New Jersey's Offshore Wind Workforce Assessment Through 2035

PRODUCED FOR THE NEW JERSEY ECONOMIC DEVELOPMENT AUTHORITY & THE GOVERNOR'S OFFICE OF CLIMATE ACTION & THE GREEN ECONOMY

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[bw] RESEARCH PARTNERSHIP

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Introduction

New Jersey is an emerging hub for offshore wind with a plan to reach 7.5 gigawatts (GW) of offshore wind by 2035. Three offshore wind projects, totaling more than half that goal, are currently in development and significant infrastructure investments, including the New Jersey Wind Port, are under construction. To guide related offshore wind workforce development efforts, the New Jersey Economic Development Authority (NJEDA) – in partnership with the Governor's Office of Climate Action and the Green Economy (Office of Climate Action) – commissioned BW Research Partnership to conduct an offshore wind workforce demand and gap analysis and identify areas in which New Jersey should prioritize its workforce training investments. This research is part of the state's development of the Wind Institute for Innovation and Training (Wind Institute) as an independent entity that will accelerate the development of a robust and diverse offshore wind workforce. The study is a companion report to the Office of Climate Action and the New Jersey Council on the Green Economy's (CGE) *Green Jobs for a Sustainable Future* that details strategies to grow and diversify employment in the state's green sectors, including offshore wind and other clean energy technologies.[1]

New Jersey is well positioned to support offshore wind projects along the East Coast due to its central location as well as its significant investments in port and supply chain development. These export activities include manufacturing turbine components and assembling and transporting components for installation (known as marshalling) from the New Jersey Wind Port to the wind farm site in the ocean. **New Jersey's target for 7.5 GW of offshore wind and accompanying infrastructure investments will result in job growth across numerous sectors of the state's economy, including construction, manufacturing, and professional services. In 2030, New Jersey is projected to see approximately 20,000 new jobs related to offshore wind, from both in-state and regional demand.**

Many of these new jobs will be in occupations that exist today in New Jersey but training for these occupations will need to scale significantly and/or require some additional training to meet the specific needs of the offshore wind industry. New Jersey's strong workforce infrastructure can be leveraged and expanded to address the offshore wind industry's workforce needs and support the development of a diverse and inclusive labor force. This includes organized labor, workforce development boards, K-12 schools,

[1] The Governor's Office of Climate Action and the Green Economy oversees the New Jersey Council on the Green Economy, which was established under Executive Order No. 221 to develop a blueprint for expanding the green economy and building a diverse workforce to support the Administration's clean energy and climate goals. Members of the Council include representatives from State departments, as well as leaders from chambers of commerce, organized labor, industry, utilities, green business, environmental justice communities, academia, small business, workforce development, and environmental advocacy. The Council's *Green Jobs for a Sustainable Future* report can be found at www.nj.gov/governor/climateaction/council/greenreport/

community colleges and four-year universities, community-based organizations, private training providers, and others. As training programs are designed, it is critical they incorporate a full suite of services that encourage and facilitate the development of a diverse and inclusive workforce.

To prepare New Jersey residents for new and growing employment opportunities presented by offshore wind, New Jersey is working across agencies, including NJEDA, New Jersey Board of Public Utilities (NJBPU), New Jersey Department of Labor (NJDOL), New Jersey Department of Environmental Protection (NJDEP), New Jersey Department of Education (NJDOE), and the Office of the Secretary of Higher Education (OSHE), and with industry, academic, labor, and community stakeholders to develop and implement workforce training programs. This report informs this cross-stakeholder approach.

Methodology Overview

The research team, comprised of staff from NJEDA, NJBPU, Governor Murphy's Office, and the consultant BW Research Partnership, constructed custom JEDI [2] models to calculate the employment impacts from offshore wind development based on publicly available data and inputs from the government team.

The job estimates reflect the development and installation of 7.5 GW of in-state offshore wind developments by 2035, as well as supply chain support for 26 GW of offshore wind capacity to be installed in Connecticut, Maryland, Massachusetts, New York, North Carolina, Rhode Island, and Virginia by 2035.

The data highlights the employment impacts by industry, occupation, time horizon/benchmark years, export capacity, and various market development scenarios. This analysis's time horizon ends in 2035 when New Jersey will achieve 7.5 GW of offshore wind; however, New Jersey anticipates continued offshore wind development in subsequent years to support the state's goal of 100 percent clean energy by 2050.

The research team developed three scenarios under which offshore wind is implemented in the 15-year period – low, mid, and high market development scenarios – to project New Jersey offshore wind job creation. These scenarios outline the differences in supply chain development potential over time. Currently, most of the offshore wind supply chain comes from Europe, but the United States and New Jersey are working to develop a greater share of the supply chain domestically. The mid case is the most likely, or benchmark, scenario that reflects an increase in major turbine components manufactured in New Jersey during the analysis period.

The team evaluated job impacts based on New Jersey's 7.5 GW of offshore wind projects, as well as New Jersey's capacity to support the 26 GW of offshore wind development by 2035 along the U.S. East Coast, referred to in this report as regional exports. Exports are namely concentrated in the manufacturing industry, as New Jersey manufacturers are positioned to export their component parts to neighboring states. All analyses presented in this report, unless otherwise stated, reflect the combined job generation from both New Jersey's projects and regional exports.

The team analyzed existing training programs in New Jersey and the region and conducted interviews with industry, training providers, and other stakeholders to inform its analysis and set of recommendations.

[2] The Jobs and Economic Development Impact (JEDI) model provides employment and economic impact estimates for the construction and operation of power generating plants or other projects at the local level. For more information, please visit: https://www.nrel.gov/analysis/jedi/.

New Jersey's Offshore Wind Projects

New Jersey has established a 7.5 GW goal of offshore wind by 2035, with a transparent schedule to issue solicitations for offshore wind projects every two years.[3] To date, NJBPU has awarded three projects totaling 3,758 megawatts (MW):

- Ørsted's Ocean Wind 1: 1,100 MW offshore wind development set to be operational in mid 2020s;
- Ørsted's Ocean Wind 2: 1,148 MW offshore wind development set to be operational in late 2020s; and
- Atlantic Shores Offshore Wind Project: 1,510 MW offshore wind development set to be operational in late 2020s.

NJBPU will issue solicitations for the remaining offshore wind power, with the next solicitation planned for early 2023. Offshore wind projects awarded through these next solicitations are expected to be operational starting in early 2030s.

Offshore wind projects are developed in phases over multiple years (Figure 1). Projects begin with a planning and development phase during which site assessments and key project planning activities occur. Next, projects enter the manufacturing and assembly phase during which the key turbine and other major components are fabricated. Projects then enter the construction and installation phase during which components are installed in the ocean. Once installed, projects enter the operations and maintenance phase. At the end of the project's lifetime, the wind farm is then decommissioned.

FIGURE 1. TYPICAL OFFSHORE WIND PROJECT TIMELINE

New Jersey's three awarded projects are currently in the planning and development phase. In 2030, when projected offshore wind job growth peaks, all projects connected to New Jersey's 7.5 GW goal will be in the manufacturing and assembly, construction and installation, or operations and maintenance phase.

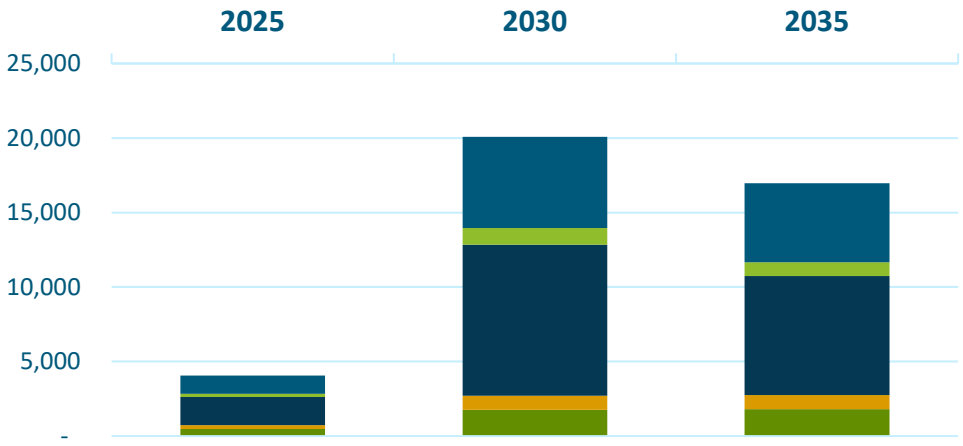
[3] New Jersey's offshore wind solicitation schedule can be found at: www.njcleanenergy.com/renewable-energy/programs/nj-offshore-wind/solicitations

Offshore Wind Jobs by Industry

New Jersey is expected to experience high growth in offshore wind occupations through 2035 with job creation peaking in 2030 during periods of significant project construction and development. As the first several years of an offshore wind project are focused on planning and development (Figure 1), New Jersey will see modest job additions through 2025 in the most likely (mid) scenario — 4,071 jobs total in 2025 (Figure 2). Most job growth will be concentrated in 2030 when construction and manufacturing activity accelerates. The state is expected to support 20,086 jobs in 2030 and 16,959 jobs in 2035. The decrease is a result of the model timeframe ending in 2035 to align with the current offshore wind target. However, if New Jersey increases its offshore wind GW goal, the model would show continued job growth in 2035 and beyond.

In the low scenario, New Jersey will see 18,836 jobs in 2030, and in the high scenario, the state will see 23,941 jobs in 2030 (Figure 3).

FIGURE 2. TOTAL PROJECTED JOBS BY INDUSTRY & BENCHMARK YEARS, MID-SCENARIO (NJ PROJECTS PLUS EXPORTS)[4]



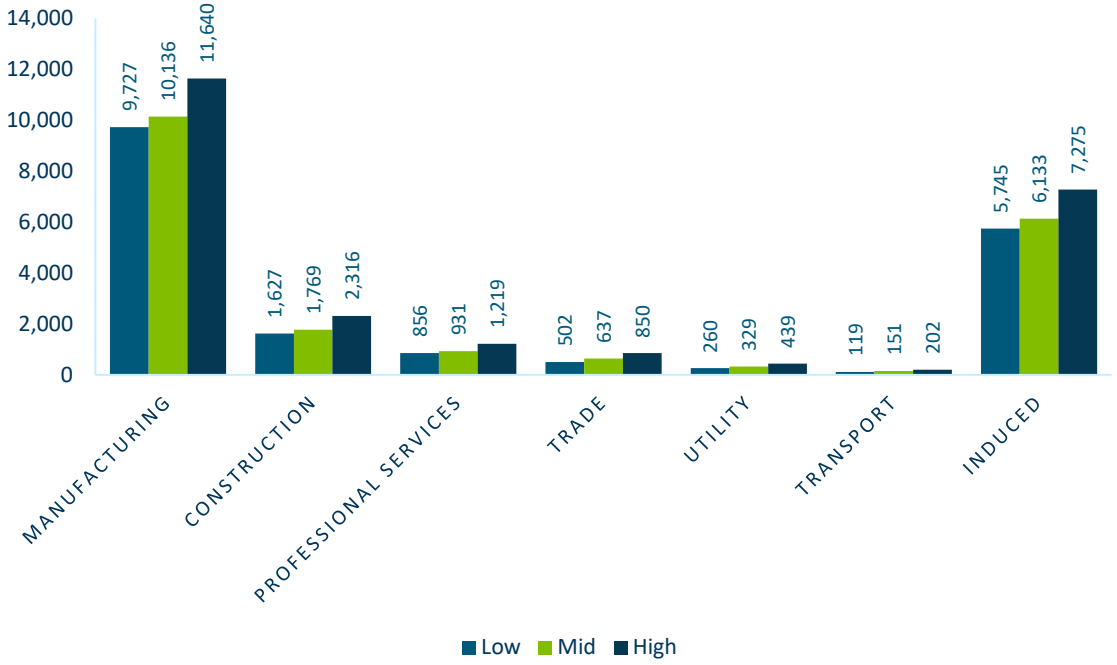
	2025	2030	2035
Induced	1,232	6,133	5,294
Other Supply Chain	207	1,117	927
Manufacturing	1,891	10,136	7,979
Professional Services	256	931	951
Construction	486	1,769	1,807
	4,071	20,086	16,959

[4] "Induced" jobs refer to jobs resulting from offshore wind workers spending their wages in New Jersey's economy and creating additional employment impacts in the healthcare, childcare, retail, or food service industries. "Other Supply Chain" includes wholesale trade, utilities, and transport.

The largest number of new jobs are expected to be in New Jersey's manufacturing industry, driven by both in-state offshore wind developments and regional export demand. In 2030 for the mid scenario, manufacturing represents 50 percent of all new jobs (Figure 2 and Figure 3). In total, New Jersey's manufacturing sector is projected to add 10,136 jobs in 2030 — 3,946 jobs from the 7.5 GW of offshore wind in New Jersey and an additional 6,190 jobs from increased regional exports.

The construction and professional services industries are also projected to see significant employment growth. In 2030 for the mid scenario, the construction industry in New Jersey is projected to see increased demand for 1,769 jobs (Figure 2 and Figure 3). New Jersey's professional services industry — which includes architecture, engineering, and management positions — is also projected to support an additional 931 jobs in 2030.

FIGURE 3. TOTAL PROJECTED JOBS IN 2030 BY INDUSTRY & SCENARIO (NJ PROJECTS PLUS EXPORTS)

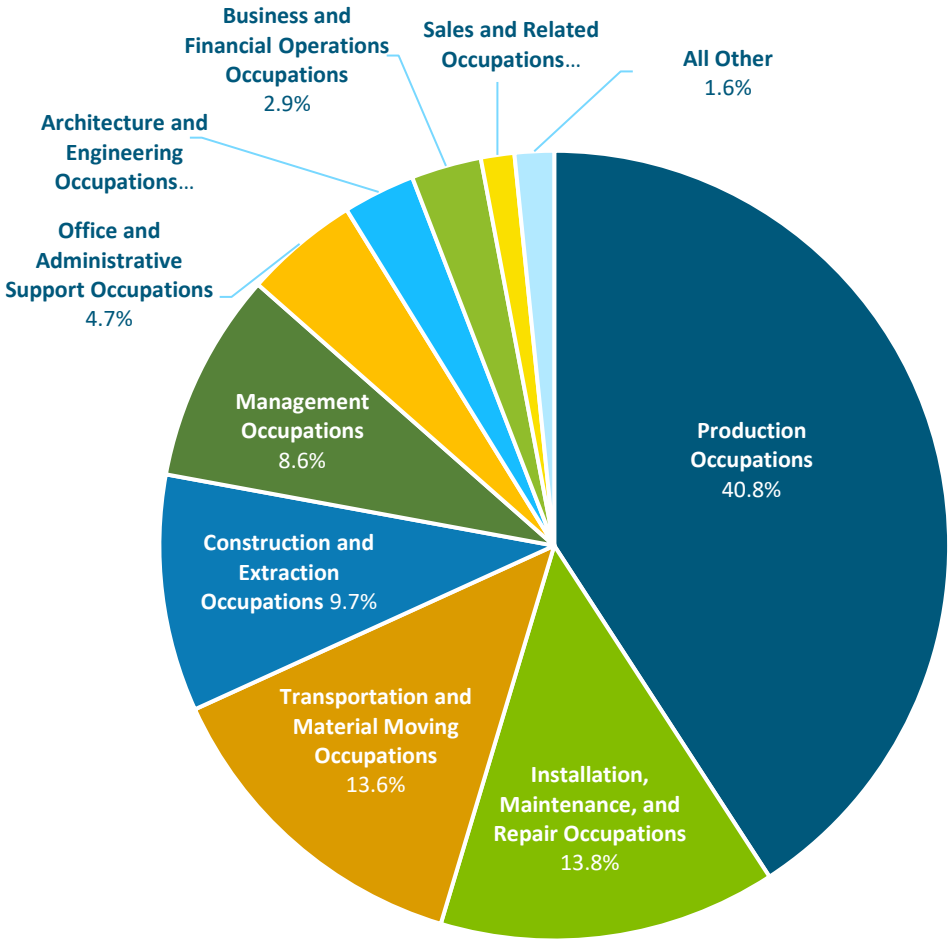


Offshore Wind Jobs by Occupation

The research team conducted an occupational analysis for all jobs to be created as a result of offshore wind activity in manufacturing, construction, professional services, trade, utility, and transport industries from 2020 and 2035.

Four in 10 new jobs in these industries are projected to be in production positions. These include welders, fabricators, and assemblers (Figure 4). Installation, maintenance, and repair jobs account for 14 percent of projected job growth, followed by transportation and material moving occupations (14 percent), construction and extraction positions (10 percent), and management positions (nine percent).

FIGURE 4. PROJECTED OCCUPATIONAL DISTRIBUTION, MID-SCENARIO (NJ PROJECTS PLUS EXPORTS)



The offshore wind industry will create employment opportunities in over 300 different occupations. Though these jobs will be supporting the offshore wind industry, it is important to note that most employment activities will occur onshore. Table 1 features the top 25 occupations that are projected to have the highest demand annually through 2035 in New Jersey.

Overall, the top five occupations projected to see the highest growth include: structural metal fabricators; assemblers and fabricators; electricians; stock and order fillers; and inspectors, testers, sorters, samplers, and weighers. The offshore wind industry will need 2,100 jobs total across these five occupations annually through 2035.

TABLE 1. TOP 25 HIGHEST PROJECTED GROWTH OCCUPATIONS, MID-SCENARIO (NJ PROJECTS PLUS EXPORTS)

Major Occupational Group[5]	Detailed Occupation[5]	Projected OSW Jobs Annually Through 2035[6]
Assemblers and Fabricators (51-2000)	Structural Metal Fabricators and Fitters (51-2041)	473
Assemblers and Fabricators (51-2000)	Assemblers and Fabricators, All Other (51-2099)	457
Construction Trades Workers (47-2000)	Electricians (47-2110)	435
Material Moving Workers (53-7000)	Stockers and Order Fillers (53-7065)	380
Other Production Occupations (51-9000)	Inspectors, Testers, Sorters, Samplers, and Weighers (51-9061)	362
Other Installation, Maintenance, and Repair Occupations (49-9000)	Maintenance and Repair Workers, General (49-9071)	345
Other Installation, Maintenance, and Repair Occupations (49-9000)	Helpers--Installation, Maintenance, and Repair Workers (49-9098)	340
Material Recording, Scheduling, Dispatching, and Distributing Workers (43-5000)	Shipping, Receiving, and Inventory Clerks (43-5071)	267
Other Installation, Maintenance, and Repair Occupations (49-9000)	Industrial Machinery Mechanics (49-9041)	247
Plant and System Operators (51-8000)	Plant and System Operators, All Other (51-8099)	242
Metal Workers and Plastic Workers (51-4000)	Welders, Cutters, Solderers, and Brazers (51-4121)	238
Metal Workers and Plastic Workers (51-4000)	Plating Machine Setters, Operators, and Tenders, Metal and Plastic (51-4193)	237
Assemblers and Fabricators (51-2000)	Engine and Other Machine Assemblers	237
Material Moving Workers (53-7000)	Laborers and Freight, Stock, and Material Movers, Hand	212
Assemblers and Fabricators (51-2000)	Electrical, Electronic, and Electromechanical Assemblers, Except Coil Winders, Tapers, and Finishers (51-2000)	204
Metal Workers and Plastic Workers (51-4000)	Metal-Refining Furnace Operators and Tenders (51-4051)	203

[5] Major occupational groups and detailed occupations are set by the 2018 Standard Occupational Classification (SOC) system that is used by federal agencies to classify workers into occupational categories for the purpose of collecting, calculating, or disseminating data. Definitions for Major Occupational Groups and Detailed Occupations can be accessed at: https://www.bls.gov/soc/2018/soc_2018_definitions.pdf

[6] Projected OSW jobs annually through 2035 reflect the average number of jobs required each year across the analysis period.

Top Executives (11-1000)	General and Operations (11-1021)	198
Metal Workers and Plastic Workers (51-4000)	Molding, Coremaking, and Casting Machine Setters, Operators, and Tenders, Metal and Plastic (51-4070)	182
Supervisors of Installation, Maintenance, and Repair Workers (49-1000)	First-Line Supervisors of Mechanics, Installers, and Repairers (49-1011)	133
Material Moving Workers (53-7000)	Material Moving Workers, All Other (53-7199)	125
Assemblers and Fabricators (51-2000)	Team Assemblers (51-2092)	125
Other Production Occupations (51-9000)	Computer Numerically Controlled Tool Programmers (51-9162)	123
Metal Workers and Plastic Workers (51-4000)	Metal Workers and Plastic Workers, All Other (51-4199)	118
Other Management Occupations (11-9000)	Architectural and Engineering Managers (11-9041)	117
Operations Specialties Managers (11-3000)	Transportation, Storage, and Distribution Managers (11-3071)	115

When analyzed against current employment levels and already expected employment growth, New Jersey is projected to have the most significant labor gaps for occupations in the following major occupational group categories: extraction workers; plant and system operators, water transportation workers; metal workers and plastic workers; and assemblers and fabricators. At a more granular level, the occupations with the greatest projected gap compared to baseline projections without offshore wind growth are: continuous mining machine operators; metal-refining furnace operators and tenders; engine and other machine assemblers; all other plant and system operators; and structural metal fabricators and fitters (Table 2). There are currently just over 1,700 workers in these five occupations in New Jersey. Baseline economic conditions without offshore wind will create the need for another 1,500 jobs. However, offshore wind developments are projected to require an additional 1,300 jobs in these five occupations which is 62 to 158 percent higher than the baseline projected growth.

TABLE 2. TOP 25 HIGHEST PROJECTED GAP OCCUPATIONS, MID-SCENARIO (NJ PROJECTS PLUS EXPORTS)

Major Occupational Group[5]	Detailed Occupation[5]	Projected OSW Jobs Annually Through 2035[6]	Current Employment, 2021[7]	10-Year Baseline Projections (no OSW growth)[7]	% Growth Above 10-Year Projections[8]
Extraction Workers (47-5000)	Continuous Mining Machine Operators (47-5041)	101	54	64	157.8%
Metal Workers and Plastic Workers (51-4000)	Metal-Refining Furnace Operators and Tenders (51-4051)	203	161	140	145.0%
Assemblers and Fabricators (51-2000)	Engine and Other Machine Assemblers (51-2031)	237	251	212	111.8%
Plant and System Operators (51-8000)	Plant and System Operators, All Other (51-8099)	242	308	299	80.9%

[7] Current employment (for 2021 Q4) and 10-year baseline projections are taken from JobsEQ, a private data source. Data was extracted in May 2022; 10-year demand includes exits, transfers, and projected employment growth.
[8]The percent growth above 10-year projections column is calculated by dividing the projected OSW jobs annually through 2035 by the 10-year baseline projections, assuming no OSW job growth multiplied by 100.

Assemblers and Fabricators (51-2000)	Structural Metal Fabricators and Fitters (51-2041)	473	969	764	61.9%
Material Moving Workers (53-7000)	Hoist and Winch Operators (53-7041)	57	87	97	58.8%
Metal Workers and Plastic Workers (51-4000)	Plating Machine Setters, Operators, and Tenders, Metal and Plastic (51-4193)	237	547	477	49.7%
Metal Workers and Plastic Workers (51-4000)	Metal Workers and Plastic Workers, All Other (51-4199)	118	505	480	24.6%
Other Production Occupations (51-9000)	Computer Numerically Controlled Tool Programmers (51-9162)	123	406	538	22.9%
Other Installation, Maintenance, and Repair Occupations (49-9000)	Wind Turbine Service Technicians (49-9081)	45	110	192	23.4%
Other Installation, Maintenance, and Repair Occupations (49-9000)	Commercial Divers (49-9092)	29	111	131	22.1%
Metal Workers and Plastic Workers (51-4000)	Drilling and Boring Machine Tool Setters, Operators, and Tenders, Metal and Plastic (51-4032)	18	137	99	18.2%
Other Installation, Maintenance, and Repair Occupations (49-9000)	Riggers (49-9096)	51	285	326	15.6%
Engineers (17-2000)	Marine Engineers and Naval Architects (17-2121)	12	151	76	15.8%
Metal Workers and Plastic Workers (51-4000)	Molding, Coremaking, and Casting Machine Setters, Operators, and Tenders, Metal and Plastic (51-4072)	182	1,531	1,284	14.2%
Material Moving Workers (53-7000)	Material Moving Workers, All Other (53-7199)	125	749	921	13.6%
Operations Specialties Managers (11-3000)	Administrative Services Managers (11-3012)	103	879	785	13.1%
Other Installation, Maintenance, and Repair Occupations (49-9000)	Helpers--Installation, Maintenance, and Repair Workers (49-9098)	340	2,177	2,814	12.1%
Engineers (17-2000)	Health and Safety Engineers, Except Mining Safety Engineers and Inspectors (17-2111)	37	489	310	11.9%
Water Transportation (53-5000)	Captains, Mates, and Pilots of Water Vessels (53-5021)	85	685	745	11.4%
Extraction Workers (47-5000)	Excavating and Loading Machine and Dragline Operators, Surface Mining (47-5022)	95	873	1,003	9.5%
Assemblers and Fabricators (51-2000)	Assemblers and Fabricators, All Other (51-2099)	457	5,000	5,461	8.4%
Water Transportation Workers (53-5000)	Sailors and Marine Oilers (53-5010)	68	641	783	8.7%
Material Moving Workers (53-7000)	Crane and Tower Operators (53-7021)	75	952	965	7.8%
Drafters, Engineering Technicians, and Mapping Technicians (17-3000)	Drafters, All Other (17-3019)	16	296	239	6.7%

Offshore wind occupations run across four major development phases for offshore wind: planning and development; manufacturing and assembly; construction and installation; and operations and maintenance. Some occupations, such as administrative services managers, construction laborers, and electricians are needed in multiple development phases (Table 3).

TABLE 3. TOP 5 PROJECTED OCCUPATIONS BY DEVELOPMENT PHASE

Planning & Development Occupations	Manufacturing & Assembly Occupations	Construction & Installation Occupations	Operations & Maintenance Occupations
Administrative Services Managers	Structural Metal Fabricators and Fitters	Electricians	Electricians
Architectural and Engineering Managers	Assemblers and Fabricators, All Other	Construction Laborers	General and Operations Managers
General and Operations Managers	Stockers and Order Fillers	Excavating and Loading Machine and Dragline Operators, Surface Mining	Construction Laborers
Captains, Mates, and Pilots of Water Vessels	Inspectors, Testers, Sorters, Samplers, and Weighers	Plant and System Operators, All Other	Architectural and Engineering Managers
Compliance Officers	Electricians	Sailors and Marine Oilers	Administrative Services Managers

Offshore Wind Training

New Jersey has a strong workforce infrastructure that can be leveraged and expanded to address the offshore wind industry's workforce needs. Currently, there are many existing programs related to the jobs created through the offshore wind industry, such as welding, electrical, construction, engineering, or machining programs. Many of these are offered across the state's community college system and through labor union apprenticeship programs.

Offshore wind industry stakeholders interviewed for this analysis indicated that work experience is highly valued for new hires in their industry. Publicly available federal data indicates that on-the-job training is common for most of the positions with the highest projected gap (Table 4). Additionally, the typical educational attainment for these occupations is a high school diploma or postsecondary non-degree award.

Table 4. Typical Educational Attainment and On-the-Job Training for Top 25 Highest Projected Gap Occupations[9]

Detailed Occupation	Typical Entry-Level Education	Typical On-the-Job Training[10]
Continuous Mining Machine Operators (47-5041)	None	Moderate-term on-the-job training
Metal-Refining Furnace Operators and Tenders (51-4051)	High school diploma or equivalent	Moderate-term on-the-job training
Engine and Other Machine Assemblers (51-2031)	High school diploma or equivalent	Moderate-term on-the-job training
Plant and System Operators, All Other (51-8099)	High school diploma or equivalent	Moderate-term on-the-job training
Structural Metal Fabricators and Fitters (51-2041)	High school diploma or equivalent	Moderate-term on-the-job training
Hoist and Winch Operators (53-7041)	None	Short-term on-the-job training
Plating Machine Setters, Operators, and Tenders, Metal and Plastic (51-4193)	High school diploma or equivalent	Moderate-term on-the-job training
Metal Workers and Plastic Workers, All Other (51-4199)	High school diploma or equivalent	Moderate-term on-the-job training
Computer Numerically Controlled Tool Programmers (51-9162)	Postsecondary non-degree award	Moderate-term on-the-job training
Wind Turbine Service Technicians (49-9081)	Postsecondary non-degree award	Long-term on-the-job training
Commercial Divers (49-9092)	Postsecondary non-degree award	Moderate-term on-the-job training

[9]Source: U.S. Bureau of Labor Statistics

[10] The U.S. Bureau of Labor Statistics defines moderate-term on-the-job training as more than 1 month and up to 12 months of combined on-the-job experience and informal training. Short-term on-the-job training is defined as one month or less of on-the-job experience and informal training. Training is occupation-specific rather than job-specific; therefore, skills learned can be transferred to another job in the same occupation.

Drilling and Boring Machine Tool Setters, Operators, and Tenders, Metal and Plastic (51-4032)	High school diploma or equivalent	Moderate-term on-the-job training
Riggers (49-9096)	High school diploma or equivalent	Moderate-term on-the-job training
Marine Engineers and Naval Architects (17-2121)	Bachelor's degree	None
Molding, Coremaking, and Casting Machine Setters, Operators, and Tenders, Metal and Plastic (51-4072)	High school diploma or equivalent	Moderate-term on-the-job training
Material Moving Workers, All Other (53-7199)	None	Short-term on-the-job training
Administrative Services Managers (11-3012)	Bachelor's degree	None
Helpers--Installation, Maintenance, and Repair Workers (49-9098)	High school diploma or equivalent	Short-term on-the-job training
Health and Safety Engineers, Except Mining Safety Engineers and Inspectors (17-2111)	Bachelor's degree	None
Captains, Mates, and Pilots of Water Vessels (53-5021)	Postsecondary non-degree award	None
Excavating and Loading Machine and Dragline Operators, Surface Mining (47-5022)	High school diploma or equivalent	Moderate-term on-the-job training
Assemblers and Fabricators, All Other (51-2099)	High school diploma or equivalent	Moderate-term on-the-job training
Sailors and Marine Oilers (53-5010)	None	Moderate-term on-the-job training
Crane and Tower Operators (53-7021)	High school diploma or equivalent	Moderate-term on-the-job training
Drafters, All Other (17-3019)	Associate's degree	None

Many offshore wind occupations exist today in New Jersey but training for these occupations will need to scale significantly and/or require some additional training to meet the specific needs of the offshore wind industry. Building trade unions play an important role in preparing workers for family sustaining careers in the construction industry. Efforts to grow the state's offshore wind workforce will build upon union training programs as well as on the wide range of existing programs at vocational schools, colleges and universities, and other training providers for quality jobs across all phases of offshore wind development.

NJEDA, as part of its effort to develop the Wind Institute, is working closely with NJBPU and NJDOL to support robust offshore wind industry workforce training and education by including more offshore wind-specific modules in traditional training and trades programs and directing funding towards launching offshore wind-specific workforce programs. For example, New Jersey has a strong welding workforce, and most current welding training programs focus on what is known as MIG, TIG, or stick welding. However, large-scale steel component manufacturing, such as the fabrication of steel foundations known as monopiles that EEW Offshore Structures will produce in Paulsboro, NJ, require an additional type of welding known as submerged arc (subarc) welding. To address this need, NJEDA is providing funding to local vocational schools to expand their welding

training programs to include subarc welding for both high school and post-secondary students.[11]

NJEDA, in collaboration with NJBPU, NJDOL and OSHE, has funded additional offshore wind-specific training programs including Atlantic Cape Community College's construction of a Global Wind Organization (GWO) Basic Safety and Sea Survival facility, Rowan College of South Jersey's development of stackable offshore wind turbine technician training programs, and the creation of a Wind Institute Fellowship Program for students at Rutgers University, Rowan University, Montclair State University and New Jersey Institute of Technology.[12] Additional programs are currently in development at other schools and labor unions, including a Protected Species Observer program at Stockton University and an underwater welding program operated by the Eastern Atlantic States Regional Council of Carpenters.

[11] https://www.njeda.com/wind_institute/
[12] Ibid

Conclusions & Recommendations

New Jersey's commitment to develop 7.5 GW of offshore wind projects by 2035 and the state's related infrastructure and supply chain investments will create significant job growth. Over the next 15 years, New Jersey is projected to see the addition of approximately 20,000 jobs across the offshore wind supply chain, from both in-state demand and New Jersey's capacity to export offshore wind components to neighboring states. To meet the workforce needs of both current projects and those coming down the pipeline, and to develop a diverse and inclusive labor pool, there are several short-term action items that the state, in its efforts to develop the Wind Institute, can facilitate.

NEAR-TERM ACTION ITEMS

1. **Engage with training providers and employers to develop manufacturing modules and curricula that are in accord with industry and employer needs.** Projected demand for production, assembly, fabrication, metal, plastic, and other manufacturing-related occupations consistently rises to the top of the economic model. If New Jersey aims to be the regional supplier of offshore wind component parts over the next two decades, the Wind Institute should make the manufacturing industry a focal point in ongoing offshore wind workforce development efforts. The State can engage with manufacturers to identify specific capacities for developing offshore wind components and subcomponents for nacelles, towers, blades, export cables, array cables, and monopiles, as well as the associated certifications and required skillsets for production workers engaged with these specific component parts. Collaborating with local manufacturing facilities and employers to understand the industry-specific certifications and requirements for production occupations is the first step in advancing the manufacturing training landscape across community colleges, vocational technical schools, and other training providers.

2. **Add contextualized training modules specific to offshore wind for non-manufacturing jobs.** With increased demand for positions in other industries outside of manufacturing, New Jersey will have to ensure that construction, installation, transportation, and material moving workers are knowledgeable about the specifics of offshore wind processes and technologies. The Wind Institute can engage employers and unions, local community colleges, vocational schools, and other training providers to identify where offshore wind-specific modules can be incorporated into current training infrastructures to ensure that electricians, construction laborers, engineers, mechanics, repair technicians, and others working on offshore wind developments have this additional knowledge base.

3. **Expand access to planning, manufacturing, construction, and installation training programs to individuals in overburdened communities.**[13] Job growth opportunities in the offshore wind industry provides a viable pathway for individuals in underrepresented and overburdened communities. The Wind Institute, as part of its objective to accelerate the development of a robust and diverse offshore wind workforce, can engage universities, community colleges, vocational schools, labor unions, and community-based organizations in low-income communities and communities of color to create targeted workforce training programs; likewise, the Wind Institute can work with these entities to create paid on-the-job learning opportunities through internships and apprenticeships that lead directly to sustainable employment outcomes. The CGE's *Green Jobs for a Sustainable Future* report[14] details additional recommendations to support the development of a diverse clean energy and offshore wind workforce.

4. **Develop partnerships with middle and high school education providers to create a talent pipeline for students to transition into offshore wind-related careers.** Showcasing career opportunities in the offshore wind industry, particularly manufacturing careers, through job fairs or site visits can expand the workforce pipeline over the next five to 10 years. For example, education initiatives that begin in middle and high school can develop and promote course modules that teach basic manufacturing skills, such as working with tools, safety protocols, manufacturing processes, and technologies. These basic introductory courses will provide students with insight into manufacturing careers and prepare them for efficient transition into a welding or fabricating program right out of school, gaining the skills, certifications, and on-the-job training needed to quickly begin working at an offshore wind job site.

5. **Partner with local and regional employers to create experience-based on-the-job learning programs for high school students.** For in-demand careers, experience and on-the-job learning is crucial. For example, many of the top in-demand manufacturing positions typically require a high school diploma, equivalent, or less, but employers cite work experience as highly valuable. Manufacturing-specific internships and apprenticeship can quickly and efficiently prepare a pipeline of offshore wind production workers in the next three to five years. A similar approach should be taken for other positions as well.

[13] NJ's Environmental Justice Law, N.J.S.A 13:1D-157, defines overburdened communities as any census block group, as determined in accordance with the most recent United States Census in which: 1) at least 35 percent of the households qualify as low-income households; 2) at least 40 percent of residents identify as minority or as members of a State recognized tribal community; or 3) at least 40 percent of the households have limited English proficiency.
[14] The Council on the Green Economy's report can be accessed at: www.nj.gov/governor/climateaction/council/greenreport/

The recommendations listed above largely center on growing New Jersey's manufacturing labor force to address specific supply gaps for the key occupations identified in the analysis. For manufacturing and other in demand positions, the Wind Institute can work with a wide range of stakeholders, including government, industry, labor union, education, training, and community groups, to develop pathways, modules, and on-the-job training opportunities to develop a robust and diverse workforce that meets the needs of the state's growing offshore wind industry.