

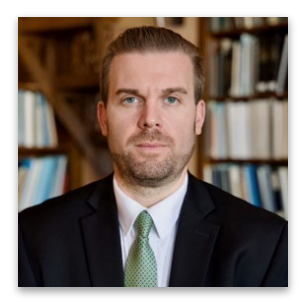


2023

**RHODE ISLAND
CLEAN ENERGY
INDUSTRY REPORT**

Table of Contents

| | |
|--|----|
| Table of Contents | 1 |
| Executive Summary..... | 2 |
| Industry Overview..... | 4 |
| Clean Energy Technology Analysis | 7 |
| Clean Energy Value Chain Analysis | 12 |
| Diversity In the Clean Energy Labor Market | 14 |
| Demographics of Current Clean Energy Workforce by Gender | 15 |
| Clean Energy Hiring..... | 17 |
| Rhode Island Workforce | 20 |
| Regional Trends..... | 20 |
| Occupations | 21 |
| Rhode Island Labor Market..... | 26 |
| Conclusions | 27 |
| Appendix A: Geographic Distribution of Clean Energy Jobs | 28 |
| Methodology..... | 29 |



CHRIS KEARNS



ELIZABETH TANNER

The Rhode Island Office of Energy Resources (OER) and the Executive Office of Commerce (EOC) are pleased to present the 2023 Rhode Island Clean Energy Jobs Report.

The Clean Energy Jobs report is a valuable tool for policy makers to help identify where growth is occurring and what barriers may impede this growth. It also provides information on what skills training is needed to build a pipeline of talent, which sectors have gaps in workforce development opportunities, and how to match qualified workers more effectively with employers.

Between 2021 and 2022 there has been an increase in clean energy jobs, but Rhode Island has not yet reached pre-pandemic employment levels. However, the clean energy industry is expected to rebound to its former strength with ongoing support from state-level policies and federal funding.

The state has several goals which will require a robust clean energy workforce. The 2021 Act on Climate sets mandatory economy-wide greenhouse gas reduction targets leading to net-zero emissions by 2050. In 2022, Governor McKee supported and signed amendments

to the state's Renewable Energy Standard to be 100% renewables by the end of 2033. In 2023, OER secured federal funding from the U.S. Department of Energy's Grid Resilience State and Tribal Formula Grant Program as well as the State Energy Program. These funds will support administrative and programmatic tasks at OER, which will help advance the goals of the Act on Climate. Also, OER launched the Clean Heat RI, a \$25 million dollar heat pump program for households, small businesses, and non-profits for the state's ongoing heating sector electrification efforts. This heat pump program is the largest energy rebate program ever launched by OER.

Rhode Island continues to capitalize on its momentum as a leader in the offshore wind industry. In a landmark development, Rhode Island, Massachusetts, and Connecticut signed New England's first multi-state Memorandum of Understanding (MOU) for offshore wind procurement coordination. This MOU lays the groundwork for potential coordinated procurement of offshore wind energy among the states, making it the first initiative of its kind in the United States. Also, Rhode Island Energy, the state's primary utility, has issued a Request for Proposals (RFP) for 1,200 MW of offshore wind energy in October 2023, representing the largest renewable energy RFP solicitation in the state to date.

With support in clean energy investments and policies from Governor Dan McKee and the General Assembly, Rhode Island remains committed to cultivating a clean energy future and fostering growth in our clean energy job sector.

Sincerely,

A handwritten signature in black ink that reads "Chris Kearns".

Chris Kearns

Acting Energy Commissioner

A handwritten signature in black ink that reads "Elizabeth M. Tanner".

Elizabeth M. Tanner, Esq.

Rhode Island Secretary of Commerce

Executive Summary

The 2023 Rhode Island Clean Energy Industry Report is the ninth annual report on clean energy employment in the state. The findings in this report are based on data from the 2023 U.S. Energy and Employment Report (USEER) and are filtered for Rhode Island's definition of clean energy. The 2023 USEER survey was administered in 2022, by telephone (more than 274,000 outbound calls) and web (more than 327,700 emails sent), to participants throughout the United States. The USEER provides a rich, comprehensive, and historical dataset of energy job trends dating back to 2015.¹

Over the years, the Rhode Island Clean Energy Industry Reports have provided valuable, year-over-year data on clean energy employment in the state, both by technology sector and value chain segment. This year's iteration of the Rhode Island Clean Energy Industry Report comes during a time of historic clean energy investment and continuing recovery from COVID-19 pandemic impacts. The data points included in this study provide useful context that can help policymakers and other clean energy stakeholders in the state identify optimal ways to utilize the additional federal funding and continue to move toward achieving Governor McKee's legislative commitments to reach 100 percent renewable energy by 2033 and net-zero emissions by 2050.

This report shows that employment across clean energy businesses in Rhode Island increased by just over 250 jobs—or 1.8 percent—between the last quarters of 2021 and 2022. By comparison, clean energy employment increased by 450 jobs from the end of 2020 to the end of 2021. It is clear that employment in this industry is bouncing back from COVID-19 declines, with a total of 14,511 total clean energy jobs in the state in the last quarter of 2022, but it has yet to reach the employment levels seen before the pandemic. Slowly, Rhode Island clean energy jobs are climbing back to 2017 levels.

Further, the total number of full-time equivalent (FTE) clean energy workers increased from the end of 2021 to the end of 2022. 11,931 clean energy workers dedicated all of their labor hours to support clean energy goods and services as of the last quarter of 2022. This represents an increase of 3.6 percent from the 11,515 FTE clean energy workers in last year's report.² The peak of FTE clean energy workers was reached in the last quarter of 2019, at the onset of the COVID-19 pandemic, with 13,226 total workers.

In 2022, the majority of job increases were in the installation, maintenance, and repair value chain segment. This aligns with the change seen from 2020 to 2021 as social distancing has become less and less of a barrier to installations and upgrades of renewable and energy efficient systems in homes and businesses. Clean energy installation and maintenance firms gained 204 jobs, an increase of 2.6 percent, from the end of 2020 to the end of 2021. This publication reports that these firms gained an additional 293 jobs, an increase of 3.6 percent, from 2021 to 2022. The manufacturing value chain underwent the highest job growth rate, a rise of 7.4 percent, from 796 jobs in the last quarter of 2021 to 855 jobs in the last quarter of 2022.

Overall, each clean energy technology sector underwent gains in employment from the last quarter of 2021 to the last quarter of 2022, though all of the sectors grew much slower than they did from 2020 to 2021. The energy efficiency technology sector experienced the steepest decline in jobs from 2019 to 2020 at a decrease of 18.8

¹ For more information on the U.S. Energy and Employment Report, please visit <https://www.energy.gov/policy/us-energy-employment-jobs-report-useer>

² The 11,931 full-time equivalent clean energy workers represent a subset of the overall clean energy workforce that spends all of their labor hours on clean energy-related tasks and services. This metric is different from the 1.8 percent increase in total clean energy employment.

percent. By the end of 2022, this sector rebounded by 174 jobs to reach 7,942 jobs in 2022, a 2.2 percent increase from 2020 and a 0.4 percent increase from 2021. Clean transportation technology grew by 53 jobs, or 12.3 percent, from the last quarter of 2021 to the last quarter of 2022, compared to a 28.2 percent increase between 2020 and 2021. Meanwhile, from 2021 to 2022, renewable energy technology employment increased by 69 jobs for a rise of 3.2 percent and renewable and efficient heating and cooling employment rose by 2.7 percent, adding 101 jobs.

The state's wind energy labor segment grew by 2.8 percent, or 16 jobs, during this time frame, while wind energy employment nationally increased by 4.5 percent, or 5,416 jobs. Job growth in this sector looks promising in Rhode Island as additional wind energy projects are in development. The large Revolution Wind Farm, approved in 2019, which will provide 400 MW of clean power to Rhode Island is expected to be completed by 2025.³ In October 2022, Governor McKee announced that bidders were allowed to submit offshore wind project proposals to Rhode Island Energy, the state's new primary utility company which acquired Rhode Island's energy and electricity operations from National Grid in May 2022.⁴ This announcement followed the bill which Governor McKee signed in July 2022 approving another 1,000 MW of offshore wind power capacity to meet at least 30 percent of the state's estimated electricity needs for 2030.⁵ Rhode Island Energy is reviewing the proposals and selecting the bidder(s) for negotiation in mid-2023.⁶

Rhode Island's clean energy labor market is rebounding from pandemic-induced job losses, though relative to past growth in the clean energy industry, growth is slower at this time and a majority of employers who were hiring in 2022 reported at least some difficulty in hiring. Yet, with Governor McKee's renewable energy and net-zero emissions commitments alongside federal funding through the Infrastructure and Investment Jobs Act (IIJA) and the Inflation Reduction Act (IRA), the state's clean energy industry will be well-supported for continued job growth. The remainder of this report provides additional detail on clean energy employment by technology and sub-technology, clean energy labor intensity, value chain employment, employer-reported hiring difficulty, clean energy workforce diversity, and finally, an analysis of the Rhode Island labor market and highest-growth clean energy occupations.

³ "Rhode Island 2022 Climate Update." Approved by RI Executive Climate Change Coordinating Council. 15 December 2022. <https://climatechange.ri.gov/media/1261/download?language=en>

⁴ "Governor McKee Announces RFP for 600 to 1,000 Megawatts of Offshore Wind." State of Rhode Island Office of Energy Resources. 14 October 2022. <https://energy.ri.gov/press-releases/governor-mckee-announces-rfp-600-1000-megawatts-offshore-wind>

⁵ Ibid.

⁶ 2022 Offshore Wind RFP Timeline." *RI Clean Energy RFP*. Accessed 22 June 2023. <https://ricleanenergyrfp.com/2022-offshore-wind-rfp/2022-offshore-wind-rfp-timeline/>

Industry Overview

Clean energy employment in Rhode Island continues to rise following the decline from the COVID-19 pandemic in 2020 and 2021. As of the last quarter of 2022, clean energy employment in Rhode Island was 14,511 jobs, with just over half (54.7 percent) of jobs in the energy efficiency technology sector. All technology sectors experienced job growth between 2021 and 2022, with the renewable energy and clean transportation technology sectors exceeding the pre-pandemic levels of employment.

Between the last quarters of 2021 and 2022, clean energy employment increased by approximately 255 jobs, representing a 1.8 percent increase in jobs. Since the 2014 Clean Energy Industry Report, employment in the industry has risen by 57.4 percent. From the last quarter of 2021 to the last quarter of 2022, the state's overall workforce increased by 2.2 percent, an increase of 11,222 jobs from 507,581 to 518,803.⁷ Clean energy job increases accounted for 2.3 percent of total job increases in Rhode Island and 2.8 percent of total employment at the end of 2022.

While the energy efficiency sector accounts for more than half of clean energy jobs in the state, this sector shed the largest number of workers in Rhode Island and in the United States as a result of the pandemic. This is not surprising, as many of the jobs in this labor segment require in-person and/or on-premises delivery of goods and services, which became especially challenging due to COVID-related closures and social distancing. These jobs are returning, though their growth may be slow as the labor segment continues to face hiring difficulty and pandemic-related challenges.

Efforts to advance energy efficiency work in the state include the 2023 Zero Energy for the Ocean State (ZEOS) program and the Public School Energy Equity Program. The ZEOS program, designed to support low- and moderate-income residents, is offering up to \$500,000 in grants to developers who can build affordable and energy efficient housing.⁸ The Public School Energy Equity Program received a total of \$20 million in funding for infrastructure upgrades, such as lighting and heating, ventilation, and air conditioning (HVAC) upgrades and heat-pump installations, in Rhode Island public schools to create healthier environments for students and contribute to state energy efficiency efforts.⁹

There have also been notable clean transportation technology efforts by Rhode Island government agencies including DRIVE EV, a rebate program launched by the Office of Energy Resources in July 2022, which aims to make electric vehicles (EVs) more affordable to residents,¹⁰ and a pilot program, launched by the Public Transit Authority, which electrified three public transportation buses on the R-Line in the fall of 2022. Electrifying the remaining 11 buses on the line and developing a charging station for the line is the next goal starting in 2023.¹¹ Further, proposals for the first phase of the federal National Electric Vehicle Infrastructure (NEVI) Formula Program to implement new electric vehicle DC Fast Chargers along Interstate 95 have been open for submission since Governor McKee

⁷ JobsEQ®, retrieved June 2023

⁸ "OER, RIHousing and Rhode Island Energy launch request for proposals for green & energy efficient housing." State of Rhode Island Office of Energy Resources. 15 March 2023. <https://energy.ri.gov/press-releases/oer-rihousing-and-rhode-island-energy-launch-request-proposals-green-energy>

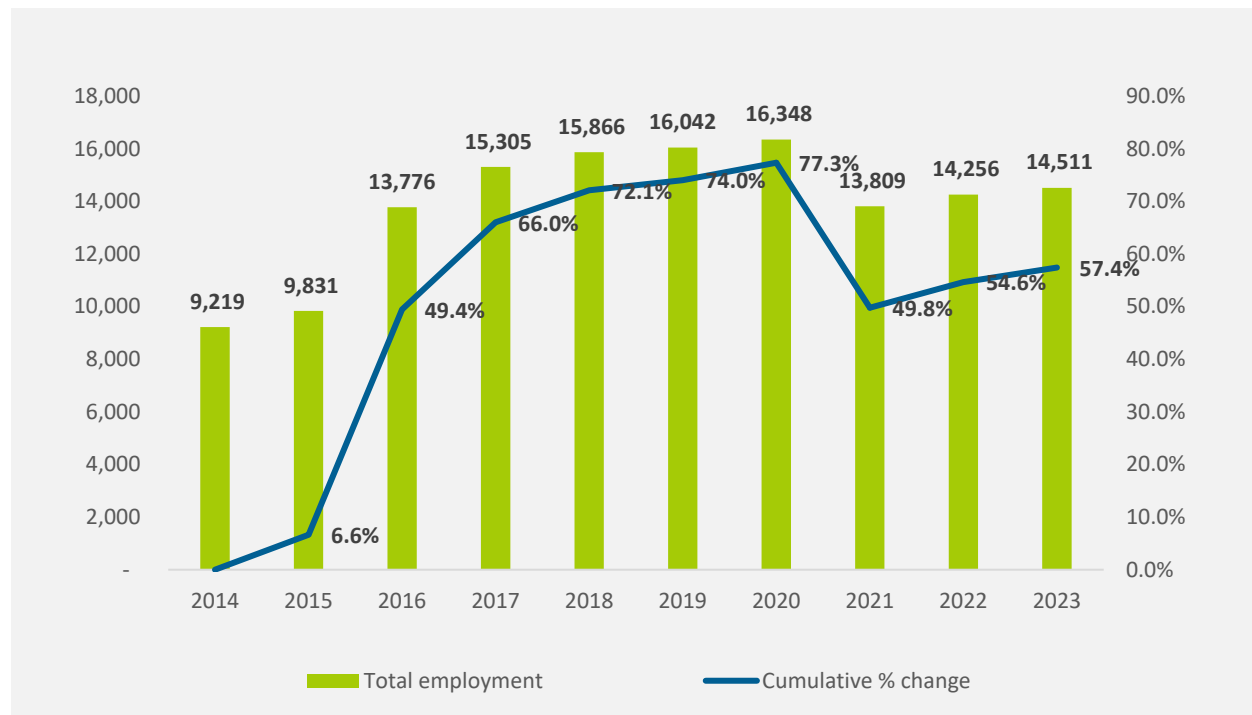
⁹ "Governor McKee, Senator Reed Announce \$20 Million of Federal and State Energy Efficiency Funding for the Public School Energy Equity Program." State of Rhode Island Office of Energy Resources. 24 March 2023. <https://energy.ri.gov/press-releases/governor-mckee-senator-reed-announce-20-million-federal-and-state-energy-efficiency>

¹⁰ "DRIVE EV." State of Rhode Island Office of Energy Resources. Accessed 22 June 2023. <https://drive.ri.gov/ev-programs/drive-ev>

¹¹ "Combating Climate Change." Rhode Island Public Transit Authority. Accessed 22 June 2023. <https://www.ripta.com/combatingclimatechange/>

announced it in April of 2023. Through the NEVI Formula Program, the state of Rhode Island is receiving a total of \$23 million over five years to increase the number of electric charging stations and support clean transportation adoption.¹²

FIGURE 1. CLEAN ENERGY EMPLOYMENT, 2014-2022

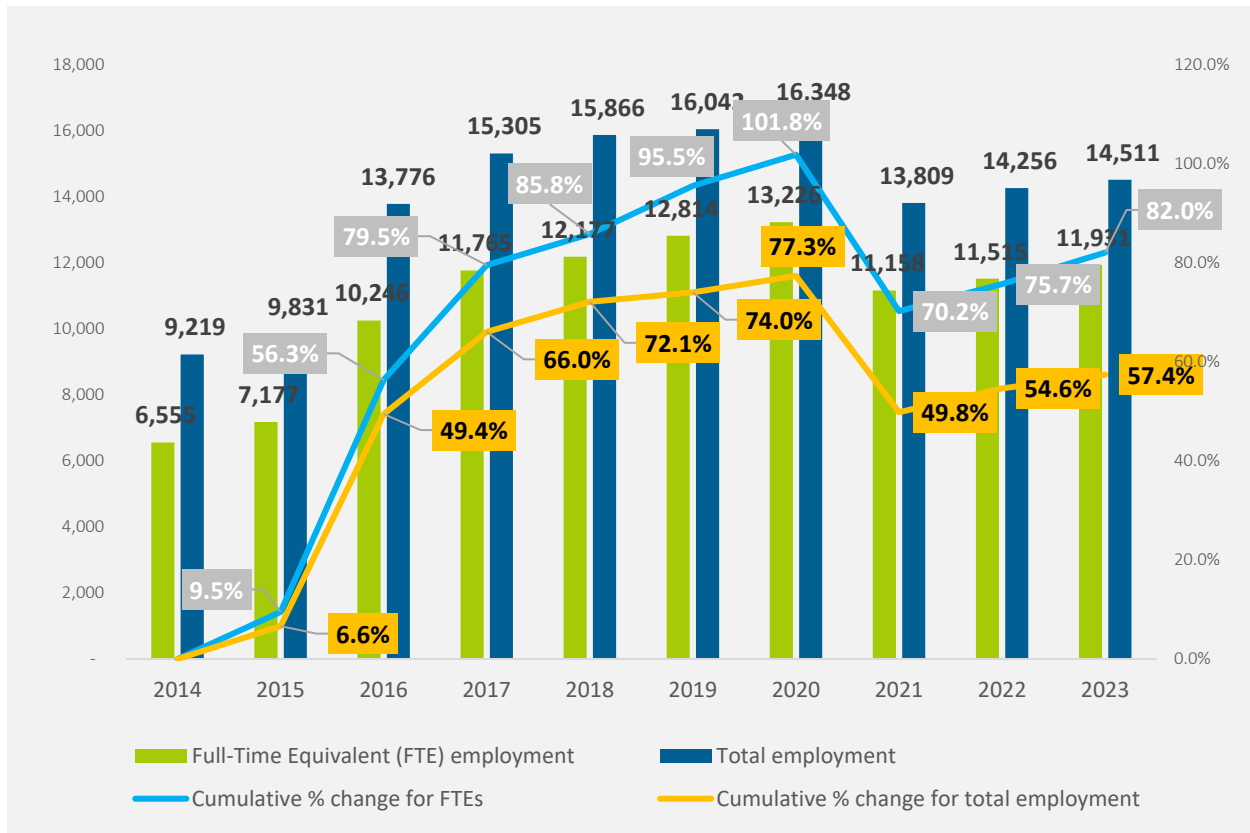


The previous year’s Clean Energy Industry Report showed that overall FTE clean energy jobs increased by 3.2 percent between the last quarters of 2020 and 2021. At the end of 2021, there were 11,515 FTE clean energy workers in Rhode Island.

This year’s Clean Energy Industry Report shows an increase in activities, with an overall rise in FTE clean energy jobs of 3.6 percent, moving from 11,515 FTE clean energy workers in Rhode Island at the end of 2021 to 11,931 at the end of 2022. This increase is double the overall clean energy employment growth rate of 1.8 percent during this time frame.

¹² “McKee Administration Announces RFP for Phase 1 of National Electric Vehicle Infrastructure Formula Program”. State of Rhode Island Office of Energy Resources. 25 April 2023. <https://energy.ri.gov/press-releases/mckee-administration-announces-rfp-phase-1-national-electric-vehicle-infrastructure>

FIGURE 2. FULL-TIME EQUIVALENT (FTE) CLEAN ENERGY EMPLOYMENT, 2014-2023



Clean Energy Technology Analysis

The largest increase in employment from the end of 2021 to the end of 2022 was within the renewable and efficient heating and cooling and renewable energy technology sectors. The renewable and efficient heating and cooling technology sector added just over 100 jobs, an increase of 2.7 percent from the previous year, while renewable energy added just under 70 jobs, an increase of 3.2 percent.

Jobs in the wind energy sector continue to gain employment each year since 2016, with an increase of 29.4 percent. Between 2021 and 2022, the sector grew by 2.8 percent, or 16 jobs.

Solar firms continue to see steady growth. From the end of 2020 to the end of 2021, solar firms increased employment by 3.9 percent, or 54 jobs. Between the end of 2021 and 2022, solar firms increased by 2.3 percent, or 34 jobs.

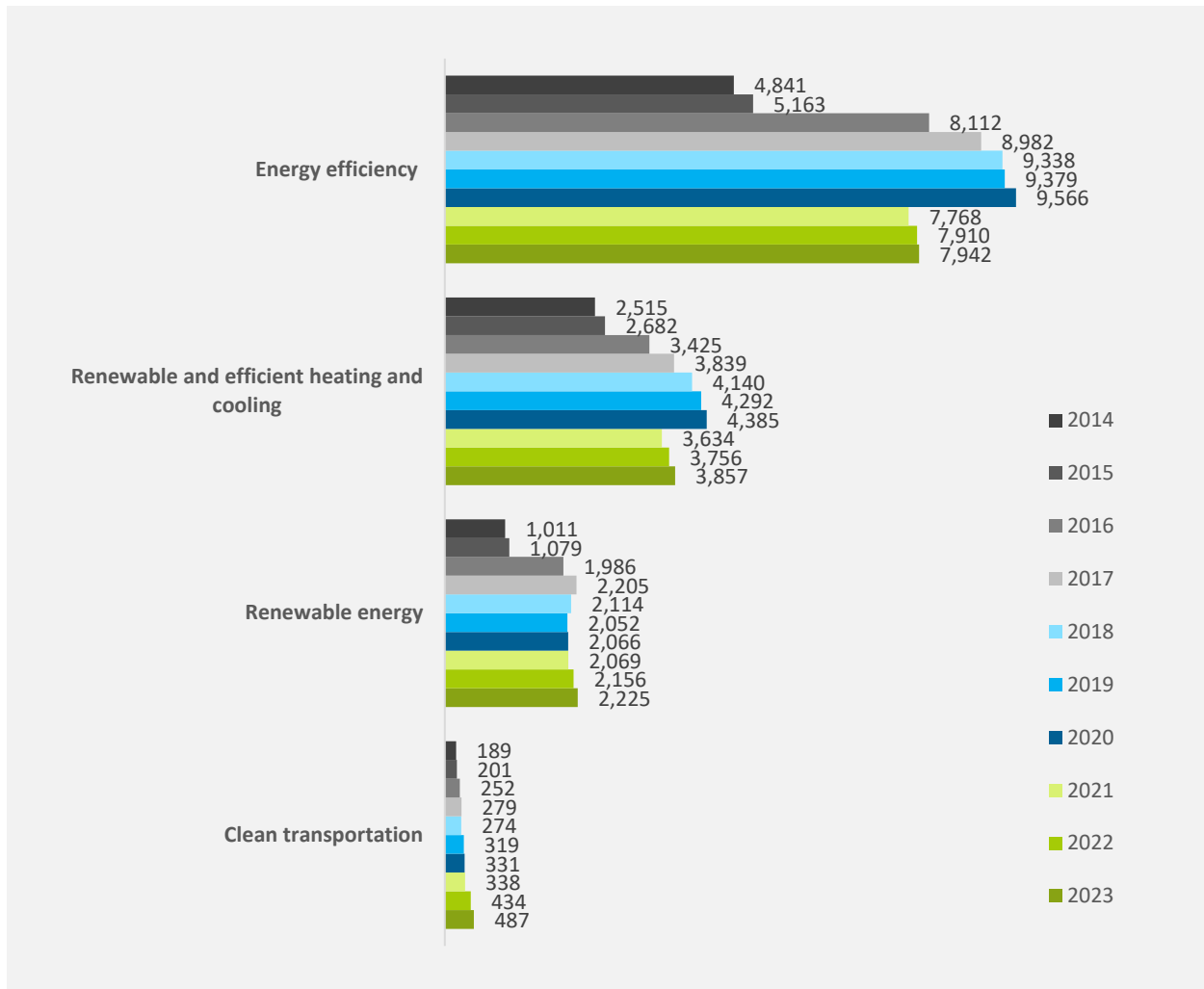
Growth in the energy efficiency technology sector continued to increase by the end of 2022 but at a slower rate than the previous year. From the last quarter of 2020 to the last quarter of 2021, energy efficiency-related jobs increased by 1.8 percent, or roughly 140 jobs. Between the last quarters of 2021 and 2022, jobs in this sector increased by 0.4 percent, or 32 jobs.

Three of the six energy efficiency sub-sectors experienced job increases between the last quarters of 2021 and 2022. Within the energy efficiency sub-sectors, the advanced building materials and other sub-sector increased by 2.3 percent—approximately 95 jobs. The ENERGY STAR® appliances sub-sector continued to see job decreases from 2021 to 2022 at a decline of 1.9 percent—roughly 19 jobs.

From the last quarter of 2021 to the last quarter of 2022, total job growth from smart grid, storage, and advanced building materials and other energy efficiency sub-sectors combined to create 110 total new jobs, while the decline of microgrid, ENERGY STAR® appliances, and efficient lighting jobs put together resulted in a loss of 78 jobs.¹³

¹³ While microgrid, storage, and smart grid are typically included under the “transmission and distribution” for USEER and other Clean Energy Industry Reports, they are included in the energy efficiency sector for this report per Rhode Island’s clean energy technology definition.

FIGURE 3. CLEAN ENERGY EMPLOYMENT BY TECHNOLOGY, 2014-2023¹⁴



¹⁴ Other employment totaled to 707 jobs in 2015 and 663 in 2014; improved methodologies have since allowed the research team to categorize all employment into a major technology. It should be noted that 2014 and 2015 employment will not sum to 9,219 and 9,832 respectively in this chart because the “other” category is not displayed.

FIGURE 4. RENEWABLE ENERGY GENERATION EMPLOYMENT, 2016-2023

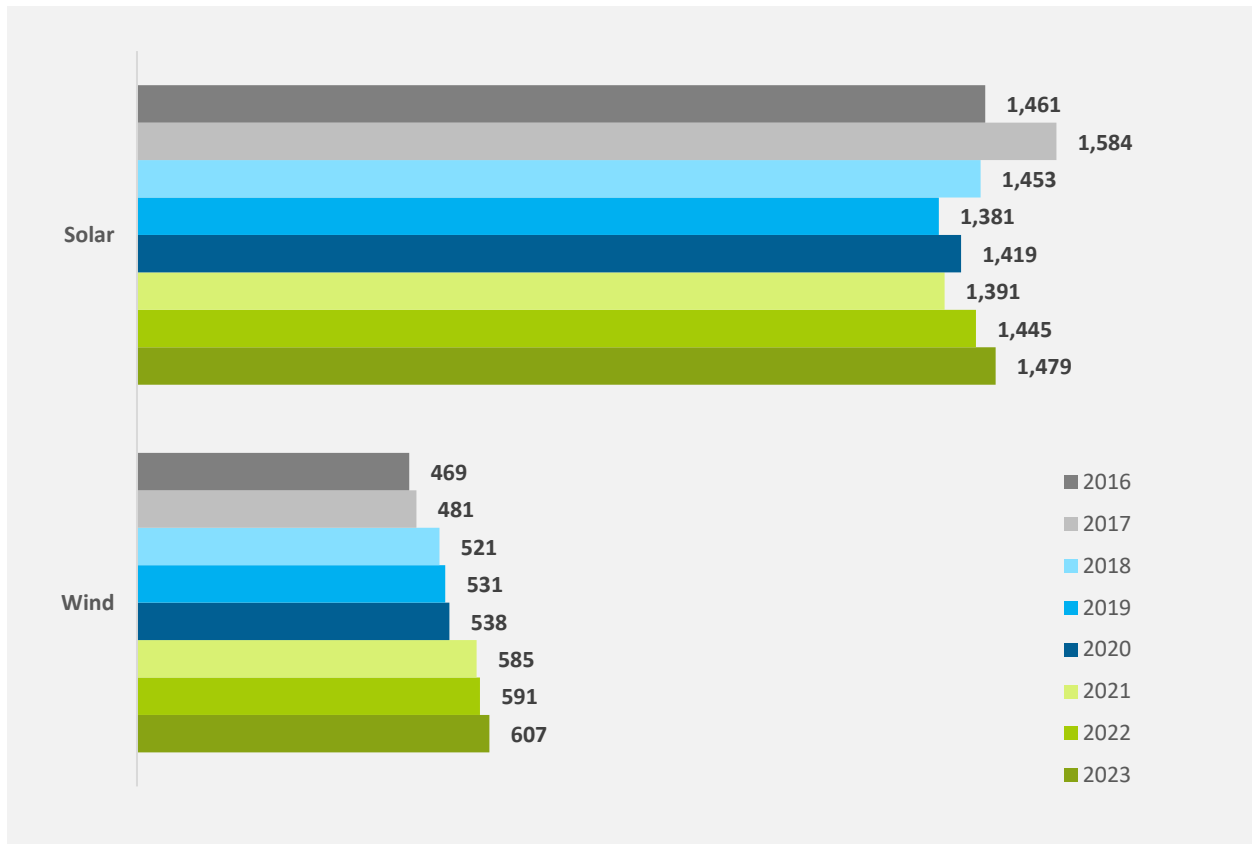
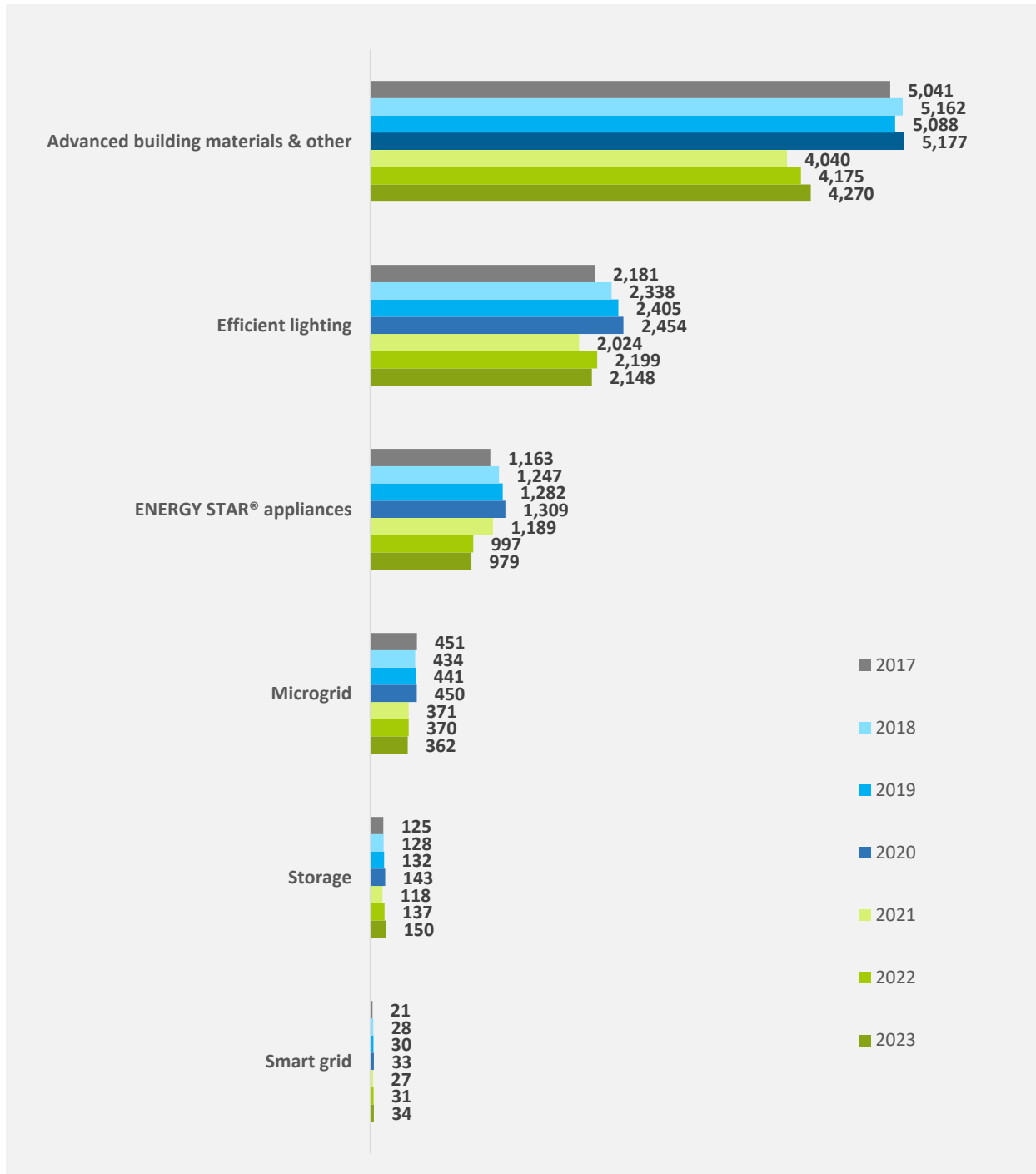
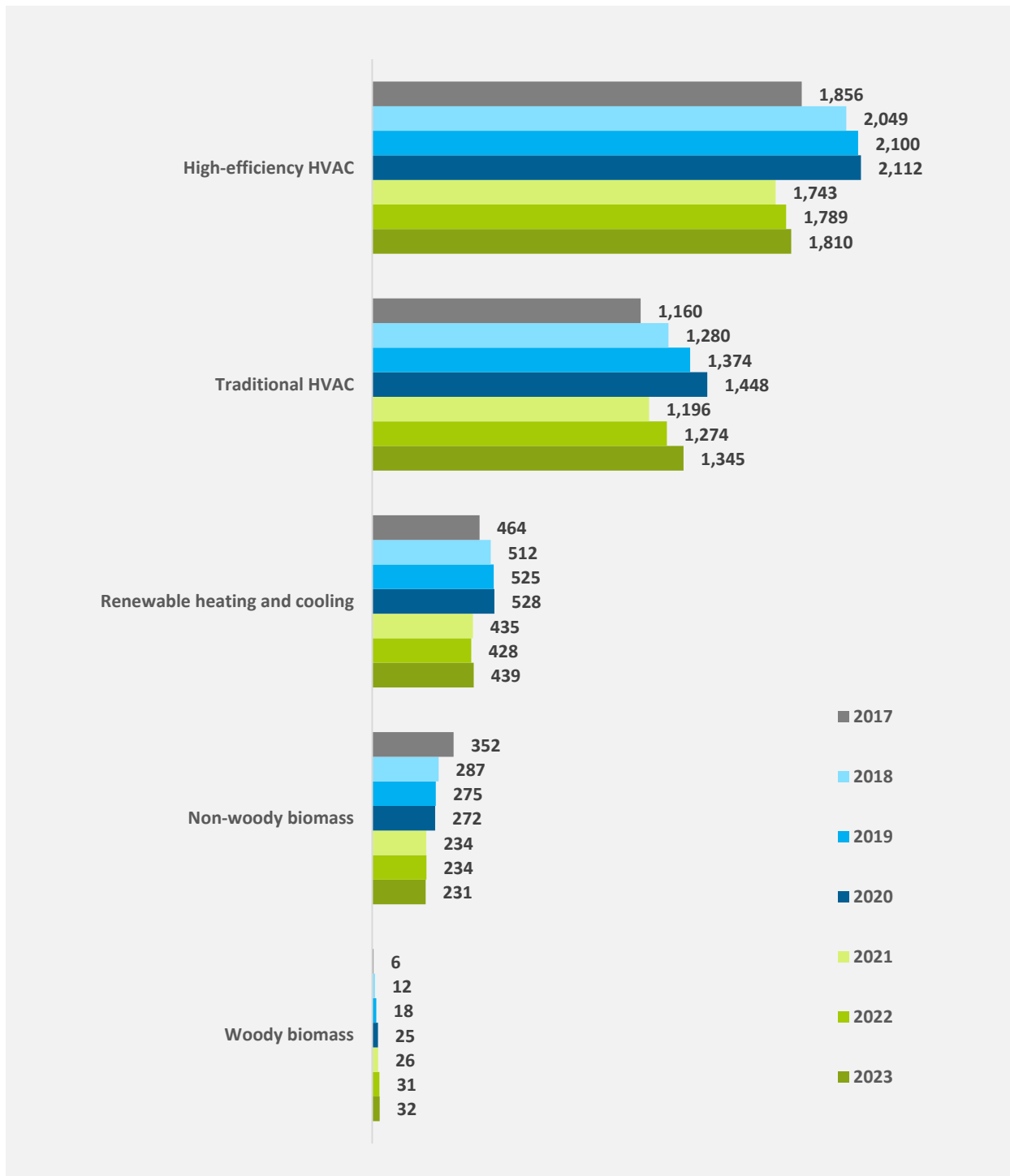


FIGURE 5. ENERGY EFFICIENCY EMPLOYMENT, 2017-2023¹⁵



¹⁵ While microgrid, storage, and smart grid are typically included under the “transmission and distribution” or “clean grid and storage” sectors for USEER and other Clean Energy Industry Reports, they are included in the energy efficiency sector for this report per Rhode Island’s clean energy technology definition. “Other” energy efficiency includes variable speed pumps, other design service, software, energy auditing, rating, monitoring, metering, leak detection, policy or non-profit work, and consulting that cannot be specific to a detailed sub-technology.

FIGURE 6. RENEWABLE HEATING AND COOLING EMPLOYMENT, 2017-2023



Clean Energy Value Chain Analysis

Value chain jobs examine the clean energy economy by identifying the industries in which clean energy activities are concentrated. Doing so provides context for what type of policy or workforce development assistance is needed to support clean energy employers across the state. For example, a state with a high concentration of research and development activity in the alternative transportation sector might signal the need for more early-stage investment funding to support continued prototype development and technology testing.

The major value chain segments examined include installation, maintenance, repair, and operations;¹⁶ manufacturing;¹⁷ trade, distribution, and transport;¹⁸ engineering, research, and professional services;¹⁹ and other.²⁰

Installation, maintenance, repair, and operations is the largest of all value chains in the clean energy industry in Rhode Island, with 8,372 jobs and accounting for just under three in five (57.7 percent) of all clean energy jobs. The engineering, research, and professional services value chain followed with 2,763 jobs making up almost one in five (19.0 percent) of clean energy jobs in Rhode Island.

Like the previous year's Clean Energy Industry Report, the installation, maintenance, repair, and operations value chain continues to increase in employment, adding nearly 300 jobs between the last quarters of 2021 and 2022, an increase of 3.6 percent. Manufacturing was the only other value chain that underwent an increase in employment with a gain of 59 jobs or a 7.4 percent rise.

Between the last quarters of 2021 and 2022, the additional clean energy manufacturing and installation, maintenance, repair, and operations value chain jobs combined accounted for just over 350 jobs. While the job losses in the engineering, research, and professional services; trade, distribution, and transport; and other value chains combined accounted for a total job loss of just under 100 jobs.

¹⁶ Installation, maintenance, repair, and operations is comprised of all workers engaged in residential, commercial, and industrial building construction, contracting and electrical work, insulation and weatherization, or plumbing and heating, air conditioning, and ventilation work.

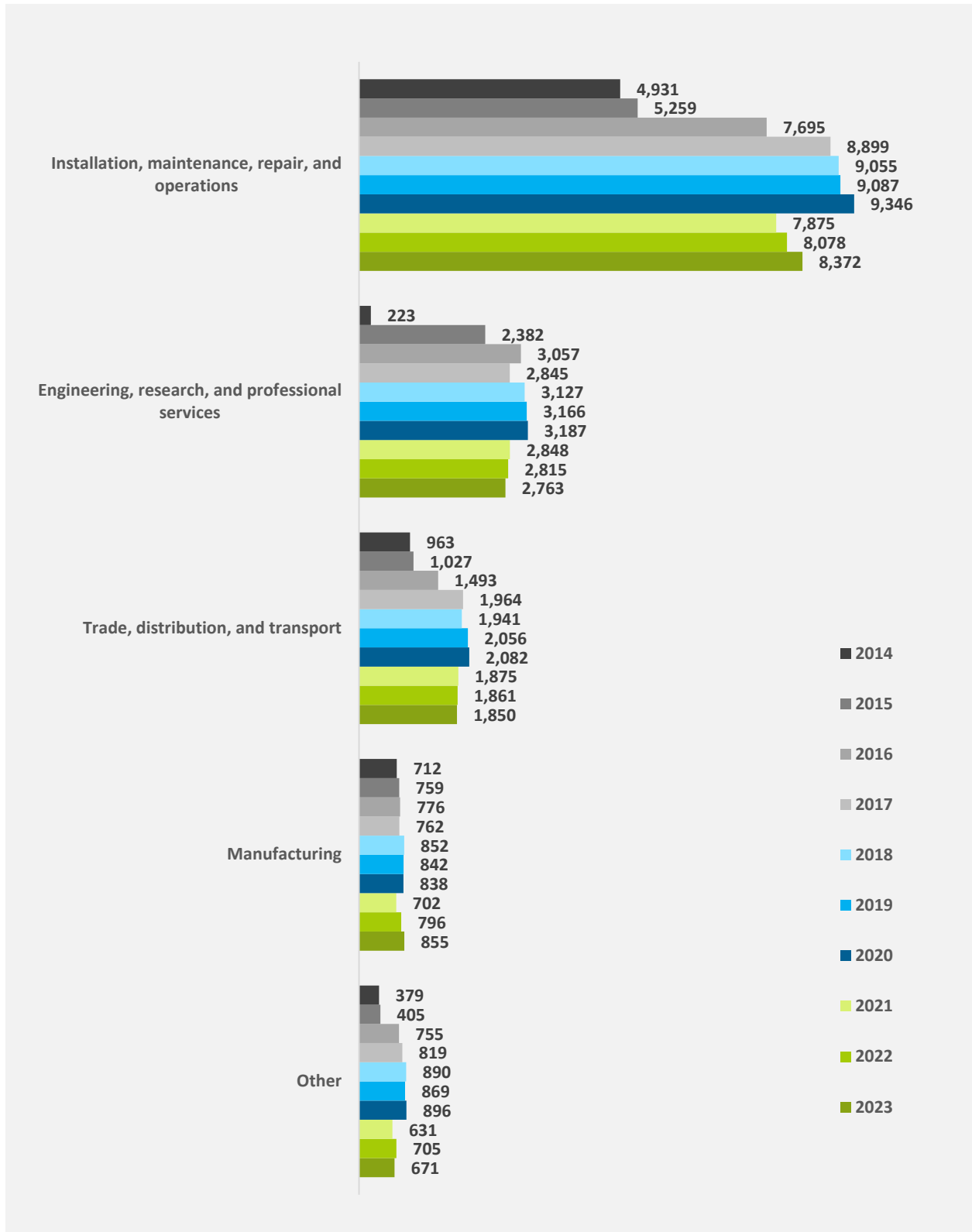
¹⁷ Manufacturing encompasses heating and air conditioning equipment manufacturing, engine and compressor manufacturing, semiconductor manufacturing, and energy efficient product, appliance, or lighting manufacturing, as well as motor vehicle and parts manufacturing.

¹⁸ Trade, distribution, and transport includes motor vehicle and parts wholesalers, electrical equipment and household appliance wholesalers, and other wholesale trade and distribution related to clean energy products and technologies.

¹⁹ Professional services include all finance, legal, consulting, engineering, research, or architectural support.

²⁰ Other includes utilities, organizational and non-profit work such as environment and conservation organizations, business associations, or advocacy organizations.

FIGURE 7. CLEAN ENERGY EMPLOYMENT BY VALUE CHAIN, 2014-2023



Diversity In the Clean Energy Labor Market

TABLE 1. CLEAN ENERGY WORKFORCE DEMOGRAPHICS²¹

| Demographic Characteristic | RI Clean Energy Workforce | RI State Average | US Clean Energy Workforce (incl. nuclear) | US Overall Workforce |
|---|---------------------------|------------------|---|----------------------|
| Male | 64.5% | 48.9% | 73.2% | 53.2% |
| Female | 35.5% | 51.1% | 26.3% | 46.8% |
| Hispanic or Latino | 12.6% | 16.4% | 17.9% | 18.5% |
| Not Hispanic or Latino | 87.4% | 83.6% | 82.1% | 81.5% |
| American Indian or Alaska Native | 0.6% | 0.4% | 2.2% | 0.8% |
| Asian | 2.8% | 3.7% | 6.8% | 6.7% |
| Black or African American | 10.6% | 6.8% | 9.2% | 12.6% |
| Native Hawaiian or other Pacific Islander | 0.1% | 0.1% | 1.0% | 0.2% |
| White | 83.4% | 82.0% | 74.9% | 77.0% |
| Two or more races | 2.5% | 7.0% | 5.0% | 2.7% |
| Veterans | 6.4% | 6.0% | 9.0% | 5.5% |
| 55 and over | 7.1% | 31.5% | 17.3% | 23.6% |

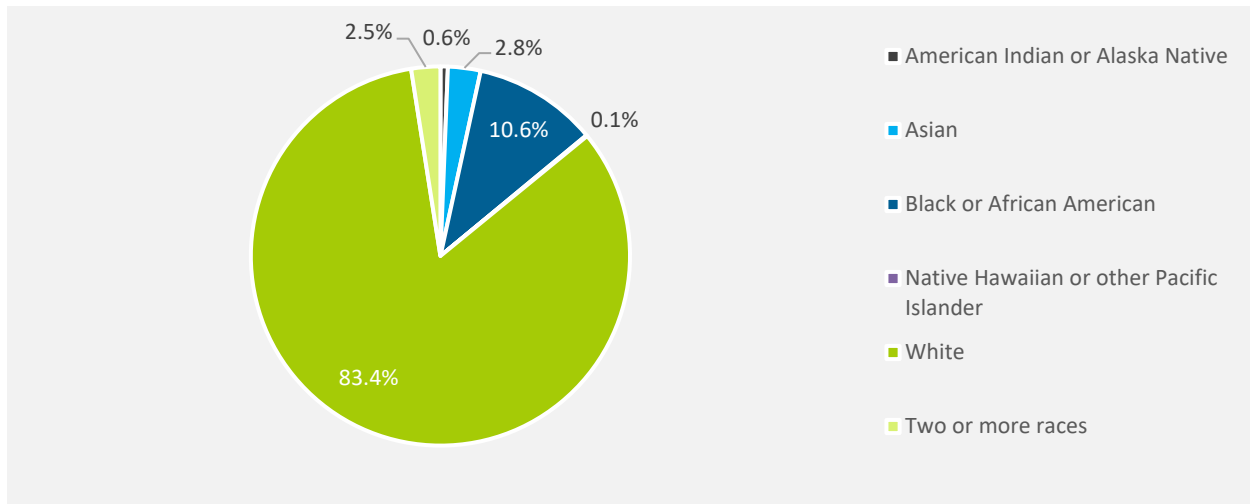
DEMOGRAPHICS OF CURRENT CLEAN ENERGY WORKFORCE BY RACE

When asked to self-identify race, current clean energy workers in Rhode Island reported a make-up of 83.4 percent White workers, 10.6 percent Black or African American workers, 2.8 percent Asian workers, 2.5 percent of two or more races, 0.6 percent American Indian or Alaska Native, and 0.1 percent Native Hawaiian or other Pacific Islander.

²¹ As with all demographic data in this report, there is a potential for reporting errors and biases. For gender specifically, it is important to note that the U.S. Census only collects data on biological “sex” and not “gender;” reporting on gender nonbinary employment should be interpreted with caution.

Clean energy workforce demographics are sourced from: U.S. Energy & Employment Jobs Report (USEER). U.S. Department of Energy. 2023. Overall workforce demographics are sourced from: U.S. Bureau of Labor Statistics.

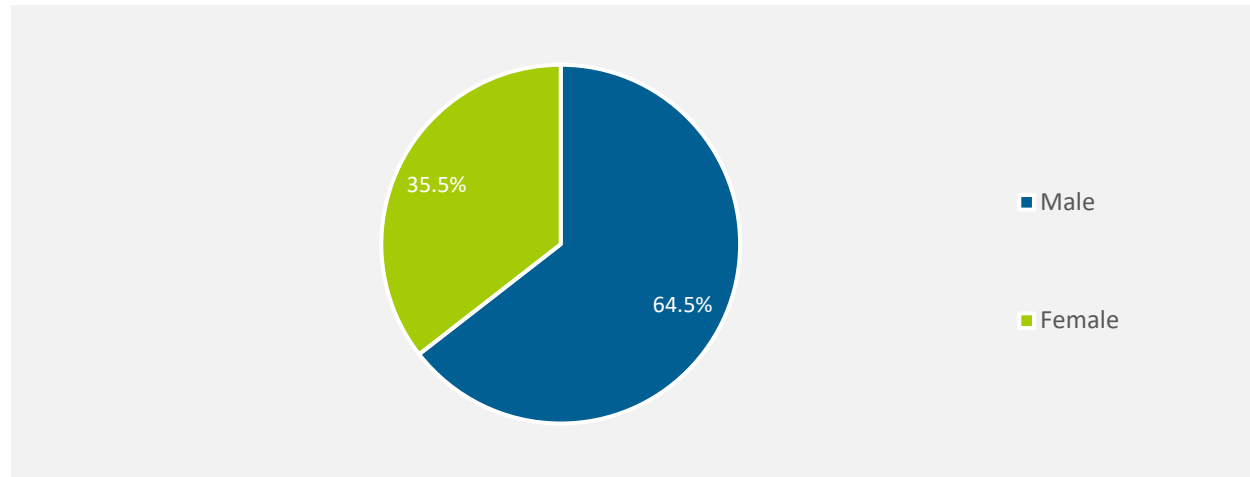
FIGURE 8. CLEAN ENERGY WORKFORCE DEMOGRAPHICS BY RACE²²



Demographics of Current Clean Energy Workforce by Gender

The current clean energy workforce is made up of 64.5 percent male-identifying workers and 35.5 percent of female-identifying workers, a 2.7 percent decrease in female-identifying workers from 2022.

FIGURE 9. CLEAN ENERGY WORKFORCE DEMOGRAPHICS BY GENDER²³



Among Rhode Island’s overall management occupations, females fill 42.3 percent of the positions, the largest percentage compared to the state’s manufacturing, construction, and clean energy industries. Over one-third (35.5 percent) of Rhode Island clean energy workers self-identify as female, followed by 31.9 percent of the state’s manufacturing industry workers identifying as female. The construction industry employs the smallest percentage of females among the four industries, with 4.5 percent of construction workers identifying as female.

²² U.S. Energy & Employment Jobs Report (USEER). U.S. Department of Energy. 2023.

²³ U.S. Energy & Employment Jobs Report (USEER). U.S. Department of Energy. 2023.

TABLE 2. BENCHMARKS FOR GENDER DISTRIBUTION IN RHODE ISLAND INDUSTRIES²⁴

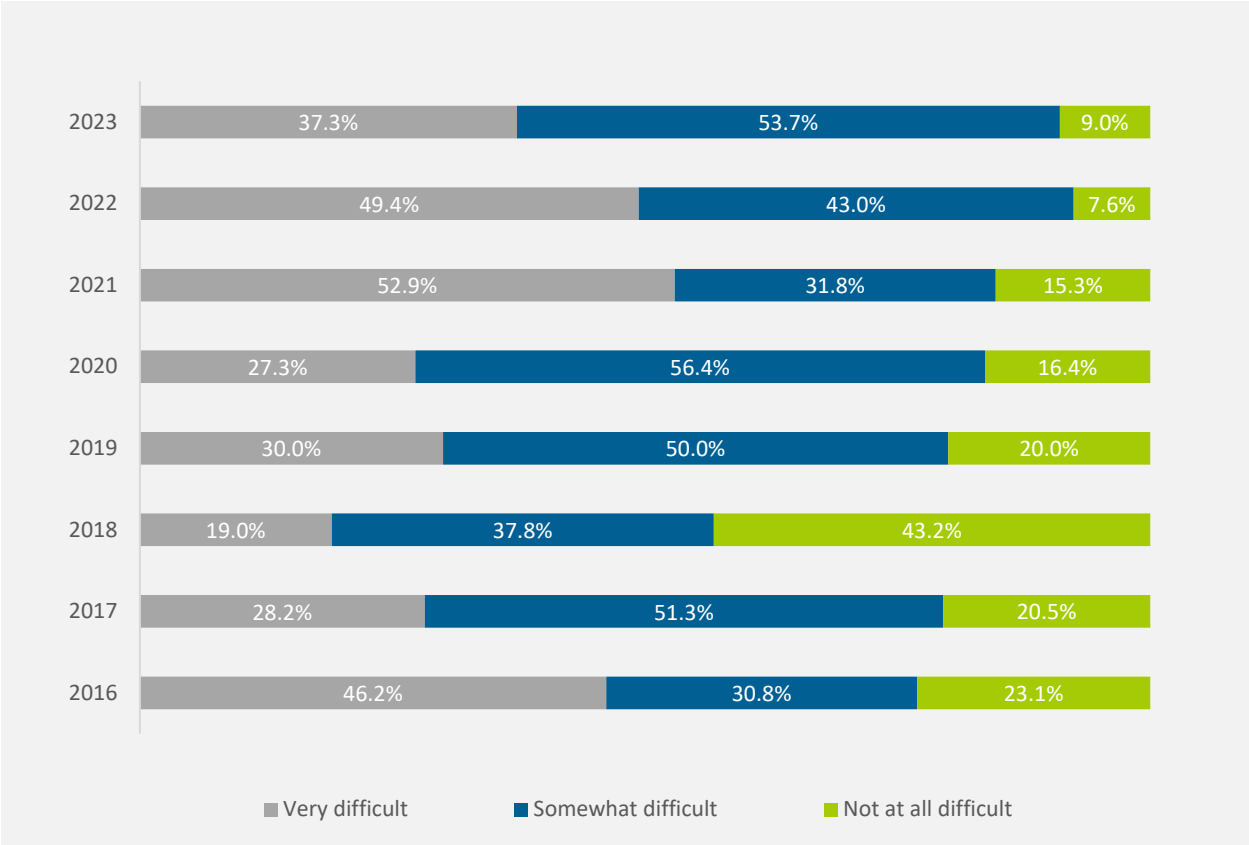
| | RI Clean Energy Overall | RI Construction Overall | RI Manufacturing Overall | RI Management Overall |
|---------------|----------------------------|----------------------------|-----------------------------|--------------------------|
| Male | 64.5% | 95.5% | 68.1% | 57.7% |
| Female | 35.5% | 4.5% | 31.9% | 42.3% |

²⁴ Demographic data is pulled from the United States Energy and Employment Report 2023 (USEER 2023) as well as JobsEQ's "Occupational Diversity" page, 2022Q4, based on place of residence, for workers across all industries in Rhode Island. Obtained July 2023.

Clean Energy Hiring

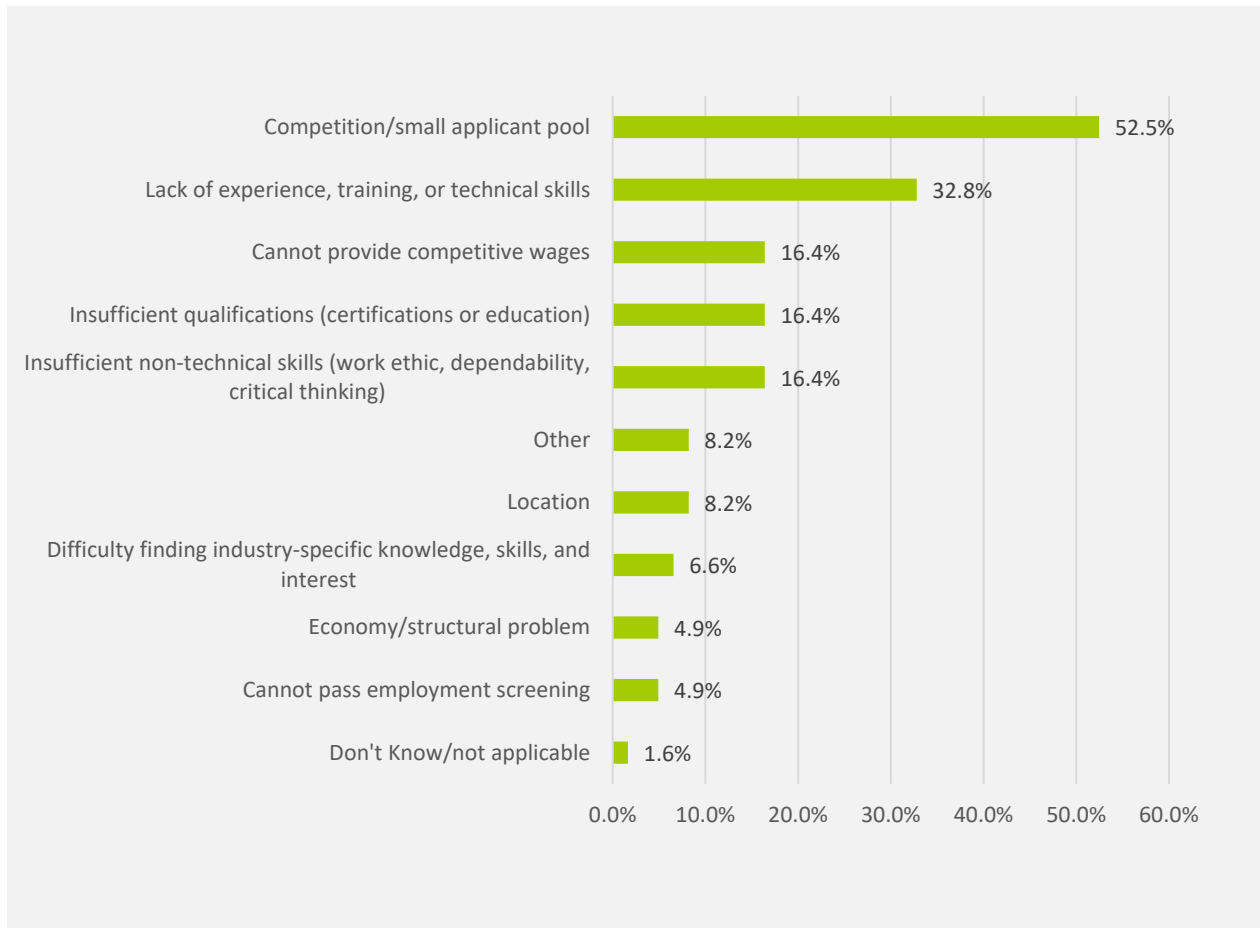
Of employers hiring in 2022, 91.0 percent indicated some level of hiring difficulty, reporting that hiring was either “somewhat” or “very” difficult in 2022. Over one-third of businesses that were seeking new hires (37.3 percent) reported that hiring was “very” difficult in 2022.

FIGURE 10. EMPLOYER-REPORTED HIRING DIFFICULTY, 2016-2023



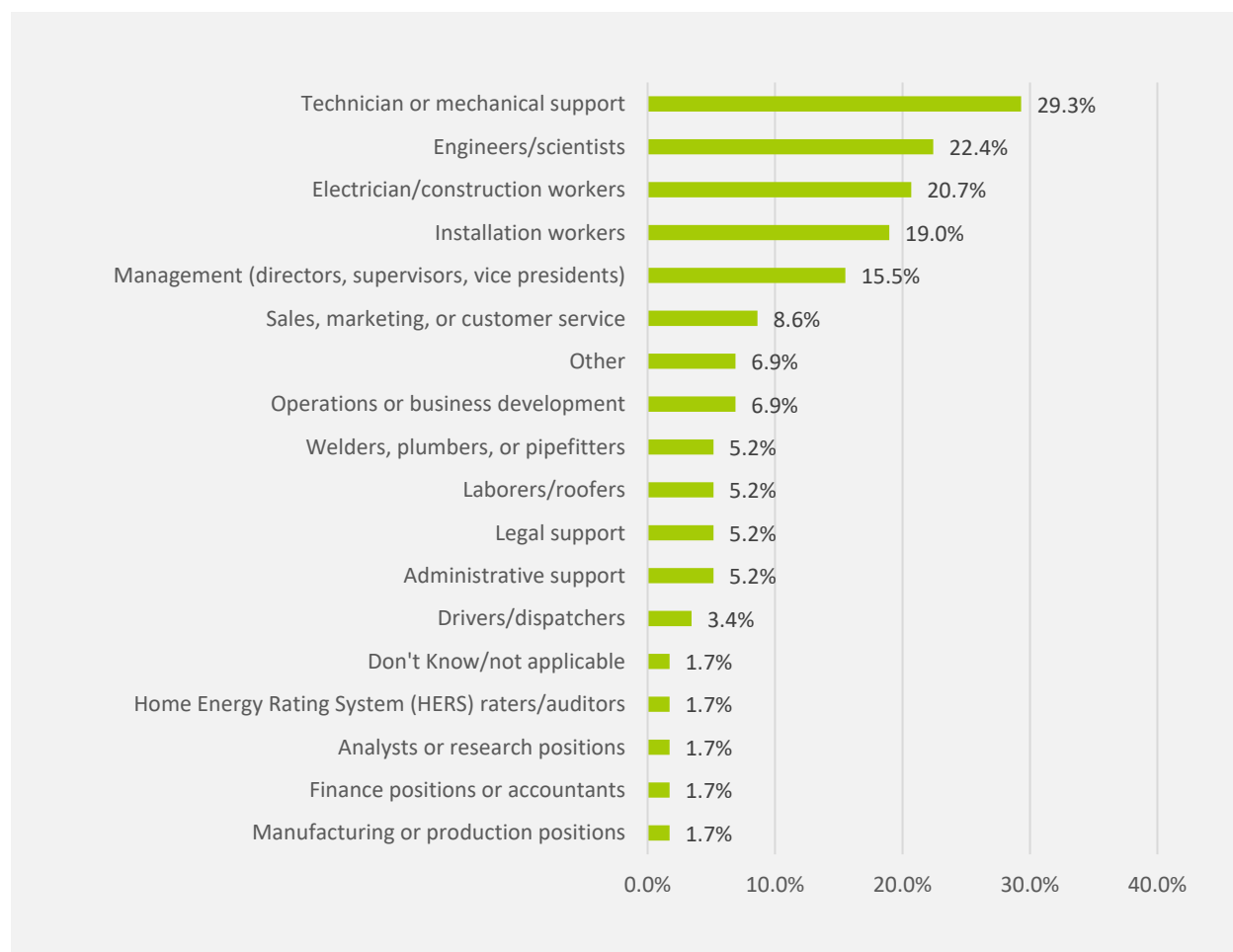
When asked about the two most significant reasons for the reported hiring difficulty, over half (52.5 percent) of Rhode Island’s clean energy employers revealed that competition with other industries hiring resulting in a small applicant pool was a significant reason. Following that, the lack of experience, training, or technical skills of applicants was a reason that almost one-third (32.8 percent) of clean energy employers in the state disclosed as significantly contributing to their reported hiring difficulties. Other reasons given by the clean energy employers in Rhode Island include the inability to provide competitive wages, insufficient qualifications (namely certification and education qualifications), and insufficient non-technical skills such as work ethic, dependability, and critical thinking skills.

FIGURE 11. MOST SIGNIFICANT REASONS FOR THE REPORTED HIRING DIFFICULTY, 2023



Among the Rhode Island’s clean energy employers who experienced hiring as “very difficult” or “somewhat difficult in 2022,” nearly three in ten (29.3 percent) reported difficulty in filling positions for technicians or mechanical support workers. Positions for engineers and scientists were also very challenging to fill, for 22.4 percent of these employers. Just over one-fifth (20.7 percent) of clean energy businesses in Rhode Island had a tough time filling electrician and construction worker positions while 19 percent found difficulty in filling installation worker positions. Some identified management (15.5 percent) and sales, marketing, or customer service (8.6 percent) positions, among several other types, as challenging to fill.

FIGURE 12. MOST DIFFICULT POSITIONS FOR CLEAN ENERGY EMPLOYERS IN RHODE ISLAND TO FILL



Rhode Island Energy’s Workforce Development study²⁵ investigates the hiring challenges that the state’s energy efficiency firm’s experience. Roughly 90 percent of Rhode Island’s energy efficiency businesses who employ heating, air conditioning, hot water, and refrigeration technicians, mechanics, contractors, and installers, as well as 90 percent of those who employ heat pump installers, reported that it is “very difficult” to fill these types of positions. Over half of the state’s energy auditor or HERS rater employers find it “very difficult” to fill positions for these occupations. Workers involved in HVAC and heat pump installations take longer to fill for Rhode Island energy efficiency workers as well, according to the Rhode Island Energy

This study also supports the findings in the Rhode Island clean energy industry overall regarding reasons for hiring difficulty. Though energy efficiency firms experience several factors contributing to challenges in hiring workers, more firms cited a small applicant pool (25 percent) and lack of experience and/or industry-specific knowledge (21 percent) than other potential reasons.

²⁵ “Rhode Island Energy Workforce Development.” Rhode Island Energy. 2023. Publication forthcoming.

Rhode Island Workforce

This section explores regional trends and areas of growth within the clean energy industry. Across the state, clean energy employment is growing, particularly within energy efficiency. Much of this growth continues to be concentrated in the construction and installation segment of the value chain. Using projections of clean energy demand, this supplemental section explores how the anticipated highest-growth clean energy occupations are faring in Rhode Island. Specifically, this analysis covers employment, wage, education and experience requirements, and demographic data of the clean energy jobs that are projected to have some of the strongest growth as the state decarbonizes. Lastly, this section reviews the current state of Rhode Island’s labor market to identify constraints as well as how the state can prepare its workforce for continuing clean energy efforts.

Regional Trends

The majority of clean energy employment in the New England states is concentrated in energy efficiency, the clean energy technology sector expected to grow the most over the next year.²⁶ Similar to Connecticut and Massachusetts,²⁷ Rhode Island’s clean energy installation, maintenance, repair, and operations value chain has employed the greatest number of clean energy workers between 2017 and 2022. As of 2023, this part of the value chain comprises 57.7 percent of all clean energy jobs in the state.

A recent report from the Massachusetts Clean Energy Center projected the highest-growth clean energy occupations in Massachusetts.²⁸ Given Rhode Island’s proximity to Massachusetts, and the similarities in the need for decarbonization, these projections are highly transferable to Rhode Island. These ten high-growth occupations are listed below. They are found within the management; office and administrative support; construction and extraction; and installation, maintenance, and repair occupational groups. These occupations are important for increasing the use of clean energy technologies and are needed to drive efforts to reach decarbonization goals.

- Electricians
- Construction laborers
- General operations managers
- First-line supervisors of construction trades and extraction workers
- Insulation workers
- Office clerks, general
- Construction managers
- Solar photovoltaic installers
- Line installers and repairers
- Heating, ventilation, air conditioning, and refrigeration mechanics and installers

²⁶ 2023 State Report. U.S. Energy & Employment Jobs Report (USEER). U.S. Department of Energy. <https://www.energy.gov/policy/us-energy-employment-jobs-report-useer>

²⁷ 2022 Connecticut Clean Energy Industry Report. Figure 13 {p. 22}. <https://www.ctgreenbank.com/wp-content/uploads/2023/03/2022-Clean-Energy-Industry-Report-final-4-5-2023-1.pdf>

2022 Massachusetts Clean Energy Industry Report. {p. 14}. https://www.masscec.com/sites/default/files/documents/2022%20Massachusetts%20Clean%20Energy%20Industry%20Report_Final.pdf

²⁸ “Powering the Future: A Massachusetts Clean Energy Workforce Needs Assessment.” Massachusetts Clean Energy Center. Table 2 (p. 34-35). July 2023. <https://www.masscec.com/resources/massachusetts-clean-energy-workforce-needs-assessment>

Occupations

This analysis looks at overall Rhode Island employment data for the ten occupations with the highest projected growth within clean energy, but the data provided on each of these occupations is not specific to the clean energy industry. Across all industries, seven of the occupations that are expected to grow the most from 2022 to 2030 have already been growing in Rhode Island from 2016 to 2022. Heating, air conditioning, and refrigeration (HVAC) mechanics and installers experienced the largest employment growth of 90.8 percent, increasing from 650 workers in May 2016 to 1,240 workers in May 2022. The remaining growth ranged from a gain of 14 solar photovoltaic installers to a gain of 400 general and operations managers. Employment declined in two occupations, construction managers and general office clerks, which were reduced by 230 workers and 760 workers, respectively.

TABLE 1. RHODE ISLAND EMPLOYMENT DATA FOR PROJECTED HIGHEST-GROWTH OCCUPATIONS, 2022²⁹

| SOC Code | Occupation | 2022 Employment | 2016 Employment | Percent Change in Employment (2016-2022) | Location Quotient |
|----------|---|-----------------|-------------------------|--|--|
| 43-9061 | Office Clerks, General | 9,190 | 9,950 | -7.6% | 1.13 |
| 11-1021 | General and Operations Managers | 7,040 | 6,640 | 6.0% | 0.64 |
| 47-2061 | Construction Laborers | 2,590 | 2,520 | 2.8% | 0.79 |
| 47-2111 | Electricians | 2,330 | 2,040 | 14.2% | 1.04 |
| 47-1011 | First-Line Supervisors of Construction Trades and Extraction Workers | 2,130 | 1,870 | 13.9% | 0.91 |
| 49-9021 | Heating, Air Conditioning, and Refrigeration Mechanics and Installers | 1,240 | 650 | 90.8% | 1.02 |
| 49-9050 | Line Installers and Repairers | 810 | 690 | 17.4% | 0.39 (SOC 49-9051) 1.89 (SOC 49-9052) |
| 11-9021 | Construction Managers | 250 | 480 | -47.9% | 0.25 |
| 47-2231 | Solar Photovoltaic Installers | 40 | 26 | 53.8% | 0.65 |
| 47-2131 | Insulation Workers, Floor, Ceiling, and Wall | 104 | 89 | 16.9% | 1.06 |
| 47-2132 | Insulation Workers, Mechanical | 40 | 2016 data not available | | 0.50 |

SKILLS, EDUCATION, AND PREVIOUS WORK REQUIREMENTS

Each of these occupations frequently requires strong active listening or information gathering skills. Strong critical thinking, problem solving, and speaking skills are also important for several of these projected highest-growth

²⁹ Occupational Employment and Wage Statistics. Bureau of Labor Statistics. May 2022 and 2016. Estimates do not include self-employed workers.

Data for solar photovoltaic installers and floor, ceiling, and wall insulation workers is sourced from JobsEQ, place of work estimates, 2022Q2.

occupations. Those involved with more office-based and/or management work need to be skilled in coordination and monitoring while those whose work requires a higher level of manual labor or physical activity must utilize robust coordination and monitoring skills.³⁰

The occupations vary in typical entry-level education requirements, ranging from no education requirement to requiring a bachelor’s degree. Neither construction laborers nor floor, ceiling, and wall insulation workers have an entry-level education requirement. A high school diploma or equivalent is required among entry-level workers for seven of the region’s projected highest-growth occupations. Only HVAC mechanics and installers typically need a postsecondary non-degree award to enter this career while managers need a bachelor’s degree. Further, eight of the ten occupations do not typically require previous work experience to begin working in that position. General and operations managers and first-line supervisors of construction trades and extraction workers usually need five years or more of previous work experience to obtain these titles.

TABLE 2. RHODE ISLAND EDUCATION AND EXPERIENCE DATA FOR PROJECTED HIGHEST-GROWTH OCCUPATIONS IN REGION³¹

| 6-digit SOC Code | Occupation | Typical Entry-Level Education Requirements | Typical Previous Work Experience Requirements |
|------------------|---|--|---|
| 43-9061 | Office Clerks, General | High school diploma or equivalent | None |
| 11-1021 | General and Operations Managers | Bachelor's degree | 5 years or more |
| 47-2061 | Construction Laborers | None | None |
| 47-2111 | Electricians | High school diploma or equivalent | None |
| 47-1011 | First-Line Supervisors of Construction Trades and Extraction Workers | High school diploma or equivalent | 5 years or more |
| 49-9021 | Heating, Air Conditioning, and Refrigeration Mechanics and Installers | Postsecondary non-degree award | None |
| 49-9052 | Telecommunications Line Installers and Repairers | High school diploma or equivalent | None |
| 11-9021 | Construction Managers | Bachelor's degree | None |
| 49-9051 | Electrical Power-Line Installers and Repairers | High school diploma or equivalent | None |
| 47-2231 | Solar Photovoltaic Installers | High school diploma or equivalent | None |
| 47-2131 | Insulation Workers, Floor, Ceiling, and Wall | None | None |
| 47-2132 | Insulation Workers, Mechanical | High school diploma or equivalent | None |

CURRENT ANNUAL WAGES

The average annual wages for four of the occupations are greater than the average annual wage of \$64,530 economy-wide in Rhode Island, as of May 2022. Except for general office clerks and floor, ceiling, and wall

³⁰ O*NET Online. Obtained 26 July 2023. <https://www.onetonline.org/>

³¹ “Occupational Diversity” page. JobsEQ. 2022Q4. Obtained 21 July 2023.

insulation workers, all occupations' wages meet the living wage of \$52,270 a year for Rhode Island, the wage needed to support a family of two working adults and two children, based on the MIT Living Wage Calculator.³² Four of these occupations consist of first-line supervisors, managers, and line installers and repairers who earn an annual mean wage of almost \$100,000 or higher. General and operations managers earn the highest average wages of \$148,070 a year. Early career general and operations managers earn just over \$88,000 a year and once experienced, can increase their annual wages to almost \$175,000. General office clerks and floor, ceiling, and wall insulation workers earn the lowest wages of the region's projected highest-growth occupations as their annual mean wages are below the estimated living wage for a four-person family with two working adults and two children.

TABLE 3. RHODE ISLAND WAGE DATA FOR PROJECTED HIGHEST-GROWTH OCCUPATIONS IN REGION, 2022³³

| 6-digit SOC Code | Occupation | Annual Mean Wages | Annual 25 th Percentile (Entry-Level) Wages | Annual Median Wages | Annual 75 th Percentile (Experienced-Level) Wages |
|--|---|-------------------|--|---------------------|--|
| LIVING WAGE (2 WORKING ADULTS AND 2 CHILDREN) | | | \$25.13 an hour / \$52,270 a year | | |
| TOTAL OCCUPATIONS | | \$64,530 | \$35,460 | \$49,360 | \$78,780 |
| 43-9061 | Office Clerks, General | \$43,720 | \$35,130 | \$42,680 | \$49,570 |
| 11-1021 | General and Operations Managers | \$148,070 | \$88,150 | \$123,910 | \$174,990 |
| 47-2061 | Construction Laborers | \$53,820 | \$41,700 | \$49,650 | \$64,520 |
| 47-2111 | Electricians | \$63,470 | \$47,960 | \$62,420 | \$78,420 |
| 47-1011 | First-Line Supervisors of Construction Trades and Extraction Workers | \$84,480 | \$64,290 | \$79,770 | \$100,570 |
| 49-9021 | Heating, Air Conditioning, and Refrigeration Mechanics and Installers | \$62,580 | \$55,010 | \$62,010 | \$73,440 |
| 49-9052 | Telecommunications Line Installers and Repairers | \$94,160 | \$92,130 | \$97,340 | \$97,680 |
| 11-9021 | Construction Managers | \$124,120 | \$93,120 | \$104,030 | \$140,800 |
| 49-9051 | Electrical Power-Line Installers and Repairers | \$101,550 | \$81,830 | \$105,900 | \$114,200 |
| 47-2231 | Solar Photovoltaic Installers | \$58,000 | \$43,300 | \$54,000 | \$65,800 |
| 47-2131 | Insulation Workers, Floor, Ceiling, and Wall | \$51,100 | \$38,700 | \$45,100 | \$54,400 |
| 47-2132 | Insulation Workers, Mechanical | \$67,970 | \$50,310 | \$64,410 | \$91,520 |

³² MIT Living Wage Calculator. Massachusetts Institute of Technology. <https://livingwage.mit.edu/>

³³ Occupational Employment and Wage Statistics. Bureau of Labor Statistics. May 2022. Estimates do not include self-employed workers. Data for solar photovoltaic installers and floor, ceiling, and wall insulation workers is sourced from JobsEQ, 2022Q4.

The living wage is sourced from the MIT Living Wage Calculator for Rhode Island. Obtained July 2023. <https://livingwage.mit.edu/states/44>

CURRENT DEMOGRAPHICS

General office clerks who earn the lowest wages among the ten target occupations have the greatest percentage of females at 83.5 percent, the only occupation with a percentage of females exceeding that of the state’s overall workforce. The largest proportion of Hispanic or Latino workers are found among floor, ceiling, and wall insulation workers, comprising 50.8 percent of these workers, followed closely by mechanical insulation workers (48.8 percent). Both occupations have proportions of Hispanic or Latino workers that exceed the proportion in the overall workforce of Rhode Island. Four occupations have a smaller percentage of Hispanic or Latino workers than the state’s overall workforce.

TABLE 4. RHODE ISLAND GENDER AND ETHNICITY DATA FOR PROJECTED HIGHEST-GROWTH OCCUPATIONS, 2022³⁴

| 6-digit SOC Code | Occupation | Female | Hispanic or Latino (of any race) |
|------------------|---|--------|----------------------------------|
| | Rhode Island Overall Workforce | 51.1% | 16.4% |
| 43-9061 | Office Clerks, General | 83.5% | 15.4% |
| 11-1021 | General and Operations Managers | 34.4% | 8.6% |
| 47-2061 | Construction Laborers | 5.0% | 38.6% |
| 47-2111 | Electricians | 2.2% | 17.7% |
| 47-1011 | First-Line Supervisors of Construction Trades and Extraction Workers | 4.3% | 20.7% |
| 49-9021 | Heating, Air Conditioning, and Refrigeration Mechanics and Installers | 2.3% | 18.6% |
| 49-9052 | Telecommunications Line Installers and Repairers | 4.8% | 17.2% |
| 11-9021 | Construction Managers | 8.3% | 8.7% |
| 49-9051 | Electrical Power-Line Installers and Repairers | 1.5% | 11.9% |
| 47-2231 | Solar Photovoltaic Installers | 3.8% | 22.9% |
| 47-2131 | Insulation Workers, Floor, Ceiling, and Wall | 6.5% | 50.8% |
| 47-2132 | Insulation Workers, Mechanical | 6.5% | 48.8% |

Over four in five of all workers in these occupations identify as White with the greatest percentage being employed as construction managers (94.5 percent). Insulation workers is the only occupation to have a smaller proportion of White workers than the overall state workforce. Only two occupations (insulation workers and general office clerks) have a lower proportion of Black or African American workers than the state overall and none of these ten target occupations employ a greater proportion of Asian workers than the state overall.

³⁴ “Occupational Diversity” page. JobsEQ. 2022Q4. Based on place of residence. Obtained 21 July 2023. Rhode Island Overall Workforce data sourced from Bureau of Labor Statistics.

TABLE 5. RHODE ISLAND RACE DATA FOR PROJECTED HIGHEST-GROWTH OCCUPATIONS, 2022³⁵

| 6-digit SOC Code | Occupation | White | Black or African American | American Indian or Alaska Native | Asian | Native Hawaiian or Other Pacific Islander | Two or More Races |
|--------------------------------|---|-------|---------------------------|----------------------------------|-------|---|-------------------|
| Rhode Island Overall Workforce | | 82.0% | 6.8% | 0.4% | 3.7% | 0.1% | 7.0% |
| 43-9061 | Office Clerks, General | 84.5% | 7.9% | 0.7% | 3.3% | 0.1% | 3.5% |
| 11-1021 | General and Operations Managers | 88.0% | 4.8% | 0.3% | 3.0% | 0.1% | 3.8% |
| 47-2061 | Construction Laborers | 87.8% | 5.7% | 0.9% | 1.1% | 0.2% | 4.2% |
| 47-2111 | Electricians | 92.4% | 4.3% | 0.5% | 1.1% | 0.0% | 1.7% |
| 47-1011 | First-Line Supervisors of Construction Trades and Extraction Workers | 92.4% | 2.7% | 0.7% | 0.9% | 0.0% | 3.2% |
| 49-9021 | Heating, Air Conditioning, and Refrigeration Mechanics and Installers | 89.0% | 6.7% | 0.2% | 1.0% | 0.1% | 3.1% |
| 49-9052 | Telecommunications Line Installers and Repairers | 89.1% | 5.1% | 0.4% | 0.5% | 0.2% | 4.8% |
| 11-9021 | Construction Managers | 94.5% | 2.2% | 0.3% | 1.3% | 0.0% | 1.7% |
| 49-9051 | Electrical Power-Line Installers and Repairers | 89.2% | 3.8% | 0.4% | 0.6% | 0.1% | 5.9% |
| 47-2231 | Solar Photovoltaic Installers | 93.0% | 2.6% | 0.6% | 0.8% | 0.1% | 2.9% |
| 47-2131 | Insulation Workers, Floor, Ceiling, and Wall | 80.6% | 16.1% | 0.4% | 0.0% | 0.0% | 2.8% |
| 47-2132 | Insulation Workers, Mechanical | 81.5% | 15.3% | 0.4% | 0.0% | 0.0% | 2.7% |

In general, workers of the ten projected highest-growth occupations requiring the most physical labor, specifically the construction and extraction and the installation, maintenance, and repair occupations, are primarily found between the ages of 25 and 54. All occupations, except general office clerks, employ a greater percentage of 35- to 44-year-olds than the state does overall, at 18.8 percent. Similarly, all occupations, except construction laborers, have a larger proportion of workers within the 45 to 54 age group than the overall state workforce at 20.4 percent. Once workers reach age 65 or older, fewer are employed in physically demanding occupations, with only three occupations, all in office or management roles, exceeding the state’s proportion of workers aged 65 and over.

³⁵ “Occupational Diversity” page. JobsEQ. 2022Q4. Based on place of residence. Obtained 21 July 2023. Rhode Island Overall Workforce data sourced from Bureau of Labor Statistics.

TABLE 6. RHODE ISLAND AGE DATA FOR PROJECTED HIGHEST-GROWTH OCCUPATIONS, 2022³⁶

| 6-digit SOC Code | Occupation | Ages 16-19 | Ages 20-24 | Ages 25-34 | Ages 35-44 | Ages 45-54 | Ages 55-64 | Ages 65+ |
|--------------------------------|---|------------|------------|------------|------------|------------|------------|----------|
| Rhode Island Overall Workforce | | 3.9% | 9.2% | 21.9% | 18.8% | 20.4% | 19.2% | 6.6% |
| 43-9061 | Office Clerks, General | 3.3% | 8.7% | 20.4% | 16.3% | 20.8% | 22.7% | 7.9% |
| 11-1021 | General and Operations Managers | 0.3% | 2.5% | 21.7% | 24.7% | 23.7% | 21.8% | 5.2% |
| 47-2061 | Construction Laborers | 2.9% | 10.8% | 24.5% | 22.5% | 20.3% | 14.7% | 4.3% |
| 47-2111 | Electricians | 1.1% | 9.5% | 23.1% | 21.9% | 21.2% | 18.0% | 5.1% |
| 47-1011 | First-Line Supervisors of Construction Trades and Extraction Workers | 0.0% | 2.1% | 18.0% | 22.8% | 28.9% | 21.6% | 6.6% |
| 49-9021 | Heating, Air Conditioning, and Refrigeration Mechanics and Installers | 1.3% | 7.2% | 26.9% | 22.2% | 20.8% | 18.8% | 2.7% |
| 49-9052 | Telecommunications Line Installers and Repairers | 1.3% | 4.9% | 17.2% | 22.0% | 33.8% | 18.0% | 2.9% |
| 11-9021 | Construction Managers | 0.3% | 2.1% | 18.8% | 22.2% | 24.7% | 24.5% | 7.4% |
| 49-9051 | Electrical Power-Line Installers and Repairers | 2.1% | 7.8% | 27.0% | 23.7% | 24.0% | 10.7% | 4.8% |
| 47-2231 | Solar Photovoltaic Installers | 1.4% | 7.5% | 22.8% | 22.1% | 21.8% | 19.0% | 5.4% |
| 47-2131 | Insulation Workers, Floor, Ceiling, and Wall | 0.0% | 10.7% | 23.8% | 28.3% | 22.1% | 10.9% | 4.1% |
| 47-2132 | Insulation Workers, Mechanical | 0.0% | 10.6% | 23.6% | 28.1% | 22.3% | 11.2% | 4.3% |

Rhode Island Labor Market

As of June 2023, Rhode Island’s labor force participation rate, or the proportion of working age people who are actively working or seeking work, is 63.9 percent. While the state’s unemployment rate is 3.0 percent, the jobless rate is estimated at 38.0 percent. Given this, roughly 17,257 people were in the labor force but not working, and a total of 342,506 people were not working, among the civilian, noninstitutional population aged 16 and older.³⁷

From June 2016 to June 2023, Rhode Island’s labor force participation rate decreased by 1.4 percent, as the civilian, working age population increased by 5.0 percent. The unemployment rate, however, was 5.0 percent in 2016 and has thus decreased by 39.7 percent. The jobless rate also decreased, from 38.5 percent in 2016 to 38.0 in 2023.³⁸

Rhode Island has a higher unemployment rate than Massachusetts with a rate of 2.8, but a lower unemployment rate than Connecticut (4.0 percent) and the United States at the national level (3.8 percent). Rhode Island’s jobless rate (38.0 percent), on the other hand, was higher than the jobless rates of both Massachusetts (35.1 percent) and Connecticut (35.2 percent).³⁹

³⁶ “Occupational Diversity” page. JobsEQ. 2022Q4. Based on place of residence. Obtained 21 July 2023.

³⁷ Local Area Unemployment Statistics. Bureau of Labor Statistics. Not seasonally adjusted. Preliminary data.

³⁸ Local Area Unemployment Statistics. Bureau of Labor Statistics. Not seasonally adjusted. Preliminary data.

³⁹ Local Area Unemployment Statistics. Bureau of Labor Statistics. Not seasonally adjusted. Preliminary data.

Conclusions

Rhode Island's clean energy industry employment is on the rise from the COVID-19 pandemic-induced job losses, though despite new and targeted investments and policy commitments, growth is slower than anticipated. While not all growth surpassed last year's growth, new initiatives and programs throughout the state will continue to increase demand for labor in the industry, yet it is unclear that the state has sufficient workers to meet the demand.

Overall, more than 90% of companies reported difficulty finding workers, with a majority reporting a small applicant pool as the primary driver of their difficulty. Rhode Island is facing constrained economic and job growth due to lack of supply. It is essential that the state find ways to increase labor participation, recruit workers to move to Rhode Island, and mitigate barriers to the long-term unemployed or it runs the risk of leaving economic opportunity on the table and failing to meet its ambitious climate goals. An all of government approach can unlock significant pent-up demand and relieve the significant difficulties facing the state's many small businesses.

Appendix A: Geographic Distribution of Clean Energy Jobs

| County | 2016 Employment | 2017 Employment | 2018 Employment | 2019 Employment | 2020 Employment | 2021 Employment | 2022 Employment | 2023 Employment |
|------------------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|
| Bristol County | 444 | 638 | 439 | 457 | 466 | 372 | 378 | 384 |
| Kent County | 2,282 | 2,586 | 2,756 | 2,840 | 3,105 | 2,645 | 2,684 | 2,732 |
| Newport County | 1,313 | 1,603 | 1,461 | 1,515 | 1,501 | 1,331 | 1,350 | 1,374 |
| Providence County | 8,046 | 8,424 | 9,058 | 9,471 | 9,564 | 7,977 | 8,092 | 8,237 |
| Washington County | 1,690 | 2,054 | 1,762 | 1,738 | 1,748 | 1,606 | 1,629 | 1,658 |

Methodology

This year's Clean Energy Industry Report is based on the data collected for the 2023 United States Energy and Employment Report (USEER). The 2023 USEER utilizes data from the Bureau of Labor Statistics Quarterly Census of Employment and Wages (BLS QCEW 2022 Q3) and Current Employment Statistics (CES Table B-1), as well as survey data. The survey was designed and implemented by BW Research Partnership. For the past decade, national, state, and local energy-related data collection and analysis efforts have used this survey methodology.

The survey uses a stratified sampling plan based on industry code (North American Industry Classification System or NAICS), establishment size, and geography to determine the proportion of establishments that work with specific energy related technologies, as well as the proportion of workers in such establishments that work with the same. These data are then analyzed and applied to existing public data published by the BLS QCEW, effectively constraining the potential universe of energy establishments and employment.

The 2023 USEER survey was administered by telephone (more than 274,000 outbound calls) and by web, with more than 327,700 emails sent to participants throughout the United States.

The sample was split into two categories, the known and unknown universes. The known universe includes establishments that have previously been identified as energy-related, either in prior research or some other manner, such as membership in an industry association or participation in government programs. These establishments were surveyed census-style, and their associated establishment and employment totals were removed from the unknown universe for both sampling and for resulting employment calculations and estimates. Over the summer of 2022, BW Research cleaned, deduplicated, added to, and refined its database to reflect churn (companies out of business, moved, no longer in energy), unverified (no answer, answering machine, fast-busy, disconnect, etc.), verified, and other available demographic tags (industry, technology, sub-technology, size, etc.).

In addition to cleaning the original known energy database, BW Research also supplemented with industry association contact lists by technology (biofuels, coal, oil, and gas, energy storage, energy efficiency, solar, and wind), new companies from the unknown database that took the survey for the 2022 USEER and contact lists from subcontractors. BW Research also appended contact information, including six-digit NAICS codes, contact, employment, and location information.

The unknown universe includes hundreds of thousands of businesses in potentially energy related NAICS codes, across agriculture, mining, utilities, construction, manufacturing, wholesale trade, professional services, and repair and maintenance. Each of these segments and their total reported establishments (within the BLS QCEW) were carefully analyzed by size (employment – provided by the Census Bureau's County Business Patterns) and state to develop representative clusters for sampling.

With clean data files in place, BW Research developed a general methodology for state employment estimation that has a few variations depending on sub-technology. Steps in the process are listed below.

100% NAICS A

These are NAICS codes where 100% of the reported employment is energy related AND 100% are allocated to a specific sub-technology. Examples include solar electric power generation, hydroelectric power generation, and motor vehicle manufacturing.

Actual Survey Responses

These include the reported sub-technology employment totals by company location. Responses from establishments in 100% NAICS codes are excluded.

Known Database

Employment is allocated by location for verified establishments in the known when the following conditions are met: 1) Have InfoUSA or DatabaseUSA appended data; 2) did not take survey (or actual survey response would be used), and 3) are not in a 100% NAICS.

Remainder

This represents remaining employment based on statistical extrapolation.

Industry Mix

Industry mix is the national proportion of industries that contribute to sub-technology employment. The mix of these industries (by 6-digit NAICS) is used to create proportions by state and remainder employment is allocated by these proportions. This “industry mix” was developed by analyzing completed survey incidence nationally for all clean energy sub-technologies over five years.

BW Research provided additional analysis of the publicly released Department of Energy data that included data from the Bureau of Labor Statistics, the Energy Information Administration, the U.S. Census Bureau, JobsEQ, the BW Research Partnership Energy Employment Index, historical data from prior Rhode Island Clean Energy Industry Reports. Of important to note, the USEER excludes any employment in retail trade NAICS codes—motor vehicle dealerships, appliance and hardware stores, and other retail establishments.