Constructing the Future

June 2025

Workforce Strategies to Help Massachusetts Meet Its Clean Energy and Housing Goals

MassINC Policy Center [bw] RESEARCH

Letter from the CEO

Dear Friends:

Recent MassINC Policy Center (MPC) research has sought to elevate and prioritize efforts to meet acute workforce needs in education and nursing. Indeed, teachers are fundamental to training the next generation and nurses are the bedrock of our health sector, which is so important to the Massachusetts economy and to our individual well-being. Similarly, the skilled building trades workforce has outsized importance and demands our attention at this moment of profound uncertainty.

Massachusetts depends on these workers to construct and maintain our housing; our transportation networks; our retail, industrial, and commercial buildings; and our water, sewer, and energy infrastructure. This dependence will only grow if we want to produce more housing that people can afford, while building a future in which we power homes and vehicles with clean energy at a lower and more predictable cost.

This study is the first installment in MPC's *Keep Going, Keep Growing* series. These reports will look at how Massachusetts doggedly pursues its goals for a better future with bold and creative public policy leadership. Given the current slowdown in construction, it is imperative that we develop and act quickly on strategies to protect and enhance the state's skilled building trades workforce.

Carpenters, electricians, plumbers, HVAC technicians, and other skilled workers in the trades will literally build our future. But we can all lend a hand by gaining a better understanding of the nature of these jobs and of the policies that will help workers in the trades employ their skills as productively as possible. With this knowledge, we can also help ensure that these workers receive fair wages and safe working conditions, so they can also build a strong future for their own families.

Toward this end, we hope that you will find useful information in this new study. As always, we welcome feedback and encourage you to join us in a collective effort to advance public policy discourse.

Sincerely,

Joe Kriesberg

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Executive Summary



The MassINC Policy Center (MPC) partnered with BW Research to produce this analysis prior to recent dramatic shifts in climate and economic policy at the federal level. We began with a simple hypothesis: To achieve the state's ambitious housing and clean energy goals over the next decade, Massachusetts would need to grow the skilled building trades workforce, and this would require significantly more training capacity. Changing policy and economic conditions make it much harder to boost housing production levels and accelerate the transition to clean energy in the near-term. Training more workers for construction jobs that will not exist for some time is not only irresponsible, but also highly infeasible, given the industry's reliance on apprenticeship and on-the-job training.

However, this does not mean that the construction workforce and training system is no longer a critical issue for state leaders. Given the uncertainty that Massachusetts now faces, making as much incremental progress as possible on housing and clean energy while positioning the commonwealth for more rapid gains in the future calls for even greater attention to the productivity of workers in the building trades. In addition to informing long-term efforts, our research can help direct near- and medium-term interventions to sustain this essential workforce and boost its skill levels. This executive summary condenses our analysis into four high-level takeaways, key findings, and policy recommendations.

Four High-Level Takeaways

The full report explores labor supply and demand in the Massachusetts construction market, estimates the number of additional workers required to meet the state's 2030 clean energy and 2035 housing production targets, quantifies the capacity of our skilled building trades training system, and offers policy recommendations. Folding this analysis together, four high-level takeaways emerge:

1. Aggregate construction output has been falling for several years. Acting swiftly to boost demand will help preserve this essential workforce and maintain its productive capacity for the long-term.

Leaders in Massachusetts must grapple with the reality that construction output is lagging and likely to decline further over the near-term. This means skilled workers will be sidelined and not contributing at their full productive capacity while Massachusetts falls behind on its housing and clean energy goals. Policymakers can respond by doing more to unlock growth and preserve jobs by acting quickly on proposed regulatory changes and deploying limited state subsidy dollars in a manner that facilitates as much construction as possible in the near-term. **2.** Even under strong assumptions for sustained economic growth, it should be relatively achievable to expand the training system to prepare the additional workers required to meet the state's housing and clean energy goals.

The greater challenge will likely be finding enough young people interested in entering these professions despite wage growth not keeping up with other industries. Economic modeling and forecasting suggests at most the skilled building trades workforce would need to grow by around 20 percent from current levels to meet the 2030 clean energy and 2035 housing production targets. The workforce has expanded at this rate to meet increasing demand over the past decade. However, much of this growth occurred in commercial construction, where union involvement helps assure good wages and working conditions. With retirements increasing and fewer young people entering the Massachusetts workforce in the future, the industry will be under increasing pressure to offer competitive pay to attract new entrants.

3. Recent gains in racial, ethnic, and gender diversity should give the industry openings to tap into a greater supply of potential workers in the future.

Efforts to bring more women and people of color into the skilled building trades had considerable success over the past decade. Increasing diversity should make the field more welcoming to groups that had previously been highly underrepresented. However, the jobs is not done. There is more work to do to increase diversity, and many impactful DEI programs are now under threat. **4.** Lowering construction costs while ensuring that the skilled building trades continue to offer competitive, familysustaining wages in our high-cost state will require productivity gains.

Limited data make it difficult to accurately measure construction industry labor productivity, but the available evidence points to stagnant or declining productivity levels in Massachusetts. State agencies, training providers, labor, and industry leaders must work together to boost productivity levels over the long-term.

Summary of Key Findings

The Skilled Building Trades Labor Market

A strong grasp of the following past patterns can help leaders consider their response to the current downturn and lay the groundwork for a workforce that will emerge prepared to meet the state's housing and clean energy goals:

- The construction industry started to contract in 2021, and total output is now roughly 10 percent lower than 2019 levels.
- At the height of the Great Recession, roughly 20 percent of Massachusetts residents in the skilled building trades were unemployed. While the workforce has recovered, growth has varied significantly by occupation. Fueled by the emergence of the clean energy sector, the electrician workforce has seen the largest increase. The number of electricians employed in Massachusetts in 2023 was nearly 50 percent higher than in 2005. The plumbing workforce has also experienced very strong growth (+44 percent) over the past two decades, driven by plumbing-intensive lab projects. In contrast, the total number of carpenters in Massachusetts is down 21 percent compared to 2005, and the number of heating, ventilation, and air conditioning (HVAC) workers only rose 10 percent—consistent with a roughly 25 decline in residential construction levels over the past two decades (Figure ES-1).
- The state's skilled building trades workforce has become far more diverse. In 2010, residents of color made up just 10 percent of workers in these occupations. By 2023, they accounted for nearly one-quarter of those employed in the skilled building trades. Progress toward gender parity has been even faster, but from a very low base. Women went from 1.5 percent of this workforce in 2010 to 4 percent in 2023. Workers in the skilled building trades are notably

less likely to be foreign-born than construction laborers and even the overall Massachusetts workforce (16 percent of skilled building workers are foreign-born, compared with 22 percent of all workers).

- Nearly one-third of workers in the skilled building trades are over age 50, a 6-percentage-point increase from 2010. While this is similar to the proportion of employed residents over age 50 in Massachusetts, it will be more problematic for construction because the physical nature of these jobs leads to earlier retirement, and the industry relies heavily on experienced workers to apprentice the next generation.
- Adjusting for inflation, wages for most workers in the skilled building trades have remained relatively flat. Between 2010 and 2023, the median hourly wage (accounting for inflation) for electricians and HVAC workers increased by 4 percent and 2 percent, respectively—well below the 8 percent pace for all payroll workers in Massachusetts. Wages for carpenters fell by 3 percent. Plumbers were the only skilled building trade that saw real wages grow at an above-average pace (+18 percent).
- Falling productivity could help explain slow wage growth. Real output per construction worker did not rise at all throughout the 2010s in Massachusetts, and since 2020 it has declined by 17 percent. A shortage of skilled workers may help explain the more recent productivity challenges in the sector.



FIGURE ES-1

Massachusetts construction industry employment and real output indexed to 2005 levels



Source: US Bureau of Labor Statistics and US Bureau of Economic Analysis

Meeting the State's Housing and Clean Energy Goals

Delivering on the state's housing and clean energy goals in tandem will be difficult. Decision-makers must know how many construction workers in various trades will be required to accomplish this task, and how these figures compare to changing levels in aggregate demand for construction workers in these occupations. Figure ES-2 provides these numbers. Summarized in context:

- Meeting the goal of building 220,000 new housing units by 2035 would require a 40 percent boost in annual production over recent levels. Constructing this additional housing will require approximately 3,152 full-time equivalent workers each year over the next decade, with the the effort spread relatively evenly across the occupations.
- Meeting the state's 2030 greenhouse gas emission reduction targets would require 5,888 workers employed annually in the skilled building trades through 2030, with electricians accounting for over 75 percent of this total.
- Increasing housing production *and* meeting the state's 2030 climate goals simultaneously would require a total of 9,040 full-time equivalent workers in the skilled building trades. The trajectory of the economy will heavily influence whether additional workers in the skilled building trades will need to be trained to meet aggregate demand for workers in these occupations.

FIGURE ES-2

Estimated number of workers required to meet the state's housing and clean energy goals (annualized)

Occupation	Housing Goals	Clean Energy Goals	Housing & Clean Energy Goals
Carpenters	711	397	1,108
Electricians	954	4,444	5,398
HVAC Mechanics and Installers	602	650	1,252
Plumbers	885	397	1,282
Total	3,152	5,888	9,040

Note: These figures represent the number of workers required to build 6,300 housing units each year and to make incremental progress toward the clean energy goals each year through 2030.

The Skilled Building Trades Training Landscape

As leaders guide the Massachusetts economy through uncertain times and position it to emerge with greater productive capacity, it is critical to understand the current capacity of the skilled building trades training landscape and barriers that providers may face if called upon to increase throughput. Data analysis and a survey of training providers yields several important insights:

- Skilled building trade workers receive training in Massachusetts through three primary providers: career and technical education high schools (CTE schools, also known as vocational schools), community colleges, and union-sponsored apprenticeship programs. Combined, these three pathways train about 1,000 carpenters and electricians each year, along with 675 HVAC mechanics and installers. However, these aggregate estimates significantly overinflate the number of new workers entering these professions because many receive training from more than one provider before fully entering the workforce.
- In a steady economy, the Massachusetts construction workforce needs around 700 new carpenters and electricians, as well as 500 new HVAC mechanics and installers, to keep up with retirements and with those who exit these professions prematurely (either to change careers or to move out-of-state). Under this steady state scenario, adding the additional workers to meet housing and clean energy goals over a fiveyear period would mean boosting training capacity to bring an additional 1,000 electricians, 220 carpenters, and 250 HVAC mechanics and installers into the workforce each year. The capacity of the electrical training system is well below this level currently, and training for carpenters and HVAC technicians is likely insufficient as well. This is because the number of trainees actually employed in Massachusetts is likely closer to 50 percent of total completions due to overlapping enrollment, career changes, and out-ofstate migration (Figure ES-3).

FIGURE ES-3

Estimated number of new entrants needed to maintain current workforce and meet clean energy and climate goals



Source: Authors' analysis of program completion data and data from the US Bureau of Labor Statistics

- If Massachusetts needs to boost training capacity, shortages of physical space and qualified instructors are the two most commonly cited barriers that programs will face. Nearly half (45 percent) of surveyed training providers with carpentry programs or HVAC programs, as well as two in five (39 percent) electrical training providers, report that they do not have enough physical space to grow. Around one-third see hiring qualified instructors as a significant barrier. This problem is especially acute for high schools. Over half of comprehensive high schools with Chapter 74 programs (55 percent) and three-quarters of CTE schools (75 percent) report difficulty hiring and retaining instructors. Lack of apprenticeships is a concern for a number of HVAC programs (30 percent).
- Few programs have difficulty recruiting students, but some training providers report a lack of employer demand for additional graduates. However, this concern is relatively limited (between 15 and 22 percent of programs note this barrier varying by trade).
- One-third of programs have plans to expand, with slightly higher rates for HVAC technicians (41 percent) and electricians (37 percent). On the other hand, 20 percent of programs for electricians expect enrollment to decline, followed by 13 percent for carpentry and 9 percent for HVAC.

Recommendations

The state's skilled building trades workforce is essential to meeting housing and clean energy goals, as well as to supporting healthy economic growth more broadly. These workers build vital public facilities and public infrastructure, as well as factories and other commercial facilities. The skilled building trades also offer good middle-class jobs, which are pathways to upward mobility and family financial security. Given the import, these seven ideas for creative policymaking will further efforts to nurture and sustain a strong and productive skilled building trades workforce in Massachusetts:

1. Improve data collection. Traditional sources of labor market information provide a poor representation of the construction workforce. Massachusetts can close these information gaps by integrating information from databases maintained by licensing boards with the education-to-career data systems managed by the Department of Elementary and Secondary Education.

2. Increase the utilization of registered apprenticeship. Providing a sufficient number of apprenticeship opportunities is always challenging, but much more so in a downturn. Threats to DEI initiatives could also make it more difficult for pre-apprenticeship programs to perform their pivotal role creating pathways into these professions for underrepresented groups. State leaders should be on the alert and ready to assist these programs. Massachusetts can also leverage free community college to help unions and employers build more apprenticeship training programs that provide classroom instruction at no cost to students. The state can also publish data on the number of apprentices working for contractors participating in public projects and their retention rates. This information will help those procuring public projects determine whether firms are fully meeting the definition of the lowest "responsible" bidder under state procurement law.

3. Ensure compliance with prevailing wage laws.

Massachusetts can follow the lead of other states by adding occupation and hours worked to unemployment insurance filings. This information would aid efforts to enforce prevailing wage laws and reduce self-reporting compliance costs for responsible employers.

4. Carefully monitor teaching vacancies and devise effective strategies to fill positions with high-quality instructors. Survey results show that both CTE high schools and community colleges are having difficulty attracting and retaining instructors. Massachusetts must capture accurate data on job vacancies and experiment with additional compensation and other strategies to help training providers recruit and retain high-quality instructors. **5. Align capital investment in high schools and community colleges with strategic efforts to increase training capacity and yield.** Adding space for career and technical education programs at comprehensive high schools can quickly and cost-effectively provide more opportunities for both youth and adult students to receive training in the skilled building trades. Funding from Governor Healey's BRIGHT Act for state-of-the-art community college training facilities could also help fill regional gaps in the skilled building trades training system.

6. Aggressively implement the recommendations of the Unlocking Housing Production Commission. With the economic barriers to housing production rising, there is even greater urgency to move expediently on the more than 50 proposals offered by the governor's commission. The Healey-Driscoll administration must adopt regulatory changes and build support for high-impact policies that will require statutory change before the close of the 2025-2026 legislative session.

7. Stimulate demand for construction labor with strategic state investment. Massachusetts can insulate its construction workforce with countercyclical investments that meet critical needs. This could be accomplished by temporarily shifting housing investment toward shallow subsidy programs that produce more units of housing for each dollar of state support. The state could also identify new dedicated revenue sources to accelerate vital public construction projects, such as school building and commuter rail transformation.

8. Co-invest in manufactured housing. Massachusetts can accelerate the growth of a manufactured housing industry that increases home energy efficiency and improves construction labor productivity and working conditions by providing state land for factories, offering loan guarantees or direct equity investments, and granting advantages in public procurement.

Introduction



Massachusetts faces headwinds that could present enormous challenges for state and local government, as well as for many sectors of the economy. As leaders measure their response to the many uncertainties at this difficult moment, they must pay particularly close attention to construction. The Great Recession demonstrated how downturns can leave deep scars on this industry's workforce.¹ When the economy recovers from a downturn and the construction sector lacks skilled labor to meet healthy levels of demand, the reverberations impact long-term growth because there is less infrastructure to move people and goods, less power for factories to expand production, and fewer homes to shelter workers and their families. With ambitious goals to produce more housing and shift to clean energy, Massachusetts can ill afford the toll that another deep downturn would take on the state's construction sector.

Demand for construction labor is already contracting. The lab boom that fueled new commercial building has ended. Steep interest rates have stalled housing production and home renovations. Clean energy projects are on hold. Hospitals and universities are pulling back on institutional building. And major infrastructure projects may have difficulty securing federal funding.

This downturn is unfolding at an inopportune time. Like many sectors in Massachusetts, the construction workforce is aging. If unemployment rises considerably and older workers retire *en masse*, it will worsen the shortage when demand returns and make it especially difficult to train the next generation, given the industry's heavy reliance on apprenticeship.

As state leaders weigh efforts to build a skilled construction workforce against other strategic priorities, they must also consider the sector's outsized role providing good jobs and upward economic mobility. For generations, workers in the skilled building trades could provide their families with stability and a solid middle-class lifestyle in Massachusetts. This is no longer guaranteed. Workers in the skilled building trades have seen wage growth stagnate in recent years as the industry has attempted to operate with a larger share of lower-skilled, lower-cost workers—often immigrants who lack work authorization and the bargaining power that accompanies legal status.² If high unemployment further reduces pay for workers in the skilled trades, it will make it more challenging to draw people to these professions in the future. Declining wages would also present a painful loss from a racial equity perspective. The skilled segment of the building trades workforce has grown significantly more diverse in recent years. Now that people of color have gained entry, Massachusetts needs these jobs to remain good jobs to close racial wealth gaps.

Of course, it is also plausible that the construction slowdown that Massachusetts is experiencing will be short lived. The tariff threat could dissipate and other efforts in Washington to reduce regulation, produce more energy, increase housing production, and stimulate domestic manufacturing might reinvigorate the economy, prompting demand for construction workers to increase in the near future. If this is the case, Massachusetts will need to put even more effort into supporting the construction industry workforce.

In recent years, economists have issued increasingly loud calls for boosting skill levels in the US construction sector.³ Disinvestment in worker training as the building trades workforce became less unionized may help explain slow labor productivity growth and declining wages relative to other skilled workers over the past several decades. Improving the training system to boost construction labor productivity is the only way to increase pay and generate more construction across the commonwealth at a lower cost. It is also critical to helping the industry adopt green building technologies. The deployment of these new products is heavily contingent on the construction sector's knowledge and experience. Building this know-how will require more training capacity and greater coordination across providers.⁴

Achieving this feat will be challenging because Massachusetts's skilled building trades training system is highly decentralized. In addition to CTE high schools and union apprenticeship programs, community colleges and private training providers offer programs. With over 20,000 constructions firms in Massachusetts, there are numerous employer partners to coordinate. To help the sector boost labor productivity and adopt new building technologies in this difficult milieu, Massachusetts needs a carefully crafted plan.

To maintain focus through turbulent times, it is especially important to have a sound strategy. Massachusetts cannot prematurely train workers for jobs that will not exist without a strong economy and/or supportive housing and clean energy policies, but it can upskill its current workforce while also laying the groundwork to quickly increase training capacity to achieve the state's housing and clean energy objectives as conditions permit.

This report makes the case for developing such a plan now and provides data to inform it. We begin with a close look at how supply and demand for workers in the skilled building trades have changed in Massachusetts over the past two decades. Next, we quantify the number of additional skilled building trade workers needed to meet the state's housing production and climate goals. Our analysis then turns to the capacity of existing training providers and the varying challenges they face increasing output. The report concludes with recommendations for state and local policymakers as well as the construction industry.

Defining the Skilled Building Trades

From residential construction to building and maintaining infrastructure, the construction industry is diverse in terms of its various activities and the numerous occupations involved in carrying out this work. There are four main trades based on vocational education, apprenticeship, and union representation: carpenters, electricians, plumbers, and heating, ventilation, and air conditioning (HVAC) mechanics and installers. For simplicity and data availability, this analysis focuses on these four main occupations. However, we recognize that the skilled building trades are numerous and that many others, particularly in the clean energy sector (e.g., wind turbine and solar panel technicians) also merit in-depth analysis and attention.

Union Training Programs Illuminate the Path to a Higher-Productivity Future

Union training programs demonstrate the potential for a higher-wage, higher-productivity workforce. As union density declined in construction and collective bargaining eroded, trades unions ramped up investment in state-of-the-art training facilities. In addition to apprenticeship training, most union programs offer journey-level members opportunities to come back and upgrade their skills to keep up with new technologies and construction methods. Union training programs typically operate as labor-management partnerships, ensuring that instruction aligns with the latest industry needs. The heavy investment in these efforts explicitly recognizes that union workers must compete based on high skill and productivity rather than low compensation. This strategy has succeeded with complex projects, but it has not penetrated most residential construction. The construction industry includes many actors who rely on low-wage workers and questionable labor practices to underbid their competitors. Massachusetts needs technological disruptions that increase the return to skilled labor, allowing for greater union employment in this large subsector so that the industry no longer depends on egregiously abusive labor practices to build homes.



Section 1

The Skilled Building Trades Labor Market

Gaining a strong grasp of the future training needs for skilled building trade workers in Massachusetts begins with an understanding of recent labor market performance. Examining the last building cycle from peak to peak provides this important context. Overall, the patterns show that this highly cyclical labor market is responsive to demand drivers. However, there are inefficiencies. Large numbers of skilled workers are un- or underemployed during downturns. And at the height of the building cycle, a shortage of skilled workers likely hampers production, reduces labor productivity, and drives up costs. This section unpacks these trends in more detail and puts them into context at this moment of economic uncertainty.

Demand for Workers in the Skilled Building Trades

In the 2010s, the Massachusetts construction industry steadily climbed out of the depths of the Great Recession with perhaps the longest expansion in its history. The sector increased real output by more than 70 percent between 2010 and 2019, when it surpassed the previous peak dating back to 2005. While the industry recovered quickly from the 2020 recession brought about by COVID-19 pandemic closures, construction output in Massachusetts started to decline in 2021 and is now roughly 10 percent lower than 2019 levels (**Figure 1**).

These aggregate numbers include output associated with constructing, renovating, and maintaining residential and commercial buildings, factories and other industrial buildings, and public infrastructure such as utilities, roads, sewers, and bridges. At the national level, census data show that residential construction makes up just under half of the industry's output (new single-family and multifamily building represents about one-quarter of all construction activity; home renovation accounts for just under 20 percent). Private nonresidential construction (including work on privately held utilities, office and institutional buildings, and manufacturing) represents about one-third of the industry. Public construction (involving work on roads, utilities, and public facilities) accounts for the remaining 20 percent.

Data to disaggregate the composition of demand across categories at the state level are somewhat limited, but drawing from various sources helps form a picture.

FIGURE 1 Real gross state product generated by construction in Massachusetts (\$B)



Source: US Bureau of Economic Analysis

The US Census Bureau reports on the "value put in place" through state and local public construction as well as through private nonresidential construction (**Figure 2**). These figures show that activity in both categories doubled in Massachusetts between 2010 and 2023, adjusting for inflation. State and local construction was flat from 2012 to 2018, but it has risen sharply since. Growth in private nonresidential construction occurred mainly between 2015 and 2019.

Going back to the 2005 peak, state and local spending has been less cyclical. Public investment helped pull Massachusetts out of the Great Recession, remained high through the 2010s, and began to climb again just before the pandemic. Adjusting for inflation, it was more than 2.5 times higher in 2023 than in 2006, the first year for which these data are available. Private nonresidential construction fell sharply during the Great Recession, but it has also grown considerably, surpassing the apex of the last building cycle by about one-third.⁵





FIGURE 4A Megawatts of solar power installed annually in Massachusetts

Source: Solar Energy Industries Association



FIGURE 4B Real annual MassSave energy efficiency spending (\$M)

The value of new development that municipalities add to their tax rolls each year provides an indicator to track increases in residential construction and benchmark them with commercial and industrial building activity. While residential construction also grew steadily throughout the 2010s, the FY 2021 peak was still nearly 25 percent lower than pre-Great Recession levels after taking inflation into account (Figure 3).⁶ By contrast, the amount of commercial/industrial valuation added to municipal tax rolls has increased sharply since the mid-2010s, reaching a new peak that was nearly double 2005 levels in FY 2024. Boston, Cambridge, and Somerville produced nearly half of all of the commercial/industrial valuation added in recent years. This suggests that efforts to build lab space for the booming life sciences industry may be responsible for the outsized growth of commercial/industrial's valuation between 2015 and 2021.

The emergence of the clean energy industry helps explain how the construction sector has been able to expand despite the drop-off in residential building. Roughly one in six construction workers (17 percent) in Massachusetts now spends at least a portion of their time on clean energy projects, including energy efficiency improvements to buildings and the construction, distribution, and storage of electric power.⁷ While real clean energy output increased by more than 50 percent between 2012 and 2019, growth has been relatively flat since. Due to host of challenges, including grid limitations, supply chain issues, and the declining value of state incentives, Massachusetts added fewer megawatts of solar last year than at any point in the past 10 years, and about 60 percent less volume than at the 2017 peak (Figure 4A). Energy efficiency investment has been much steadier; between 2010 and 2023, inflationadjusted MassSave spending more than doubled to nearly \$1.2 billion annually (Figure 4B).

The Supply of Skilled Building Trade Workers

Labor supply for the construction industry is difficult to analyze because many workers are independent contractors or off the books entirely. Workers may also move intermittently across state borders to reach job sites. It is not possible to fully address these challenges, but comparing and contrasting two data sources can help provide a more accurate picture of changes in this workforce over time. The American Community Survey (ACS) asks Massachusetts residents about their occupation. These figures tell us how many residents perform a trade regardless of their current employment status. The US Bureau of Labor Statistics (BLS) occupational employment data include all laborers currently working full- or part-time for Massachusetts employers, irrespective of the state where they live.

At the height of the Great Recession, roughly 20 percent of Massachusetts residents in the skilled building trades were unemployed according to the ACS data. Many left these professions entirely due to the prolonged downturn.⁹ Since 2010, the state's skilled building trade workforce has recovered. However, growth rates vary significantly across the four core occupations.

Fueled in part by the emergence of the clean energy sector, the electrician workforce has grown the most (**Figure 5**). According to the ACS, Massachusetts added more than 7,000 resident electricians between 2010 and 2023, a 38 percent increase. Growth since 2010 in the BLS data was even stronger (77 percent) because this series captures those returning from unemployment in addition to the expansion of the overall workforce. The BLS gains might also reflect electricians taking a second job with an employer and an influx of labor from other states. The BLS series is the only one that extends back to the 2005 peak. It shows that the number of electricians employed in Massachusetts in 2023 was nearly 50 percent higher than in 2005.

The plumbing workforce has also seen very strong growth. According to both the ACS and BLS figures, the steepest increases occurred later in the building cycle. This corresponds with the rise in private nonresidential building activity, and it is consistent with the hypothesis that a frenzy of Boston-area lab projects drove this uptick (lab construction is much more plumbingintensive than typical residential and commercial building construction). In 2023, the number of plumbers in Massachusetts was 44 percent higher than the 2005 peak according to the BLS data. In contrast to electricians and plumbers, Massachusetts has seen less growth in heating, ventilation, and air conditioning (HVAC) mechanics and installers, as well as a decline in the number of carpenters.

The ACS data show the HVAC workforce recovering quickly from the Great Recession. However, the sharpest increase in this series occurred between 2010 and 2013. Employment growth stalled as building activity increased throughout the 2010s. The BLS trend was up and down over the past decade. As a result, the number of HVAC workers in 2023 was only 10 percent higher than 2005 levels.

Compared to the other three trades, Massachusetts's carpenter workforce appears to be in decline. From 2010 to 2023, the number of carpenters in the ACS data fell by 8 percent. While the BLS data show a 24 percent increase, this was primarily carpenters returning from layoffs. The total number of carpenters on payrolls in 2023 was 21 percent lower than 2005 levels. However, it is also possible that there has been significant growth in the number of undocumented carpenters in Massachusetts that is not visible in either the BLS or ACS data. This decline is consistent with the fact that residential construction has never returned to 2005 levels in Massachusetts. Compensation could also be a factor. On average, carpenters receive the lowest wages of the four core skilled building trades. The rising cost of living in Massachusetts may make this profession increasingly less attractive.

FIGURE 5 Number of skilled building trade workers in Massachusetts by occupation

12,000 11,000 10,00 8,000 BLS 2010 2023 2011 2012 2013 2014 2015 2016 2017 2018 2020 2021 2022 2019



Carpenters

HVAC Technicians and Installers





Source: US Bureau of Labor Statistics and American Community Survey, Public Use Microdata Sample

Labor Productivity and Wage Growth

Adjusting for inflation, wages for most workers in the skilled building trades have remained relatively flat according to the BLS data (**Figure 6**). Between 2010 and 2023, the median hourly wage for electricians and HVAC workers increased by 4 percent and 2 percent, respectively—well below the 8 percent pace for all payroll workers in Massachusetts. Plumbers were the only skilled building trade that saw real wages grow at an above-average pace (+18 percent). Growth in annual income as reported in the ACS is larger over this period, but this reflects the return to full employment. And average annual income for skilled building trade workers, as self-reported in the ACS, is notably lower compared to the average employed resident of Massachusetts—especially for carpenters (63 percent of the average), but also for HVAC mechanics and installers (78 percent), plumbers (82 percent), and electricians (90 percent).

This muted wage growth is surprising given that the share of construction workers covered by labor unions rose.¹⁰ Even more importantly, the shift to labs and towering downtown condominium developments should boost the average wage, since these projects utilize more union labor and generally employ more technology, which increases labor productivity.

Given this context, some may interpret slow wage growth as a sure sign that Massachusetts did not face an acute shortage of workers in the skilled building trades at the top of the building cycle. However, it could be that the economics of construction projects simply do not allow wages to rise past a certain point in response to labor scarcity. With onerous regulation, escalating costs for materials, and rising interest rates, developers may have put projects on hold rather than increasing pay to attract skilled workers to the job. This interpretation syncs with national data, which show an extremely tight labor market with job openings for construction workers reaching a two-decade high in 2022. Massachusetts construction firms surveyed during this time also reported acute hiring challenges.¹¹



Source: US Bureau of Labor Statistics

Stagnant and declining worker productivity due to falling skill levels may also explain lagging wage growth for construction workers (**Figure 7**). Real output per worker did not rise at all throughout the 2010s, and since 2020 it has fallen by 17 percent. While the COVID-19 pandemic certainly contributed to the sharp decline, these losses intensified and persisted in 2022 and 2023. This pattern suggests a particularly acute undersupply of skilled workers when building activity peaked. Construction projects that break ground without a sufficient number of workers in the skilled building trades experience more problems and delay, which depresses worker productivity.¹²

FIGURE 7 Real output per worker, Massachusetts construction industry



Source: US Bureau of Labor Statistics and US Bureau of Economic Analysis

Measuring Construction Labor is Hard Work

The construction labor market is difficult to analyze because so many workers are off the books, move across borders to reach job sites, and/or are immigrants without work authorization. Looking at data from the Occupational Employment and Wage Statistics series from the US Bureau of Labor Statistics (BLS) as well as the American Community Survey (ACS) helps provide a clearer picture of labor patterns over the course of the building cycle. The BLS figures come from payroll data provided by employers, whereas the ACS is a representative survey of all Massachusetts residents conducted by the US Census Bureau, so it reflects the self-reported experience of employees.

Generally, the ACS survey captures more data from construction workers because it includes those who are unemployed as well as those who work as subcontractors or entirely off the books. The ACS applies weights to the sample to compensate for underrepresented groups. But there still may be systematic undercounts for hard-tocount populations. And the ACS data also does not go back in time far enough to show the size of the workforce at the peak of the pre-Great Recession building cycle. While the BLS payroll data excludes independent contractors, it does capture residents of other states employed in Massachusetts. However, it double-counts workers with multiple employers because it includes both full and parttime employees.



To increase the accuracy of the occupational estimates, the BLS figures average payroll data over a three-year period. For consistency and to increase precision, this analysis does the same with the ACS data. For example, the figures reported for 2023 are actually a moving average of responses collected during 2021, 2022, and 2023.

Mixed-methods research can provide a more complete understanding of the state's construction workforce. Tom Juravich, a UMass Amherst labor studies professor, has undertaken this extensive work. Partnering with labor unions to gain the trust of workers in the underground economy, his research shows that illegally misclassifying workers as independent contractors and paying them in cash has become commonplace in Massachusetts, even for large residential construction projects. This suggests that the undercount of construction workers in official data may be worsening. If this is the case and these large-scale projects are making it into industry output data, the decline in labor productivity could be even more significant than the figures presented in this analysis suggest.

Looking to the Future

In recent years, commercial development accounted for an increasingly large share of construction in Massachusetts. Greater Boston's life sciences industry seems to have been behind much of this uptick. With a glut of lab space, this demand driver is gone for at least the foreseeable future. While growth in residential building appears to have been a less prominent feature in the most recent building cycle, it is likely that there was an extensive increase in demand for residential remodeling that the municipal valuation data do not capture fully. If interest rates remain high and/or home price appreciation moderates (making it more difficult to borrow against home equity), it is also possible that Massachusetts will see significantly less residential removation activity in the coming years.

Growth in MassSave has become a significant share of demand over the past decade. While there have been some recent cuts to the program to reduce energy costs for ratepayers in the short-term, the new three-year plan should still generate modest growth, particularly with more funding for mitigation to remove old wiring and make other major improvements that must occur before insulation and other efficiency improvements take place.¹³ Building decarbonization that would result in more demand for workers in the skilled building trades has slowed as rising electric prices deter many consumers. However, the solar market is poised for a strong rebound with storage and other grid improvements enabling significant growth. And potential for a large wave of heat pump conversions remains if the state can stay on track to increase energy supply through the development of solar, offshore wind, energy storage, and other improvements to the grid.

On the supply side, the state's skilled building trades workforce grew more diverse as it expanded (**Figure 8**). White residents made up more than 90 percent of workers in these four occupations in 2010. By 2023, workers of color made up nearly one-quarter of those employed in the skilled building trades. The industry is still less diverse than the overall Massachusetts workforce, but the gaps have narrowed and skilled building trade workers are now nearly as diverse as Massachusetts residents with other forms of advanced training.¹⁴

Progress toward gender parity has been even faster, but from a very low base. According to the ACS data, women made up just 4 percent of workers in the four core trades in 2023, up from 1.5 percent in 2010. Workers in the skilled building trades are notably less likely to be foreign-born than the overall workforce (16 percent of skilled building workers are foreign-born, compared with 22 percent of all workers and 19 percent of workers with advanced training), and the gaps have not narrowed since 2010. This disparity is notable given that immigrants make up half or more of the workers in the construction industry's low-skilled occupations.

The increasing diversity of the skilled building trades workforce should bode well for attracting and retaining more workers of color and women to these professions in the future. While many DEI efforts have been put on hold, the learn-to-earn nature of the skilled building trades should make it a particularly viable pathway for students of color who struggle to pay for college and may face steeper financial barriers in the future if there are reductions to federal financial aid. And as far as declines in immigration may present a threat to future labor supply, it is no more of a risk to the skilled tradesthan to other sectors of the economy (though to be clear, the loss of lower-skilled laborers would certainly have a highly disproportionate impact on the performance of the construction sector overall).

The aging workforce is more of a concern. Nearly one-third of workers in the skilled building trades are over age 50, a 6-percentage-point increase from 2010. While this is similar to the proportion of employed residents over age 50 in Massachusetts, it could be more problematic for construction. The physical nature of these jobs leads to earlier retirement. And if there is a significant downturn, workers will likely be forced to look for opportunities in other sectors, and many will not wish to return to physical labor when demand for construction workers returns in the future. Losing these experienced workers will not only reduce the number of available workers directly, but it may also make it more difficult to apprentice the next generation.

FIGURE 8 Share of Massachusetts workers by race/ethnicity



Source: American Community Survey, Public Use Microdata Sample



The Heat Pump and HVAC Technician Training Network is a Targeted Approach to Meet a Clearly Defined Goal

Fulfilling a commitment Governor Healey made in her 2024 State of the Commonwealth address, the Massachusetts Clean Energy Center (MassCEC) is working with community colleges to build a Heat Pump and HVAC Training Network. This network will play a central role in ensuring that Massachusetts can meet the goal of installing 500,000 heat pumps by 2030. Grants and technical assistance will help colleges design new training programs or expand existing ones. These resources will help with equipment purchases. Programs can also tap them to add staff and deliver wrapround supports to increase student retention. This \$14 million investment will expand HVAC training capacity across the state's 15 community colleges with a standardized curriculum and instructional framework. With a focus on reaching residents of low-income communities and environmental justice neighborhoods, these investments will also help Massachusetts maintain momentum increasing diversity in the skilled building trades workforce.



Section 2

Meeting the State's Housing and Clean Energy Goals

With a stronger grasp of the dynamics in the state's construction market and labor force, we turn now to Massachusetts's housing and climate goals. The Healey-Driscoll administration is working hard to place the commonwealth on a path to produce 220,000 new housing units by 2035. At the same time, the administration is committed to fulfilling the state's legal mandate to reach net zero carbon emissions by 2050.¹⁵ Achieving this objective will require considerable progress in the near-term, and the administration has established a number of targets for 2030. These include installing over 400,000 heat pumps and enough charging infrastructure to support 900,000 electric vehicles. To meet electrical demand, plans call for building 3,650 MW of offshore wind, 4,000 MW of solar, and 5,000 MW of energy storage by the end of the decade.¹⁶

Building a construction workforce that can accomplish the state's housing and clean energy goals at the same time will be difficult. As noted in the introduction, we cannot train workers for jobs that are unlikely to materialize. However, it is critically important to have a thorough understanding of how many workers will be required to meet these goals so that Massachusetts can expeditiously put plans in motion to train these workers if aggregate demand is strong and a larger workforce is required. To provide these metrics, we combined estimates for clean energy workforce needs developed previously by BW Research with new analysis of workforce needs for increasing housing production that BW Research conducted for this study (see **Appendix A** for detailed methodology).

Housing

Massachusetts has been producing around 16,000 housing units per year. Meeting the goal of building 220,000 new housing units by 2035 would mean a net increase of 6,300 units per year, a 40 percent boost in annual production over recent levels. Economic impact modeling suggests that constructing this additional housing will require 3,152 full-time equivalent workers employed in the skilled building trades each year, balanced fairly evenly across the four occupations. This is 5 percent of the most recent (2023) employment figure. While this seems undersized relative to the 40 percent increase in production that these workers will deliver, as noted in Section 2, new residential construction accounts for just 25 percent of construction output.¹⁸

Clean Energy

Massachusetts will require 38,000 workers to meet the state's 2030 greenhouse gas emission reduction targets. This total includes approximately 5,888 workers in the skilled building trades. Electricians represent the largest occupational need among the trades, with nearly 4,500 workers required. The skilled building trade workers required to undertake the clean energy construction projects amounts to about 10 percent of the 2023 workforce, although this comparison is not exact because the clean energy current workforce needs assessment was conducted with 2021 data and a growing number of incumbent workers are now employed performing these functions.

FIGURE 9

Estimated number of workers required to meet the state's housing and clean energy goals (annualized)

Occupation	Housing Goals	Clean Energy Goals	Housing & Clean Energy Goals
Carpenters	711	397	1,108
Electricians	954	4,444	5,398
HVAC Mechanics and Installers	602	650	1,252
Plumbers	885	397	1,282
Total	3,152	5,888	9,040

Note: These figures represent the number of workers required to build 6,300 housing units each year and to make incremental progress toward the clean energy goals each year through 2030.

Housing and Clean Energy in Combination Under Different Growth Scenarios

Increasing housing production and meeting the state's 2030 climate goals simultaneously will generate more significant demand for skilled building trade workers. Combined, these efforts will require more than 9,000 workers, including 5,398 electricians, 1,282 plumbers, 1,252 HVAC technicians, and 1,108 carpenters.

At this uncertain time, it is even more difficult than usual to forecast demand for workers in the skilled building trades, but we can model positive and negative scenarios. If growth continues to unfold at the average pace over the past two decades, Massachusetts would need approximately 3,800 additional workers in these occupations by 2030. Combining this positive growth estimate with the 9,040 additional workers needed to meet climate and housing goals suggests that the state should aim to grow the skilled building workforce by 12,845 additional workers by 2030, a 22 percent increase (**Figure 10**).²⁰

At the other extreme, a Great Recession-scale downturn would reduce demand for skilled building trade labor by more than 13,000 workers at the trough. Even more concerning, nearly 50,000 work-years of skilled building trade labor could be lost between 2025 and 2030, if markets take equally long to recover. Stimulating all of the output necessary to accomplish the state's housing and clean energy goals over this time period could avoid more than 90 percent of these lost work-years.²¹

While spurring this level of demand is improbable if not impossible (especially without federal stimulus), these figures illustrate the lost productive capacity and the value of thinking creatively about unusual steps that the state could take to keep as many skilled construction workers employed if Massachusetts does experience conditions conditions that will likely lead to a sharp or prolonged downturn.

FIGURE 10

Projected growth in the skilled building trade workforce plus additional workers required for clean energy and housing goals





How Does Apprenticeship Work?

An apprenticeship is a formal training program that combines paid, hands-on work experience with classroom instruction. Apprentices are employed by private contractors and earn wages while they learn, working under the supervision of experienced professionals on real job sites. At the same time, they complete a set number of classroom hours to gain technical knowledge.

Many construction apprenticeships are operated by unions through Joint Apprenticeship and Training Committees (JATCs), while others are offered by non-union contractors or trade associations. The classroom instruction can be delivered by union training centers, community colleges, or private training centers. While it varies by trade, students who attend CTE high schools receive credit toward approximately half of the classroom instruction hours required.

In Massachusetts, electricians, plumbers, and HVAC mechanics and installers must apprentice to earn a license per the requirements outlined below. A license is not required to perform carpentry work in Massachusetts. However, the carpenters union requires all members to complete a registered apprenticeship with similarly high standards.

Occupation	On-the-Job Training	Classroom Instruction
Electricians	8,000 hours	600 hours
Plumbers	8,500 hours	550 hours
HVAC Mechanics and Installers	6,000 hours/4,000 hours	500 hours/250 hours
Union Carpenters	5,200 hours	640 hours



Section 3

The Skilled Building Trades Training Landscape

As policymakers work to guide the Massachusetts economy through uncertain times and position it to emerge with greater productive capacity, it is critical to understand the skilled building trades training landscape. This system is decentralized, and there is limited data on the outputs and outcomes of each provider. Information on the constraints that providers face in expanding capacity is equally limited. To fill this void, BW Research assembled the data currently available and supplemented it with a survey of all known training providers in Massachusetts (Survey conducted by MassINC with BW Research. See Appendix B for details.). This analysis reveals varied needs across the sector when it comes to recruiting, training, and supporting more students. This section summarizes these findings and puts them into context.²²

Current Training Capacity

Skilled building trade workers receive their training in Massachusetts through three primary providers: career and technical education high schools (CTE schools, also known as vocational schools), community colleges, and union apprenticeship programs.

CTE high schools graduate a disproportionately large number of carpenters, especially relative to the number who apprentice. Community colleges have established a large niche preparing HVAC mechanics and installers. Combined, these three pathways train about 1,000 carpenters and electricians each year, along with 675 HVAC mechanics and installers (**Figure 11**). However, aggregate estimates significantly inflate the number of new workers entering these professions because many receive training from more than one provider. For instance, students who study electrical at CTE high schools must still complete a four-year apprenticeship for licensure. The workforce yield is also significantly lower than the number of completions because some who trained for a skilled building trade will pursue work in construction management or another field altogether, and some will relocate to other states. As a result, the training system's actual contribution to the workforce is far lower than the total number of completers.

Figure 12 provides data to benchmark completions against the number of workers needed to both maintain the workforce under business-as-usual conditions and



Source: See Appendix B



FIGURE 12

Estimated number of new entrants needed to maintain current workforce and meet clean energy and climate goals

Source: Authors' analysis of program completion data and data from the US Bureau of Labor Statistics

to grow it to meet the state's housing and clean energy goals. Each year, the Massachusetts construction workforce needs around 700 new carpenters and electricians, as well as 500 new HVAC mechanics and installers, to keep up with retirements and those who exit these professions prematurely (either to change careers or to move out-of-state).²³

While actual demand for more workers to meet the state's housing and clean energy goals remains speculative at the moment, if this need were to materialize and we spread the ramp-up over a five-year period, it would mean boosting training capacity to bring an additional 1,000 electricians, 220 carpenters, and 250 HVAC mechanics and installers into the workforce each year. Combined with maintenance-level training requirements, these estimates suggest that Massa-chusetts would need a system capable of preparing

over 1,800 electricians, 800 carpenters, and 500 HVAC workers annually. The lines on Figure 12 indicate how these needs compare to current training capacity based on total completions (solid line) and the reasonable assumption that actual yield equals 50 percent of current completions (dotted line) due to overlapping enrollment, career change, and outmigration.²⁴ This modeling shows that the system is likely under capacity to meet maintenance-level needs for electricians and carpenters, especially if the older workforce and weaker economic conditions leads to a wave of retirements in the coming years. Scaling the skilled building trades training system to meet the state's housing and clean energy goals will require a particularly targeted focus on expanding capacity to help electricians develop the skills necessary to deploy new technologies.

Barriers to Expansion

Shortages of physical space and qualified instructors are the two most commonly cited barriers to expanding training capacity for target occupations in the near-term. Nearly half (45 percent) of surveyed training providers with carpentry programs or HVAC programs, as well as two in five (39 percent) electrical training providers, stated that not having enough physical space was a significant barrier to expanding training capacity over the next three to five years. Around one-third noted that hiring qualified instructors was a significant barrier for all three occupations. This problem is especially acute for high schools. Over half of comprehensive high schools with Chapter 74 programs (55 percent) and three-quarters of CTE schools (75 percent) report difficulty hiring and retaining instructors.

Student interest is a less commonly cited challenge (**Figure 13**). Fewer than 20 percent of training providers see recruitment as a significant barrier to expanding out across all three occupations. However, community colleges are an exception. All of the community colleges surveyed noted that lack of student interest was a significant obstacle to expanding electrical training programs, and half cited limited student interest as a barrier to increasing enrollment in their carpentry programs.

Some training providers said that lack of employer demand for additional graduates or lack of apprenticeships and other placements for on-site learning present significant obstacles to expansion. However, these responses were relatively rare (between 15 and 22 percent of programs note this barrier varying by trade).

Most providers believe that students are generally prepared for their training regimens; however, union-affiliated apprenticeships were an exception here. Half of these respondents reported that their applicants are underprepared for their training programs, compared with about one-quarter of comprehensive and CTE high schools and community colleges.

FIGURE 13

Percentage of training providers that report factors as "significant barriers" to expansion



Student Supports

Ensuring that students who enroll in programs successfully complete them is key to maximizing output and efficiency. Sound strategies to promote persistence will be especially important if programs must rapidly expand. All three trades currently face moderate retention challenges according to the survey results. Electrical programs have slightly higher average completion rates (62 percent), followed by carpentry (58 percent) and HVAC (57 percent).

Training providers offer a variety of supports to boost participation and success in their programs. On-the-job training with compensation for work performed during the program is a cornerstone of adult programs, with two-thirds offering pay directly or through referrals to learn-and-earn programs. Financial aid is available for two-thirds of the adult programs. For the training programs that offer aid, it typically covers between 25 and 49 percent of the program cost, and fewer than half of students receive it. Providers also offer a range of other supports to help students access training. These include assistance with language, transportation, immigration matters, and housing. To connect adult students to employment, programs provide interview and résumé preparation services along with internship navigation assistance (Figure 14).

Youth-serving providers typically offer internships, interview/résumé preparation, transportation, and assistance with language barriers. However, only a handful offer stipends or compensation. Although it is common for adult-serving training providers to offer assistance with housing, immigration, or legal matters, none of the youth-serving training providers surveyed do so (**Figure 15**).

Building Pathways Demonstrates the Power of Pre-Apprenticeship

A Boston-based nonprofit established in 2011, Building Pathways provides pre-apprenticeships to increase access to union construction careers for underrepresented groups, including women, people of color, and low-income residents. The program delivers a comprehensive 200-hour training model that combines classroom instruction with hands-on experience to prepare participants for entry into registered union apprenticeships. Students boost their math skills, learn to read blueprints, and gain exposure to the various trades. Building Pathways also provides support services, including case management, job placement assistance, and resources for childcare and transportation. Over 70 percent of graduates successfully enter union apprenticeships or related employment.



FIGURE 14 Services offered to program participants at adult-serving training providers



Note: Excludes vocational/ technical schools and comprehensive high schools with Chapter 74 programs, as these typically do not charge tuition. Some vocational/technical schools do offer adult training through the Career Technical Initiative, but data on those program completions and matriculations into industry were unclear, so they were excluded from this analysis.

FIGURE 15 Services offered to program participants at youth-serving training providers



Note: Excludes community colleges, public or private universities, private training organizations, pre-apprenticeship programs, and apprenticeship programs that typically focus on adults.

Student Recruitment and Enrollment

Most providers had few entry requirements. A high school diploma or equivalency and an interview were the most common qualifications required for the adult programs (**Figure 16**). Only a handful required a driver's license (14 percent). Overall, a background/Criminal Offender Record Information (CORI) check was uncommon (7 percent). However, a criminal record review was more prevalent for CTE schools (29 percent).

Adult-serving training providers used various outreach methods to market their training programs (**Figure 17**). More than half of the adult-serving providers indicated that they "always" used career fairs (64 percent) and social media (57 percent) for outreach. In addition, half of adult-serving training providers "always" used Mass Hire Career Centers and community-based organizations. By comparison, youth-serving training providers "often" relied on word-of-mouth referrals and friends and family for outreach and marketing (**Figure 18**).



FIGURE 17 Resources used to find program participants at adult-serving training providers

Always used Rarely or never used	
Craigslist or Indeed	36% 21%
LinkedIn	43% 14%
Local college job board	43% 36%
Friends and family	43% 7%
Community-based organizations	50% 14%
MassHire Career Centers	50% 14%
Word of mouth referrals from current or past students	50% 0%
Social media (Facebook, Instagram, Snapchat, etc.)	57% 0%
Career fairs	64% 7%

Note: Excludes comprehensive high schools with Chapter 74 programs and vocational/ technical schools, as the latter typically focus on adults. Some vocational-technical schools do offer adult training through the Career Technical Initiative, but data on those program completions and matriculations into industry were unclear, so they were excluded from this analysis.

FIGURE 18 Resources used to find program participants at youth-serving training providers

Always used Rarely or never	used
Craigslist or Indeed	0% 50%
LinkedIn	6% 50%
Local college job board	6% 44%
Community-based organizations	6% 25%
Social media (Facebook, Instagram, Snapchat, etc.)	6% 44%
MassHire Career Centers	13% 31%
Lorem ipsum Career fairs	13% 25%
Friends and family	19% 25%
Word of mouth referrals from current or past students	19% 19%

Note: Excludes comprehensive high schools with Chapter 74 programs and vocational/ technical schools, as the latter typically focus on adults. Some vocational-technical schools do offer adult training through the Career Technical Initiative, but data on those program completions and matriculations into industry were unclear, so they were excluded from this analysis.

Expansion Plans

Only one-third of programs have plans to offer more seats, with slightly higher rates for HVAC (41 percent) and electrical work (37 percent). On the other hand, 20 percent of programs for electricians expect enrollment to decline, followed by 13 percent for carpentry and 9 percent for HVAC. Of the programs that expect to expand, the average anticipated growth rate for electrical program completions over the next year is 21 percent, followed by 19 percent for carpentry and 10 percent for HVAC (**Figure 19**).

FIGURE 19

Expected participant growth over the next year

	Electrical	Carpentry	HVAC
Percent of training providers that project the number of participants will increase	37%	30%	41%
Percent of training providers that project the number of participants will stay the same	43%	57%	50%
Percent of training providers that project the number of participants will decrease	20%	13%	9%
Average growth rate projected by training providers projecting participant increase	21%	19%	10%
Average growth rate projected by training providers projecting participant decrease	-35%	-45%	-45%



Section 4

Strategies to Construct the Future in Uncertain Times

In these uncertain times, strong leadership and creative policymaking will be essential to developing the workforce that Massachusetts needs to achieve its clean energy and housing goals. Governor Healey has been clear that we must continue to pursue our plans for the future with urgency. State agencies are well-positioned to vigorously follow her lead.

Recognizing that the transition to clean energy rests on workers with the skills to install and maintain new technologies, the Massachusetts Clean Energy Center (MassCEC) is playing an increasingly important role in workforce development. Over the past few years, MassCEC has built a strong workforce team. The relationships and experience that they have gained establishing a variety of new training programs hold enormous value in a period that will require even greater trust and flexibility among partners.

The Executive Office of Housing and Livable Communities (EOHLC) is also starting to play an active role in construction industry workforce development. The new secretariat oversaw the development of the state's first housing plan. EOHLC recently partnered with the UMass Donahue Institute and the Executive Office of Labor and Workforce Development's Economic Research Department to estimate the number of construction workers required to meet the plan's 2035 production targets. As the state works to implement the plan, these partners can help EOHLC collect and analyze data in real time to ensure that training efforts align with changing demand in the construction market.

With creative policymaking, Massachusetts can build on the strong foundation that MassCEC and EOHLC have established. The analysis presented in this report suggests that the following eight ideas are particularly worthy of consideration:

1. Improve data collection.

As described throughout this report, traditional sources of labor market information provide a poor representation of the construction workforce. Massachusetts has low-hanging fruit opportunities to close these information gaps. Over the past decade, the state has made considerable progress in building education-to-career data systems that allow researchers to follow the trajectory of students as they progress from high school through postsecondary training and into the workforce. Integrating information from databases maintained by licensing boards will provide decision-makers with a far richer understanding of how workers enter the construction industry through various training providers.

Our education-to-career data systems will offer particularly valuable insight into the construction workforce if Massachusetts follows the lead of Indiana, Hawaii, Texas, and several other states that have added occupation and hours worked to their quarterly unemployment insurance reporting requirements. This change would give researchers a true indication of the number of workers employed full- and part-time, as well as of the variation in hourly wages by skill level. It will also help Massachusetts improve utilization of registered apprenticeships and ensure stronger compliance with prevailing wage laws as described further in Recommendations 2 and 3.

2. Increase the utilization of registered apprenticeship.

Apprenticeship is the centerpiece of career training and industry-supported education in the skilled building trades. Providing a sufficient number of these opportunities is always challenging, but much more so in a downturn. This can put the next generation behind pace completing the thousands of hours of on-the-job-training that they will need for full licensure. New threats to DEI initiatives could also make it more difficult for pre-apprenticeship programs to perform their pivotal role creating pathways into these professions for underrepresented groups.

Drawing on the Executive Office of Labor and Workforce Development's 2018 apprenticeship expansion plan as well as recent Healy-Driscoll administration and legislative initiatives, Massachusetts can find many creative ways to encourage employers to continue offering and improving their apprenticeship programs through the current downturn and beyond.

Free community college is one new avenue. This state funding puts community colleges in a better position

to partner with employers and unions to offer classroom instruction to complement on-the-job-training in registered apprenticeship programs. Apprentices will be able to earn a certificate or associate degree without any direct expense to the student or employer.

Massachusetts could tap improvements in information technology to create incentives to offer strong apprenticeships by collecting and publishing data on the number of apprentices working for contractors participating in public projects and their retention rates. This information will help those procuring public projects determine whether firms are fully meeting the definition of the lowest "responsible" bidder under state procurement law.

Pre-apprenticeship programs like Building Pathways, a nonprofit funded by the Greater Boston Building Trades Unions, have played a major role opening these professions to more women, people of color, and other underserved communities. State leaders must be on the alert and ready to provide funding and other forms of assistance to ensure that these programs are able to continue offering their essential services.

3. Ensure compliance with prevailing wage laws.

Prevailing wages promote fair compensation, workforce stability, and compliance with established labor standards. They also help create a level playing field for responsible contractors and workers, which further reinforces the utilization of apprentices and sustainable workforce growth.

The Division of Fair Labor at the Massachusetts Attorney General's Office does yeoman's work enforcing prevailing wage laws with modest resources. The Massachusetts Executive Office of Labor and Workforce Development is a strong partner in these efforts through its Council on the Underground Economy. The Council has data-sharing agreements to help identify wage theft and employers that are not complying with prevailing wage laws. Adding occupation and hours worked to unemployment insurance filings would significantly advance these efforts. By moving away from self-reporting on paper forms, this could also help reduce compliance costs for responsible employers.

4. Monitor teaching vacancies and devise effective strategies to fill positions with high-quality instructors.

Results from our survey show that both CTE high schools and community colleges are having difficulty in attracting and retaining instructors. This is not surprising given the disconnect between salaries for educators and compensation for skilled workers in the construction industry. Low faculty wages have made it especially difficult for public two-year colleges to compete for qualified instructors. Recent state investments in financial aid have increased enrollment at these institutions. Without complementary investments in faculty compensation, community colleges will have great difficulty meeting the demand for training in the skilled building trades.

Addressing this problem begins with capturing accurate data on job vacancies. State workforce leaders should partner with CTE schools and community colleges to track this information. They can then experiment with providing additional compensation and other cost-effective strategies to help these training providers recruit and retain high-quality instructors. With support from MassCEC, Greenfield Community College is designing and launching a train-the-trainer academy aimed at recruiting and preparing new instructors for teaching roles. This model exemplifies the kind of targeted approach that could have real impact guided by reliable data on job vacancies in the community college system.

5. Align capital investment in high schools and community colleges with strategic efforts to increase training capacity.

There is growing support for increasing the capacity of CTE high schools to meet student demand. Adding space for career and technical education programs at comprehensive high schools is one way to create more opportunities for students to take advantage of this training pathway quickly and cost-effectively. Massachusetts should pursue this approach strategically by prioritizing programs that are committed to preparing students for the skilled building trades and achieving high placement rates in these professions through strong partnerships with local employers and labor unions. The state should also consider prioritizing high schools with plans to securely offer CORI-friendly "After Dark" training programs for adults. This will maximize the use of facilities and equipment to increase the skills of construction workers across the commonwealth.

Community colleges are also playing an increasingly important role helping the industry innovate and adopt new technologies in response to climate change. Governor Healey's BRIGHT Act will make Fair Share surtax funds available to build new state-of-the-art training facilities on these campuses. This presents an opportunity to fill regional gaps in the skilled building trades training system.

6. Aggressively implement the recommendations of the Unlocking Housing Production Commission.

Massachusetts will not make progress on its housing and climate goals with spending alone. Regulatory reform likely holds equal or greater power to keep the construction market moving through the ups and downs of the economy. In February 2025, Governor Healey's Unlocking Housing Production Commission presented over 50 recommendations to increase the supply of housing in Massachusetts. With the economic barriers to housing production rising, there is even greater urgency to move expediently on these proposals.

Making progress in the near-term will require additional leadership from the governor. Many of the recommendations can be addressed through regulatory changes. And for the various proposals that do require statutory change, the administration is best-positioned to evaluate the tradeoffs and political viability and rally support for meaningful action before the close of the 2025-2026 legislative session.

7. Stimulate demand for construction labor with strategic state investment.

Massachusetts can insulate its construction workforce with countercyclical investments that meet critical needs. To some degree, this can be accomplished without increasing state spending. For example, the state could temporarily shift housing investment toward shallow subsidy programs that produce more units of housing for each dollar of state support. The state could also identify new dedicated revenue sources to pay for public construction. School building is one example-Massachusetts has fallen behind on school facility investment, and many urban schools are in chronic disrepair. Moving quickly to rebuild these buildings while private demand is weak would lower the cost of these difficult-to-finance projects and help keep the state's skilled construction workforce intact. Commuter rail transformation is another area where the state could look for a dedicated revenue source to make countercyclical investments that pave the way for future growth.

8. Co-invest in manufactured housing.

Manufactured housing has long been seen as a way to lower construction costs and increase energy efficiency. Despite steady improvement in technology, Massachusetts has not been able to overcome the many barriers to widespread adoption of this production method. These challenges include limited availability of land for large factories, high transportation costs to deliver components to project sites for final assembly, and difficulty raising capital for startup costs when there is unpredictable demand for the product.

Massachusetts should strive to unlock the potential of manufactured housing with creative policymaking. For instance, rather than providing public land to housing projects that produce a few hundred homes at most, the state could focus on securing land for manufactured housing factories that produce thousands of high-quality, energy-efficient homes in each region of the commonwealth every year. Massachusetts could go a step further and provide loan guarantees, direct equity investments, or advantages in public procurement. Providing stronger support for worker-owned co-ops could help address the small firm size problem that lowers productivity, while also giving the diverse construction workforce a larger equity stake in the industry.

But even with traditional private ownership models, manufactured housing should help ensure that workers benefit from productivity gains. Production facilities that are fixed in place are far easier for labor to organize and for regulators to monitor to ensure adherence to labor laws. In this regard, the state must consider the multiple streams through which it can accrue return on investment: additional housing production, more energy-efficient homes, and a healthier, more productive construction workforce.

Appendix A: Housing Production Modeling Methodology

BW Research used the following methodological approach to estimate employment impacts associated with the construction of new single- and multi-family housing in the state of Massachusetts:

- Assume Massachusetts generates a net increase of 6,300 units per year.
- Allocate these additional housing units to Massachusetts municipalities using 2025 population forecasts from the Census Bureau, assuming each municipality builds new housing units consistent with its share of the state population in 2025.
- Break out the allocated housing units in each municipality by building type using the proportional types of buildings constructed between 2017 and 2022 per US Census Bureau data as the basis for municipality-specific unit allocations.²⁶
- Calculated municipality- and housing-unit-type-specific construction costs for the allocated housing units using RSMeans data, which provides granular construction cost estimates by housing type and region.²⁷
- Employ IMPLAN modeling software to translate housing construction costs into job impacts and produce initial employment outputs (IEOs) segmented by value chain (Construction, Professional Services, Manufacturing, and Other Supply Chain).²⁸
- Use occupational employment forecasts from the US Bureau of Labor Statistics Quarterly Census of Employment and Wages (QCEW) to determine the occupational composition of the IEOs and calculate secondary employment outputs (SEOs) segmented by occupation cluster (Carpenters, Electricians, and HVAC Mechanics and Installers).²⁹

Appendix B: Survey Methodology

BW Research conducted a survey of 99 training providers with programs for electricians, carpenters, and HVAC mechanics and installers in Massachusetts. Researchers also called 57 training providers for additional survey completions. Staff at MassINC and MassCEC also reached out to known contacts at related organizations to solicit feedback through the survey. Relevant trainings for each occupation were identified through training inventories crosschecked with secondary data.

The survey instrument was programmed internally by BW Research, and each respondent was assigned a unique ID to prevent duplication. The survey was fielded between April 4, 2024, and November 11, 2024. It resulted in 46 survey completions from training providers representing 125 unique and relevant training programs across the commonwealth. The average survey duration was 15 minutes.

Responses were not weighted to match the proportion of various training institutions because the total number of training institutions was limited, which would increase the likelihood of over-valuing the response of one particular respondent. Response rates were robust across institution types, which minimizes the risk of inappropriately overemphasizing one particular type of institution.

	Survey Respondents	Total Number of Training Providers with Relevant Programs	Response Rates
Vocational/Technical School or Comprehensive High School with CHP. 74 Program(s)	24	60	40.0%
Public or Private College or University	6	8	75.0%
Community College	5	8	62.5%
Apprenticeship (Union-Affiliated)	3	5	60.0%
Other	2	5	40.0%
Total	40	86	46.5%

Response rates by type of training provider

Secondary Data Supplementation Methodology

To supplement the survey results with representative data for the 52 nonrespondent training providers (36 technical high schools, 1 community college, and 15 union-affiliated or private training providers), the research team first identified the following survey questions that could be feasibly supplemented with secondary data sources:

- 1. Question 2 Approximately how many seats were available for each of these programs over the past year?
- 2. Question 3 How many participants completed each of these programs last year?
- 3. Question 5 How long does each program last (in weeks)?
- 4. **Question 6** Before financial aid, what is the approximate total cost of each program (including tuition, books, equipment, and other expenses in cumulative dollars for the entire duration of training)?
- 5. Question 12 Is financial aid available for your training program?

The research team then identified the following secondary data sources that can supplement the preceding questions:

- 1. 2023-2024 Pathway/Program Enrollment by School, Grade, and Program Type Massachusetts Department of Elementary and Secondary Education.³⁰
 - a. Used to supplement **Question 2** for all nonrespondent technical high schools.
 - b. Data availability was robust for all nonrespondent technical high schools.
- 2. 2022-2023 Degree Award Data National Center for Education Statistics, Integrated Postsecondary Education Data System (IPEDS)¹
 - a. Used to supplement **Question 3** for all nonrespondent community colleges.
 - b. Data availability was robust for all nonrespondent community colleges.
- 3. Locate Training Tool MassHire JobQuest³²
 - a. Used to supplement **Question 5 and Question 12** for all nonrespondents.
 - b. Data availability and quality varied significantly by individual training provider.

In summary, the research team identified robust data sources to supplement Question 2 for nonrespondent technical high schools and Question 3 for nonrespondent community colleges. The research team also identified a data source to supplement Question 5 and Question 12 for all nonrespondents, though data availability and quality varied significantly.

The research team was not able to identify any data sources to supplement Question 6.

End Notes

- Troup Howard and others. "How Do Labor Shortages Affect Residential Construction and Housing Affordability?" (2024); Cihan Bilginsoy. "Unemployment, the Great Recession, and Apprenticeship Attrition in the US." Journal of Vocational Education & Training 70.2 (2018).
- 2. Mark Erlich. The Way We Build. University of Illinois Press, 2023.
- 3. Austan Goolsbee and Chad Syverson. "The Strange and Awful Path of Productivity in the US Construction Sector." (Cambridge, MA: National Bureau of Economic Research, 2023); Jan Mischke and others. "Delivering on Construction Productivity is No Longer Optional." (New York, NY: McKinsey and Company, 2024).
- 4. Amos Darko and others. "Examining Issues Influencing Green Building Technologies Adoption: The United States Green Building Experts' Perspectives." Energy and Buildings 144 (2017).
- 5. Note: Adjusted for inflation using Consumer Price Index data for the Northeast region. These figures may overstate real growth in public and nonresidential construction slightly because they include the value of materials and installed equipment—costs that have exceeded overall inflation by a considerable margin in recent years. This is apparent by comparing nominal construction industry output figures to real output using the chain-type price index, a more accurate measure of inflation that accounts for substitution in response to rising prices. See: https://fred.stlouisfed.org/series/MACONSTRQGSP.
- 6. Projects must be completed and assessed before they are added to the tax rolls for the following fiscal year, so there is significant time lag in this series. In all likelihood, residential building began to slow in the 2018-2019 period.
- 7. This estimate draws on the 115,291-worker estimate of the clean energy workforce with 28 percent of clean energy workers engaged in installation activities per the 2024 Massachusetts Clean Energy Industry Report. This equates to 32,000 clean energy construction workers, or 17 percent of the 184,000 construction industry workers in Massachusetts, per the 2023 ES-202 report.
- 8. Tom Juravich and others. "The Social and Economic Costs of Illegal Misclassification, Wage Theft and Tax Fraud in Residential Construction in Massachusetts." (Amherst, MA: University of Massachusetts, 2021).
- 9. Thao Le. "The Scarring of the Great Recession on Construction Labor and Housing Supply." Real Estate Economics (2025).
- 10. Unionization data from <u>https://unionstats.com/</u> show that union coverage for workers in the private construction industry in Massachusetts rose from 15.6 percent in 2010 to 19.6 percent in 2024. These figures are drawn from the Current Population Survey and should be interpreted somewhat cautiously given the margin of error associated with the relatively small sample size at the state level.
- 11. Carrie Bernstein and others. "Construction-Related Trades and Union Occupations in the Greater Brockton Region." (Amherst, MA: UMass Amherst Donahue Institute, 2023).
- 12. Hossein Karimi and others. "Impact of Skilled Labor Availability on Construction Project Cost Performance." Journal of Construction Engineering and Management 144.7 (2018).
- 13. See: <u>https://www.masssave.com/-/media/Files/PDFs/Mass-2025-2027-Energy-Efficiency-Decarbonization-Plan.pdf.</u>
- 14. White workers currently make up 74 percent of Massachusetts workers with an associate degree or higher.
- 15. <u>https://www.mass.gov/doc/determination-letter-for-the-2050-cecp/download</u>.
- 16. There are currently around 90,000 heat pumps installed and 140,000 electric vehicles. See: <u>https://www.mass.gov/report/2024-massachusetts-climate-report-card</u>.

- 17. Average of building permit data from the US Census Bureau, 2021-2024.
- 18. Economic modeling of the number of full-time equivalent workers required to produce the requisite output is also a conservative estimation method because it does not account for slack in the labor market with workers who are between jobs or temporarily off the job for other reasons.
- 19. BW Research Partnership. <u>Powering the Future: A Massachusetts Clean Energy Workforce Needs Assessment</u>. (Boston, MA: Massachusetts Clean Energy Center, 2023).
- 20. This maximum estimate should be interpreted cautiously, as it likely contains some upward bias. To the degree that clean energy transition construction has driven the increasing demand for electricians and other skilled building trade workers above baseline economic growth over the past two decades, the linear growth trend already anticipates some of the continued growth that will be required to meet the state's climate goals.
- 21. Lost work-years is the difference between peak 2023 employment and projected employment between 2024 and 2030. While the housing production/clean energy stimulus only fills half the difference at the trough, for many years it more than replaces lost demand due to recession.
- 22. This component of our analysis draws from BW Research conducted for the Massachusetts Clean Energy Center. Because the center is primarily concerned with the trades most intensively involved in clean energy construction, BW Research's extensive data collection did not include training capacity for plumbers.
- 23. This estimate conservatively assumes that 1/35th of the workforce retires each year and that 1 percent exit to change professions or relocate.
- 24. Massachusetts needs far better data on the training system's yield, but 50 percent is a reasonable starting point. CTE schools account for more than half of completions. Many graduates of these programs pursue higher education and those who do continue in their field of study often enter apprenticeship or community college programs, hence they will be double-counted in our estimates. Outmigration likely also has a significant influence on yield. Roughly 40 percent of high school graduates leave Massachusetts for employment in other states.
- 25. Excludes community colleges, public or private universities, private training organizations, pre-apprenticeship programs, and apprenticeship programs that are typically focus on adults.
- 26. Building types include single-family detached, single-family attached, 2-family, 3-4 family, 5-9 family, 10-19 family, 20-49 family, and 50-or-more family buildings
- 27. RSMeans, 2023. https://www.rsmeans.com/.
- 28. The "Other Supply Chain" value chain includes modeled impacts on thirteen other industries, such as Utilities, Retail and Wholesale Trade, Transportation, and Distribution.
- 29. These categories are based on US Bureau of Labor Statistics (BLS) occupational groups. Descriptions of each group and its associated occupations can be found at <u>https://www.bls.gov/ooh/</u>. "Construction, Installation, Maintenance and Repair Occupations" is a combination of "Construction Occupations" and "Installation, Maintenance and Repair Occupations." These categories were combined due to the similarity in their skills and work tasks.
- 30. Massachusetts Department of Elementary and Secondary Education, "2023-24 Pathways/Programs Enrollment by Grade (District)." 2023. <u>https://profiles.doe.mass.edu/statereport/PathwaysProgramsEnrollmentbyGrade.aspx</u>.
- 31. US Department of Education, National Center for Education Statistics, IPEDS. <u>https://nces.ed.gov/</u>.
- 32. MassHire Department of Career Services, "MassHire JobQuest." <u>https://jobquest.dcs.eol.mass.gov/jobquest/TRain-ing.aspx</u>.

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About MassINC

MassINC is a nonpartisan, non-profit civic organization working to make Massachusetts a place of civic vitality and inclusive economic opportunity. We believe public policy should be informed by data, evidence, and accurate information and that policy makers should be transparent and accountable to the public. We do our work across three independent divisions—the MassINC Policy Center, our civic news organization CommonWealth Beacon, and our subsidiary company, The MassINC Polling Group.

About the MassINC Policy Center

The MassINC Policy Center generates research to frame pressing issues, identify actionable solutions, and monitor progress. The Center favors a collaborative approach, engaging with state and local officials and civic leaders to surface problems and actionable strategies to address them. We strive to produce timely and accurate information that leaders can rely on when tasked with making difficult choices.

About BW Research

BW Research Partnership is a full-service market research firm answering the big questions about employment, the economy, and industry and their evolving impact on communities, regions, and countries. BW is known for robust, evidence-based approaches to finding solutions for clients. Their distinguished team is committed to continually building and improving research processes and analyses while producing customized results, tailored to customers' needs. BW's work provides directions and answers to government entities, non-profit organizations, and corporations that are looking for insights into the evolving world of work and its relationship with businesses, educators, technologies, and communities.



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