employers reported at least some difficulty hiring in the past year, and more than a third reported "great difficulty." When asked reasons for that difficulty, the most common responses were that "Applicants do not have the training[28] or education needed for the job" (62% agree, Figure 7); and "Applicants do not have the prior work experience needed for the job" (60% agree). Key EE/BE certifications and licenses were not identified as required *or* preferred by a majority of employers across a range of occupations.

Employers and training providers made it clear that experiential learning—through apprenticeships, on-the-job training, or other hands-on experience opportunities—is essential for EE/BE job seekers to succeed. Employers value hands-on experience, but they often do not have the capacity to partner consistently with training providers. This weakens the potential for curriculum alignment, job placement, and feedback loops unless specific accommodative efforts to convene and engage EE/BE employers are undertaken, as previously discussed.

Current EE/BE workers also reported challenges attaining experiential learning. More than two-thirds (71%) of current EE/BE workers surveyed reported that 'getting relevant work and/or industry experience' was a challenge to starting their career (Figure 17).

Pre-apprenticeship programs that align with priority EE/BE occupations are limited. The inventory identifies relatively few pre-apprenticeship programs, even though preparation for apprenticeships is important for many job seekers aspiring to enter construction-based EE/BE occupations.

RAs, while numerous in the training inventory, are often competitive, and there is much higher demand than there is supply, due in part to the EE/BE's concentration of small employers with minimal capacity for apprentices, combined with lower union participation, which are typical

providers of apprenticeship pathways in other construction sectors. Apprenticeship completion rates are also low; nationally, only 44.6% of apprentices in the Construction industry completed their apprenticeship, and only 46.5% of apprenticeships overall in New York State were completed (DOL n.d.).

Subsequent recommendations are to:

- Limit new worker training program funding to only those programs that incorporate on-the-job readiness and hands-on experience. EE/BE employers often seek candidates who can contribute immediately, and certifications are helpful signals of knowledge and proficiency of technical material, but they are not substitutes for on-the-job experience. This creates a persistent challenge: workers need experience to be hired, but often cannot gain that experience without first accessing employment. New York State should expand training-to-employment pipelines that help new workers gain the hands-on experience employers consistently value.
- Fund RA support systems. RAs are often considered to be the gold standard for providing valuable on-the-job training experience. Making it easier for employers to participate in apprenticeships—whether through incentives, administrative support, or coordination of a consortium or group-level trainings where apprentices are shared across companies—will help grow the number of job seekers who have completed apprenticeships. Additional support for programs and enrollees can also boost completion rates. Increasing completion rates can increase the number of job seekers with relevant experience without increasing the number of apprenticeship seats.
- Expand programs that fund mobile equipment purchases and delivery of experiential learning. Also highlighted in Appendix B as a solution for rural areas, mobile training trailers can help a wider audience across the state get access to a physical workspace and hands-on training.

7.1.2 Key Occupational Investments

Half (50%) of the growth in projected EE/BE demand will be concentrated in thirteen occupations, nearly all of which are construction and installation roles. Meeting projected demand for EE/BE workers requires prioritizing specific construction-based occupations—carpenters, painters, laborers, plumbers, and HVAC mechanics and installers. Many of these occupations typically require general construction experience as well as additive trades-specific training.

Furthermore, training providers also struggle to recruit qualified CTE instructors. Stakeholders identified the lack of qualified instructors as a major training system gap. Recruiting instructors appears to be harder than retaining them, suggesting a limited supply of qualified candidates entering teaching roles.

Weatherization occupations in particular face high demand, and early signs indicate there is already a shortage of supply. Weatherization occupations—which can include weatherization technicians as well as insulation workers and general construction laborers—are unique to EE/BE and are a crucial component of New York State's building sector goals. EE/BE employers reported that building insulation and envelope sealing was the second most common service they provided, behind heat pump installation. One in four employers reported hiring weatherization workers
in the past year, which may reflect higher demand, high turnover, or both.

At the same time, 52% of employers reported that hiring weatherization techs takes more than three months despite the fact that these roles have fewer education and certification requirements. Strong hiring challenges, despite relatively low barriers to entry, suggest there are deeper structural issues for this occupation. These structural challenges include relatively low wages, high demand from other industries for related workers, and a pool of interested talent that often has barriers to employment, such as transportation, heightened by the nature of the EE/BE sector. If the structural barriers to the weatherization worker supply are not addressed, heightened demand will only exacerbate the supply shortage for these workers.

Recommendations to assist job seekers in gaining this knowledge include:

- Agencies should collaborate to fund general construction workforce programs. General construction training is foundational for industries beyond EE/BE, meaning that there should be opportunities to collaborate across sectors to support a broader construction workforce in the state. Cross-sector planning can expand the overall worker pipeline while allowing participants to develop transferable skills applicable to EE/BE and other infrastructure industries. These general construction programs can focus on jobsite safety, gaining familiarity with common tools and building systems. These programs can provide entry points into multiple occupations before participants advance into specialized trade, apprenticeship, or industry-specific training. Furthermore, given the ubiquity of EE/BE principles (such as broader energy efficiency) across a range

of industries, incorporating preliminary EE/BE concepts into this broader construction training would bring value to all workers, even those who look to work beyond EE/BE. This concept is already in practice in some areas, for example, through the North America's Building Trade Unions' Multi-Craft Core Curriculum, which includes a chapter on Green Construction (North America's Building Trades Unions 2017).

- EE/BE convener organizations (discussed in earlier recommendations) should be in communication with recent or soon-to-be graduates of general construction programs. These convening entities could visit these programs as graduation dates approach and discuss various EE/BE career pathways and connect interested students with employers or specialized career training for specific trades.
- Fund instructor recruitment and train-the-trainer strategies that bring current industry practitioners into classrooms and labs. Solutions could include subsidized teaching instruction and support, teaching stipends, adjunct pathways, shared instructor pools, employer-loaned instructor models, and partnerships among BOCES, SUNY, CUNY, unions, and contractors.
- Dedicate workforce funding to the specific training, recruitment, and retention strategies needed for high-demand EE/BE occupations, including weatherization technicians and insulation workers, carpenters, laborers, HVAC workers, and construction managers. Targeted funding should therefore focus on occupation-specific recruitment, training, and retention strategies that better connect workers to residential EE/BE opportunities and support their long-term success in the market. There is also an opportunity for collaboration among training providers, educators, unions, RA programs, contractors, and employers to align traditional trades' training with emerging EE/BE workforce needs. This collaboration is discussed in a later recommendation.
- Develop a strategy specific to weatherization jobs. Weatherization technicians will likely face heightened demand from the 2025 State Energy Plan, though it faces the most severe supply challenges of EE/BE occupations, given its low wages despite its specialized training. One strategy to address this supply challenge is to embrace training and job placement systems that treat weatherization jobs as a structured entry point into longer-term EE/BE career pathways. The Massachusetts Clean Energy Center is currently funding a pilot program that seeks to treat weatherization jobs as a pre-apprenticeship program and connect weatherization technicians to broader EE/BE jobs and career exploration (discussed further in Appendix B: Case Studies and Good Practices).

7.1.3 Improving Access to Wraparound Services

EE/BE employers will need to draw from labor pools of job seekers and workers who face greater barriers to education, training, and employment, as competition from other industries limits the pool of job-ready workers. Poverty, as well as a lack of awareness and experience, is the most frequent barrier faced by these workers. Those who are aware and interested in EE/BE are likely to face significant structural barriers to employment as well, including instability in housing, transportation, childcare, and other critical needs. Financial instability, housing insecurity, food insecurity, and related poverty barriers can reduce training completion and job retention. Due to the historic and persistent link between poverty and race, tackling these barriers is a necessary element to achieve the State's goals for improving outcomes in DACs.

Some potential workers may need remedial education, digital literacy, or basic workforce preparation before entering EE/BE training. Individuals without a high school diploma may require remedial education, and technology skills and internet access may limit participation for some populations. These barriers increase the cost and intensity of workforce preparation. Increased need for EE/BE activity creates important opportunities for workers from DACs and priority populations, but only if workforce programs are equipped to address structural barriers they often face, such as lack of transportation and childcare, financial instability, and language access, as well as limited skills, prior education, or training.

Access to wraparound support—including transportation, childcare, financial constraints, language access, and other barriers—is especially important for EE/BE workforce development, particularly in disadvantaged and rural communities. Wraparound support services, which are resources that help reduce barriers to accessing workforce training and employment opportunities, tend to be most concentrated in urban areas, leaving many rural communities particularly vulnerable. Training providers may not have the funds to offer wraparound services on their own, and comprehensive wraparound resources may not be available in every region.

Transportation access is especially important in EE/BE because work sites are often dispersed across residential areas, and employers need workers who can arrive reliably. Yet, despite its importance, transportation assistance is the least common wraparound service identified in the inventory, offered at only 11% of the provider service sites.

A shortage and lack of access to childcare compounds problems, and the shortage is especially acute in specific rural geographies (North Country Clean Energy Hub 2024). For example, only two childcare providers supporting workforce development efforts in the North Country were found during the development of the training inventory.

Language barriers are also a concern for the current and potential EE/BE workforce. Surveyed Hispanic or Latine workers were twice as likely (67%) compared to non-Hispanic or Latine (33%) to agree with the statement "Language barriers are preventing me from accessing the training and education necessary to support my career advancement." Further, as of 2024, one-quarter (26%) of Spanish-speaking Hispanic or Latine New Yorkers economy-wide reported that they do not speak English well or at all (U.S. Census Bureau 2024a).

Some ways to improve the connection between EE/BE and wraparound services include:

- Prioritize funding workforce training programs that have wraparound services sourced through other means and assist training programs in finding those service providers. There is a substantial wraparound service ecosystem, and encouraging training providers to regularly engage with that ecosystem ensures that extant services and programs are utilized before new ones are considered.
- Strengthen connections between clean energy workforce programs and complementary state housing, public benefits, childcare, and energy assistance programs. Many resources already exist across state agencies, local workforce boards, Career Centers, Regional Clean Energy Hubs, weatherization agencies, and community-based organizations, but workforce entrants, especially young workers facing barriers, may not be consistently connected to them. More formal referral pathways, shared intake processes, co-funded initiatives, and provider networks could help participants access the supports they need as they move through training, job placement, and employment.
- Leverage the training and wraparound support inventories to identify regional service gaps and fund rural provider partnerships, mobile case management, and regional provider networks. Workforce boards could help coordinate "one-stop-shop" models for navigation, referrals, and funding guidance to supplement the Regional Clean Energy Hubs' current outreach and program referral efforts.
- Encourage public service organizations to conduct regional transportation, housing, and childcare assessments and fund the approaches identified to be most effective in addressing local workforce training access barriers. Building on existing RABAs, as well as strategic plans from New York State REDCs, additional surveys, more detailed and layered mapping, and more granular employment projections can help identify the specific supports most needed across urban, suburban, and rural regions.

- Expand language accessibility and support across EE/BE workforce programs, including through multilingual instructors, navigators, case managers, and workforce staff; multilingual technical assistance; language access requirements in grant solicitations; multilingual instruction in EE/BE-specific training programs, and English language educational programs. Although State agencies are subject to New York State's Language Access Law, language barriers continue to affect workers and small contractors as well as MWBEs, often in the construction industry. These options can help non-native English speakers more fully access training, contractor support, funding opportunities, and career advancement pathways.
- Build targeted transportation interventions into regional workforce strategies rather than having training providers try to resolve transportation on their own.
- Conduct regional childcare access assessments and fund locally appropriate supports such as childcare stipends, provider partnerships, co-located services, evening/weekend training options, and referral pathways. These supports should be embedded into training and placement programs rather than treated as optional add-ons.
- Expand multilingual instructors, navigators, case managers, workforce staff, technical assistance, translated materials, and dual-language EE/BE training. Language access requirements could also be incorporated into grant solicitations and contractor support programs, though these requirements would have to be tempered by their relative burden on employers, and particularly small contractors.

7.1.4 Addressing Regional Concerns

Regional labor markets differ substantially, so one statewide strategy will not address all workforce gaps. Projected employment growth, training availability, occupational gaps, language access needs, transportation barriers, and wraparound service capacity vary by region. Strategies that work in New York City may not fit Mid-Hudson, the North Country, the Southern Tier, or the Mohawk Valley. Rural institutions also may lack the scale of constituency to independently offer specialized training for every priority EE/BE occupation.

A range of potential solutions exists to address these gaps:

- Bolster the number of rural training programs, particularly for pre-apprenticeship and general construction training. Building out training programs for every occupation in rural regions is unlikely to be financially or logistically feasible, but there are several alternatives that may provide solutions:
- Some rural training programs can focus on general construction curriculum, to offer job seekers entryways into a range of high-demand construction occupations in EE/BE. The North American Building Trades Unions (NABTU)'s Building Trades' Multi-Craft Core

Curriculum is one example of a common construction curriculum underlying a variety of more specialized roles, such as electricians and HVAC installers. These more general programs could provide core training to a broader pool of job seekers who can then attend other institutions to receive additional training for specialized roles.

- State agencies and EE/BE conveners should formalize regional training partnerships among rural institutions. This includes supporting memoranda of understanding and shared-service agreements that allow institutions to coordinate curricula, instructors, equipment, recruitment, and specialized training across multiple jurisdictions. This shared specialization solves the challenge of scale while still ensuring there are specialized training opportunities for residents in the region.
- Mobile training programs, complete with mobile training laboratories that can travel across institutions, offer geographic flexibility alongside opportunities for hands-on learning. Mobile training labs can incorporate a range of hands-on general construction and EE/BE technologies—SUNY Schenectady has two that support advanced manufacturing and healthcare. These mobile training hubs can also expand the reach of EE/BE career awareness efforts by attending institutions that otherwise lack EE/BE-relevant programming (SUNY Schenectady County Community College 2023).
- Maintain and implement regional strategies tailored to local labor market conditions, training capacity, and supportive service needs. Stakeholders identified opportunities to improve access to existing programs through regional partnerships, transportation supports, hybrid delivery models, and stronger connections between workforce providers and rural communities. Appendix A: Regional Level Findings and Recommendations provides regional-level recommendations to address these specific challenges. Additional recommendations include:
    - Leverage the findings of this assessment with the existing RABA reports as the foundation for a detailed assessment of region-specific workforce gaps, training and support service capacity, and barriers to participation in the EE/BE regional workforce, and use this updated regional assessment to adjust workforce programs and funding targets.
    - Support targeted "one-stop-shop" approaches that include technical assistance and grant consulting to regional stakeholders navigating New York State and federal EE/BE workforce programs opportunities. Both the Central New York and Southern Tier Clean Energy Hubs offer good examples of informing regional stakeholders about workforce funding opportunities and other resources available through EE/BE.

- Utilize the training and wraparound support inventories in this assessment that highlight programs and services underrepresented in existing regional offerings and develop region-specific strategies to address the gaps in those services within individual regions.
- Reinforce communication directly and encourage support for ongoing regional convenings, data gathering, and relationship building that share information and coordinate activities across stakeholders.

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Appendix A. Regional Level Findings and Recommendations

This appendix contains regional-level employment and training program data, identifying where there are gaps in training relative to the anticipated workforce. Table A-1 provides an overview of the forecasted employment demand, identified training and wraparound service assets, and population in the state's ten REDC regions.

The sections following the table provide more detail on the identified training gaps in each region. Only training programs for priority occupations facing the greatest workforce gaps are featured in these sections.

Table A-1. Regional EE/BE Employment and Assets

Region	Population	EE/BE Industry Employment Change, 2025–2035	EE/BE Industry Employment Percent Change, 2025–2035	EE/BE Training Programs	Wraparound Service Provider Locations
Capital Region	1,110,551	1,589	22%	58	35
Central NewYork	777,758	992	23%	65	14
Finger Lakes	1,213,399	1,620	23%	73	16
Long Island	2,919,737	4,508	21%	84	29
Mid-Hudson	2,406,825	3,347	24%	83	37
Mohawk Valley	481,053	433	27%	22	6
New York City	8,483,844	8,256	12%	153	78
North Country	416,124	490	33%	31	6
Southern Tier	632,884	656	24%	49	10
Western New York	1,410,191	1,519	20%	72	45

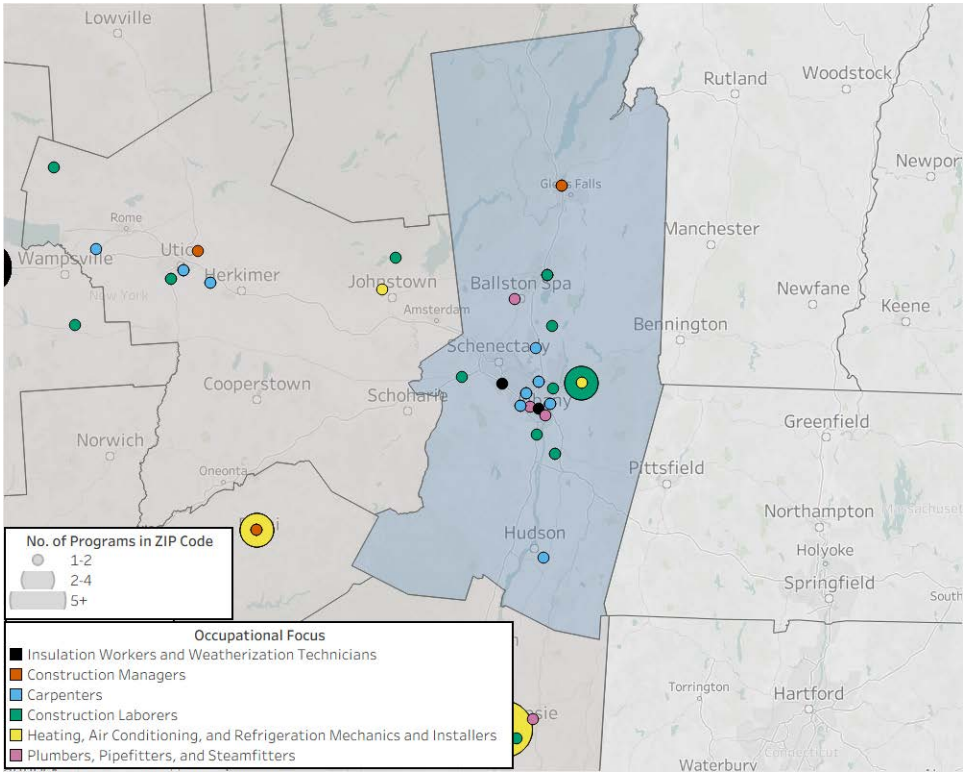
A.1 Capital Region

This section provides an overview of employment projections, identified training, education, and wraparound service programs, and associated gaps in New York State's Capital Region.[29]

Table A-2. Employment Projections and Workforce Training Assets Identified in the Capital Region

EE/BE Industry Employment Change, 2025–2035	EE/BE Industry Employment Percent Change, 2025–2035	EE/BE Training Programs	Wraparound Service Provider Locations
1,589	22%	58	35

Figure A-1. Selected Training Programs in the Capital Region



A.1.1 Training Opportunities for the Capital Region

- There are currently limited training options for insulation and weatherization job seekers. Training could be integrated into career and technical training programs, such as those at BOCES or community colleges, to begin expanding the workforce pipeline. It will be difficult for apprenticeship sponsors to integrate weatherization concepts if they don't work in weatherization already.

- There were few identified construction management programs in the Capital Region, with one being a dedicated construction management program and another being a component of an entry-level construction technology program. There is a potential opportunity to expand programming for this occupation across the region.

A.1.2 Transportation and Geography for the Capital Region

- Training programs are concentrated in the center of the region, with fewer programs in the northern and southern areas. There are fewer programs north of Saratoga and Columbia counties.
- The Capital Region relies heavily on the Capital District Transportation Authority bus system for public transportation, which has better coverage in more dense areas like Albany, Schenectady, Troy, and Saratoga Springs. However, while this transportation system is stronger than other parts of the State, the residential market is so spread out, with 82% of buildings having 1–4 units, meaning that high job-site mobility is required. The bus system is not likely to be sufficient for residential EE/BE workers in the region (Capital District Transportation Authority n.d.).

A.1.3 Demographics for the Capital Region

- Albany and Schenectady counties have nonwhite, low-income populations of over 32% and 27.5%, respectively, predominantly residing in DACs (NYSERDA 2024). Training providers in these counties should be aware of the targeted outreach strategies and supportive services needed to target low-income populations.

A.1.4 Housing Stock for the Capital Region

- Nearly 400,000 (75%) housing units in the Capital Region were built before 1990, suggesting an opportunity for weatherization and other energy efficiency measures, although other building conditions may cause weatherization projects to be deferred (NYSERDA 2024). Workers will need specialized skill sets to handle the outdated electrical and heating/cooling systems, inadequate insulation and ventilation, and dangerous materials such as lead and asbestos.

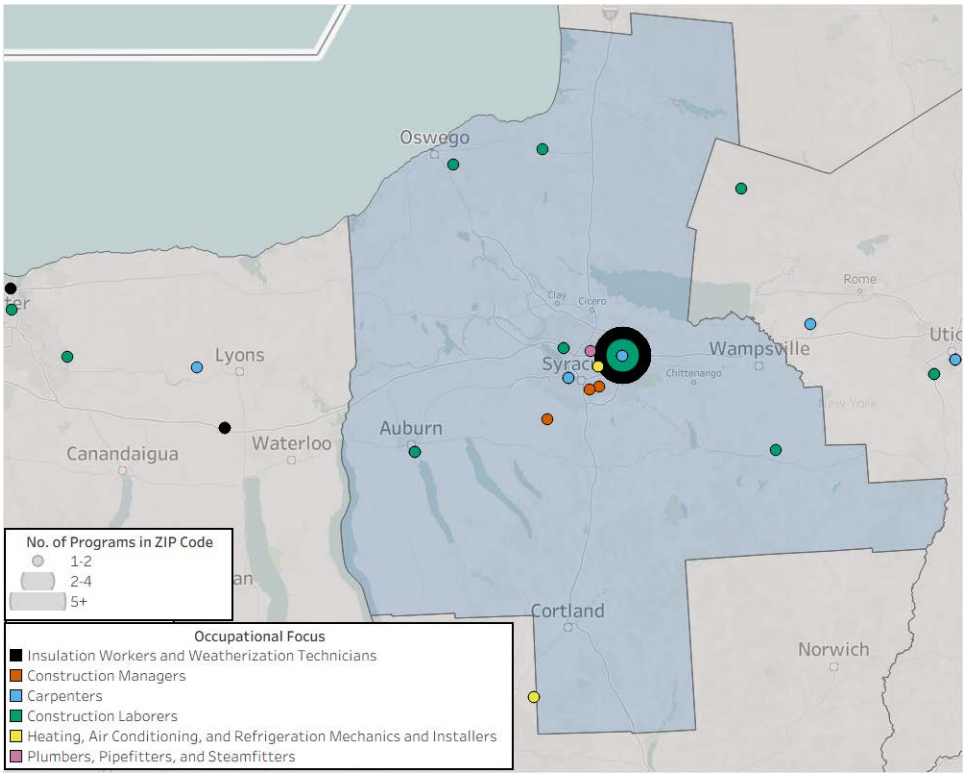
A.2 Central New York

This section provides an overview of employment projections, identified training, education, and wraparound service programs, and associated gaps in Central New York.

Table A-3. Employment Projections and Workforce Training Assets Identified in Central New York

EE/BE Industry Employment Change, 2025–2035	EE/BE Industry Employment Percent Change, 2025–2035	EE/BE Training Programs	Wraparound Service Provider Locations
992	23%	65	14

Figure A-2. Identified Training Programs in Central New York



A.2.1 Training Opportunities for Central New York

- Central New York has the most programs for insulation and weatherization workers compared to the other regions of the state, because the New York State Weatherization Directors Association is located in the region. New York State Weatherization Directors Association offers a range of EE/BE trainings, from basic skills courses to advanced skill courses and industry standard credentialing.
- Construction management, HVAC, and carpentry programs were found in Onondaga County. The carpentry programs primarily consist of RAs, meaning workforce growth will depend heavily on the speed with which local businesses grow and take on new apprentices.
- There is limited plumbing training outside of Onondaga County, which will make it difficult to build out this workforce in Central New York.

- There is an opportunity to expand programming for all priority occupations outside of Onondaga County, including with new employer partners in the residential market space who may be able to support on-the-job training opportunities with the right programs and incentives to support them.

A.2.2 Transportation and Geography for Central New York

- While most of the Central New York population lives in Onondaga County (61%) (NYSERDA 2024), there is still a significant share of people outside the county.

A.2.3 Demographics for Central New York

- Syracuse is ranked 20th among the top 50 metro areas in the nation for refugee resettlement (Fein 2021), highlighting a need to ensure that language programs are sufficient to support workers accessing EE/BE training and communicating with homeowners.
- "There are . . . 22,500 people in [Central New York] who report that they speak English less than 'very well.'" Nearly 5,000 who say they do not speak English well are Spanish speakers. Over half of these Spanish speakers live in the City of Syracuse, and 84% are located in Onondaga County. "Other Indo-European Languages" is the most prevalent language group in the surrounding counties. Syracuse has always been a city of immigrants and continues to welcome people from around the world to resettle here" (NYSERDA 2024).

A.2.4 Housing Stock for Central New York

- Most homes in the region are detached single-family homes (NYSERDA 2024), underscoring the need for job-site mobility among workers.

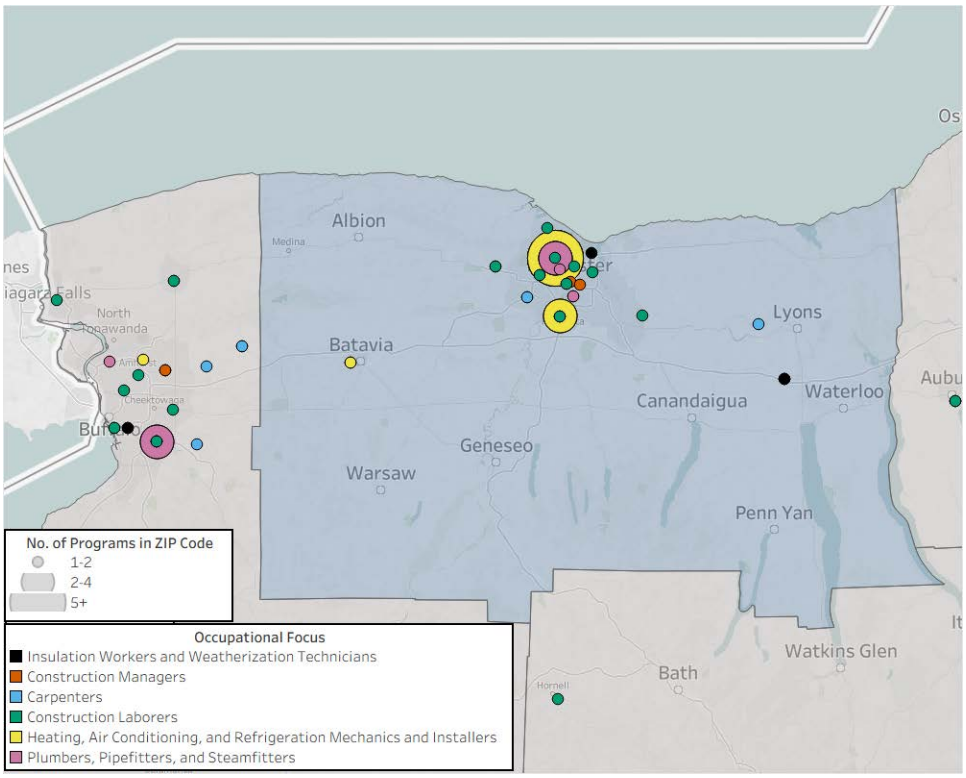
A.3 Finger Lakes

This section provides an overview of employment projections, identified training, education, and wraparound service programs, and associated gaps in the Finger Lakes region of New York State.

Table A-4. Employment Projections and Workforce Training Assets Identified in the Finger Lakes

EE/BE Industry Employment Change, 2025–2035	EE/BE Industry Employment Percent Change, 2025–2035	EE/BE Training Programs	Wraparound Service Provider Locations
1,620	23%	73	16

Figure A-3. Identified Training Programs in the Finger Lakes



A.3.1 Training Opportunities for the Finger Lakes

- There are limited programs for insulation and weatherization in the Finger Lakes region. Insulation and weatherization concepts could be integrated into CTE programs for construction laborers to expand awareness and improve entry into EE/BE careers, though laborer training in this region is also concentrated around Rochester. While there are also apprenticeships for construction laborers in this region, apprenticeships are not easy to adjust to accommodate other occupations and may not be fully aligned with EE/BE work.
- There are also limited programs identified for carpenters in the region. One program identified is at a BOCES, and another is a union-affiliated training program. The residential market, in which the most EE/BE workforce demand is expected, is likely to rely primarily on the BOCES program for workers, given the lower prominence of union labor in residential projects. There's an opportunity to expand EE/BE carpentry training for the residential market beyond the BOCES program and beyond Rochester.
- There is a potential opportunity at BOCES for a carpentry program, as well as other urgent/emerging gap construction trades like construction laborers, insulation and weatherization workers, HVAC, and plumbing.

- There was plumbing and HVAC (including an Environmental Protection Agency 608 certification) programming identified at community colleges in the region. Community colleges could explore offering a general construction program or one more specific to insulation/weatherization.
- New residential employer partners outside of Rochester could support carpentry, HVAC, plumbing, weatherization/insulation apprenticeships, or other on-the-job training opportunities given the right support and incentives (NYSERDA 2024).

A.3.2 Transportation and Geography for the Finger Lakes

- Training programs for the EE/BE priority occupations in this assessment are highly concentrated near Rochester, which makes sense given the population density of the region, but there is a severe lack of training outside of the city.

B.3.3 Demographics for the Finger Lakes

- Rochester is also a notable resettlement hub in upstate New York, underscoring a need for language services (NYSERDA 2024). In fact, Rochester ranked 32nd among the top 50 metro areas in the nation for refugee resettlement (behind Buffalo (13th) and Syracuse (20th) (Fein 2021).

C.3.4 Housing Stock for the Finger Lakes

- Of the over 500,000 housing units in the Finger Lakes region, about 66% are single-family detached homes, emphasizing the need for transportation solutions to support worker mobility (NYSERDA 2024).
- In the Finger Lakes region, 56% of housing units were constructed before 1970, while 28% were built before 1939 (NYSERDA 2024). Workers will need specialized skill sets to handle outdated electrical and heating/cooling systems, inadequate insulation and ventilation, and dangerous materials such as lead and asbestos.

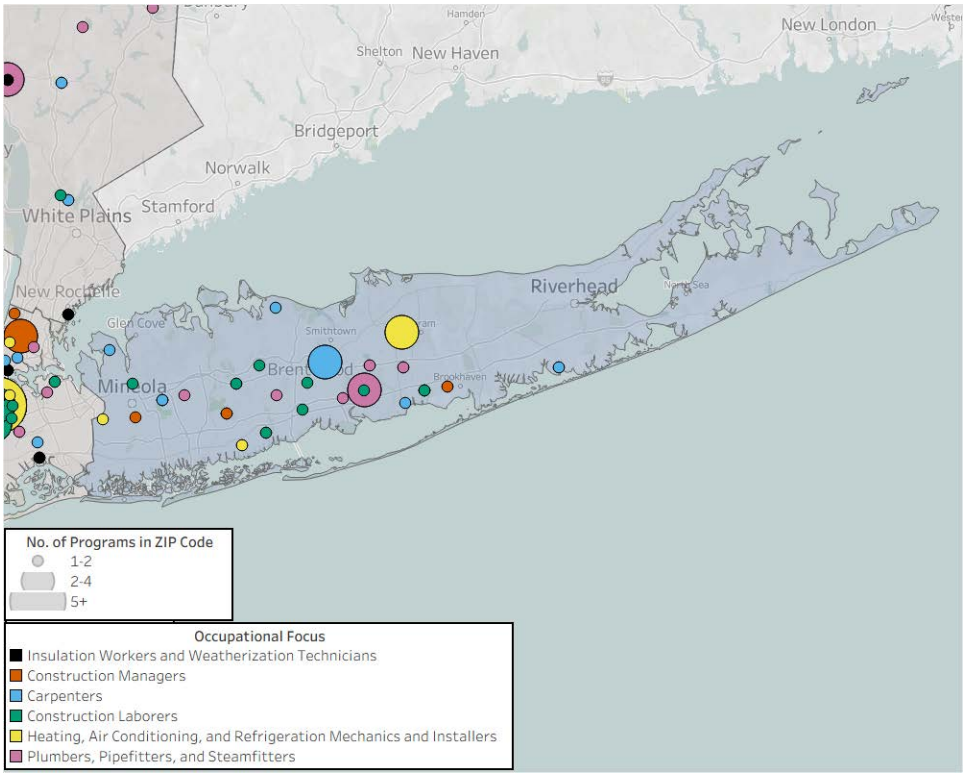
D.4 Long Island

This section provides an overview of employment projections, identified training, education, and wraparound service programs, and associated gaps on Long Island, New York.

Table A-5. Employment Projections and Workforce Training Assets Identified on Long Island

EE/BE Industry Employment Change, 2025–2035	EE/BE Industry Employment Percent Change, 2025–2035	EE/BE Training Programs	Wraparound Service Provider Locations
4,508	21%	84	29

Figure A-4. Identified Training Programs on Long Island



A.4.1 Training Opportunities for Long Island

- Long Island and New York City are the two regions with the greatest number of electrician-related training in the inventory. Together, Long Island and New York City have more plumbing and operating engineering programs than other regions. They account for a quarter of the state's operating engineering programs.
- Long Island has limited insulation and weatherization programming. One opportunity to address this shortage is for construction CTE programs to incorporate insulation and weatherization concepts.

A.4.2 Transportation and Geography for Long Island

- Nassau County, closer to New York City, has only a quarter (26%) of the available training programming on Long Island. Many programs are supported by Nassau BOCES and Farmingdale State College.

- Most EE/BE relevant training (74%) is found in Suffolk County, which is further from New York City and is the more rural of the two counties on Long Island. However, within Suffolk County, training and transportation options are primarily in the western part, closer to Nassau County and New York City. The eastern part of Suffolk County, which is more rural, has more limited access to transportation. There are longer distances between communities and greater reliance on flexible or on-demand transportation services, such as cars, to connect residents to rail stations, employment centers, and residences. Entering New York City is also more expensive and takes longer from this part of Suffolk County.
- The Long Island Rail Road and Nassau Inter-County Express bus system help connect various parts of the County together and connect the County with New York City, where additional programming is accessible (Metropolitan Transportation Authority n.d.-a; Nassau Inter-County Express n.d.). However, the proximity may also draw available workers into the city, where jobs may pay more than outside the city, and reduce the number of available or interested workers for EE/BE work on Long Island.
- Most Suffolk County workers drive alone to work (77%) and only 6% use transit, compared to 65% and 14% in Nassau County, respectively (NYSERDA 2024).

A.4.3 Housing Stock for Long Island

- High job-site mobility is needed for EE/BE work, with 79% of buildings on Long Island being single-family detached buildings.

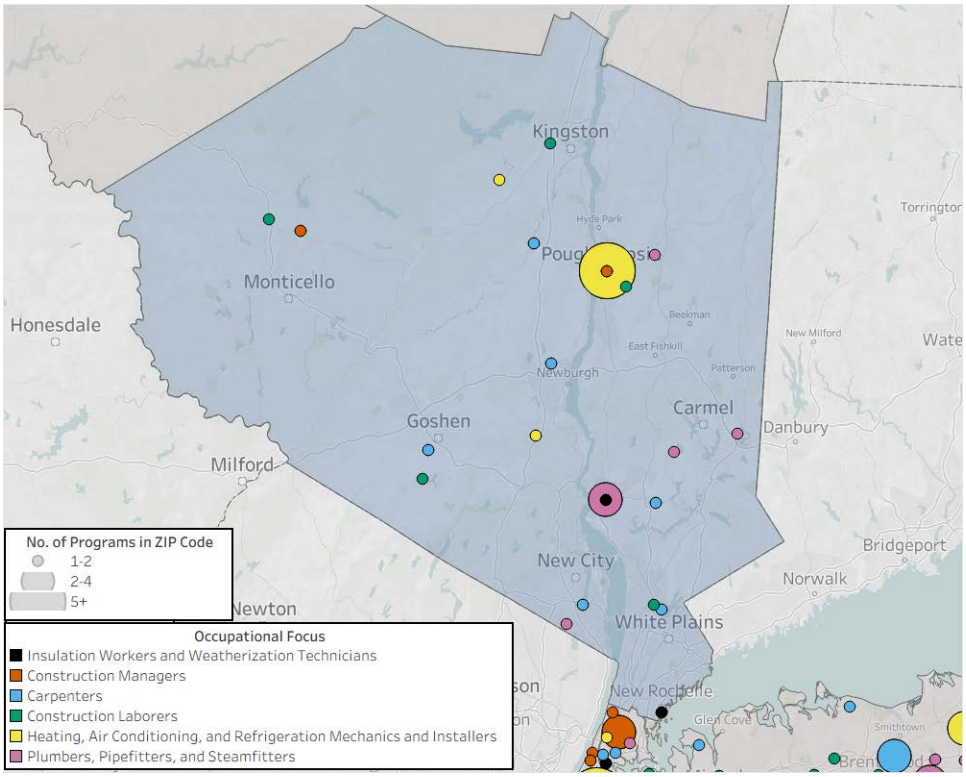
A.5 Mid-Hudson

This section provides an overview of employment projections, identified training, education, and wraparound service programs, and associated gaps in New York State's Mid-Hudson region.

Table A-6. Employment Projections and Workforce Training Assets Identified in Mid-Hudson

EE/BE Industry Employment Change, 2025–2035	EE/BE Industry Employment Percent Change, 2025–2035	EE/BE Training Programs	Wraparound Service Provider Locations
3,347	24%	83	37

Figure A-5. Identified Training Programs in Mid-Hudson



A.5.1 Training Opportunities for Mid-Hudson

- HVAC programming is concentrated in Poughkeepsie, and there were no plumbing training programs identified west of the Hudson River. This creates an opportunity to identify new residential employer partners in these areas to support new apprenticeship and on-the-job training opportunities for more HVAC techs and plumbers.
- There is also limited insulation and weatherization training in this region. One identified program is with the insulators' labor union, and another one is at a community-based training agency just outside of New York City. There is a potential opportunity to introduce basic insulation and weatherization concepts to other parts of the region, such as at CTE programs or foundational construction programs.

A.5.2 Transportation and Geography for Mid-Hudson

- Putnam County has limited training programs identified, primarily plumbing apprenticeships with private companies. The surrounding counties have many EE/BE training options; however, Putnam County residents must have reliable access to transportation to attend and later access residential work sites that are likely to be spread out across the county and other parts of the region.

- Sullivan County, a largely rural county in the western Mid-Hudson region, with low population density and limited transit coverage compared to more urbanized parts of the region, also has limited identified training programs. Its main transportation system is free of charge and runs four different routes at limited hours. However, only 2% of residents use public transit (NYSERDA 2024).
- Even with these transportation systems, with the residential market spread across neighborhoods and work sites changing frequently, workers are still likely to face barriers without a flexible and reliable mode of transportation, especially in less urban areas.

A.5.3 Demographics for Mid-Hudson

- Over a quarter (28%) of Poughkeepsie City's population is non-English speaking (NYSERDA 2024). Sufficient language support is needed for this area to successfully support non-English-speaking workers into EE/BE training and employment opportunities.

A.5.4 Housing Stock for Mid-Hudson

- According to the "2024 Mid-Hudson Energy Needs Assessment," 99% of occupied buildings in the region are residential buildings (NYSERDA 2024).

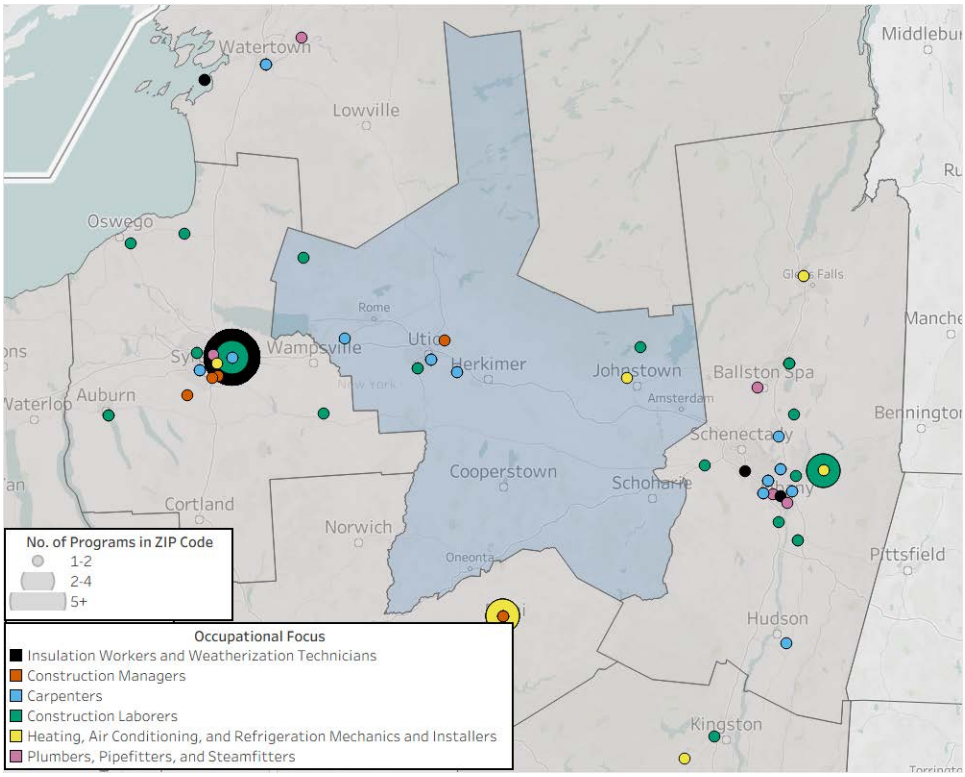
A.6 Mohawk Valley

This section provides an overview of employment projections, identified training, education, and wraparound service programs, and associated gaps in New York State's Mohawk Valley.

Table A-7. Employment Projections and Workforce Training Assets Identified in the Mohawk Valley

EE/BE Industry Employment Change, 2025–2035	EE/BE Industry Employment Percent Change, 2025–2035	EE/BE Training Programs	Wraparound Service Provider Locations
433	27%	22	6

Figure A-6. Identified Training Programs in the Mohawk Valley



A.6.1 Training Opportunities for the Mohawk Valley

- Most rapid EE/BE employment growth (27%) is expected in the Mohawk Valley, compared with all other regions. By comparison, the region has relatively few EE/BE-relevant training programs.
- Critically, the region has limited plumbing and electrical programs. The only identified program was BOCES in Herkimer County, which offers Electricity I-III courses. Electrical upgrades across the region may be inhibited—or conducted through informal or unsafe work—in the absence of appropriate workforce training.
- At the time the inventory was conducted, there were two community colleges in the Mohawk Valley that had certificate and associate degree programs for HVAC, but there were no other avenues for HVAC training, underscoring the importance of strengthening partnerships with employers (to offer greater hands-on training experience to workers).
- The Mohawk Valley Regional Clean Energy Hub, like many others, has many partners, including several contractors. Identifying the types of support these contractors need and facilitating their access to those supports should be a priority in this region. Stemming from the region's rural nature, contractors in the region are extremely important to expanding the workforce in the region, and many are likely to lack the capacity to support the workforce pipeline and expand their businesses.

A.6.2 Transportation and Geography for the Mohawk Valley

- All Mohawk Valley counties, except Oneida, with the cities of Utica and Rome, are considered rural counties. With less than 1% of DAC members using public transportation (NYSERDA 2024), access to reliable transportation, such as a car, will be critical for supporting DAC workers entering the EE/BE industry.

A.6.3 Demographics for the Mohawk Valley

- Almost one-quarter (23%) of Mohawk Valley residents are located in DACs, underscoring a need for targeted wraparound support for workers seeking training, education, and employment opportunities in EE/BE (NYSERDA 2024).
- "Roughly 12% of DAC households speak a language other than English," highlighting the importance of language support services in the region (NYSERDA 2024). Furthermore, "Since 1981, [Utica] has resettled over 16,500 refugees from Bosnia and 30 other nations . . . Today 40 languages are spoken in the Utica City School District. and 19.4% of the population are foreign-born residents" (Fein 2021).

A.6.4 Housing Stock for the Mohawk Valley

- The Mohawk Valley also has a high share of older building stock (only behind Western New York), suggesting that workers will need specialized skill sets to handle the outdated electrical and heating/cooling systems, inadequate insulation and ventilation, and dangerous materials such as lead and asbestos.

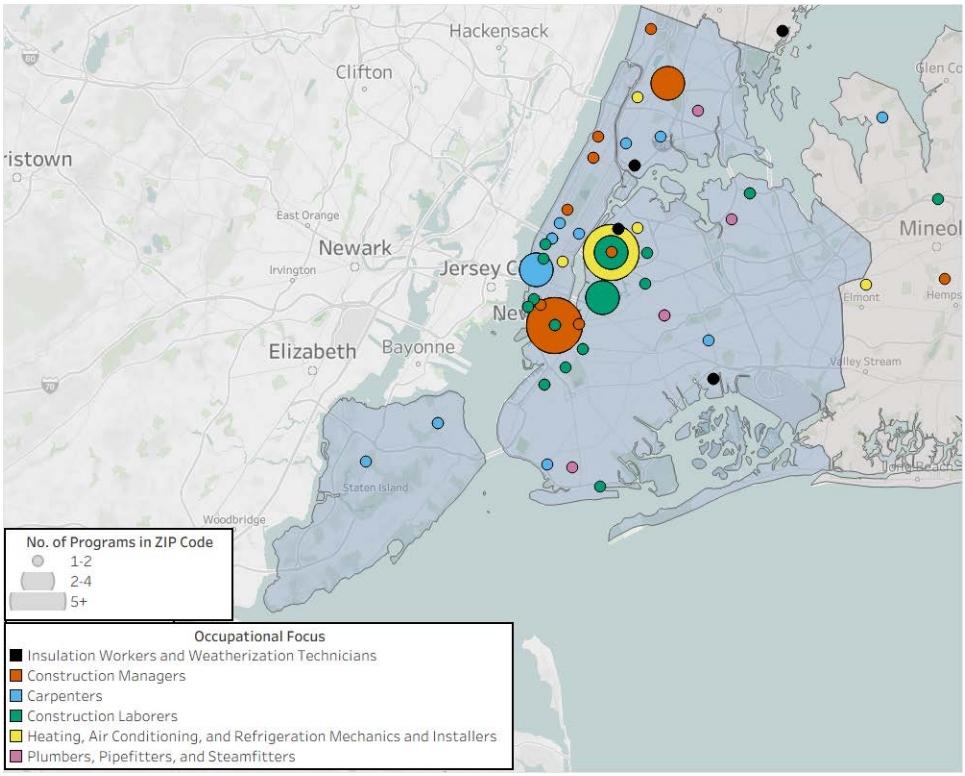
A.7 New York City

This section provides an overview of employment projections, identified training, education, and wraparound service programs, and associated gaps in New York City.

Table A-8. Employment Projections and Workforce Training Assets Identified in New York City

EE/BE Industry Employment Change, 2025–2035	EE/BE Industry Employment Percent Change, 2025–2035	EE/BE Training Programs	Wraparound Service Provider Locations
8,256	12%	153	78

Figure A-7. Identified Training Programs in New York City



A.7.1 Training Opportunities for New York City

- New York City has a relatively high concentration of programs compared to other regions. Training for construction managers, construction laborers, and carpenters is most prominent in this region relative to the rest of the state.
- Staten Island has limited training options for EE/BE. There were limited HVAC, carpentry, weatherization, construction management, construction laborer, and plumbing programs on the island at the time the inventory was conducted.[30]
- "Some Manhattan jobseekers need to develop basic job skills before or alongside more specialized training to qualify for green jobs," including job-seeking, office management and administrative, and basic computer skills, as well as obtaining a driver's license, GED or remedial education programs, and English language proficiency (NYSERDA 2024). Wraparound services that help workers develop these skills and knowledge should be a priority in this region to prepare job seekers for entering technical training and education programs and employment opportunities.

A.7.2 Transportation and Geography for New York City

- While the Staten Island Ferry and the Staten Island Express Bus Service are transit options for individuals to travel between Staten Island and the rest of the New York City boroughs, multiple connections are required, making travel longer and more time-consuming (New York City Department of Transportation n.d., Metropolitan Transportation Authority n.d.-b). For example, workers not located near the St. George Ferry Terminal, which carries passengers across Upper New York Bay to Manhattan, must travel across the island by bus, car, or another mode of transportation to reach the Ferry Terminal. Once docked in Lower Manhattan, transferring to other bus routes, the subway, or other transportation modes may be required to get across Manhattan. While this is not the only route available, this example illustrates that transportation is likely to be a barrier for workers on Staten Island interested in training programs in other boroughs of New York City.

A.7.3 Housing Stock for New York City

- The overwhelming majority of high-rise buildings in New York State are in New York City Council on Tall Buildings and Urban Habitat 2025). Due to the greater share of commercial and high-rise residential buildings, union-affiliated training and job opportunities are likely to be more abundant in New York City.
- However, in the Bronx, Brooklyn, Queens, and Staten Island, most homes are 1–4 unit residential buildings (88% in the Bronx and Brooklyn and 93% in Queens and Staten Island).

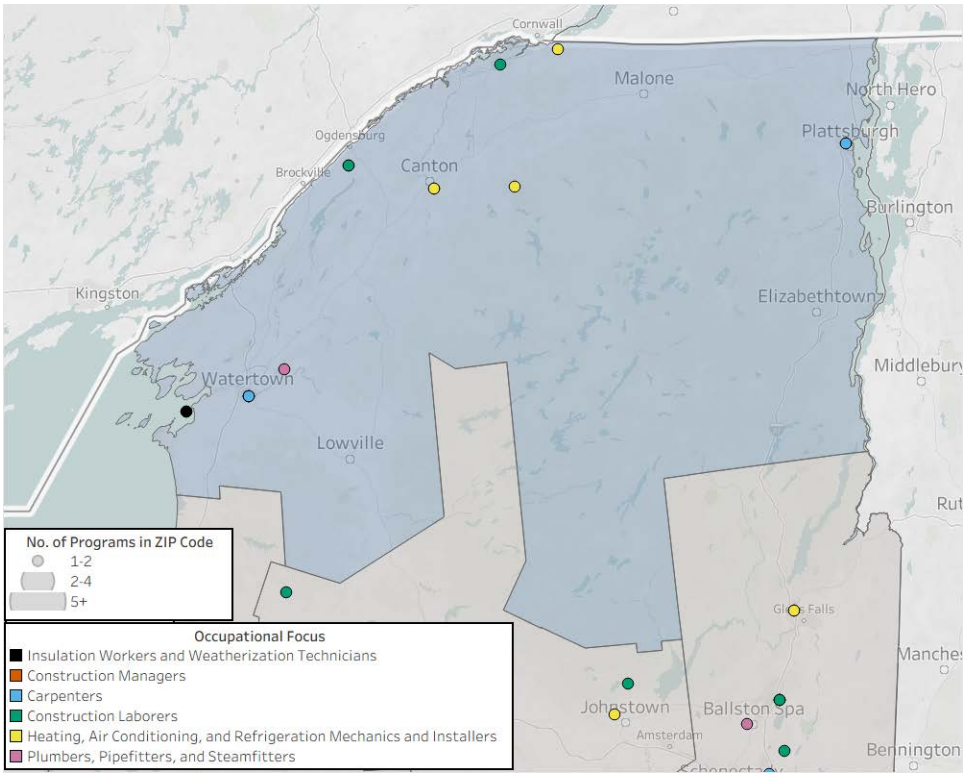
A.8 North Country

This section provides an overview of employment projections, identified training, education, and wraparound service programs, and associated gaps in New York's North Country.

Table A-9. Employment Projections and Workforce Training Assets Identified in the North Country

EE/BE Industry Employment Change, 2025–2035	EE/BE Industry Employment Percent Change, 2025–2035	EE/BE Training Programs	Wraparound Service Provider Locations
490	33%	31	6

Figure A-8. Identified Training Programs in the North Country



A.8.1 Training Opportunities for the North Country

- At the time the inventory was conducted, there were only four construction laborer programs in the North Country, mostly at BOCES. While this presents an opportunity to incorporate weatherization and insulation training into the curriculum to expand education and awareness of these EE/BE activities, it also highlights a need for stronger employer engagement in this region. Strengthening ties with employers may help connect BOCES students to job opportunities once completing the programs or increase on-the-job training opportunities for workers. These employers are likely to need risk-sharing or capacity-building support, however, to participate in these on-the-job opportunities.
- Carpentry programs are limited in the North Country, with one identified at the BOCES in Plattsburgh on the far eastern part of the region. There is a need for more carpentry programs in counties such as Jefferson, Lewis, and St. Lawrence. Conversely, HVAC and plumbing programs are only in the western part of the region, creating a similar accessibility challenge for residents in eastern counties. Expanded training opportunities in this region could offer a wider variety of careers to potential workers.

- The region contains limited construction management or operating engineer programs. Where most of those programs are concentrated in the southern part of the state near New York City, additional programs in the northern part of the state could benefit from the EE/BE workforce and elevate opportunities for upward career mobility.
- While the North Country overall has a low density of programming, its education system is strong. Most EE/BE-relevant programs in the region are offered by BOCES, community colleges, or 4-year academic institutions. Apprenticeship opportunities are more limited, making up only 26% of all programming in the region. This is not surprising given the limited number of contractors in the region. Strengthening partnerships with residential employers to support more on-the-job training outside of the education systems, as well as supporting new business growth among contractors, can help expand the North Country's EE/BE businesses and workforce.

A.8.2 Transportation and Geography for the North Country

- Without reliable and widespread public transportation access across the North Country (NYSERDA 2024), EE/BE workers will need to rely heavily on cars to get to available training, education, and employment opportunities. However, the costs of car ownership, or at least reliable and frequent access to a car, may present a barrier for workers in the North Country.

A.8.3 Housing Stock for the North Country

- Most homes in the North Country are single-family detached buildings (NYSERDA 2024), requiring high mobility for workers to reach various job sites.
- About 60% of North Country building stock was constructed before 1980 (NYSERDA 2024). Similar to other regions with old building stock, workers will need skill sets to handle the outdated electrical and heating/cooling systems, inadequate insulation and ventilation, and dangerous materials such as lead and asbestos.

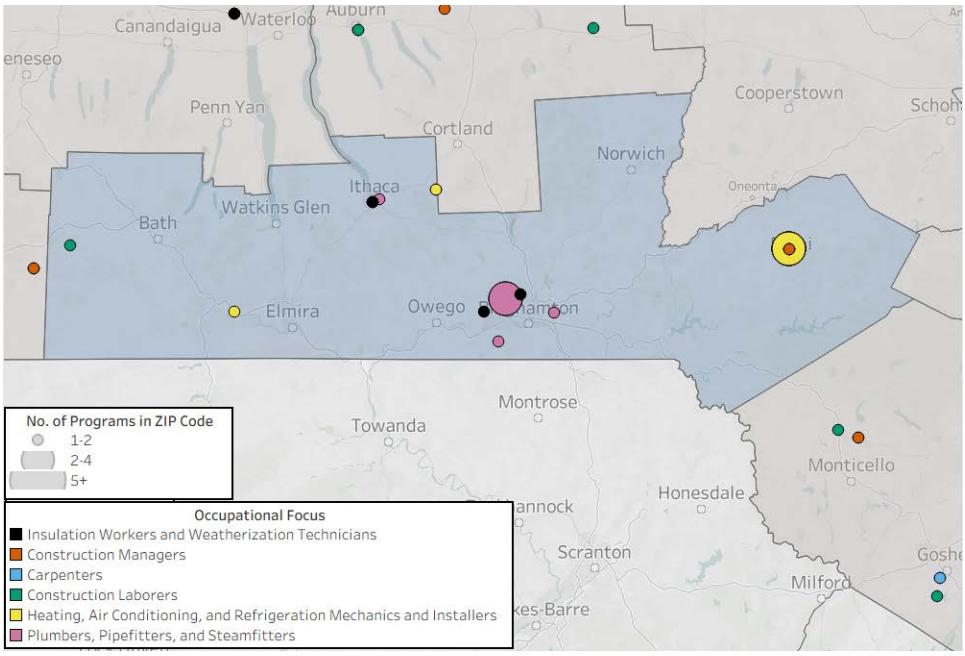
A.9 Southern Tier

This section provides an overview of employment projections, identified training, education, and wraparound service programs, and associated gaps in New York State's Southern Tier.

Table A-10. Employment Projections and Workforce Training Assets Identified in the Southern Tier

EE/BE Industry Employment Change, 2025–2035	EE/BE Industry Employment Percent Change, 2025–2035	EE/BE Training Programs	Wraparound Service Provider Locations
656	24%	49	10

Figure A-9. Identified Training Programs in the Southern Tier



A.9.1 Training Opportunities for the Southern Tier

- Few operating engineering carpentry programs exist in the Southern Tier, which will make growing these workforces difficult in the region. One of the carpentry programs is a BOCES program, while the other is an associate degree program at a SUNY institution, highlighting a potential limit in apprenticeships.
- There are few contractors in the Southern Tier that provide EmPower+ and heat pump services (NYSERDA 2024). Employer partnerships are critical for growing the workforce and, later, the employer base. Existing contractors are likely to need support for retraining and capacity building, as well as risk-sharing incentives to hire new apprentices and workers. This hiring is critical for preparing a workforce capable of offering Empower+ and heat pump services because on-the-job training is an important aspect of training. Once these workers become experienced and obtain the necessary business support, they could expand the employer base by starting their own companies.

A.9.2 Transportation and Geography for the Southern Tier

- Programming in the Southern Tier is most concentrated in or around Binghamton, with some offerings in Ithaca and Delhi. SUNY Delhi offers programs for carpentry, construction management, construction laborer, electrical, HVAC, and plumbing. Cornell University offers engineering programs and a plumbing apprenticeship, while its Cooperative Extension supports weatherization training in Ithaca.
- Since most counties in the region are rural, public transportation is unlikely to be a feasible option for most. Fewer than 5% of each county's population use public transportation. Yet, reliable transportation is necessary for EE/BE work in the region since two-thirds of housing units in the Southern Tier are single-family homes (NYSERDA 2024).

A.9.3 Demographics for the Southern Tier

- Around 20% of Southern Tier residents live in DACs (NYSERDA 2024). Workers from these communities and others who have faced structural barriers to education and employment may need targeted support to enter programs at post-secondary academic institutions. They require longer-term commitments and, sometimes, relocation to enroll. Enrollment fees at SUNY are more accessible for state residents with federal aid programs such as the New York State Tuition Assistance Program, but they may still be high for individuals from DACs. These individuals may also need support in completing the educational prerequisites to enroll.

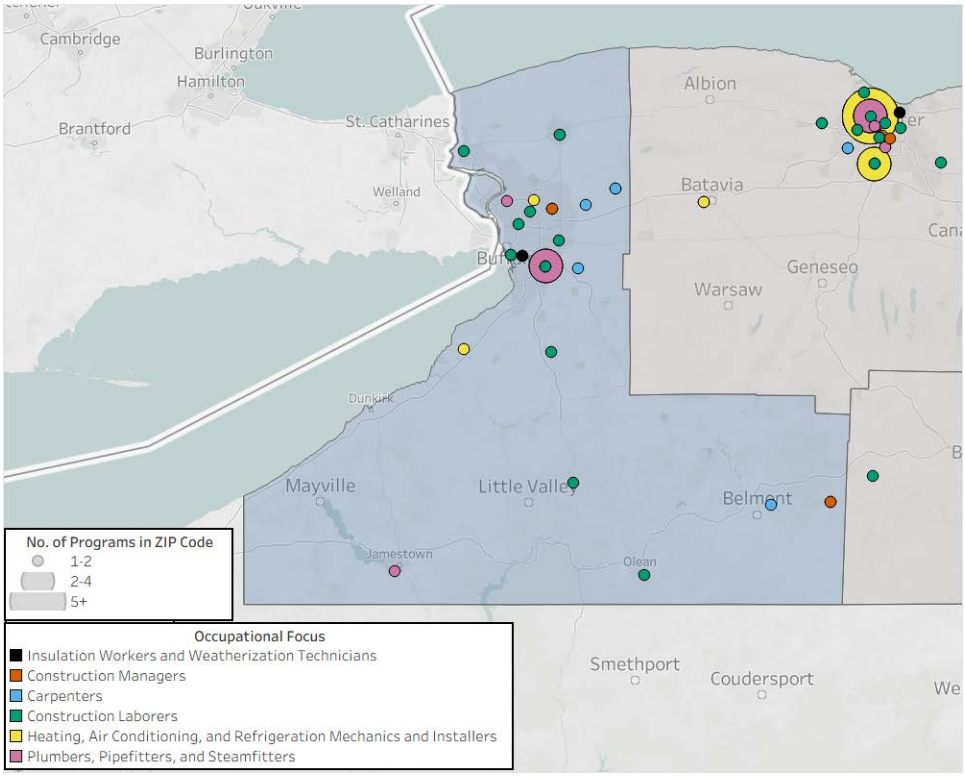
A.10 Western New York

This section provides an overview of employment projections, identified training, education, and wraparound service programs, and associated gaps in Western New York.

Table A-11. Employment Projections and Workforce Training Assets Identified in Western New York

EE/BE Industry Employment Change, 2025–2035	EE/BE Industry Employment Percent Change, 2025–2035	EE/BE Training Programs	Wraparound Service Provider Locations
1,519	20%	72	45

Figure A-10. Identified Training Programs in Western New York



A.10.1 Training Opportunities for Western New York

- Western New York is one of the regions in which there are few identified EE/BE training programs offered by community-based organizations (the others include Central New York, the Finger Lakes, Long Island, and the Mohawk Valley). To recruit and support workers from DACs, EE/BE workforce development stakeholders should prioritize trust-building strategies with DAC residents, such as partnering with community-based organizations that have a legacy of positive work in these communities.

A.10.2 Transportation and Geography for Western New York

- HVAC, carpentry, construction laborer, and plumbing programs are limited outside of Buffalo. Without expanding training programming, residents may face transportation barriers to accessing training and education opportunities. "Public transportation options are insufficient and unreliable across the region" (NYSERDA 2024). Even with a reliable car, the commute between Olean and Buffalo would be at least an hour and a half.

A.10.3 Demographics for Western New York

- Most EE/BE programming is concentrated in the Buffalo metro area, which ranks 13th among the top 50 in the US for refugee resettlement (Fein 2021). DACs are also concentrated in Buffalo, of which nearly half of the population is people of color, though there are large DAC areas outside of Buffalo as well. With limited English proficiency in DACs (53% of all Western New York residents with limited English proficiency living in DACs) (NYSERDA 2024), language services are critical for expanding employment opportunities to DACs in Western New York.

A.10.4 Housing Stock for Western New York

- The region could benefit from targeted programs to support the residential market because 63% of buildings in Western New York are detached single-family homes (NYSERDA 2024). One possible opportunity is for programs for construction laborers to introduce weatherization and insulation concepts to increase awareness and foundational knowledge of the occupation.

Appendix B. Case Studies and Good Practices

This appendix highlights several case studies and examples of good practices to support EE/BE workforce development efforts and address identified challenges in New York State. An overview of good practices from New York State follows an extensive review of case studies from other states.

B.1 Shift from Low- to High-Quality Careers Good Practices

The following case studies provide examples of programs that develop pathways from lower-wage or physically demanding careers into longer-term, higher-quality roles. These pathways are particularly relevant for those in New York State's residential EE/BE market.

B.1.1 Labor-Management Training Partnership—Healthcare Career Advancement Program, Multiple States

The Healthcare Career Advancement Program (H-CAP) transforms low-wage occupations into family-sustaining careers through a national network of labor-management training partnerships jointly governed by employers and unions. H-CAP reaches more than 1,000 employers and 550,000 workers across the healthcare industry. H-CAP convenes employers, labor organizations, and educators to develop industry-driven career pathways with structured advancement opportunities to high-quality careers. As in the residential EE/BE industry, traditional workforce development models in healthcare that rely on short-term classroom-based training often fail to meet the needs of incumbent workers or create meaningful advancement opportunities. Through labor-management training partnerships, H-CAP provides a formal structure for addressing shared workforce challenges, including skills gaps, turnover, and recruitment, while aligning training with employer demand and worker career advancement (Healthcare Career Advancement Program n.d.).

H-CAP is a nonprofit governed by a board of both healthcare employers and Service Employees International Union local unions. This board establishes strategic priorities, secures funding, and offers training resources, coordination, and peer learning opportunities to local labor-management training partnerships. Each partnership is typically established through collective bargaining relationships between a local union and one or more healthcare employers. Funding comes from multiple sources, including federal and state grants, philanthropy, and employer and union contributions.

Rather than adopting a one-size-fits-all approach, H-CAP and its partners develop career pathways for specific occupations and advancement opportunities. Best practices include offering training in multiple formats (virtual, hybrid, and in-person), offering multilingual instruction, and scheduling courses at times and locations that accommodate full-time workers. It is also recommended to provide digital literacy coaching and technical support, loan internet-enabled devices, and optimize training platforms for smart phone compatibility to reach workers with limited computer access. H-CAP also prioritizes earn-and-learn models, including RAs and paid incumbent worker training, allowing participants to gain skills while remaining employed. By combining flexible delivery, wraparound supports, and structured career pathways, H-CAP improves training completion, worker retention, and advancement while helping employers build a more skilled and stable workforce.

For the residential EE/BE sector, H-CAP demonstrates that workforce development is most effective when training is integrated with career advancement, employer engagement, and worker supports rather than delivered as a stand-alone education program. Flexible training delivery, paid incumbent worker upskilling, structured career ladders, and labor-management collaboration could help address many of the recruitment, retention, and advancement challenges facing New York State's residential construction workforce (New America n.d., Healthcare Career Advancement Program n.d.).

B.1.2 Mass CEC Weatherization as an Entryway to EE/BE and Beyond

Through its Equity Workforce Training Implementation Grants, Mass CEC is seeking innovative training and support programs that help meet workforce demand in critical clean energy sectors and enable underserved individuals historically excluded from these sectors to find new or advanced career opportunities (Massachusetts Clean Energy Center n.d.). In the early stages, this includes exploring ways to help weatherization technicians understand the variety of career pathways in the high-performance buildings sector and empower them to make their own informed career pathway decisions.

Weatherization technicians gain building science knowledge and experience working with homeowners in their day-to-day. This gives them a strong foundation for other skilled building trades, or other building science careers, such as energy auditing, engineering, and architecture. However, weatherization technicians often lack exposure to career advancement opportunities in the building sector and the knowledge of how to pursue these opportunities. A community-based or anti-poverty organization provides delivery services and aims to provide entry-level

and incumbent weatherization technicians with career exploration and exposure curriculum as well as case management and remedial education services to prepare the workers for apprenticeship aptitude tests or college/community college entrance exams and applications. With employer buy-in, weatherization technicians could work part-time and be compensated for their time spent in class.

This concept creates a pipeline of entry-level weatherization technicians while equipping current weatherization technicians with the knowledge and skills to seek long-term careers. The weatherization technician role is treated as an off-ramp into other advanced weatherization or other building careers to improve job quality. This also has the potential to help weatherization businesses diversify and expand their services.

A program like this in New York State could develop a workforce capable of addressing multiple of the state's climate goals while improving job quality and business development in the residential EE/BE sector.

B.2 Third-Party Ecosystem Facilitation

The following case studies show how third-party intermediaries can strengthen fragmented workforce ecosystems by convening employers, state agencies, labor, CBOs, and other partners. This structure is especially relevant for small EE/BE contractors with limited capacity to participate in workforce planning, as well as for training providers that need consistent feedback on employer needs.

B.2.1 Wisconsin Regional Training Partnership/Building Industry Group Skilled Employment Program

The Wisconsin Regional Training Partnership/Building Industry Group Skilled Employment Program (WRTP/BIG STEP) serves as a workforce intermediary connecting entry-level workers to high-quality jobs through long-term employer partnerships. By consistently convening employers, unions, state agencies, and community organizations, WRTP/BIG STEP developed career exploration and apprenticeship readiness programs to move entry-level workers into high-quality jobs in the skilled trades.

Due to the identified complementary strengths of WRTP and BIG STEP, the organizations originally partnered in 2002 and fully merged their boards in 2014 (The Wisconsin Regional Training Partnership, n.d., United Way of Dane County n.d.). Originally, BIG STEP was funded

by Joint Apprenticeship Committees, Joint Apprenticeship Training Committees, the Wisconsin Department of Workforce Development, and unions to prepare underrepresented populations for skilled trades. The need for WRTP was created after the Commission on a Quality Workforce recommended partnerships between business, labor, and government to reinvigorate the industrial workforce in the Milwaukee area in 1992. WRTP received federal DOL and private funds to create a model for partnerships within the manufacturing and other industries.

Today, the board and leadership of WRTP/BIG STEP include union leaders, contractors, industry associations, and community-based organizations. The organization is funded through multiple federal grants, state workforce funding, and philanthropy, which allows it to be nimble during economic downturns. Industry and labor partners contribute training facilities, equipment, instructors, and occasionally direct financial support. WRTP/BIG STEP holds standing convenings with partners and uses labor market data through an annual employer assessment survey to facilitate discussions. Employers remain engaged because WRTP/BIG STEP's training programs provide employers with a highly skilled workforce. Workforce intermediaries like WRTP/BIG STEP are typically nonprofit or public organizations led by labor and community leaders.

B.2.2 Shift Work Forward, Multiple States

Shift Work Forward, formerly the National Fund for Workforce Solutions, is a nonprofit that aligns power and resources across employers, funders, education and training providers, and governments in the workforce development ecosystem. Strong relationships across stakeholders with different incentives and spheres of influence rely on a data-driven understanding of the local labor market, a clear purpose for collaboration around equitable workforce solutions, and transparent and inclusive governance and decision-making structures. Shift Work Forward recommends regular meetings, leveraging trusted community messengers, and developing a sustainable funding strategy to build lasting workforce partnerships (Shift Work Forward n.d.).

Shift Work Forward's Advancing Workforce Equity in Energy and Infrastructure Jobs initiative is funded by the Harry and Jeanette Weinberg Foundation, JP Morgan Chase & Co., and the W.K. Kellogg Foundation. Shift Work Forward communicates best practices and offers technical assistance to local partners committed to this initiative, including:

- Hawai'i Workforce Funders Collaborative
- United Way of Central Iowa
- EmployIndy
- Baltimore Workforce Funders Collaborative

- Triad Workforce Solutions Collaborative
- Pittsburgh Area Workforce Learning Collaborative/Partner4Work

B.3 Increase Small-, Minority-, and Women-Owned Contractor Capabilities and Capacity

The following case studies provide examples of programs that support small-, minority-, and women-owned contractors build the capacity they need to engage in EE/BE programs, emerging technologies, and on-the-job training opportunities. These examples focus on technical assistance, mentorship, access to capital, administrative support, and incentives that can help firms scale while supporting stronger job quality and more stable career opportunities for workers.

B.3.1 Bay Area Residential High Road Training Partnership, California

The Bay Area Residential High Road Training Partnership demonstrates how workforce development can simultaneously expand the EE/BE workforce while improving job quality in the residential construction sector. Co-led by Rising Sun Center for Opportunity and the Construction Trades Workforce Initiative, the partnership recognizes that transforming a historically low-wage industry requires collaboration among union and nonunion contractors, labor organizations, local governments, employers, and community-based organizations. Rising Sun Center for Opportunity serves as the fiscal agent, convener, and project manager, while the Construction Trades Workforce Initiative represents labor and co-convenes partners to jointly design workforce and labor standards recommendations. This collaborative governance structure ensures that labor standards are informed by both employer realities and worker needs.

The High Road Training Partnership supports contractors in improving job quality and benefits, rather than simply requiring higher labor standards. The partnership recommends a phased implementation approach that allows small and disadvantaged contractors to prequalify for publicly funded programs if they commit to meeting labor standards. Contractors receive technical assistance, mentorship, business development support, and access to financing to help them. The High Road Training Partnership recommends targeted supports for BIPOC-, women-, and disadvantaged-owned contractors, including procurement assistance, concierge services, and business coaching through organizations such as Emerald Cities Collaborative's

E-Contractor Academy and Revalue.io. This approach enables contractors to provide prevailing wages, benefits, career advancement opportunities, and other quality job standards while remaining competitive in the residential decarbonization market (Emerald Cities Collaborative n.d.-c; Revalue.io n.d.).

To encourage adoption of higher labor standards, the High Road Training Partnership recommends rewarding contractors through both financial and competitive incentives, including:

- Points in competitive procurement processes for meeting regional hire and other workforce standards
- Pay-for-performance incentives for demonstrating compliance with incentivized labor standards
- Points toward free tools or equipment
- Preferential placement within qualified contractor directories
- Enhanced rebate or incentive amounts for contractors meeting high-road standards

By pairing stronger labor standards with contractor capacity-building, improving job quality does not require excluding nonunion contractors. This approach expands opportunities for both union and nonunion contractors while increasing worker access to family-sustaining careers (Bay Area Residential Decarbonization High Road Training Partnership n.d.).

The first step in the New York State EE/BE workforce development ecosystem would be to begin a conversation with unions and contractors about higher labor standards in the residential EE/BE industry.

B.3.2 Emerald Cities Collaborative E-Contractor Academy, Multiple States

Emerald Cities Collaborative E-Contractor Academy offers no-cost mentoring and partnership opportunities to women-, minority-, and disadvantaged-owned business enterprises (MWDBEs) contractors to build their capacities for new technologies and larger projects in the EE/BE industry. Most MWDBEs possess the technical expertise to perform clean energy work but lack the organizational capacity to compete for larger public and utility-funded projects. Emerald Cities Collaborative provides a seven-week, no-cost contractor accelerator focused on long-term business growth and competitiveness. It also supports a network of over 3,000 small contractors in California, the Pacific Northwest, DC-Maryland-Virginia region, and the Northeast (Emerald Cities Collaborative n.d.-a).

The E-Contractor Academy is funded through utilities, foundations, state clean energy workforce funding, such as MassCEC's Minority- and Women-Owned Business Enterprise Support Implementation and Planning Grants, and other partners.

The E-Contractor Academy combines business development training with individualized technical assistance and long-term coaching to help contractors translate new skills into business growth. Participants receive training in estimating and bidding, project and financial management, marketing, and operational efficiency while developing business growth strategies tailored to their firms. Contractors are connected with lenders, insurance brokers, and financial institutions to improve access to capital needed to pursue larger projects. Emerald Cities Collaborative facilitates relationships with utilities, public agencies, contractors, and other industry partners while helping contractors navigate procurement processes and compete for clean energy projects.

A distinguishing feature of the E-Contractor Academy is its continued engagement with contractors after the formal curriculum concludes. Through ongoing mentorship, technical assistance, and networking opportunities, Emerald Cities Collaborative helps contractors build industry partnerships and continue to compete in the EE/BE market. By developing contractor capacity alongside workforce development, the E-Contractor Academy enables small businesses to grow sustainably and create stable, quality career opportunities for workers (Emerald Cities Collaborative n.d.-b, Economic Development Council of Western Massachusetts 2023, BEEP Coalition 2025).

B.3.3 ReMaine Clean Energy Internship Program, Maine

The ReMaine Clean Energy Internship Program engaged 30 employers and 60 interns, with a third-party manager, the JPI Group, handling onboarding, recordkeeping, and payroll. This internship program is funded by Maine's Department of Energy Resources and partners with the Environmental and Energy Technology Council of Maine, the Alliance for the Climate Transition, and IntWork to recruit employers and interns.

Under this program, employers typically paid 50% of the intern's wages, plus an additional 30% administration charge for JPI Group's program administration and logistics. In cases where nonprofits and other companies could not meet these payment requirements, the program covered up to 75% of the wage and half of the 30% employment burden fee. Among the 49 participants who completed the program, 23 were offered full-time roles (47%).

One weatherization company, Quoddy Spray Foam, noted this program allowed them to pay interns a livable wage in the weatherization field. The average wage was $21, $3 per hour more than the program's required minimum, and the program achieved its stated diversity goals (Northeast Energy Efficiency Partnerships 2025). A third-party manager for administrative and logistical functions would increase the likelihood of small EE/BE contractors participating in NYSERDA programs, such as the On-the-Job Training Program (OJT). Flexible financing options, like offering more financial support or fee waivers to small businesses, would further incentivize participation.

B.3.4 DC Sustainable Energy Utility, Washington, DC

DC Sustainable Energy Utility's Train Green Sustainable Energy Infrastructure and Capacity Building Pipeline Program provides no-cost classes and certifications to increase businesses' skill set and knowledge in renewable energy and better position them for contracting opportunities. The program supported 266 program participants in FY 2025, more than doubling the previous fiscal year's total. Potentially in part due to this support, registrations of Certified Business Enterprises, including SMWBE certifications (Small-, Minority-, and Women-Owned Business Enterprise), increased by 150% from the prior fiscal year (DC Sustainable Energy Utility n.d.-a).

DC Sustainable Energy Utility also has a program to support entry-level energy efficiency workers through five-month-long paid externship opportunities. From 2014 to 2023, 220 energy efficiency externs of all experience levels completed the program. Externs work with mentors and have opportunities to receive on-the-job training and credentialing while receiving DC's living wage as a minimum. In addition to externships in the positions of mechanical engineering, HVAC helper, and building maintenance, DC Sustainable Energy Utility offers administrative and program assistant externships. This program provides contractors with consistent workers for almost half a year.

DC Sustainable Energy Utility's Workforce Development program supports cohorts of 15–25 clean energy externs twice a year, with more than 85% going on to full-time positions. DC Sustainable Energy Utility is a nonprofit funded by the Sustainable Energy Trust Fund and the Renewable Energy Development Fund that operates as a one-stop resource for energy efficiency and renewable energy services independent of DC utilities (DC Sustainable Energy Utility n.d.-b).

Extern roles increase the capacity of small contractors while providing an on-ramp into EE/BE careers. The first step would be to ensure small contractors are aware of externship and internship opportunities, and then to provide initial administrative support to engage with this program. Practices from this program support both entry-level workers in EE/BE while increasing the competitiveness of SMWBE contractors.

B.3.5 Program to Watch: Just Transition Residential Electrification Pilot, California

The City of Berkeley's Just Transition Residential Electrification Pilot is a local electrification pilot that seeks to increase the job quality within the residential construction workforce by aggregating residential electrification projects while requiring prequalified contractors to maintain labor standards for high-quality jobs. Aggregating residential electrification projects may increase cost efficiencies for construction crews while increasing the feasibility for larger contractors to support residential decarbonization projects. For residential electrification programs, the City of Berkeley recommends complex and multilayered funding, support for both union and nonunion, and timely payments to support small firms. This program is in the pilot stage, but could provide a model for achieving residential electrification goals while improving the quality of residential electrification jobs (Rebuilding Together East Bay Network, n.d.).

B.4 Mobile Training Centers

Mobile training centers offer a potential solution for regions in New York State where EE/BE training options are limited, populations are dispersed, and transportation barriers exist. These training centers bring hands-on instruction closer to workers, employers, and rural communities without requiring new permanent training facilities.

B.4.1 Prairie State College Mobile Training Centers, Illinois

Prairie State College created Mobile Training Centers to support manufacturing workforce development in south suburban Chicago. Federal funding from the U.S Economic Development Administration supported the purchase of trailers and equipment with matching funds from the college's Workforce Development and Community Education budget. Mobile Training Centers support rural entry-level training and minimize work interruptions for the existing workforce

(Prairie State College n.d.). The trailers are equipped with welding stations, manual mill and lathe combo machines, and other industrial robotics. These centers are managed by Prairie State College and respond to training and skill gaps identified by employers for both new and incumbent workers.

Similarly, SUNY Schenectady received $1 million through the SUNY Workforce Development Initiative Consolidated Funding Application (WDI CFA) Grant to develop two Mobile Training Labs for advanced manufacturing and healthcare workforce development. These training labs support 24 students and two instructors while providing customizable curriculum for employers (SUNY Schenectady County Community College 2023).

B.5 Transportation Solutions for Rural Communities

Access to a car is critical for most EE/BE occupations, especially for low-income and rural workers, due to the dispersed nature of job sites. The following grant programs fund innovative transportation solutions to support job seekers, trainees, and workers.

B.5.1 Workforce Transportation Solutions, Maine

Maine's Workforce Transportation Solutions program allocated $5 million to 14 employers to pilot innovative transportation solutions that connect workers with employers in rural areas (Office of Governor Janet T. Mills 2024, Maine Department of Transportation n.d.). Competitive solicitations of up to $750,000 were allocated through Governor Janet Mills' Maine Jobs and Recovery Plan, funded by the federal American Rescue Plan Act. Maine's Department of Transportation's Bureau of Planning managed the program for two years and reviewed applications, in consultation with Maine Department of Economic and Community Development, Maine Department of Health and Human Services, Maine Department of Labor, and the Governor's Office of Policy Innovation and the Future. A portion of the funds was targeted specifically to connecting workers in rural areas to employment.

Applicants partner with regional planning organizations, Chambers of Commerce, workforce boards, and community action programs to develop transportation solutions. Funds could be used for capital and operating costs and proposed solutions, including the following three examples.

Industrial Roofing Company was awarded $305,938 to purchase six new crew trucks, including two electric trucks and two charging stations, to bring employees from Rumford, Skowhegan, and Turner to IRC's facility in Lewiston.

Sugarloaf Resort was awarded $277,600 to support the purchase of three vans, one of which will be electric, to provide transportation for workers in nearby towns to and from the mountain.

Aroostook Regional Transportation System was awarded $321,600 to support development of a commuter bus service to connect Caribou and Presque Isle to several of the region's largest agricultural, forestry, and manufacturing employers.

New York State could leverage existing transportation funds or allocate additional funds to support workers to EE/BE jobsites in rural regions. Rideshare, carpool services, and public transit alone are unlikely to be the sole solution in rural areas due to highly dispersed EE/BE job sites. Funding crew trucks and personal vehicles, similar to the grantees in Maine's Workforce Transportation Solutions program, could be beneficial to rural EE/BE workers. NYSERDA's Clean Mobility program could be adapted to include small EE/BE contractors.

For this to happen, trusted community and workforce organizations could be leveraged to market the program and provide technical assistance. As suggested by the Maine Workforce Transportation Solutions program, while one agency can be responsible for managing the program, input will be needed from other state agencies, including NYSERDA, DOL's Office of Just Energy Transition (OJET), and New York State Department of Transportation.

B.5.2 Employment Transportation Assistance Program, Wisconsin

The Wisconsin Employment Transportation Assistance Program is an annual competitive grant program to address local and regional transportation barriers for low-income workers. The Wisconsin Department of Transportation combines state funding from the Wisconsin Department of Workforce Development with federal transit funding into a single annual grant program (Wisconsin Department of Transportation n.d.).

Grant applicants work with employers, workforce development boards, regional planning commissions, and other stakeholders to identify transportation gaps and develop coordinated solutions. The Wisconsin Department of Transportation provides startup funding to help communities launch and test new approaches to alleviating transportation barriers. One of the Wisconsin Employment Transportation Assistance Program's services supporting rural workers

without access to cars is providing low-cost, interest-free loans to purchase a car or pay for repairs (211 Wisconsin n.d., Wisconsin Department of Transportation n.d.). Expanding marketing and resources for similar programs in New York State, such as Driven2Success in the Finger Lakes region, would support the EE/BE workforce that needs cars to get to work (Catholic Charities Family and Community Services n.d.).

B.6 Small and Rural Employer Engagement

The following programs across the U.S. offer relevant models for maintaining feedback loops with rural employers, training providers, and students, and engaging them in on-the-job training opportunities.

B.6.1 Shasta College CRAFT Logging Apprenticeship, California

Shasta College engages small- to medium-sized rural employers to inform the California Registered Apprenticeship Forest Training (CRAFT) statewide RA program. The program is tailored to the needs of smaller businesses in the industry and reduces employers' training costs through an earn-and-learn model. Shasta College hosts the program, and it is led by a committee of logging industry employers and industry associations (Rural Assembly n.d.). This structure has a few notable strengths for keeping small and rural businesses engaged; first, the Unilateral Training Committee, which is made up of logging companies and industry associations, ensures that employer voice drives much of the program's direction and student curriculum. Second, the function of an intermediary model ensures that employer burden is small. The resulting low costs (effectively used time) and high rewards (intermediary-driven support with subsidized training and a firm employment pipeline) ensure that participation is feasible for even the most capacity-constrained firm.

Similar to the logging industry, rural EE/BE work is done by a few smaller employers with limited capacity. RAs strengthen workforce pipelines and improve employer productivity. Community colleges and local universities in the EE/BE workforce development ecosystem could leverage their connections with small contractors to create RAs that directly serve their needs.

B.6.2 Reach Higher Montana/Montana Work-Based Learning Collaborative

Through experience with a statewide rural workforce development ecosystem, the nonprofit organization Reach Higher Montana learned that long-lasting, trusted relationships, employer support, and educator externships are essential aspects to engaging employers in workforce

development. Reach Higher Montana developed a three-year strategic plan for workforce development ecosystem engagement, including quarterly meetings and annual retreats with educators, employers, and other stakeholders. Montana's Work-Based Learning Collaborative was established to achieve these workforce development goals and currently comprises 30 public- and private-sector organizations. The Work-Based Learning Collaborative is funded by Reach Higher Montana, EdChoice, Dennis & Phyllis Washington Foundation, and Arthur M. Blank Family Foundation, and has two staff members, a Director and Data Analyst (Reach Higher Montana n.d.).

The Work-Based Learning Collaborative is informed by real-time labor market data through annual surveys of employers and potential workers. In addition to 12 apprenticeship opportunities, Reach Higher Montana offers externships for educators, allowing them to spend a week engaging in hands-on learning with employers (Work-Based Learning Collaborative Montana n.d.). Hosting educator externs increases employers' interest in work-based learning opportunities such as youth apprenticeships, thereby reinforcing this feedback loop (Zaruba 2025). Reach Higher Montana provides support with employee recruitment, paperwork, training, and coordination, so small contractors can dedicate their time to the on-the-job aspects of the apprenticeship.

Rural regions in New York State are similarly fragmented and could benefit from sustained employer relationships built by trusted community leaders. Educator externships could strengthen the relationship between employers and training providers.

B.6.3 West Alabama Works

West Alabama Works is a nine-county workforce partnership with 230 employer and educator representatives operating with a $1.8 million annual budget from public and private sources. The organization partners with the Chamber of Commerce of West Alabama to manage day-to-day operations and personnel needs (West AlabamaWorks n.d.-a). West Alabama Works uses federal funds to provide companies with incentives to hire rural, impoverished students, including coverage of salaries, continuing education, and credentials (Carnegie Corporation of New York n.d.).

West Alabama Works hosts two career expos at local high schools to increase awareness of skilled trades and manufacturing careers. The first expo is Worlds of Work, which brings over 100 companies with interactive displays to more than 4,000 ninth graders in the region. This event increased enrollment in welding and modern manufacturing programs in 2024,

strengthening the pipeline of entry-level carmaker and supplier jobs after high school. The second recurring expo, Worlds of Work 2.0, catering to high school seniors, resulted in more than 610 job offers in 2023. Employers at Worlds of Work 2.0 come prepared to interview candidates and make job offers on the spot. After participating in West Alabama Works' workforce development expos, graduating students were more likely to report post-high school plans, with the share planning to work or continue their education increasing by 15 percentage points in 2023 (Worlds of Work n.d.).

West Alabama Works strengthens the feedback loop between educators and employers by running a yearlong program bringing educators to factories and worksites through the Educator Workforce Academy. Educators are then able to integrate industry-based learnings in the classroom. After the relationship is formed, employers' interest in hiring individuals from these educators increases (West AlabamaWorks n.d.-b).

Interactive expos at high schools could increase awareness of EE/BE work and strengthen the pipeline of skilled workers in rural regions of New York State. A yearlong program to build relationships between employers and educators could lead to training that ties more directly to recent employer needs and employers being more willing to hire these individuals.

B.7 Trainer Preparation and Support

Given the insight provided by stakeholders, innovative strategies to recruit skilled trades workers into educator roles may be necessary to strengthen talent pipelines for CTE instructors. The following case studies offer a few examples of actions that can bolster a sustainable pipeline of CTE instructors.

B.7.1 Educator Preparation Program, New Jersey

The New Jersey Department of Education's Educator Preparation Program developed a successful model for providing CTE instruction exposure to industry professionals through shorter introductory courses that grew from six to 53 participants in just under two years. The New Jersey Department of Education partnered with William Paterson University to offer a 400-hour Educator Preparation Program, which begins with a 50-hour introductory program that provides an opportunity to try teaching before committing. As of spring 2022, the New

Jersey Department of Education had 53 participants enrolled in the 50-hour course and 23 enrolled in the full two-year program. After the 50-hour course, people can sign up for the remaining 350-hour, four-semester, two-year program to be eligible to become a CTE instructor. To increase accessibility for those working in industry, the 50-hour course is $300, offered online, and spread across 12 weeks (U.S. Department of Education 2022).

The New York State Department of Education and NYSERDA could similarly work together to develop CTE educator programs that offer exploration into teaching pathways and close the gap between industry work and instruction for qualified workers.

B.7.2 Southern Regional Education Board, Multiple Locations

CTE programs often struggle to retain instructors from alternative backgrounds who lack a strong foundation in pedagogy or a sufficient support system. The Southern Regional Education Board's Teaching to Lead program provides professional, instructional, and operational resources and training suited for new CTE instructors with no prior educational or teaching experience. The Teaching to Lead format consists of 200 hours of intensive instruction, coaching, and professional development offered before, during, and after a teacher's first year. Teaching to Lead is not a one-size-fits-all approach; it is adaptable to state and school-specific needs (Southern Regional Education Board n.d.-a). The Southern Regional Education Board is an interstate nonprofit funded by appropriations from states and grants from foundations, local, state, and federal agencies (Southern Regional Education Board n.d.-b).

The Teaching to Lead framework demonstrates that teacher retention increases when teachers are supported through direct coaching and peer collaboration. Teacher retention increased from 50% to 87% in Syracuse after the Syracuse City School District and SUNY Oswego County adopted the Teaching to Lead framework. Similarly, teacher retention increased by 24 percentage points in Kentucky and reached 100% at Sumner County Schools in Tennessee after two years (Southern Regional Education Board n.d.-c).

B.8 Shared Apprentice Scheme

Shared apprentice schemes can reduce the administrative burdens that often prevent small contractors from hosting apprentices. The following U.K.-based example offers a successful approach to rotating apprentices among multiple smaller employers.

B.8.1 Cyfle Building Skills, South West Wales, UK

Cyfle Building Skills' Shared Apprentice Scheme reduces the burden of apprenticeship participation for small employers by removing the long-term commitment and administrative workload associated with apprenticeships. The program employs apprentices directly and rotates them among multiple employers, typically for three- to six-month placements, allowing apprentices to complete a full apprenticeship without requiring a single employer to commit to the entire training period. Since 2013, this program has supported over 1,000 apprentices, with approximately 90% securing full-time employment (Cyfle Building n.d.).

The success of this program is built on the collaboration between the Construction Industry Training Board, the Welsh Government, six local colleges and universities, and three regional training groups. Apprentices take classes with Cyfle's educational partners, receive support services from the Jack Lewis Wellbeing Center, and complete hands-on training at the South West Wales Onsite Construction Hub prior to rotating among employers.

B.9 New York State Case Studies

The following case studies highlight workforce development progress already underway in New York State's EE/BE ecosystem and existing organizations that are addressing some of the challenges identified in this assessment.

B.9.1 Trade Ally Network

Con Edison's Trade Ally Network is a collaborative network of contractors, manufacturers, architecture and engineering firms, distributors, retailers, and other allied professionals that support the delivery of energy efficiency solutions. The network serves as a platform to engage, support, and grow the workforce responsible for promoting and implementing energy efficiency technologies. Members receive access to technical training, financial incentives, performance-enhancing initiatives, and opportunities to expand their customer base. The network also provides recognition programs and co-branding resources that help members differentiate themselves and grow their businesses.

The partnership structure of Trade Ally Networks and the benefits members contribute to high customer satisfaction with energy efficiency programs. These networks are increasingly seen as trusted advisors and key partners in helping businesses and customers reach energy efficiency targets.

B.9.2 Soulful Synergy

Soulful Synergy treats workforce development as a full pathway rather than a single training event. The organization helps participants understand career pathways that are often overlooked, including energy auditing, incentive administration, sales, and contractor support roles. It works across New York City and the Mid-Hudson region to support career exploration in a fragmented, evolving clean energy market, technical instruction, hands-on learning, and job placement focused on expanding access for underserved communities to EE/BE career pathways. Soulful Synergy is recognized for its recruitment and outreach efforts in DACs. The organization's team brings direct experience from the workforce system, including staff who have moved through clean energy training themselves.

B.9.3 Ithaca, New York

The City of Ithaca plays a distinct role in the Southern Tier EE/BE workforce development ecosystem by translating its Ithaca Green New Deal commitments into local projects that create training, employment, and contractor engagement opportunities. By using public and community-serving buildings as training sites, Ithaca's approach shows how municipalities can help make workforce development more practical by connecting climate projects to paid work-based learning. This model links municipal decarbonization goals with equity, local hiring, employer participation, and the hands-on experience workers need to move into clean energy careers. The City also uses data analysis, contractor roundtables, and local partnerships to better understand workforce needs, including shortages in energy auditing, limited contractor capacity, and the difficulty new workers face in gaining jobsite experience.

B.9.4 New Women New Yorkers

New Women New Yorkers provides workforce development programs to help immigrant women obtain meaningful employment or pursue higher education in New York City. Its initiatives include job-readiness workshops, technical training, hands-on practice and networking opportunities, mentoring, and career fairs, helping participants from early-career programs or certifications to direct job placement. New Women New Yorkers provides support and guidance throughout every phase of the participant's journey to employment and education.

Collaboration is central to New Women New Yorkers' model. It serves as one of the workforce development partners in the Queens and Staten Island Clean Energy Regional Hub, and also operates within a larger network of partners, including other nonprofits, city agencies, and companies across industries and sizes. Its model of holistic support and strong partnerships allows immigrant women to bring the skills that effectively meet workforce needs.

B.9.5 The Green Launchpad

The Green Launchpad acts as a bridge and capacity builder, and a market transformation organization for clean energy workforce development across New York State. It addresses a persistent gap in the field: Employers are often disconnected from workforce programs, while training providers may lack up-to-date information on EE/BE roles, incentives, and hiring practices.

The Green Launchpad facilitates employer-led workforce coalitions and educational sessions structured as both training and working meetings, providing action plans that partners can use immediately. Its noncompetitive position allows it to work across organizations, distill best practices, and help partners focus on building electrification, energy efficiency incentives, and the employer relationships needed to connect workers to jobs.

B.9.6 Willdan Clean Energy Academy

Willdan operates as both a technical training provider and EE/BE contractor, offering it a dual view of employer needs and worker readiness. Its Clean Energy Academy trains approximately 500 participants a year and provides additional training to about 150 staff members. About 70% of its participants are placed in jobs across New York State. The program leverages its experiences as an employer to offer tailored training that addresses gaps that often limit job placement for workers, including interviewing, networking, basic digital skills, and the ability to explain work experience to employers. The Academy also effectively combines workforce training with placement support and employer engagement through its contractor operations and direct partnerships with Con Edison and small, minority-owned businesses.

B.9.7 Office of Just Energy Transition

The DOL's OJET demonstrates how public agencies can support workforce growth by pairing clean energy training funding with coordination, support for wraparound services, employer engagement, and sustained stakeholder feedback. As New York State scales building electrification, weatherization, and related clean energy investments, public agencies at both

local and state levels can collaborate with OJET or use similar models to support a just energy transition. OJET leverages its funding, convening role, and stakeholder relationships to address statewide workforce barriers and connect underrepresented workers to clean energy training, employment, and upskilling. The office shapes programs based on input from regional workforce working groups, community-based organizations, training providers, and employers. Its emphasis on flexible wraparound support and collaborations with DOL's in-house regional labor market analysts help design funding programs that better reflect local workforce conditions and participant needs.

DOL also strengthens the broader workforce development ecosystem by working across training and funding programs, policy and research, and interagency spaces. Through participating in cross-sector forums such as NYSERDA's Energy Equity Collaborative and others, OJET gathers feedback from stakeholders and explains government processes, what can be changed, what cannot yet be changed, and why. The office aims to close these feedback loops to help reduce silos, improve trust with community partners, and make state workforce resources easier to navigate.

B.9.8 Stacks+Joules

Stacks+Joules strengthens the EE/BE workforce development ecosystem by creating a clear pathway into specialized and high-demand roles in building automation and commercial energy efficiency. These roles can be difficult to hire for because they require technical training, employer trust, and exposure to systems that are not always available in general construction programs. Stacks+Joules helps fill this gap by building strong employer relationships and giving students a direct connection to companies seeking qualified talent.

Supported by state agency funding, Stacks+Joules' tuition-free program serves participants ages 18–24 and trains students in technical skills tied to building controls, HVAC systems, and energy management. The program is well established in the building automation field, and employers engage directly with students as part of the training-to-employment pathway. Graduates receive continued support through internships, job placement, and mentorship from industry professionals. Its partnership with Henry Street Settlement is central to this success, connecting the program to a trusted community anchor with direct access to young people who most need this pathway. Henry Street's wraparound support and community

credibility help ensure students stay engaged and complete the program, making the partnership a key driver of its strong outcomes. Its model shows how focused training, employer engagement, and continued mentorship can help young workers advance quickly into stable, clean-energy careers.

B.9.9 Energy Warriors

Cornell Cooperative Extension—Tompkins County's Energy Warriors program—offers a regional model for connecting underrepresented workers to clean energy jobs through holistic training, employer relationships, and trusted community leadership. Energy Warriors combines technical training with the trust-building, personal support, and community education needed to reach workers who may not otherwise see themselves in clean energy careers. Energy Warriors operates in Ithaca and the broader Southern Tier region to connect people facing barriers to employment with paid clean energy training, environmental literacy, and employer-connected career pathways. The program partners with local employers, municipalities, workforce agencies, and the Southern Tier Clean Energy Hub. Energy Warriors is also expanding its role in regional workforce development, with commitments through 2028 to train workers across two counties and place participants into meaningful career pathways.

The program offers transportation, childcare, meals, stipends, and make-up classes, while also treating environmental literacy and communication as core workforce skills. Its regular convenings with its partners and similar stakeholders help align training with real project needs and create direct recruitment channels.

B.9.10 The Capital Region Workforce Development Board

The Capital Region Workforce Development Board (CRWDB) has distinguished itself in EE/BE through direct employer engagement. Many EE/BE contractors are small businesses without structured HR support. CRWDB's business services personnel fill this gap by connecting employers to training pipelines, relevant certifications, and state programs. Effective communication with employers has shaped CRWDB's approach to pre-apprenticeship programming, emphasizing the integration of professional skills alongside technical credentials. To address skepticism toward entry-level clean energy roles, the CRWDB highlights long-term career potential as a core part of its recruitment and outreach efforts. Through sustained investments in employer relationships and regional career development initiatives, CRWDB works to align workforce programming with local labor market needs.

Appendix C. Priority Occupations Gap Analyses

The priority occupation gap analyses categorized priority occupations into one of three tiers:

1. **Tier 1: Urgent Focus**

   Tier 1 occupations face the most acute shortage risk and show significant strain across both dimensions of the gap analysis: EE/BE industry-specific demand and historical supply capacities are both severe. These occupations will require broad statewide workforce strategies, including rapid expansion of training pipelines, targeted energy-sector recruitment for both new and existing workers displaced over the last decade, and new or strengthened workforce partnerships. Without intervention, these occupations pose the highest risk of shortage in the coming decade as expanded building electrification and energy efficiency work take place.

2. **Tier 2: Emerging Gaps**

   Tier 2 includes occupations that exhibit elevated demand in at least one of two metrics—either high EE/BE-specific pressure or projected demand that exceeds historical growth capacity. These roles are not yet at crisis levels but show clear upward pressure and will require targeted workforce interventions to prevent future shortages. Recommended actions include expanded recruitment pathways, expanded career progression pathways, moderate expansion of training capacity and accessibility, and closer alignment between employers and education providers. These occupations represent areas where New York State can proactively build capacity before more acute shortages emerge.

3. **Tier 3: Stable Occupations**

   Tier 3 occupations demonstrate strong alignment between future workforce needs and New York State's historical capacity to supply talent. The state's established training pipelines and educational systems are likely sufficient to meet projected need without drastic levels of new investment. For these occupations, New York State should maintain current training and credentialing capacity, monitor demand trends, and support incremental expansion as needed—but no large-scale interventions are required in the immediate term.

C.1 Relative Growth Rates

Table C-2 examines the projected growth rate of priority occupations in the EE/BE industry relative to its current size. This highlights occupations where the EE/BE industry alone is generating disproportionate new demand, even when those occupations represent a small share of the overall labor market. Evaluating demand in this way isolates EE/BE-driven growth pressures (i.e., employment changes driven by EE/BE upgrades and policy expansion) from broader economic forces such as population growth, general industry expansion, or labor market changes.

Multiple occupations are experiencing moderate or severe EE/BE-specific pressure and are thus at the greatest risk of shortages. Most notably, the occupation with the largest gap between current EE/BE industry employment and additional demand through 2035 is to weatherization.

Table C-1. Criteria for "Severe," "Moderate," and "Mild" Classifications of Identified Demand Gap based on Forecasted Demand

Severity of Gap	Description of Gap
Severe	Additional EE/BE demand is 35% or more of the 2025 EE/BE employment. (Gap is double or more the additional demand for New York State's total EE/BE workforce.)
Moderate	Additional EE/BE demand is more than 17% but less than 35% of the 2025 EE/BE employment. (Gap is more than the additional demand for New York State's total EE/BE workforce.)
Mild	Additional EE/BE demand is 17% or less of the 2025 EE/BE employment (Gap is less than the additional demand for New York State's total EE/BE workforce.)

Table C-2. EE/BE Demand as a Percent of 2025 EE/BE Employment by Priority Occupation

Priority Occupation Name	EE/BE Work Activities	EE/BE Industry Employment, 2025[b]	Additional EE/BE Demand, 2025–2035	Additional EE/BE Demand as % of 2025 EE/BE Employment	Severity of Gap
All New York State Occupations		**134,444[c]**	**23,410**	**17%**	
Insulation Workers, Floor, Ceiling, Wall[d]	Weatherization	727	2,054	282%	Severe
Heating, Air Conditioning, and Refrigeration Mechanics and Installers	Electrification, General Building Construction, and Maintenance	12,414	4,079	33%	Moderate
First-Line Supervisors of Construction Trades and Extraction Workers	Supervision/Management	2,643	817	31%	Moderate
Plumbers, Pipefitters, and Steamfitters	General Building Construction and Maintenance	3,663	1,035	28%	Moderate
Construction Managers	Supervision/ Management	3,886	1,045	27%	Moderate
Operating Engineers and Other Construction Equipment Operators	General Building Construction and Maintenance	2,170	557	26%	Moderate
Electricians	Electrification, General Building Construction, and Maintenance	2,428	562	23%	Moderate
Carpenters	Weatherization, General Building Construction, and Maintenance	1,433	336	23%	Moderate
Painters, Construction and Maintenance	Weatherization	687	159	23%	Moderate
Construction Laborers	Weatherization, General Building Construction, and Maintenance	4,323	820	19%	Mild
Maintenance and Repair Workers, General	General Building Construction and Maintenance	385	60	15%	Mild
Construction and Building Inspectors	General Building Construction and Maintenance	1,266	26	2%	Mild
Mechanical Engineers	Administration/ Professional Services	1,922	43	2%	Mild

[a.] This table assesses the projected workforce demand only for the EE/BE priority occupations; the 2025 employment values of each occupation will not sum to the total EE/BE industry workforce.

[b.] The current workforce estimates reported here are sourced from the New York State Jobs Impact Analysis and vary from the 2025 NYCEIR due to data availability. The New York State Jobs Impact Analysis leveraged the 2024 United States Energy and Employment Report (USEER), which reported 2023 data. This Analysis projects the 2025 workforce based on the 2023 data that was available at the time. The 2025 NYCEIR uses 2025 USEER data (reporting 2024 data), which were both released after the Jobs Impact Analysis.

[c.] Due to misclassifications of insulation workers between the SOC system and employers, employment projections for this occupation are estimated using the employment projections of related occupations, including construction laborers, carpenters, and construction painters. See Methodology for more details on this calculation.

C.2 Comparing Future Demand to Historical Growth

The data presented in Table C-4 evaluate whether New York State's historical ability to meet workforce needs suggests the state can meet projected demand through 2035. Occupations with high projected demand but negative or flat historical growth pose the greatest risk, as New York State has not, at least recently, produced enough workers to meet future needs at the required scale.

Four of the five priority occupations flagged as experiencing severe EE/BE-specific workforce pressure in Table C-4 show negative historical growth over the last decade, indicating the potential risk of unmet labor needs as demand for these EE/BE workers increases over the next ten years. Two of these occupations—construction painters and carpenters—show large negative growth over the last ten years, likely due to structural shifts in the state's construction workforce. The COVID-19 pandemic caused one of the largest construction employment contractions in decades, with employment still remaining below pre-pandemic levels in parts of the state. At the same time, demand for commercial construction, especially in New York City, has declined as hybrid work reduces demand for new office buildings and reduces available work for occupations that rely on commercial building activity.[31]

While large negative historical growth may indicate that a portion of the existing workforce in these occupations is underemployed and available to fill any future worker demand, there is a risk that experienced workers have exited the occupation, transitioned into adjacent occupations, retired, or relocated, each of which reduces the pool of readily available labor. Even where former workers in these occupations remain in the labor pool rather than exiting the labor market altogether, their skills may be out of practice and require updated training, or there may be a geographic disconnect between the location of these workers and the areas of the state most in need of workers to complete weatherization and general building construction projects.

Two priority occupations—plumbers, pipefitters, and steamfitters; and construction managers—have seen relatively stable employment over the last decade, with small negative employment growth. For these occupations, small negative historical growth does not necessarily suggest that workers have exited the occupation on a large scale or that the state lacks a functional training or apprenticeship ecosystem. This is similar for HVAC/R mechanics and installers: While projected employment is on par with historical employment growth, it does not account for future demand outside the modeled EE/BE industry, which could strain the existing training ecosystem.

Table C-3. Criteria for "Severe," "Moderate," and "Mild" Classifications of Identified Demand Gap based on Historical Growth

Severity of Gap	Description of Gap
Severe	Total projected demand exceeds historical growth by more than 100%.
Moderate	Total projected demand exceeds historical growth by less than 100%.
Mild	Total projected demand does not exceed historical growth.

Table C-4. Historical Growth vs. Projected Demand by Priority Occupation

Priority Occupation Name	EE/BE Work Activities	Historical Growth, 2015–2025	Additional EE/BE Industry Demand, 2025–2035	Excess Demand Beyond Historical Capacity	Severity of Gap
Carpenters	Weatherization, General Building Construction, and Maintenance	-7,539	336	7,875	Severe
Painters, Construction and Maintenance	Weatherization	-2,661	159	2,820	Severe
Insulation Workers, Floor, Ceiling, Wall	Weatherization	500	2,054	1,554	Severe
Plumbers, Pipefitters, and Steamfitters	General Building Construction and Maintenance	-104	1,035	1,139	Severe
Construction Managers	Supervision/ Management	-8	1,045	1,053	Severe
Heating, Air Conditioning, and Refrigeration Mechanics and Installers	Electrification, General Building Construction, and Maintenance	4,015	4,079	64	Moderate
Mechanical Engineers	Administration/ Professional Services	712	43	-669	Mild
Operating Engineers and Other Construction Equipment Operators	General Building Construction and Maintenance	1,333	557	-776	Mild
Construction and Building Inspectors	General Building Construction and Maintenance	2,086	26	-2,061	Mild
Electricians	Electrification, General Building Construction, and Maintenance	3,287	562	-2,725	Mild

Table C-4. (continued)

Priority Occupation Name	EE/BE Work Activities	Historical Growth, 2015–2025	Additional EE/BE Industry Demand, 2025–2035	Excess Demand Beyond Historical Capacity	Severity of Gap
Construction Laborers	Weatherization, General Building Construction, and Maintenance	7,179	820	-6,359	Mild
First-Line Supervisors of Construction Trades and Extraction Workers	Supervision/ Management	6,575	817	-5,758	Mild
Maintenance and Repair Workers, General	General Building Construction and Maintenance	8,751	60	-8,692	Mild

C.3 Unemployment, Concentration of Workers, and Age of Current Workforce

Unemployment Rate: This helps gauge the immediate availability of workers; a low unemployment rate may mean that most workers are already employed, signaling a tight labor supply, while a high unemployment rate indicates more available workers.

Location Quotient (LQ): LQ represents the concentration of an occupation compared to the national average. An LQ greater than one indicates greater concentration in that region than nationally, often indicating a local/regional cluster, while an LQ less than one indicates lower prevalence and potentially more difficult recruitment.

Share of Older Workers: A higher share of workers above the age of 55 signals near-term retirements, which could mean less labor supply and a need for talent pipelines and succession of knowledge and skills.

Data in these categories for the priority occupations is found in Table C-6. Initial analysis is included in the following section.

Five of the 13 priority occupations have unemployment rates above the statewide average, suggesting that some of the additional demand stemming from increased EE/BE activities across the state could be met by existing workers who are currently not employed in their occupation.

Aside from general maintenance and repair workers, and construction and building inspectors, all other priority occupations have an LQ less than one, indicating that New York State may have less existing capacity in these occupations relative to national employment levels and may face challenges in worker recruitment. Construction and building inspectors have both low unemployment (1.1%) and one of the highest LQs of the selected priority occupations (1.13), signaling a specialized workforce in the state. They also represent an aging workforce, with 46% of workers in the State age 55 or older. While this does not present a risk to New York State's EE/BE industry in the short term—with EE/BE activities associated with the Additional Action scenario projected to increase their demand by fewer than 30 workers—the State should be mindful of a longer-term strategy to ensure adequate worker supply in what is already a tight occupational labor market.

The share of New York State workers aged 55 and older (25%) is higher than the national average (23%) (U.S. Census Bureau 2024b) and the labor force participation rate among workers aged 55–64 in the state is considerably higher than in 2019 (Kohli 2025). For those priority occupations where the share of workers aged 55 and older is similar to the statewide workforce average, retirement pressures could become an additional constraint in meeting projected demand. Occupations like general maintenance and repair workers, construction and building inspectors, carpenters, plumbers, pipefitters, steamfitters, and floor, ceiling, and wall insulation workers are more likely to require targeted, long-term workforce recruitment as worker demand increases due to retirements, while occupations classified as moderate should be monitored for future age-related retirement pressures.

Both carpenters and construction painters have unemployment rates higher than the state average (6.0% for carpenters and 8.7% for painters, compared to 4.2% statewide), suggesting that some workers in these occupations remain in the labor market but are currently unemployed.

This indicates that part of the future weatherization workforce demand associated with the 2025 State Energy Plan could potentially be met by recruiting existing workers rather than training new workers, reducing burden to the training ecosystem, and reconnecting experienced carpenters and painters with stable work in weatherization. The same can be said for construction laborers, which is a Tier 2 occupation in terms of gap severity, due to high employment growth over the next decade but also have a high unemployment rate (7.8%), indicating that a portion of this gap could potentially be filled by existing workers.

The same cannot be said, however, for construction managers and HVAC/R mechanics and installers, who both fall under the second tier of workforce gap severity due to their projected employment growth relative to historical growth levels. These occupations have low unemployment rates (2% for construction managers and 2.6% for HVAC/R mechanics and installers, compared to 4.2% statewide), indicating that there is little excess labor supply to absorb additional demand stemming from building electrification and heat pump deployment. These tight labor market constraints reinforce the takeaway that expanding existing training pipelines and career progression pathways are critical to meeting future workforce needs for construction managers and HVAC/R mechanics and installers.

Table C-5. Criteria for "Severe," "Moderate," and "Mild" Classifications by Unemployment Rate, Location Quotient, and Share of Current Workers Aged 55 and Over

Unemployment Rate	
Severe	Unemployment rate less than 80% of the NY average (<3.4%)
Moderate	Unemployment rate between 80% and 100% of NY average (3.4%–4.2%)
Mild	Unemployment rate more than 100% of NY average (>4.2%)
Location Quotient (LQ)	
Severe	LQ less than 80% of the NY average (<0.8)
Moderate	LQ between 80% and 100% of the NY average (0.8–1.0)
Mild	LQ more than 100% of the NY average (>1.0)
Share Of Current Workers Age 55+	
Severe	Share more than 100% of the NY average (>25%)
Moderate	Share between 80% and 100% of the NY average (20%–25%)
Mild	Share less than 80% of the NY average (<20%)

Table C-6. Factors Related to Labor Supply by Priority Occupation

Occupation Name	Unemployment Rate, 2025 (JobsEQ 2025)	Location Quotient, 2025 (JobsEQ 2025)	Share of Current Workers Age 55+ (JobsEQ 2025)
All New York State Occupations	**4.2%**	**1.00**	**25%**
Maintenance and Repair Workers, General	3.8%	1.25	26%
Construction Laborers	7.8%	0.74	23%
Carpenters	6.0%	0.92	26%
Electricians	3.7%	0.85	21%
First-Line Supervisors of Construction Trades and Extraction Workers	3.4%	0.71	18%
Plumbers, Pipefitters, and Steamfitters	3.1%	0.81	27%
Heating, Air Conditioning, and Refrigeration Mechanics and Installers	2.6%	0.90	20%
Construction Managers	2.0%	0.56	11%
Painters, Construction and Maintenance	8.7%	0.90	22%
Operating Engineers and Other Construction Equipment Operators	6.8%	0.55	22%
Construction and Building Inspectors	1.1%	1.13	46%
Mechanical Engineers	0.7%	0.54	16%
Insulation Workers, Floor, Ceiling, and Wall	4.3%	0.83	33%

Appendix D. Methodology

To develop this assessment, BW Research conducted foundational research, quantitative data collection and analysis, including economic modeling and surveys, stakeholder engagement, and additional analyses.

D.1 Foundational Research

- **Literature review** of academic research, industry reports, workforce studies, and relevant publications to identify best practices, workforce challenges, and emerging trends related to EE/BE.
- **Analysis of 12 Regional Assessment and Barriers Analysis (RABA) reports** to determine regional workforce conditions, labor market dynamics, industry assets, and barriers to workforce participation. This was supplemented by engagement with Regional Clean Energy Hubs to incorporate region-specific perspectives and priorities.
- **Past New York State EE/BE workforce, employer, and industry surveys** were reviewed,
  and findings were synthesized to inform the study's research framework, develop updated surveys, and identify recurring workforce challenges and opportunities.
- **Policy and funding assessment** of federal, state, utility, and regional policies, programs, and funding mechanisms influencing workforce development, training capacity, and industry growth.

D.2 Quantitative Data Collection

- **Economic and workforce modeling** aligned with the 2025 State Energy Plan was used to estimate future employment demand under projected EE/BE growth scenarios and identify potential occupational shortages and workforce gaps.
  - Due to misclassifications of insulation workers between the SOC system and employers, resulting in imprecision in the data at the occupational level, the employment estimation for insulation workers is the sum of the residential shell employment data of construction laborers, carpenters, and construction painters. The employment data reported for these three occupations include the other five EE/BE sub-sectors modeled in the 2025 State Energy Plan (i.e., residential HVAC, residential other, commercial shell, commercial HVAC, and commercial other).
- **A survey of EE/BE employers** was developed to assess workforce characteristics, hiring challenges, partnerships, and other industry trends. The survey was fielded from

March 19 to April 20, 2026 and resulted in 122 completions. The survey sample was weighted to be representative of establishment size categories in the relevant industries in New York State.

    - Occupational specific findings from the employer survey should be interpreted carefully when the number of respondents for a given occupation is fewer than 30. With a sample size of 30 or more, it is assumed that the responses follow a normal distribution.

- **A survey of current workers and job seekers** was developed to better understand barriers to entry and advancement, job quality, and awareness of opportunities within the EE/BE industry. The survey was fielded from March 19 to April 20, 2026, and resulted in 394 completions. The survey sample was weighted to be representative of workers by value chain (industry) within clean energy industries.
    - Due to oversampling of senior-level respondents and challenges reaching entry-level workers through standard survey outreach channels, the results may more closely reflect the experiences and perspectives of senior-level workers. This higher share of senior-level respondents results from differences in accessibility and responsiveness across worker groups, which can affect findings related to acquired certifications and the types of credentials workers report holding.

D.3 Qualitative Stakeholder Engagement

- **Forty-four research interviews** were conducted with training providers, community-based organizations, labor representatives, utilities, and other stakeholders to gather qualitative insights and validate research findings.

D.4 Additional Analyses and Mapping

- **Workforce development ecosystem gap analysis** included evaluation of training, wraparound service, and workforce development ecosystem strengths, weaknesses, and gaps across regions in New York State.
- **Geographic mapping and statewide inventories of training providers and workforce support services** were developed utilizing existing inventories and additional research to identify current resources and trends across regions.
- **Pathway profiles for priority occupations** were developed using New York State-specific career data from the U.S. Bureau of Labor Statistics (BLS), JobsEQ Real Time Intelligence, U.S. Department of Labor O*NET, BW Research's proprietary Job Quality Index, and other public data sources.

Endnotes

[1] Data is taken from the NY Clean Energy Industry Report, which reports employment data across the clean energy sectors annually.

[2] Includes management, business and financial, computer and mathematical, architecture and engineering, life, physical, and social science, and legal occupations (SOC codes 11, 13, 15, 17, 19, and 23).

[3] Includes construction and maintenance occupations (SOC codes 37, 47, and 49).

[4] The current workforce estimates reported here are sourced from the New York Jobs Impact Analysis and vary from the 2025 New York Clean Energy Industry Report (NYCEIR) due to data availability. The New York Jobs Impact Analysis leveraged the 2024 United States Energy and Employment Report (USEER), which reported 2023 data. This Analysis projects the 2025 workforce based on the 2023 data that was available at the time. The 2025 NYCEIR uses 2025 USEER data (reporting 2024 data), which were both released after the Jobs Impact Analysis.

[5] Due to granularity of available data, "residential" in the context of all current and forecasted employment/worker data, includes all building types that house people, both single-family and multifamily of any size. Conversely, data collected from surveyed EE/BE businesses categorized by a) single-family and smaller multifamily buildings and b) large multifamily and commercial buildings.

[6] The residential and commercial sectors align with those of the 2025 State Energy Plan. The commercial sector includes buildings from across nine business segments, including office/government, retail, food service, warehouse, grocery/convenience, health services, hospitals, education, and lodging/hospitality. Industrial buildings were not analyzed in this study.

[7] Data from 2026 employer survey, n = 122. Please see Appendix D: Methodology for more information.

[8] Survey design and weighting was utilized to ensure that responses are representative of firm size and industry.

[9] The discrepancy in responses by employer size grows as employee count increases. For example, firms with fewer than ten employees are more than two times as likely to report single-family residential buildings as the primary building type they work on as employers with 50 or more employees.

[10] Due to the oversampling of senior-level respondents and challenges reaching entry-level workers through survey outreach, these results may more closely reflect the experiences and perspectives of senior-level workers.

[11] Direct employment is the employment associated with the initial economic activity of a given investment or activity (e.g., a construction worker hired to work on shell upgrades to a commercial building).

[12] Indirect employment is the employment associated with the supply chain connected to the initial economic activity of the original investment or activity (e.g., a worker at a lumber mill hired to handle the increased demand for construction lumber resulting from the initial investment).

[13] For more information on employment projections and model inputs, see Appendix D: Economic Modeling Inputs and Assumptions.

[14] The Additional Action scenario assumes an acceleration of heat pump adoption beyond the level supported by existing state electrification and energy efficiency programs; the AA scenario assumes that by 2035—the second benchmark SEO year—the heat pump sales will comprise 40% of all residential space heating device sales and 33% of all commercial space heating device sales.

[15] The Additional Action scenario assumes all new building construction currently have medium shells (as well as all existing units that were built after 2010), switching to deep shells starting in 2028. The Additional Action scenario also assumes additional commercial and residential building shell retrofits beyond the level supported by current policies; for residential building stock, the assumption is that 12% have basic shells, 13% have medium shells, and 4% have deep shells in 2035.

[16] In the context of current and forecasted employment/worker data, residential includes all building types that house people, including single-family and both small (low-rise) and large (high-rise) multifamily buildings.

[17] Two-digit SOC codes: 37, 47, and 49.

[18] Bolded values represent total EE/BE employment for each subsector.

[19] This is an average of the relative growth rates for all other ESD regions excluding New York City, which range from 20%–33%.

[20] Based on the 2025 State Energy Plan economic modeling. Note that the modeling data is directional, providing industry and workforce estimates in the EE/BE industry based on the 2025 State Energy Plan. Misalignment in occupational categorizations between the U.S. Bureau of Labor Statistics, employers, and other stakeholders create variation and, therefore, imprecisions in the data.

[21] Tiering framework is intended as an analytical tool, not a prescriptive prioritization. Tier 1 occupations should not be interpreted as the only roles warranting investment or expansion—all tiers may present strategic opportunities depending on policy goals, industry needs, and regional considerations. Occupation tier assignments are based solely on projected demand and labor supply indicators and do not account for other factors such as wages, career pathways, or broader economic development priorities.

[22] The Tier 1, 2, and 3 labels are used in this section rather than the "severe," "moderate," and "mild" labels used in Appendix C to avoid conflating occupations that exhibit a single "severe" flag with occupations projected to experience an overall severe workforce shortage.

[23] Data from 2026 current worker and job seeker survey, total survey n = 394. See Appendix D: Methodology for more information.

[24] Many more organizations provide or support these services, but the inventory is limited to wraparound services targeted directly at supporting workforce development.

[25] Central, Finger Lakes, Mid-Hudson, North Country, and New York City regions.

[26] Refer to Appendix A for regional findings and recommendations.

[27] Residential in this context of the economic modeling conducted includes all building types that house people, including single-family and multifamily buildings.

[28] Because many jobs are “hands-on” construction roles, EE/BE employers often consider “‘training”’ to include on-the-job experience and other experiential learning.

[29] Some HVAC programs are hidden in this diagram due to multiple training offerings in the same ZIP code.

[30] The HVAC program is not visible in the map (Figure A-7) because the carpentry and HVAC programs are located in the same ZIP code and the HVAC symbol is covered by the carpentry symbol.

[31] For more information, see “The Construction Sector in New York City: Post-Pandemic Trends from the Office of the New York State Comptroller”. https://www.osc.ny.gov/files/reports/pdf/report-8-2026.pdf.

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