

PREPARING WORKERS FOR THE GREEN ECONOMY

Opportunities and Challenges for an Emerging Labor Market

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The transition to clean energy in the United States promises to create millions of new jobs over the coming decade. Research suggests clean energy technologies could create up to six million new jobs by 2035.¹ Given that thousands of new jobs in clean energy sectors were already created in 2022 and 2023, it seems likely these projections for the coming years will be realized.² The ability to rapidly grow the green workforce could have significant consequences — not just for American competitiveness but for the planet, as institutions worldwide allocate substantial funding to combat climate change.³ The coming demand for green labor also provides a unique chance to more equitably include members of marginalized communities who have historically been left out of opportunities for economic advancement and growth.⁴

But while the need for workers with green job skills is growing, career and technical education (CTE) training organizations poised to train those workers are struggling to keep pace with the demand in industries at the heart of the transition — everything from solar and wind power technology to green finance and sustainable fashion.⁵ Educational institutions looking to rapidly adjust or expand their curricula face additional barriers. For example, there is a lack of agreement about just which skills green workers will need to meet future demand. At the same time, efforts to recruit students into green job training programs are complicated by the need to promote jobs that have yet to fully materialize. Failure to address these issues could slow public policy efforts to implement fundamental changes to energy use and infrastructure to reduce greenhouse gas emissions.

This brief aims to shed light on the complex factors that have both facilitated and hampered efforts to train and hire workers for the green labor market. The MDRC research team conducted a qualitative case study based on interviews with stakeholders involved in green policy, education, training, and employment sectors in the New York metropolitan region. Participants were invited to share their experiences in this critical economic sector as well as their thoughts about the challenges and opportunities that will inform future green jobs initiatives around the country. As such, the case study was designed as an inductive line of inquiry, which is useful for developing ideas and hypotheses from which specific issues and solutions can be developed.⁶ Given the newness of the issues identified and the need for rapid change by often slow-moving institutions, this brief also highlights ways policy and practice communities can develop solutions in a more timely way.

The brief begins with an overview of New York City (NYC) and New York State (NYS) policies that have helped create a foundation for making the metropolitan region one of the most robust green labor markets in the country.⁷ Next, the brief provides an overview of the study design, followed by findings about the kinds of skills and training employers are looking for, the barriers to creating and scaling up a robust training ecosystem, and solutions that are being developed to address those barriers. The final sections detail key conclusions from the study followed by implications for policies related to education and training.

The New York Metro Region Context

In recent years, both NYC and NYS have been advancing policies that support the transition to a clean energy and climate-resilient future. For example, in 2019, the New York City Council passed the Climate Mobilization Act, a legislative package aimed at cutting citywide greenhouse gas emissions (GHGs) by 40 percent by 2030 and to net zero by 2050. Given that the majority of NYC's GHGs come from its buildings, the legislation seeks to reduce the city's carbon footprint through a combination of regulations including increasing the use of electricity over oil and gas for heating and cooling, installing more solar panels and green roofs, and retrofitting older buildings for energy efficiency.⁸ The city has also passed laws to reform its waste management system, increase its recycling and composting programs, and ban plastic bags and single-use foam containers.⁹

The city's efforts have been reinforced by state legislation. The 2019 New York State Climate Leadership and Community Protection Act set goals to increase the amount of electricity the state produces from renewable energy sources such as solar and wind to 70 percent by 2030.¹⁰ The New York State Energy Research And Development Authority (NYSERDA) has since committed \$170 million for training as many as 40,000 people across the state for green jobs.¹¹ Due to these laws as well as national legislation and private sector momentum, green jobs in NYC are expected to increase by nearly 65 percent, from 140,000 jobs in 2021 to 230,000 jobs by 2030.¹² But while the laws have contributed to a policy climate that is friendly to green jobs development, questions remain as to whether there will be enough skilled workers to fill the demand and what the education and training sectors are doing to address that gap.

Methods

The MDRC team conducted 23 semi-structured, qualitative interviews between October 2022 and May 2023. Participants represented a range of voices across key stakeholder groups with a vested interest in the development of education and training for the green labor market. As shown in Table 1, participants included employers, secondary and postsecondary education administrators, workforce training organization leaders, and representatives from organizations that work with labor unions, city, and state agencies.

Table 1. Case Study Participants

Type	Organization	Description
K-12 education	New York City Public Schools (NYCPS)	NYC public school system, including Career and Technical Education (CTE) schools
K-12 education	Urban Assembly New York Harbor School	High school that offers training focused on marine resource management, science and technology
Organized labor organization	Climate Jobs Institute at Cornell School of Industrial and Labor Relations	Cornell extension program working to provide sustainability and climate change education to union leaders
Organized labor organization	Consortium for Worker Education at City College of New York	Nonprofit workforce development arm of the NYC Central Labor Council, AFL-CIO
Organized labor organization	Edward J. Malloy Initiative for Construction Skills	Nonprofit organization that operates a pre-apprenticeship program that trains New York City residents for direct entry into apprenticeships in the unionized building and construction trades
Policy/government	Mayor’s Office of Climate & Environmental Justice	City office preparing NYC for the impacts of climate change
Policy/government	New York State Energy Research and Development Authority (NYSERDA)	State agency that is charged with both reducing greenhouse gases and investing in economic growth of the green economy for NYS
Policy/government	NYC Economic Development Corporation	Nonprofit focused on developing city’s economy through leasing industrial spaces and land development
Postsecondary education	Bronx Community College	Community college that offers maintenance technician training for electric vehicles and chargers

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Table 1 (continued)

Type	Organization	Description
Postsecondary education	City University of New York (CUNY) Kingsborough Community College	Community college which offers maritime related trainings for the offshore wind industry including deckhand and crew transfer vessel training
Postsecondary education	New York Community Colleges Energy Equity Consortium (NYCCEE)	Consortium of 24 organizations, mainly community colleges, focused on funding for green jobs training
Postsecondary education	State University of New York System (SUNY) Westchester Community Colleges	Community college serving Westchester area students
Private employer	Animated Insights	Software company that creates digital twins of buildings to analyze and plan energy efficiency upgrades
Private employer	BlocPower	Company that offers energy efficiency upgrades to residential city buildings
Private employer	Brooklyn Solar Works	For-profit residential and commercial solar panel installation company
Private employer	Local Office Landscape and Urban Design	Firm that builds climate-resilient outdoor spaces
Private employer	National Grid	Electric and gas utility company that serves Massachusetts and New York
Private employer	New York Power Authority (NYPA)	NYS public electric utility focused on clean energy generation
Workforce training organization	Association for Energy Affordability (AEA): Workforce Development Program	Industry association that provides training on building weatherization and green HVAC
Workforce training organization	Groundwork Hudson Valley	Nonprofit focused on sustainability education, community-based climate resilience, and green workforce development.
Workforce training organization	Solar One	Nonprofit that trains NYC residents in building operations and maintenance, solar, and energy efficiency skills
Workforce training organization	Stacks+Joules	Nonprofit that provides high school-based training in building automation and controls
Workforce training organization	Sustainable South Bronx – The HOPE Program	Nonprofit that trains Bronx residents in solar installation and green infrastructure skills

Voices from the NYC Green Jobs Landscape

Identifying the Necessary Skills

Study participants were asked to identify areas of job growth and the skills they think workers will need to participate successfully in the green labor market. An interviewee from the NYC Economic Development Corporation, an organization that works with city government to develop new industries for the city's economy, said the big areas for job growth include energy infrastructure, decarbonization of buildings, transportation, and food and waste systems. Within these fields, study participants said they are looking for a variety of skills that can vary depending on the job type. These include technical skills for specific jobs and soft skills — generally considered to be those that support effective employees, such as collaboration, communication, and awareness skills, among others. Basic skills, such as how to use a calculator, as well as basic math and science skills, are also essential in preparing entry-level workers for jobs in the green economy, according to an interviewee from NYSERDA — which works to advance energy solutions and protect the environment.

Other jobs require existing workers to obtain new technical skills or training to learn about green practices. “[Workers] may be...really good HVAC technicians, but not familiar with heat pumps or... how to size a heat pump for cold weather applications,” the NYSERDA participant said. Multiple interviewees also expressed the need for workers with technology and construction skills that are specific to the green labor market. For example, an interviewee from Animated Insights, a company that uses smart technology to help buildings be more energy efficient, discussed the need for workers with programming and software skills. A participant from the New York Power Authority (NYPA) also noted the need for workers with skills in smart street and energy-efficient lighting technology.

An interviewee from the workforce development program at the Association for Energy Affordability (AEA) expects jobs to grow in the building and power sectors, including weatherization, energy efficiency, and transitioning heating, ventilation and air conditioning (HVAC) systems from oil- and gas-burning boilers and furnaces to electric heat pumps. The AEA interviewee also expects growth in jobs focused on transitioning to new energy sources such as solar, wind, and geothermal. The participant from the New York Community Colleges Energy Equity Consortium (NYCCEE) noted that the demand for electricians with skills in wind power production will also likely grow. The interviewee from the Cornell University School of Industrial and Labor Relations (Cornell ILR) noted the need for electricians as well, including those who can work on building decarbonization. As building heating and cooling systems continue to be modified and improved, workers with clean energy HVAC skills will be needed to maintain them. The interviewee from Groundwork Hudson Valley, a nonprofit organization focused on sustainability education and climate resilience training, expects funding to grow for training in green infrastructure jobs such as stormwater management. Welders were also identified by some program participants as essential to offshore wind expansion, which is a priority for New York State.¹³

Key Issues Related to Preparing Students and Workers for Green Jobs

While many of the interviewees were able to identify a broad range of skills that will be required for green jobs, they also noted that existing shortages of workers such as skilled electricians — where there have already been warnings of shortages over the past two decades — are bound to make hiring even harder.¹⁴ A major piece of the strategy for decarbonization, for example, is to transition more and more products — including cars, ovens, and HVAC systems — to run on electricity rather than on fossil fuels.¹⁵ For this reason, demand for electricians with the expertise to wire homes, electric vehicle (EV) charging stations, induction stoves, and other products, is expected to grow for many years to come. Welding is another area where a strong demand for workers already exists. For example, the American Welding Society predicts a need for more than 360,000 new welders nationally by 2027.¹⁶ According to NYCCEE, this demand will in part be driven by the need for welders to construct wind farms.

Other fields also face worker shortages, including those that support the growth and maintenance of rapidly emerging new technologies. For example, a training specialist for Toyota predicted a shortage of EV technicians. This claim is supported by national data, which shows that as of 2019, fewer than two percent of certified automotive technicians currently have EV certification.¹⁷

Difficulties Developing Training Programs

Developing appropriate training programs faces challenges as well. An interviewee from Kingsborough Community College (KBCC) noted that a planned program focused on offshore wind technology had been in development for four years and has still not opened to students. Given the newness of the industry in the United States, developing the program involved sending staff members for training in Europe, where the industry is more advanced, working with industry organizations to identify the skills and credentials needed for a career in the sector, and developing faculty buy-in for the program. The latter can be challenging if it requires course offerings to be adapted, faculty to be trained, new hires to be made, or course offerings to be shifted to accommodate the new curricula.

Similarly, some interviewees noted that the skills needed to transition to green jobs such as EV maintenance are so new that certificates indicating competency in those skills have yet to be developed. Without a green certification program, it is difficult for institutions to identify the standardized skills students need to master or to convince students to even take such courses in the first place. An interviewee from the State University of New York (SUNY) Westchester Community College said it is hard to adjust programs at SUNY schools when even changing the name of a program can take more than a year to get approved. These realities reflect the challenges that institutions face in order to make even small changes, let alone the large ones needed to keep pace with rapidly changing labor markets.

Lack of Clarity About Needed Skills

There was some disagreement among interviewees about which skills workers will need to participate in the green economy. For example, the Edward J. Malloy Initiative for Construction Skills, a pre-apprenticeship training program that is a pipeline for union jobs in the building and construction trades, does not offer certifications specifically focused on green construction. An interviewee from the organization noted that construction jobs have “always been green jobs,” suggesting that general construction skills and training already prepare workers sufficiently for green construction projects. Instead, the program is providing students with a general overview of green construction and how it applies to the industry. However, an interviewee from the Center for Worker Education (CWE) at City College of New York disagreed with this characterization, noting, for example, that specific skills are required to install materials used in buildings that are certified as environmentally sound under the Leadership in Energy and Environmental Design (LEED) rating system. According to the CWE interviewee, installing materials like triple-pane windows and automatic light controls takes specific skills that workers are learning through the curriculum and training that unions are providing to their members:

A senior worker, a shop steward, has to basically learn and understand those processes themselves. Then it gets adopted into the curriculum for the apprentices. So, all the apprentices coming forward have to learn how to use new materials, new installations, new methodologies.... I would argue that the union-built buildings are usually far more efficient because...you need a higher level of skill to approach these LEED certifications. [They] also take half the time to build because [the workers are] so well-trained.

A principal landscape architect and designer at Local Office Landscape and Design said it is a challenge finding construction firms that have experience building climate-resilient designs because of “a dearth of expertise” in the green construction industry. Building outdoor spaces that utilize natural elements to help address climate-related issues like heavy rains, flooding, and erosion in coastal areas requires specific skills and knowledge. “Everyone knows about pumps and pipes, plumbers, electricians,” he said. “But what happens when you want to use gravity and nature and trees, and there’s not the equivalent of electricians and plumbers for that? And that’s kind of like plumbing 2.0, right?”

The Need for National Standards and Agreement About Certification and Curricula

The ability to scale up the green workforce is being further complicated by the absence of cross-state agreement about certification and curricula. The interviewee from NYSERDA noted the inefficiencies when each state develops its own courses and requirements. Such differences can also make it more difficult to leverage federal funding across multiple states. National certifications for skills training would help create cross-state coordination and consistency. “I’d love to see the [federal government] do a lot more with developing national certifications, maintaining those certifications, requiring...certain jobs to have some of these certifications,” the interviewee said. “It would be so much easier if we had more consistency.”

The interviewee from Stacks+Joules, a nonprofit organization that provides training in building automation and energy management systems, also discussed the need for national standards and certifications. Noting how quickly the automation field is evolving, he discussed the challenges of getting new CTE pathways and courses developed and approved, which can be a lengthy process that takes multiple years. The long development and approval time is further complicated by how quickly the industry changes. By the time curricula and courses for pathways are approved, the skills and knowledge required may become obsolete from an industry perspective.¹⁸ He noted another challenge: As fast as Stacks+Joules has been able to hire program facilitators, many of whom are graduates of the organization's own training programs, private employers in search of trained workers lure them away with better offers. This creates a scenario in which program and training expansion is undermined by private employer demands for skilled labor.

Despite these concerns, an interviewee from the New York City Economic Development Corporation (NYCEDC), an organization that works with the New York City government on economic development, noted the uniqueness of the moment for public policy stakeholders. "We're at a rare moment now where locally, state-level-wide, and federally, we're all aligned in a lot of ways when it comes to policy, when it comes to ideology around addressing climate change and how to go about it."

Nonetheless, states and organizations may need more support than what is currently available to interpret and implement those policies. For example, the interviewee from NYSERDA, which is backed by state policies designed to increase training for green jobs and has millions of dollars to invest in that endeavor, expressed challenges in being able to disperse those funds.¹⁹ Citing one funding opportunity in which subsidies of up to \$10,000 per worker are available, the interviewee said, "I think we've had close to three hundred companies participate. But we're shocked that more companies don't participate in that program. And it's hard to get the word out. There's a lot of noise out there...[so] how do we make it easier for people to apply?" The interviewee also said there has been a lack of applicants for funding streams specifically designed to be accessible to small employers and businesses.

Some interviewees took issue with that assessment, noting that the NYSERDA proposal process can be hard to manage for small organizations with limited resources. Differing perceptions of the process suggest a lack of clear communication about the program and the policy mandate. Even in a time of unprecedented policy alignment, as noted by the interviewee from NYCEDC, issues like these remain a barrier to smooth program implementation.

Funding Mechanisms and Red Tape

Lack of access to funding can slow efforts to advance training opportunities for green jobs. For example, the New York Community Colleges Energy Equity Consortium (NYCCEE) started as an effort among SUNY and CUNY schools to connect students of color and other marginalized groups to green economy education and training programs. The consortium of 24 institutions applied for funding from the federal Good Jobs Challenge to help meet the state Climate Act's goal of having 35 to 40 percent of the state's clean energy and energy efficiency investments made in low-income and other marginalized communities.²⁰ Ultimately, however, the consortium did not receive

the funding. The only Good Jobs Challenge grant that was awarded in New York was for a different partnership comprising the New York City Human Resources Administration, several labor unions, and CUNY.²¹ To be sure, not all applicants can meet the requirements of specific federal funding opportunities. Still, a lack of funding options to support a variety of projects and partnerships presents another potential stumbling block to the larger goal of meeting current and future demand for green workers.

Bureaucratic red tape can also stymie progress. For example, the interviewee from Toyota said that sometimes when the company has extra cars, they would prefer to donate them to public schools, rather than put them up for auction. But, he said, the company often finds the red tape involved to be insurmountable. “The corporate side [of Toyota] has red tape, too, but you can get things done a lot quicker here,” said the interviewee, who works in the company’s training program. “On the school side, it’s like there’s a lot of chain of command to go through before you can get a decision made.”

Challenges with red tape aren’t limited to industry partnerships. Creating new CTE pathways can get bogged down because of the burdensome certification process involved. For example, the interviewee from the Harbor School, which offers seven CTE pathways related to marine careers, noted the importance of individual teacher interest to help push programs forward. Professional diving, for example, had been taught at the Harbor School for over 10 years, but it had only recently become certified. Prior to that, a teaching certification for the program did not exist. Since CTE programs require teachers to be certified in the particular field, the school had to work with the state to develop a certification so the diving teacher could then apply to be certified in the subject area.

Individual efforts like this may not be the most effective or efficient way to align CTE programs with green labor market demand, however. Lack of clearly defined standards and certifications may prevent other schools from creating programs in a timely fashion. Finding and holding onto certified instructors is another issue, the interviewee from NYCPS said. Industry professionals who transition from the private sector into teaching often take major pay cuts, making recruitment a challenge. At the same time, it can be difficult for existing teachers to become certified CTE instructors if they don’t already have relevant industry experience. All of these issues contribute to long-standing shortages in CTE fields that have been tracked nationally for years.²²

Interviewees also discussed the difficulty of developing programs and training people when there is still uncertainty about whether the training will lead to a job. “Very few employers will commit to hire,” said the interviewee from Groundwork Hudson Valley. This creates a cycle in which a lack of definition and clarity about green skills and green jobs makes it challenging to create training for those jobs, and a lack of existing jobs that would help provide clarity about the specific skills required makes it difficult to create effective training programs. There is some level of faith required by both training organizations and workers that green jobs will materialize. But challenging bureaucracies and tight resources disincentivize engagement in developing training and education that is responsive to future labor market needs rather than to existing opportunities alone.

Barriers to Accessing Education and Training

The rapidly expanding green job market may provide opportunities to diversify trades in which women and people of color have historically been unrepresented. In 2022, just 4 percent of workers in construction were women, and 7 percent were Black. A much larger share of construction workers were Hispanic, but these workers were also overrepresented in the lowest paid jobs in the sector.²³ Study interviewees discussed these disparities. For example, a participant from the New York City Public Schools (NYCPS) system noted the lack of women in CTE programs in general and in skilled labor and construction programs in particular. NYCPS is trying to address the gender gap in several ways, such as by partnering with another organization to offer trade-career bootcamps to young women and nonbinary students, with a focus on green economy careers. Similarly, the representative from CWE noted that NYC trade unions are slowly becoming more female and more ethnically diverse over time, thanks, in part, to organizations like the Edward J. Malloy Initiative for Construction Skills, which was founded more than 20 years ago specifically to diversify the workforce pipeline.²⁴ Despite such efforts, interviewees from organizations that train workers of color said that racial biases within trade unions persist. One interviewee from The Hope Program — a green careers job readiness program that provides training in fields like HVAC and horticulture — described unions as still being mostly male and White. This perception has kept the program from working with unions, opting instead to work with independent employers and organizations. The interviewee did note, however, that as the city creates stronger laws to encourage unions to become more racially inclusive, he would be more open to working with them.

Entrenched beliefs can also affect the hiring process. For example, one employer interviewed said that while diverse in “other ways,” their employees skew more male than female; he attributed this disparity to different aptitudes among men and women. While there is no evidence to support such claims, workers often make career choices along traditional gender lines and employers hire along those gender lines as well — cementing outdated beliefs into the practices of career choice and career development for many people.²⁵

Interviewees from several organizations also noted that students from marginalized communities may need more targeted and tailored supports to pursue jobs in the green economy. For example, the interviewee from Groundwork Hudson Valley noted that her program’s participants often face significant barriers that prevent them from taking advantage of job opportunities. “These students...are dealing with massive challenges that we don’t even think about as middle-class people, things as simple as like, you need a car,” she said. The interviewee from BlocPower noted that workers with shorter job stints on their resumes may not have had time to develop the skills needed to transition into the green economy from another field. Interviewees from AEA and KBCC both said students may need wrap-around services like food support, financial support, transportation, and child care. These challenges may be barriers for students from marginalized communities seeking employment in any field. But the issues have particular salience in the development of the green labor market, which has massive needs for training and scaling jobs, and where a failure to meet demand at a rapid pace may have environmental as well as economic consequences.

Several organizations noted that public policies that overlook the specific needs of communities of color can have negative impacts. For example, the interviewee from Local Office Landscape and Design discussed his company's work rebuilding areas of New York City affected by Hurricane Sandy — widely considered to be a harbinger of future climate-driven natural disasters.²⁶ He noted that the slow pace of payments and reimbursement for city contract work hit many minority-owned businesses the hardest because they tend to have less excess capital. As these kinds of storms increase, businesses that are trained in rebuilding coastal areas in more resilient ways will also be more in demand. Policy processes that make it more difficult for minority-owned businesses to get paid for this kind of work also hurt their ability to grow in a changing environment.

Solutions from the Field

Understanding Skills Needs

Many interviewees were able to speak generally about the skills needed for the green economy, as described earlier. But incorporating that knowledge into training and business decisions requires organizations to take deliberate action. The interviewee from the NYPA, which says more than 70 percent of the electricity it produces comes from renewable hydropower, said the agency is using skills mapping, both internally and with peer organizations, to understand the green job skills needed for both entry-level and higher-level positions within the organization.²⁷ For example, working in collaboration with the human resources department and other business units, the agency has identified a need for people to work in cybersecurity both at the NYPA and within the industry more broadly. “We work with subject matter experts to ensure that we capture all that information,” the interviewee said.

The participant from National Grid, another energy utility company, said they help students in K-12 settings understand how the skills needed for careers they are interested in, such as engineering and medicine, can be applied to jobs at the utility company — for example, operating robots or working in their visual learning labs. The interviewee from the HOPE program said the organization works closely with its employer partners to understand where they have gaps in employees with the proper certifications and then works to help their clients earn those certifications.

Addressing Training for Shortages

The NYC Mayor's Office of Climate & Environmental Justice announced a 15-year, \$191-million plan in 2021 to create 13,000 jobs in offshore wind power technology, one of many efforts the office is engaged in.²⁸ To address a lack of training in this area, several organizations are beginning to roll out new programming focused specifically on training for jobs in offshore wind, including the Harbor School and KBCC. Likewise, Cornell ILR works with building trade unions to educate them about coming jobs in the green economy. This level of responsiveness to a policy and economic investment suggests that similar coordination in other green industries may be possible.

Addressing Equity

Some interviewees see the emerging green labor market as a singular moment to address long-standing equity issues by training individuals from historically marginalized communities — often the most affected by climate change — for high-paying jobs in the green economy. For example, BlocPower, a climate technology company, is working with frontline communities to hire local workers to upgrade or retrofit buildings. Similarly, the participant from Stacks+Joules said the company has found that programs that focus only on career exposure and awareness for high school students are ineffective. Instead, the company decided to focus its program on having students learn specific technical skills and gain mastery in them, and says it has found success placing students into jobs with this focused approach. NYCEDC announced a plan in 2022 to transform the South Brooklyn Marine Terminal in Sunset Park into an offshore wind port facility.²⁹ The neighborhood is home to many immigrants and families with low incomes. The terminal is being upgraded and expanded by Equinor, an international energy company; the deal requires the company to provide workforce training for local residents.³⁰

At the state level, when considering funding programs for worker training, NYSERDA mandates that some training is set aside for people from disadvantaged communities. “We’re requiring that at least 50 percent [of trainees] come from a disadvantaged or underserved community or from priority populations. So, we’re really pushing industry to use this tremendous untapped potential for workers through our programs,” the NYSERDA participant said. At the federal level, a stated goal of the Biden administration’s Justice 40 initiative is to direct 40 percent of the overall benefits of certain federal investments in the green economy to marginalized communities that are most impacted by pollution.³¹

Many jobs in the green economy are union jobs in the skilled trades, which require lengthy apprenticeships and have historically been dominated by male workers; according to the U.S. Department of Labor, just 14 percent of all union apprentices are women.³² As mentioned earlier, some organizations are working to diversify apprenticeships in organized labor by offering pre-apprenticeship programs targeting women as well as people with low incomes and people of color. In many cases, students who complete those pre-apprenticeship programs are offered direct entry into union apprenticeship programs.

Still, the obstacles that these workers face in taking advantage of these training opportunities are similar to those of workers in other fields. “It’s child care, it’s nutrition, it’s mental health, it’s health, it’s housing, it’s transportation, it’s eyeglasses,” the Stacks+Joules interviewee said. In response, Stacks+Joules partners with community-based organizations to make sure students have the support they need to complete the pre-apprenticeship programs. The Malloy Initiative helps students by subsidizing the cost of tools and other items needed for training and employment, such as work belts and boots, and by providing workplace preparation like interview counseling and support for resume writing. The interviewee from NYSERDA said that increasingly, employers are paying attention to external issues that prevent people from being able to engage in training or work. “For the first time ever, employers are worried about child care, they’re worried about how people are getting to work [and] what their transportation situation is. So, I think

employers are looking at a whole bunch of different things as it relates to your work schedule, your work-life balance, your barriers to employment.”

Program Collaboration

Many of the organizations the research team spoke to said they are collaborating with employers to create a pipeline of green workers, a change from past practices. For example, National Grid runs a program called “Grid for Good” that offers training opportunities in energy careers to young people from marginalized communities. The energy utility partners with BlocPower and NYSERDA to develop education and training programs in weatherization, heat pumps, and other areas of clean energy. Similarly, NYPA is partnering with the New York City Housing Authority (NYCHA), the largest public housing authority in the country.³³ Many NYCHA buildings need to be retrofitted for energy efficiency. An interviewee from NYPA described one such project:

We recently had a partnership with the Fund for Public Housing, which is a NYCHA organization. As part of their energy goals...they’re going to try and make sure that underemployed NYCHA residents who partner with their implementation contractors do that work for decarbonization over the next ten years. And so, that’s going to mean lots of training. So, we’ve partnered with them to do a clean energy academy and to share our resources, and to pay for curriculum to make sure that they can... participate.

In Yonkers, Groundwork is working with the Municipal Housing Authority to train residents to become maintenance workers for bioswale management systems, which use plants and natural elements to control storm water.

NYCPS is working with Solar One and New York City Department of Citywide Administrative Services (DCAS) to give construction CTE teachers the opportunity to earn North American Board of Certified Energy Practitioners (NABCEP) certificates; the certification can support them to bring more clean energy content into classrooms. DCAS also donates electric vehicles to K-12 programs and helps assist automotive CTE programs by training participants to work on these vehicles. The Harbor School recently won NYS funding to become a P-TECH high school — where students earn a high school diploma and an associate’s degree simultaneously and participate in work-based learning experiences with industry partners; the associate’s degrees are tied to the field of the industry partner.³⁴ In the case of the Harbor School, which is already focused on green jobs training in maritime fields, the associate’s degrees will provide additional educational preparation for students.

Implications for Policy and Further Research

NYC and NYS are making significant investments in the green economy and green labor market, but there are enduring barriers to scaling up a skilled workforce ready to meet the coming demand. While many of these barriers reflect long-standing issues regarding the development of labor market-aligned education and training programs, accepting the status quo could have sig-

nificant implications for the future. NYC, NYS, and the federal government have all set ambitious targets to reduce greenhouse gas emissions by the end of the decade and beyond.³⁵ Lags in the development of a workforce capable of carrying out the jobs that will help meet those targets will hinder those policy goals and international commitments. The following recommendations are intended to help government and industry stakeholders within the green labor market ecosystem remove or reduce some of the existing hurdles to the creation of an equitable education and training community that is aligned with the green economy:

1. Convene panels of experts in green industries to work with policymakers and educators to clearly identify and define the necessary skills for green jobs.
2. Address the bureaucratic delays and inefficiencies that are slowing the creation of new CTE pathways, credentials, employment certifications, and teacher certifications.
3. Create meaningful and adequately compensated career paths for industry professionals looking to transition into CTE classroom teaching positions.
4. Incentivize collaboration and communication between employers and educators to share knowledge about in-demand skills and educational opportunities.
5. Design information and dissemination strategies about funding initiatives and training programs to reach a wide range of audiences who may be eligible for specific opportunities.
6. Provide more funding for organizations that run pre-apprenticeship programs targeted specifically at women and members of marginalized communities that are linked directly to union and registered apprenticeship pipelines.³⁶

This case study, which provides a look at the ecosystem of green jobs policy, training, and employment in the New York metro region, is a first step in the effort to understand the evolution of a national green jobs labor market and economy. Future research could examine other issues related to the transition to a cleaner economy. This might include looking at students' and workers' experiences in green jobs education and training programs; measuring program success on outcomes such as green economy-related postsecondary degree enrollment and attainment, job placement, and earnings; and measuring the impact of programs on outcomes such as environmental awareness and consumer behavior. Additional efforts could include similar case studies in other locations where economic policy and job development programs may not be as aligned with changes in the green labor market as in New York.

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