



**NC DEPARTMENT
of COMMERCE**
ENERGY & INFRASTRUCTURE

A collage of images related to energy infrastructure and workforce training. The top half shows two workers in hard hats and safety gear standing on a rooftop solar panel array, looking at a set of plans. The background features several large wind turbines under a clear sky. The bottom half shows a group of five people, three men and two women, in a classroom or training facility. They are gathered around a table, looking at a document. In the background, there are computer monitors and technical equipment. The entire image has a blue tint.

THE FUTURE OF NORTH CAROLINA'S ENERGY ECONOMY

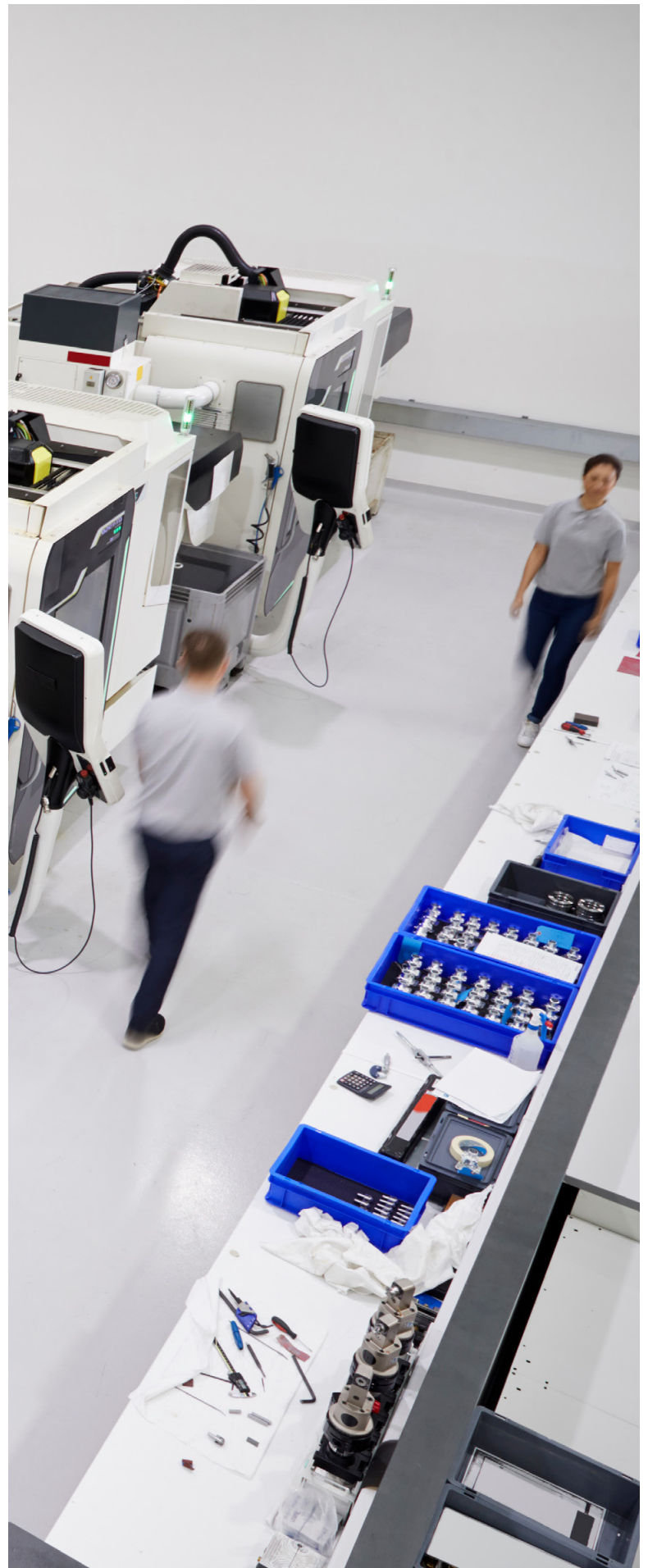
Part Four: Training a Workforce to Meet an "All-of-the-Above" Energy Strategy

NC DEPARTMENT OF COMMERCE | ENERGY & INFRASTRUCTURE OFFICE

From traditional utility workers maintaining the electrical grid to manufacturing technicians producing advanced batteries and solar panels, growth in the energy sector is rebuilding the state's industrial base while creating pathways to middle-class careers for workers with diverse educational backgrounds.

North Carolina is at the intersection of three major economic trends dependent on the electric power sector: booming demand for computing power from data centers, the reshoring of manufacturing, and population growth, with North Carolina among the top five fastest-growing states since 2020. Access to affordable, reliable, and diverse energy sources will determine whether and how North Carolina captures future economic opportunities as the U.S. races to build more resilient domestic supply chains and maintain its competitive edge in AI.

Recognizing energy's critical role in driving economic growth, the NC Department of Commerce's Energy & Infrastructure Office is releasing a series of white papers examining North Carolina's energy sector and its connection to the state's future economic competitiveness and resilience. This fourth paper in the series highlights how recent investments in the state's energy economy are creating diverse career paths for North Carolinians and identifies strategies for preparing a workforce ready for employment in our growing "all-of-the-above" energy economy.



The Energy Economy is Creating Diverse Career Paths for North Carolinians

The energy workforce is traditionally thought of as occupations directly involved in the generation and transmission of electrical power, including power plant operators, maintenance workers, line workers, and technicians who work around the clock to keep the lights on and respond quickly to outages. Last year, more than 12,000 North Carolinians were employed in the electric power generation, transmission, and distribution sector.¹ As the state's utilities continue adding significant generating capacity to the electric grid, these occupations will remain vital to constructing, operating, and maintaining new energy infrastructure.

However, North Carolina's energy economy extends far beyond generating power and maintaining the state's electrical system. Energy supply chains are long and complex, encompassing the sourcing of raw materials, manufacturing of components, and assembly of technologies that underpin modern energy infrastructure. As the United States reshores the manufacturing of these critical components, North Carolina has captured a significant share of the investments. Since 2022, the state has secured more than 35,000 new jobs tied directly to the energy supply chain.²

These projects require a prepared workforce trained across a wide range of occupations. While traditional energy jobs remain important, the greatest economic opportunities lie in the energy supply chain. Roles in the supply chain are responsible for producing the components, equipment, and technologies that power, operate, and maintain the modern electric grid.

Manufacturing in the energy supply chain encompasses a vast ecosystem of specialized activities. Beyond producing the final components like solar panels, batteries, transformers, or natural gas turbines, companies up and down the value chain require workers skilled in mineral extraction and processing, advanced materials science, precision machining, quality control systems, and specialized technologies unique to energy applications.



1. Quarterly Census of Employment & Wages (QCEW)

2. North Carolina's role in reshoring the nation's energy supply chains is explored in depth in EIO's White Paper on energy and manufacturing.

North Carolina's Workforce Development System to Create a Skilled Energy Workforce

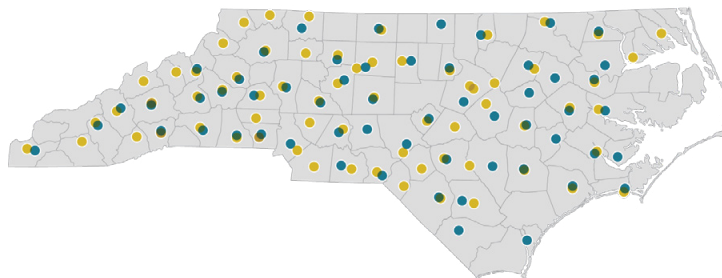
North Carolina's workforce development system—and the policies that guide it—are closely aligned with the needs of energy industry employers and are ready to train a skilled workforce.

In 2019, state policymakers set a goal of ensuring 2 million North Carolinians aged 25 to 44 hold an industry-valued credential or postsecondary degree by 2030. With 1.66 million workers currently meeting this definition, the state needs to train an additional 336,000 workers over the next five years.³ This workforce development target directly supports the needs of energy sector employers, as many of the most in-demand energy jobs—from precision manufacturing roles to grid maintenance positions—require a post-secondary credential or specialized training that falls between a high school diploma and a four-year degree.

In June 2025, the Governor's Council on Workforce and Apprenticeships established specific targets to achieve this goal, including doubling the number of registered apprentices from the current 9,700 participants and expanding work-based learning experiences from 57,000 to significantly higher levels across high schools, community colleges, and the NCWorks system.⁴ These metrics directly align with energy sector workforce needs, as apprenticeships and work-based learning provide the hands-on training essential for manufacturing and technical roles in the energy supply chain.

North Carolina's workforce development system covers every region of the state, and includes more than 70 NCWorks Career Centers, 58 community colleges, nearly 3,000 employers

Workforce training resources are located throughout North Carolina.



● Community College ● Career Center

Sources: NCOneMap and NCWorks Commission.

participating in registered apprenticeship programs, and partnerships across 20 Local Workforce Development Boards.⁵ Employers can also receive tax credits and wage reimbursements when hiring from target populations like veterans or youths.⁶

There are also opportunities for employers to develop and provide specialized training for in-demand positions, including those in manufacturing. NCEdge is the first statewide customized training program of its kind in North Carolina, linking all 58 community colleges with businesses to deliver tailored workforce training. The program helps employees advance skills they already have or learn new ones, aligning closely with employer's needs. Services such as recruitment, candidate screening, and job-specific training are provided at no cost to qualified businesses, particularly in sectors like advanced manufacturing. NCEdge supports companies preparing for new processes, equipment upgrades, or expansion by ensuring their workforce is equipped with the necessary skills.⁷

3. dashboard.myfuturenc.org

4. commerce.nc.gov/reports-policy-makers/other-reports/report-workforce-development-goals-governors-council-workforce-and-apprenticeships-june-2025/open

5. nccommunitycolleges.edu/about-us/data-reporting/data-dashboards-page/apprenticeships-in-north-carolina

6. commerce.nc.gov/grants-incentives/workforce-grants

7. Rural Advanced Manufacturing Partnerships Toolkit: How North Carolina's Rural-Serving Community Colleges Leverage Partnerships to Meet Advanced Manufacturing Workforce Needs. NC Community Colleges. 2025. [Belk-center.ced.ncsu.edu/wp-content/uploads/sites/128/2025/05/RP3-Rural-Advanced-Manufacturing-Partnerships-Toolkit.pdf](https://belk-center.ced.ncsu.edu/wp-content/uploads/sites/128/2025/05/RP3-Rural-Advanced-Manufacturing-Partnerships-Toolkit.pdf)

A Manufacturing Case Study: Identifying Strengths and Gaps in Solar Manufacturing Workforce Training

In April 2025, Boviet Solar celebrated the opening of its \$294 million solar panel manufacturing facility in Greenville, North Carolina. The Boviet facility employs advanced solar cell technology to produce both traditional single-sided panels and modules that can capture sunlight on both sides, increasing energy output for utility-scale applications. Phase 1 of the factory will produce 2 gigawatts (GW) of annual module output capacity, with Phase 2 scheduled to come online in 2026 and add another gigawatt of high-efficiency solar cell manufacturing.⁸ Once both phases are fully operational, Boviet will have invested \$400 million in the Greenville area and created more than 1,300 jobs.

The complexity of solar panel manufacturing requires workers skilled in precision assembly, quality control systems, advanced materials handling, and specialized techniques for processing silicon cells. Beyond the 1,310 direct manufacturing jobs, the Boviet facility illustrates the supply chain multiplier effect, with an estimated 1,965 indirect positions supporting the operation through logistics, maintenance, component sourcing, and technical services.

Job posting data from June 2025 revealed the breadth of skills needed for work at Boviet: logistics specialists, plant controllers, HVAC engineers, electrical engineers, equipment technicians, and IT personnel. Of the 28 positions posted, 13 required an associate's degree or less education.⁹



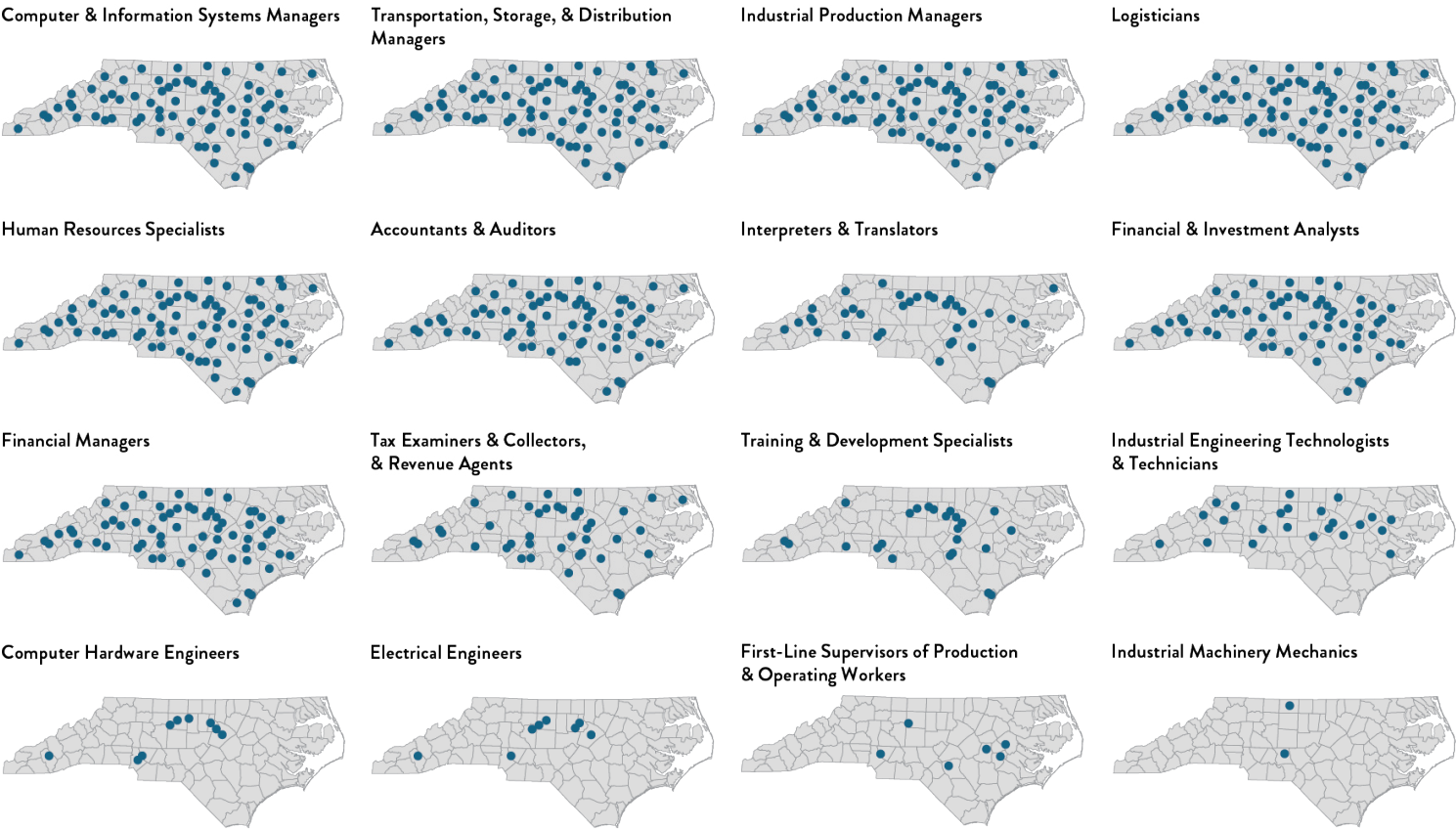
8. bovietsolar.com/boviet-solar-celebrates-opening-of-its-first-u-s-pv-module-factory, bovietsolar.com/boviet-solar-increases-pv-module-capacity-to-3-0-gw-in-greenville-north-carolina

9. web.archive.org/web/20250622050626/https://bovietsolar.com/company/careers

How can Commerce work with a company like Boviet to better understand the strengths and gaps of the workforce development system for their facility? Using data available from EIO’s [NC Energy Workforce Development Dashboard](#), we can map out the training programs that traditionally feed into key occupations identified by Boviet.

The maps below set out the different occupations being hired by Boviet in September 2025 at its Greenville facility and each blue dot represents either a community college program or four-year degree program that offers the basic training required for those occupations.

Occupation Categories in Demand (Map Titles) and Corresponding Programs Offered in State (Dots)



Source: NC Energy Workforce Development Dashboard Program Search tool.



By matching data on the training programs to the critical occupations, we can make informed decisions about how to strengthen our workforce development system. For instance, this data shows that the state has abundant training programs for information systems managers, logisticians, HR specialists, and accountants. However, training programs for positions like electrical engineers, industrial machinery mechanics, or computer hardware engineers are harder to come by.

There are several ways employers in the energy sector and workforce development stakeholders can use this data to make strategic decisions and investments. For occupations with abundant training opportunities, recruitment efforts can target community colleges and universities within close proximity to a company's facilities. This approach has the potential to create regional talent pipelines that reduce relocation costs for prospective employees. Where training gaps are identified, employers can work directly with community colleges to develop specialized curriculum, fund equipment upgrades for labs and training facilities, or create direct pathways through registered apprenticeships that combine classroom learning with on-the-job experience.

The Boviet case study also illustrates the importance of “stackable credentials”—training programs that allow workers to build skills progressively over time. For example, a worker might start with basic manufacturing safety certifications, then advance

to specialized solar cell handling techniques, and in time, earn credentials in quality control systems or equipment maintenance. This approach allows companies to promote from within while providing career advancement opportunities that retain skilled workers employed by North Carolina businesses, especially those in the energy supply chain.

Beyond the needs of an individual company, a data-driven approach can inform statewide workforce planning as North Carolina continues to recruit and develop energy investments. Similar analysis could be applied to other major energy projects to identify common skill requirements and training gaps across the entire energy supply chain.

Furthermore, partnerships with energy companies can create “bridge programs” that help current workers transition from declining sectors—such as coal-fired power generation—into growing areas of the energy economy. For example, a bridge program could recognize that many of the foundational skills employees in power plant operations, electrical systems, and industrial maintenance possess are transferable to renewable energy operations and battery manufacturing, requiring only targeted retraining rather than starting from scratch.

Investments in the Energy Sector Create Opportunities to Innovate with Workforce Development Tools

Many workers face barriers to jobs unrelated to their skills and training. In a 2023 survey conducted by Commerce, employers report that transportation challenges and limited access to affordable childcare are major obstacles to hiring preferred candidates. Childcare availability and cost were the biggest hurdles to employment. North Carolina’s licensed, high-quality childcare system can only serve about two-thirds of the children whose parents work, and childcare costs have risen faster than inflation, housing, and groceries nationwide.¹⁰ A 2023 joint study by Commerce and NC Child found that there were 100,000 fewer working-age parents of young children in the labor force compared to 2019.

Top Barriers to Employment Identified by Employers

Barriers	All Industries	Manufacturing	Construction
Transportation	23%	21%	18%
Childcare	20%	19%	7%
Commuting Distance	17%	17%	8%
Criminal Record	14%	14%	19%
Drug Screening	6%	10%	16%

Transportation and commuting distance also limit workers’ access to jobs. In one national study, the remoteness of job opportunities was a barrier for students seeking employment in the wind energy sector. About 64% of students enrolled in wind training programs at a postsecondary institution reported difficulty finding energy-based jobs near where they are willing to live.¹¹ Finally, housing has emerged as a significant barrier to recruitment as costs have soared statewide in the years following the COVID-19 pandemic. In a 2025 study commissioned by the North Carolina Chamber of Commerce, the state has an inventory gap of over 750,000 units.¹²

Many of these workforce barriers can compound each other. For instance, limited housing supply near employers can lead to longer commuting times (sometimes more than an hour each way). In addition to greater transportation costs, employees with dependents may need to spend more on childcare or struggle to find care that accommodates extended hours.

As companies in the energy sector invest in North Carolina and create thousands of jobs over the next decade, some are experimenting with innovative ways to be competitive in the hiring market. For instance, as part of its strategy to hire over 5,000 employees for its battery manufacturing facility, Toyota is building a childcare facility, pharmacy, and other amenities on its campus in Randolph County. The company is also partnering with Randolph Community College and NC A&T State University to develop tailored curriculum for students. While financing onsite childcare may not be feasible for every employer, there are a variety of models that provide greater access to childcare for employees that are successful. This model represents a workforce development program that addresses both skills and other barriers to employment for a company to reach its ambitious, yet necessary hiring goals in a historically rural community.

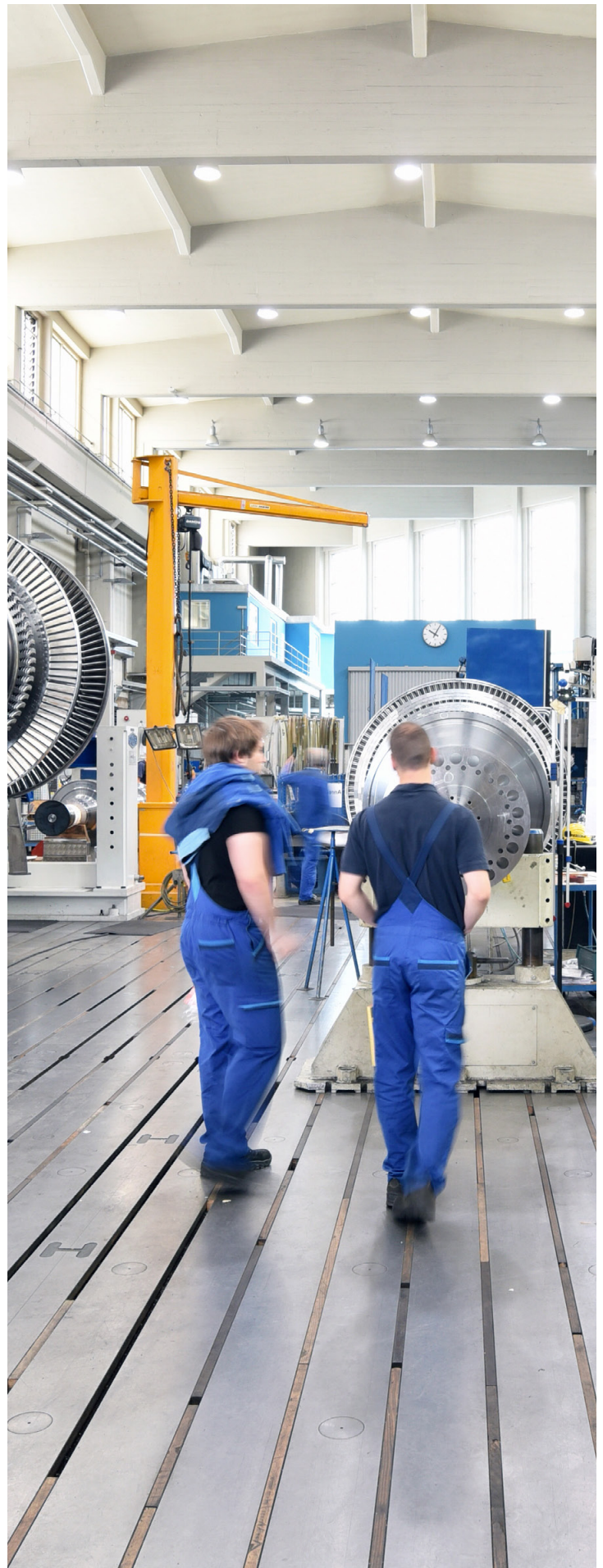
10. ifp.org/hot-rocks-part-two-how-public-policy-accelerated-the-shale-revolution

11. “National Wind Energy Workforce Assessment: Challenges, Opportunities, and Future Needs.” National Renewable Energy Lab. Revised March 2024. [Nrel.gov/docs/fy24osti/87670.pdf](https://www.nrel.gov/docs/fy24osti/87670.pdf)

12. ncchamber.com/2025/02/05/new-report-details-significant-housing-supply-gap-in-north-carolina/cnbc.com/2025/07/10/north-carolina-top-state-for-business-america.html

The scale of investment in the greater Triad region of North Carolina offers another opportunity for large-scale, regional workforce strategies. In addition to the 5,000 jobs at Toyota, JetZero announced the state's largest economic development project in terms of jobs and plans to hire over 14,000 people to manufacture high efficiency, low emissions aircraft in the Greensboro area—less than a 30-minute drive from the Toyota plant.

With so many jobs announced within a short time frame, the pressure on the region's housing market will be intense. Commerce can explore ways of working with local governments, the companies, and other community stakeholders to address these wraparound needs as part of the company's recruitment strategy.



Conclusion

North Carolina’s “all-of-the-above” energy strategy is creating workforce opportunities across the skills spectrum. From traditional utility workers maintaining the electrical grid to manufacturing technicians producing advanced batteries and solar panels, growth in the energy sector is rebuilding the state’s industrial base while creating pathways to middle-class careers for workers with diverse educational backgrounds.

Success in capturing these opportunities requires continued investment in workforce development infrastructure, innovative partnerships between industry and education providers, and strategic coordination across the state’s workforce development ecosystem. The foundation is strong: North Carolina’s community college system, apprenticeship programs, and industry partnerships provide the infrastructure needed to prepare workers for careers in the growing energy economy. The work of the Governor’s Council on Workforce and Apprenticeships will further advance alignment of workforce development actors to meet goals that serve the growing advanced manufacturing employment opportunities.

As federal policy continues to support domestic manufacturing, North Carolina’s ability to supply skilled workers will determine how much of this economic opportunity the state captures. The workforce development strategies outlined in this paper provide a roadmap for ensuring that North Carolina workers are prepared to build, operate, and maintain the energy infrastructure that will power the state’s continued economic growth and competitiveness for decades to come.





The Energy and Infrastructure Office (EIO) at the North Carolina Department of Commerce helps the state capture future economic opportunities by ensuring access to affordable, reliable, and diverse energy sources. EIO guides communities, businesses, and policymakers through the energy transition while maximizing economic benefits from an “all-of-the-above” strategy. The office collaborates with local governments, utilities, industry leaders, and workforce experts to promote job creation in the evolving energy economy and position North Carolina’s industries for long-term competitive advantage.



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