



2022

RHODE ISLAND CLEAN ENERGY INDUSTRY REPORT

PRODUCED FOR THE RHODE ISLAND OFFICE OF ENERGY RESOURCES & RHODE ISLAND COMMERCE

[bw] RESEARCH
PARTNERSHIP



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The Rhode Island Office of Energy Resources (OER) and the Executive Office of Commerce are pleased to present the 2022 Rhode Island Clean Energy Jobs Report.

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

The COVID-19 pandemic hit the Rhode Island and New England economies hard, and the clean energy sector was no exception. From 2020-2021, the clean energy industry returned to growth rather than decline but did not yet return to pre-pandemic levels.

However, despite the challenges of 2020, overall state-level policy support and goals, as well as federal legislative priorities, point toward a continuation of historical job growth in Rhode Island’s clean energy sector.

In June 2022, Governor McKee signed historic legislation requiring 100 percent of Rhode Island’s electricity to be offset by renewable energy by 2033.

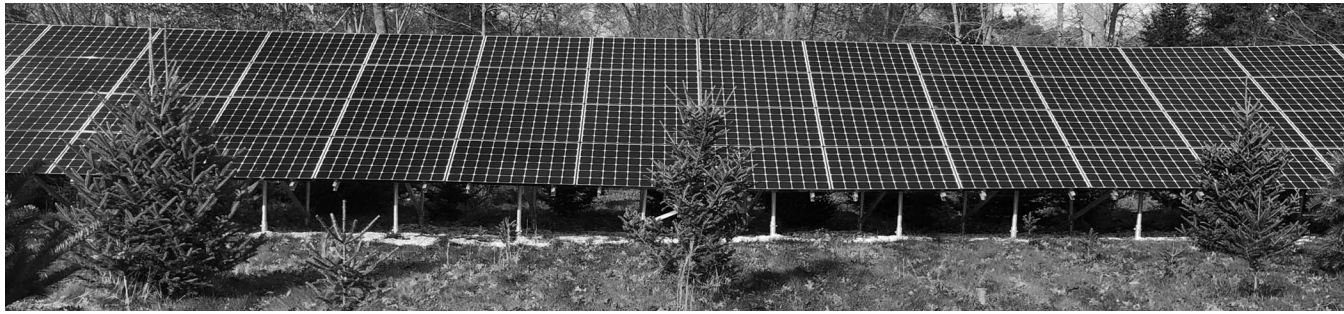
Following the Governor’s signing of the 2021 Act on Climate to reduce the state’s carbon emissions to net zero by 2050, these two ambitious goals will support a robust expansion of the State’s existing clean energy economy for years to come.

In October 2022, Governor McKee’s administration issued an offshore wind request for proposals. The law, which the Governor signed in July, requires a market-competitive procurement for between 600 and 1000 megawatts (MW) of new developed offshore wind capacity. When added to the 30 MW Block Island Wind farm and the planned 400 MW Revolution Wind project, roughly half the state’s projected energy needs will be powered by wind. Our State is committed to ensuring a clean energy future, and we expect the clean energy economy to not only return to pre-pandemic levels, but far surpass it in the years ahead. We are thankful to Governor Daniel McKee and the General Assembly for helping to make Rhode Island a leader in clean energy and continuing to foster growth across this sector of our economy.

Sincerely,

Chris Kearns
Acting Energy Commissioner

Elizabeth M. Tanner, Esq.
Rhode Island Secretary of Commerce



Acknowledgment

This Clean Energy Industry Report is the eighth iteration in a series of reports conducted and written by BW Research Partnership, Inc. under commission by the Rhode Island Office of Energy Resources and the Renewable Energy Fund at Commerce RI. Thank you to the stakeholders who responded to the survey which resulted in the data summarized in this report.

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Executive Summary

The 2022 Rhode Island Clean Energy Industry Report is the eighth annual report on clean energy employment in the state. The findings in this report are based on data taken from the comprehensive 2022 U.S. Energy and Employment Report (USEER). The 2022 USEER survey was administered by telephone (more than 247,500 outbound calls) and by web, with more than 104,000 emails sent to participants throughout the United States. An additional 33,000 business locations were mailed an invite letter instructing respondents to complete the survey via phone or web (included a link). 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 on the heels of new federal funding through historic climate legislation and the rebounding impact of the COVID-19 Pandemic. The datapoints included in this study provide useful context that can help policymakers and other clean energy stakeholders in the state make forward looking decisions. Particularly given the recently passed Inflation Reduction Act and coming federal investments, this study provides information on what areas might be key drivers for investment.

The report shows that employment across clean energy businesses increased by almost 500 jobs—or 3.2 percent—between the last quarters of 2020 and 2021. This comes after an unprecedented decline in clean energy jobs of over 2,500 jobs—or 15.5 percent— from 2019 to 2021 due to COVID-19. While clean energy employment is trending upwards, it has not yet bounced back to pre-pandemic levels during 2020-2021. The economic aftermath of COVID-19 resulted in the loss of roughly four years of clean energy job growth, sending Rhode Island's clean energy economy back to 2016 employment levels.

From 2020-2021, overall clean energy jobs increased and total full-time equivalent clean energy workers also increased. As of the last quarter of 2021 there were 11,515 clean energy workers that dedicated all of their labor hours or work week to support clean energy goods and services— a 3.2 percent increase as compared to the 11,158 clean energy workers in last year's report.² (This is down from the pre-pandemic overall clean energy jobs of 13,226 reported at the end of December 2019).

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

² The 11,515 full-time equivalent clean energy workers represents 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 3.2 percent increase in total clean energy employment.

In 2021, the majority of job increases were in installation, maintenance, and repair jobs in the energy efficiency and renewable and efficient heating and cooling sectors. This is not surprising as it is the value chain that was the most impacted in 2020-2021 during the height of the pandemic because energy efficiency-related installations and upgrades typically require tasks to be completed within homes or businesses and were thus unable to maintain the social distancing guidelines during 2020. Clean energy installation and maintenance firms lost almost 1,500 jobs, for a decline of 15.7 percent from the end of 2019 to 2020. From the last quarter of 2020-2021 clean energy installation and maintenance firms increased 204 jobs for an increase of 2.6 percent.

From 2019 to 2020 there was a steep decline in jobs in the energy efficiency technology sector (19 percent decline) and the renewable and efficient heating and cooling (17 percent decline). Rebounding from that, from 2020 to 2021 the energy efficiency technology sector saw a 1.8 percent increase —roughly 142 new jobs— and renewable and efficient heating and cooling firms saw an increase of 3.4 percent—roughly 122 new jobs. Meanwhile, the technology sector with the highest growth from 2020 to 2021 was clean transportation with a 28.2 percent increase —with roughly 95 new jobs.

Following the pandemic-induced job losses in 2020, Rhode Island’s clean energy labor market is making a slow but sure rebound with job numbers increasing across all technologies. The industry is well-supported by policy mechanisms and decarbonization goals, putting it on-track for long-term job growth. State-wide policy commitments (including the commitment to net-zero emissions by 2050), combined with significant federal funding anticipated through the Inflation Reduction Act point towards a positive future of clean energy employment growth for the state in coming years.

According to clean energy employers, the largest challenge currently preventing industry growth is finding qualified employees. When surveyed, 58%³ percent of clean energy employers in Rhode Island reported that they did not have an adequate number of qualified clean energy employees to meet their current needs. Despite the industry rebounding from pandemic losses, companies are having a hard time their reaching pre-pandemic highs due limited labor supply.

The remainder of this report provides additional detail on clean energy employment by technology and sub-technology, clean energy labor intensity, value chain employment, and employer-reported hiring difficulty and COVID-19 impacts.

³ BW Research Partnership Clean Energy Employer Survey.



Industry Overview

The 2021 Clean Energy Industry Report marked the first year of clean energy job losses in Rhode Island since this analysis commenced in 2014; as of 2022, those jobs are returning and clean energy employment is growing once more. As of the last quarter of 2021, clean energy employment in Rhode Island totaled roughly 14,256 jobs, the majority of which—roughly six in ten—are concentrated in the energy efficiency technology sector.⁴ This is compared to about 13,800 jobs reported at the end of 2020. Nearly all clean energy technology segments lost jobs during the period of 2019 to 2020, with the exception of the wind industry. Meanwhile in the last year from 2020 to 2021, all technology segments saw job growth, with the technology sectors of renewable energy and clean transportation exceeding pre-pandemic levels of employment.

Between the last quarters of 2020 and 2021, clean energy businesses increased their ranks by roughly 450 jobs. These job increases represent a 3.2 percent increase compared to last year's report. From December 2020 to December 2021, the state overall increased jobs from 527,526 to 543,856 an increase of 3.1 percent.⁵ Clean energy job increases accounted for 2.7 percent of total job increases in Rhode Island and about 2.6 percent of total employment at the end of 2021.

Between 2019 to 2020, Rhode Island's clean energy sector was harder hit compared to the statewide average due to the high proportion of energy efficiency jobs, which required in person engagement for execution. The energy efficiency sector accounts for about six in ten clean energy jobs in the state, and this sector shed the largest number of workers, not just in Rhode Island, but nationwide. This is not surprising, as many of the jobs in this labor segment requires in-person and/or on-premises delivery of goods and services, which became especially challenging due to COVID-related closures. While these jobs are returning, their growth may be slow as the labor segment continues to face pandemic- related challenges.

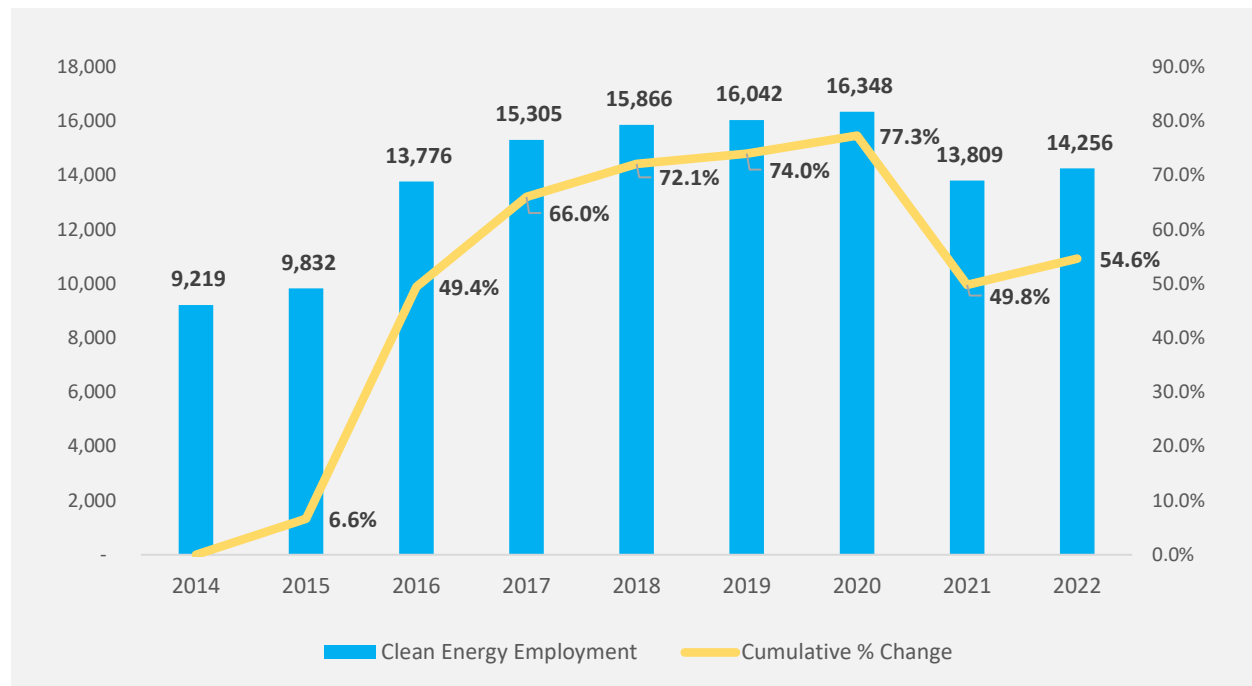
Efforts to increase education and training for clean energy jobs includes two new particularly high-profile programs. The first is an effort of the Community College of Rhode Island (CCRI), who is part of a new coalition working to increase ease of transferring college credits. CCRI has hired a full-time coordinator focused on increasing the ease of transferring college credits and has started a new program named the Joint Admissions Agreement which guarantees students admission based on their grade point averages. The second major program is a 375-thousand-dollar congressional allocation to the creation of a Career and Technical Education certification in offshore wind for high

⁴ For more information on clean energy technology sectors, please see the Clean Energy Technology Analysis section of this report.

⁵ Statewide employment totals are from the Bureau of Labor Statistics, Quarterly Census of Employment and Wages. Data was extracted in August 2022.

school students.⁶ The allocation was made to the North Kingston Chamber of Commerce at the end of 2022 and the certification program will be a first-of-its-kind program.⁷

Figure 1 Clean Energy Employment, 2014-2022



Alongside overall job increases, the number of full-time equivalent (FTE) clean energy jobs also increased.⁸ Over the last several years, FTE clean energy jobs had been growing faster than the overall clean energy labor market, indicating that while total jobs were growing, clean energy workers were also spending more of their work week or labor hours dedicated to clean energy-specific tasks.

Last year’s Clean Energy Industry Report showed that overall FTE clean energy jobs declined by 15.6 percent between the last quarters of 2019 and 2020. As of the end of 2020, there were 11,158 full-time equivalent clean energy workers in Rhode Island, indicating that there were fewer clean energy workers overall that spent their full work week dedicated to clean energy tasks and activities.

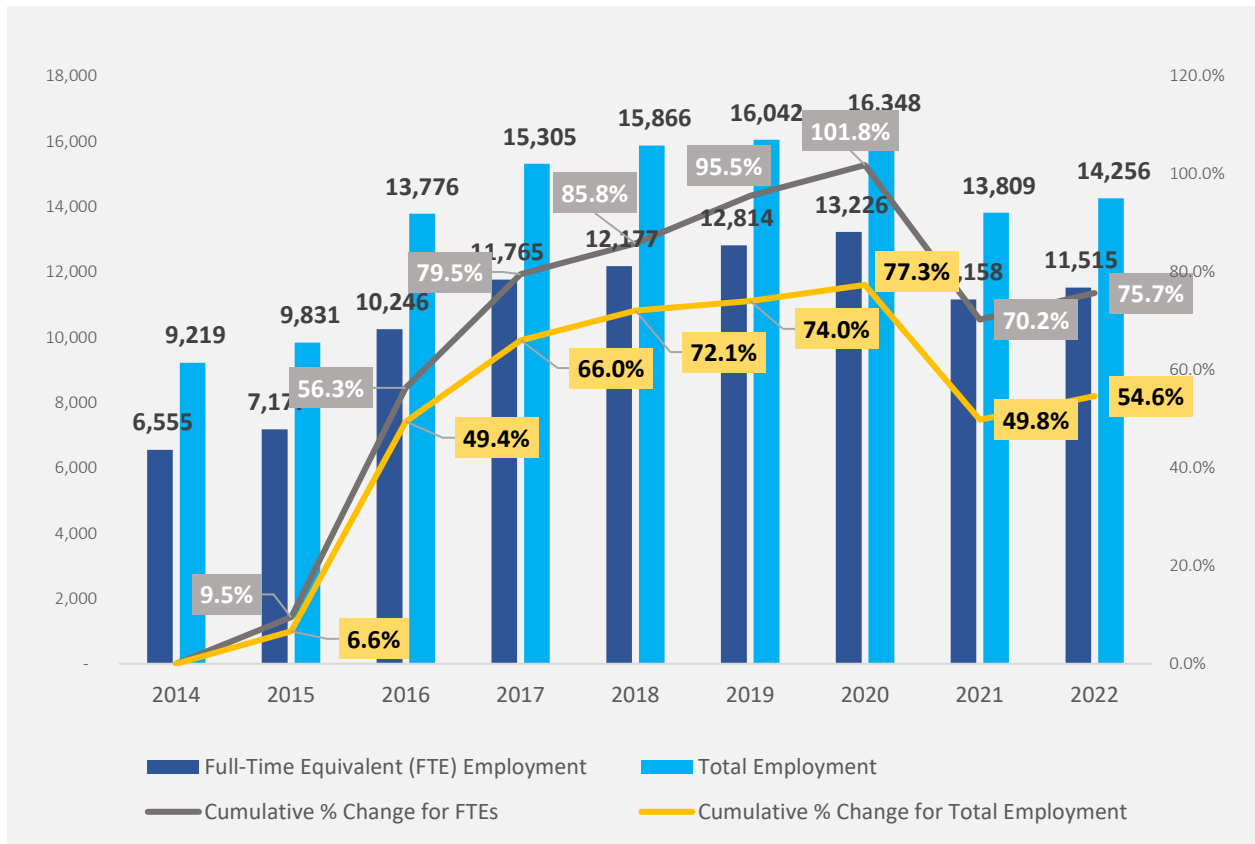
This year’s Clean Energy Industry Report shows a bounce back in activities, with an overall FTE clean energy jobs increase of 3.2 percent, moving from 11,158 full-time equivalent clean energy workers in Rhode Island at the end of 2020 to 11,515 at the end of 2021. This follows the same rate of increase as the overall rise in clean energy employment.

⁶ Boston Globe, Community college students’ bachelor’s degree dreams getting farther out of reach, 2022.

⁷ Providence Business News, N.K. Chamber gets \$375 for new high school offshore wind certification program, 2022

⁸ Full-time equivalent (FTE) clean energy jobs are extrapolated by weighting each clean energy worker based on what proportion of their labor hours are spent on clean energy-related activities (0-49 percent, 50-99 percent, or 100 percent). It should be noted that this metric measures the proportion of total labor hours dedicated to clean energy activities and is unrelated to the total number of hours worked in a week. A part-time clean energy employee who works 20 hours a week with 100 percent of these hours dedicated to clean energy activities would be counted as one FTE clean energy job.

Figure 2 Full-Time Equivalent (FTE) Clean Energy Employment, 2014-2022





Clean Energy Technology Analysis

The largest increase of employment from the end of 2020 to the end of 2021 was within the energy efficiency and renewable and efficient heating and cooling sectors. This comes after a year in which those two sectors were the hardest hit during the pandemic. The change is not surprising, as many of the jobs in these labor segments require in-person and/or on-premise delivery of goods and services, which became especially challenging due to COVID-related closures. Since that time, they have slowly increased in 2020-2021 matching changes in requirements for social distancing.

Jobs in the wind energy sector steadily increased employment each year since 2016. Between 2019 and 2020, the sector grew by 8.7 percent, or 47 jobs. Following that growth spurt, wind job increases slowed from 2020 to 2021 with growth just under 1%, or 6 jobs.

While wind firms have seen a steady increase in job numbers since 2016, solar firms saw a decrease in jobs during the pandemic, followed by a slow return in the last year. From the end of 2019 to 2020 solar firms saw a decrease of 2 percent, or 28 jobs. From the end of 2020 to the end of 2021, solar firms increased employment by 3.9 percent, or 54 jobs.

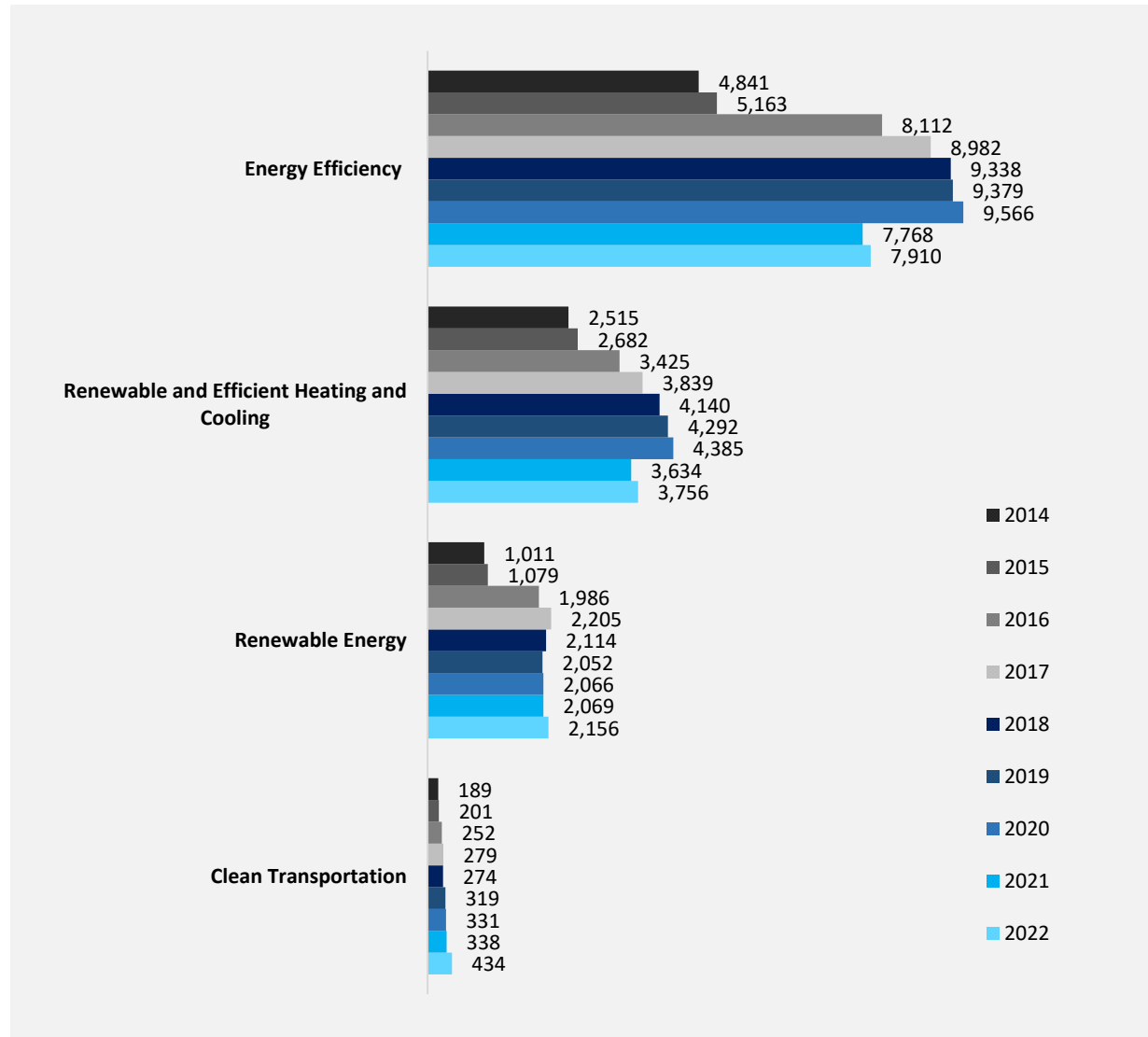
Energy efficiency firms experienced both the largest job losses during the start of the pandemic, as well as the largest bounce-back in the following year. Between the last quarters of 2019 and 2020, energy efficiency jobs declined by 18.8 percent—roughly 1,800 lost energy efficiency-related jobs. From the last quarter of 2020 to 2021 energy efficiency-related jobs increased by 1.8 percent —roughly 140 jobs gained in the year following pandemic losses.

Renewable and efficient heating and cooling firms lost 750 jobs, or 17 percent decline from 2019-2020, with a bounce back of 122 jobs or 3.4 percent increase from the end of 2020 to the end of 2021.

All energy efficiency sub-sectors experienced job losses over from 2019-2020, and almost all of them started to make a comeback. Withing the energy efficiency sub-sectors, job increases from 2020-2021 included the sub-sector of storage with an increase of 16.6 percent—roughly 20 jobs, and smart grid with 12.3 percent—roughly 3 jobs. The ENERGY STAR® Appliances sub-sector continued to see job decreases from 2020-2021 at a decline of 16.1 percent—roughly 190 jobs.

From the last quarter of 2020-2021, total job growth within energy efficiency sub-sectors from smart grid, storage, efficient lighting, and advanced building materials & other put together create 333 total new jobs, while the decline of microgrid and ENERGY STAR® Appliances jobs put together shed a total of 191 jobs.⁹

Figure 3 Clean Energy Employment by Technology, 2014-2022 ¹⁰



⁹ 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.

¹⁰ 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, 2016-2022

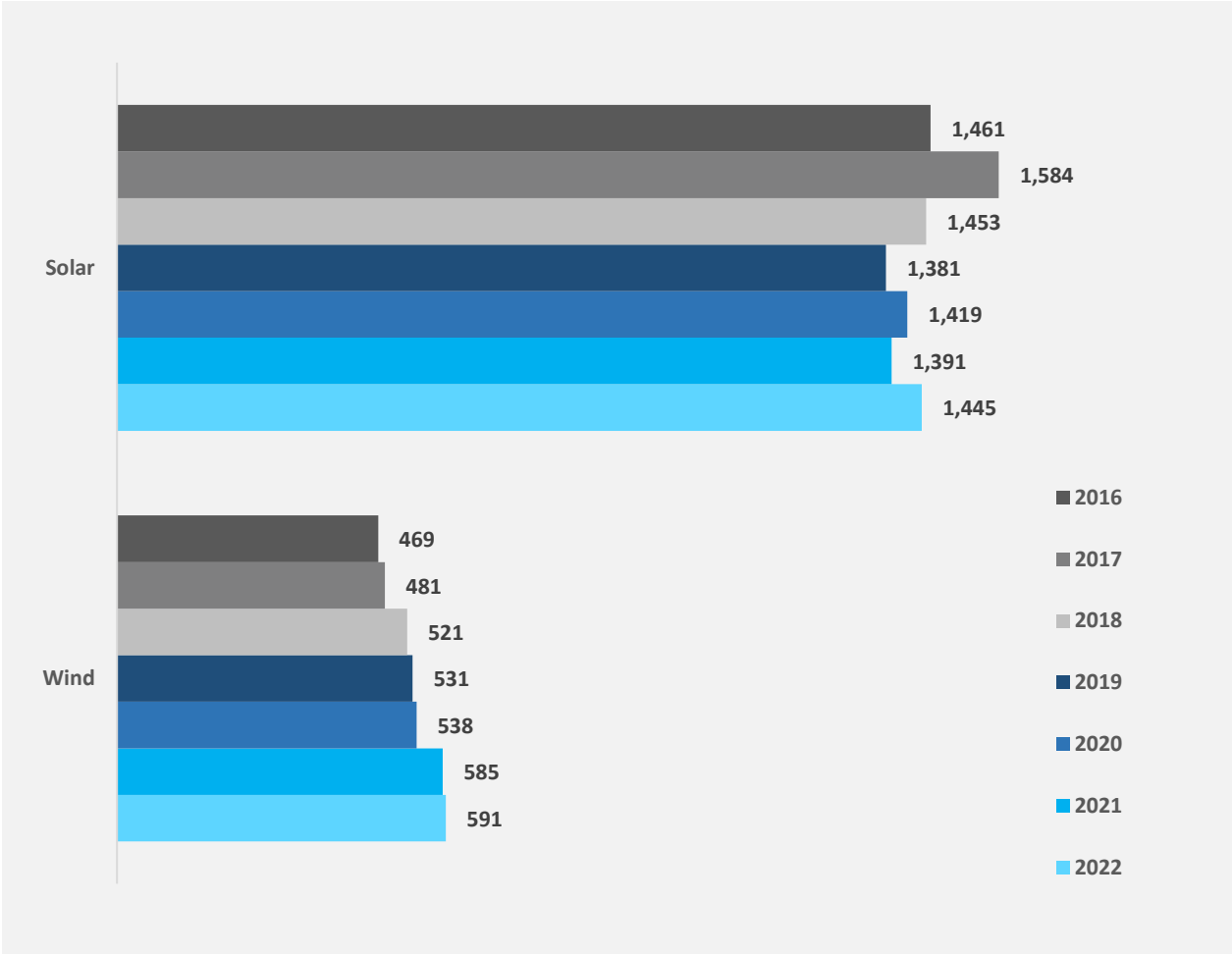
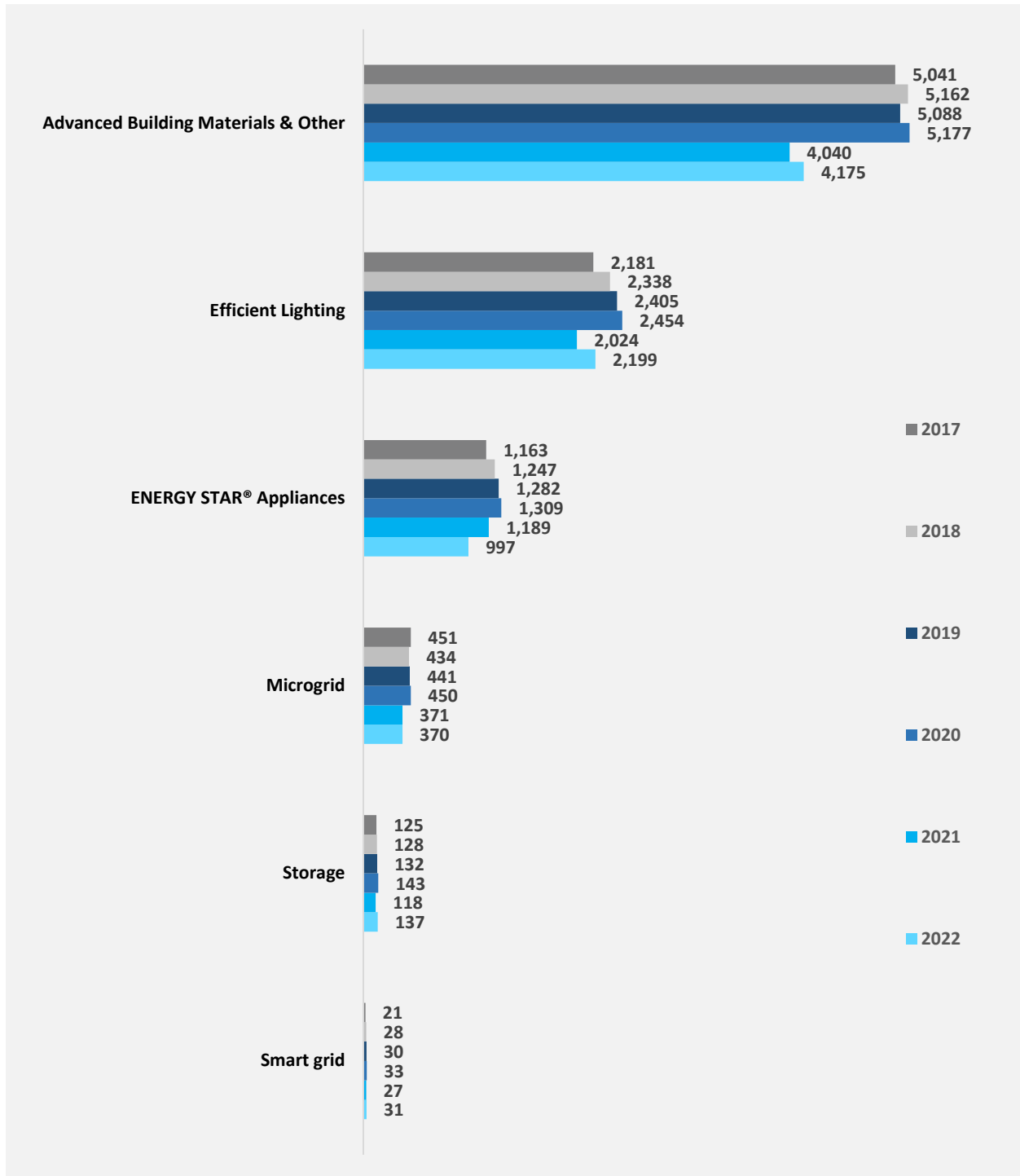
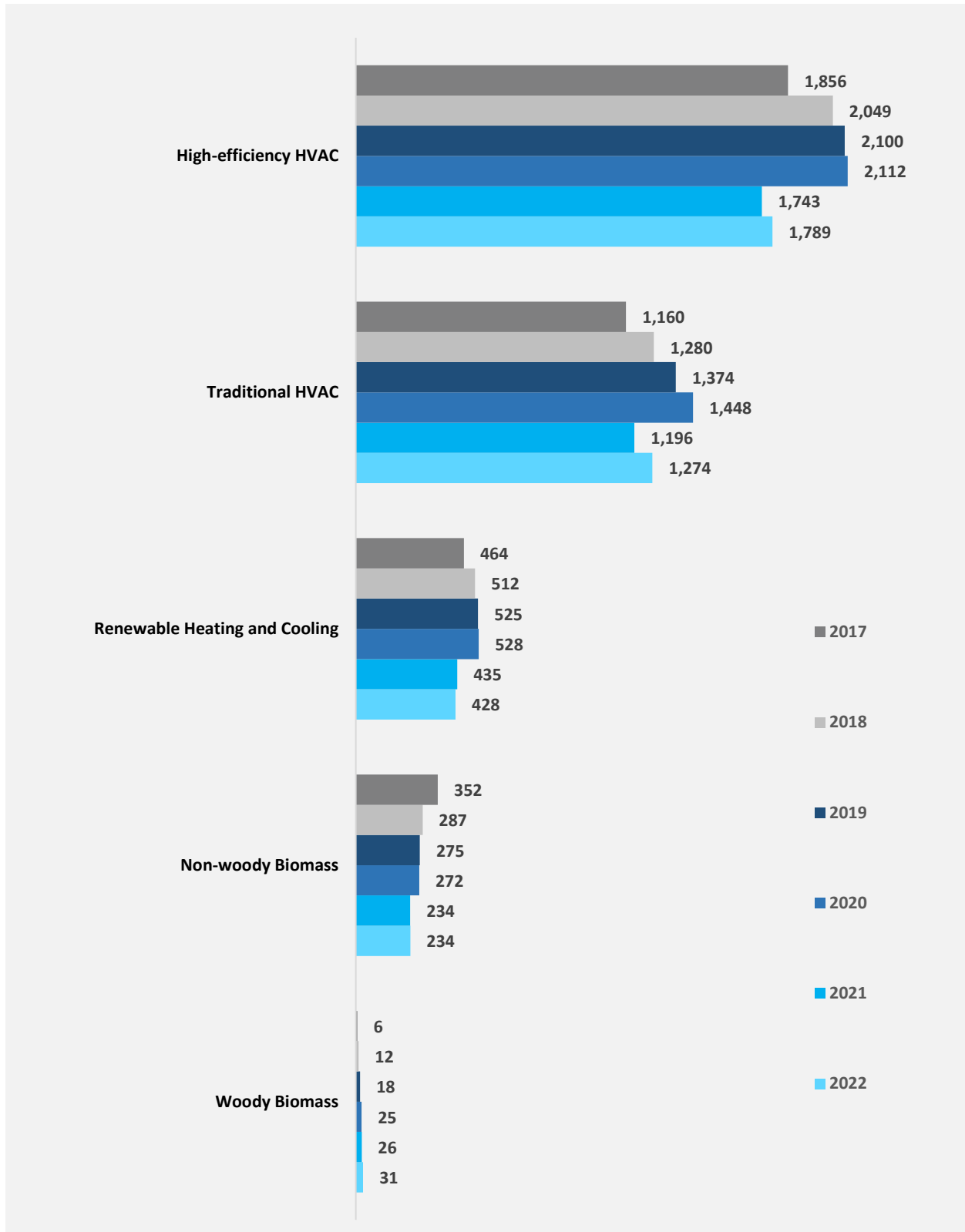


Figure 5 Energy Efficiency Employment, 2017-2022 ¹¹



¹¹ 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, 2017-2022





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 operations¹²; manufacturing¹³; trade, distribution, and transport¹⁴; engineering, research, and professional services¹⁵; and other.¹⁶

During the first year of the pandemic, all value chain sectors suffered employment losses. In the following year from 2020-2021, clean energy installation, maintenance, repair, and operations firms saw the largest come back with an increase of 2.6 percent, or 204 jobs. This followed a loss of almost 1,500 jobs from 2019 to 2020—a decline of 15.7 percent. The loss of these jobs in the first year of the pandemic was likely related to the energy efficiency and renewable heating and cooling sectors, which largely consist of installation and other construction-related jobs that were impacted by social distancing mandates. These started to see a comeback on the last year.

Manufacturing was impacted at the start of the pandemic, losing 136 jobs from 2019-2020—a decline of 16.2 percent. However, from 2020-2021 some of those jobs came back as the segment saw an increase of 94 jobs, or 13.4 percent.

All together clean energy installation, maintenance, repair, and operations, combined with manufacturing and “other” all saw an increase of 372 jobs from 2020-2021. Engineering, research, and professional services along with clean energy trade, distribution, and transport continued to shed jobs totaling 171 together.

¹² 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.

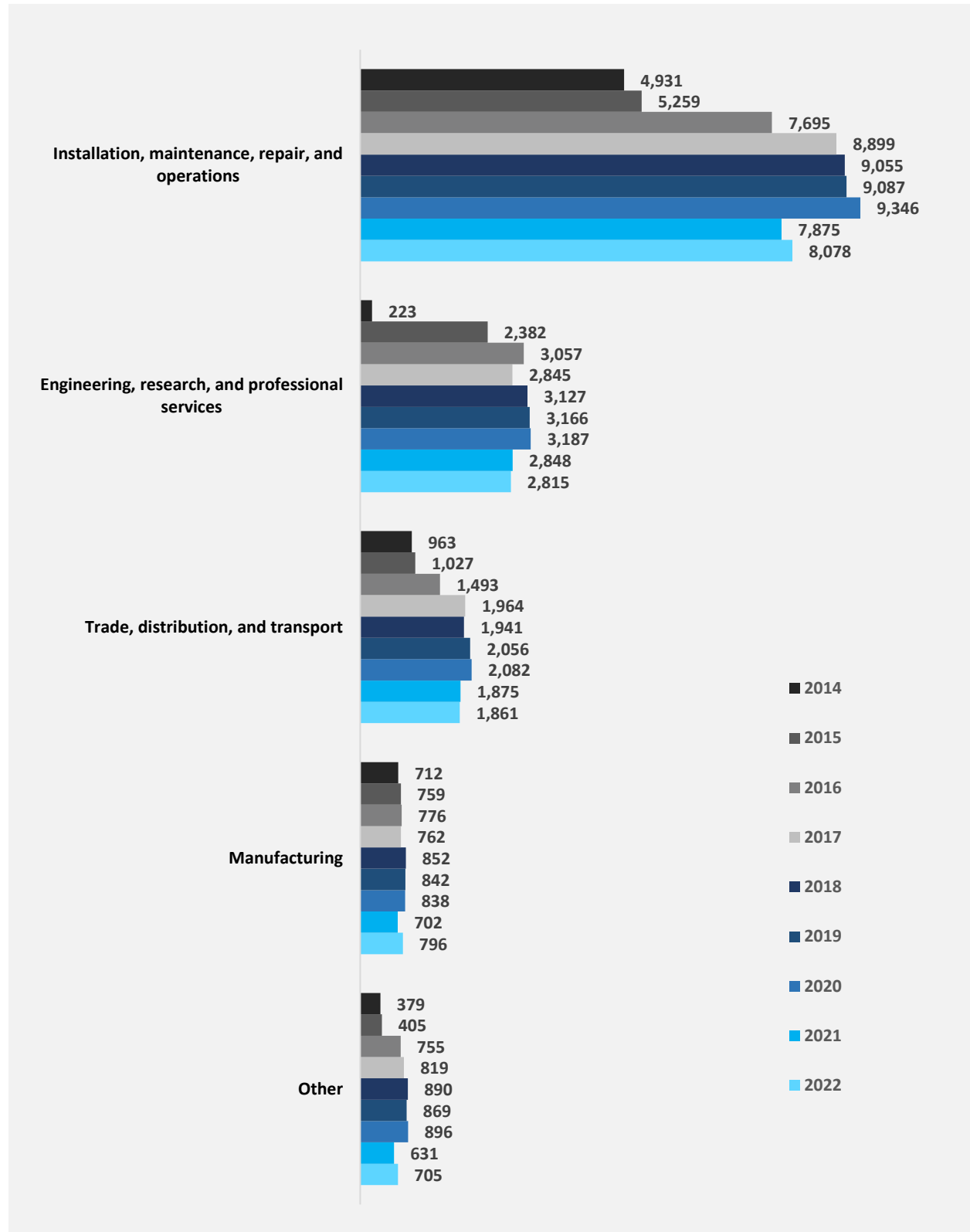
¹³ Manufacturing encompasses heating and air conditioning equipment manufacturing, engine and compressor manufacturing, semiconductor manufacturing, and energy efficient product, appliance, or lighting manufacturing, as well as motor vehicle and parts manufacturing.

¹⁴ 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.

¹⁵ Professional services include all finance, legal, consulting, engineering, research, or architectural support.

¹⁶ 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, 2014-2022





Diversity in the Clean Energy Labor Market

Figure 8 Clean Energy Workforce Demographics¹⁷

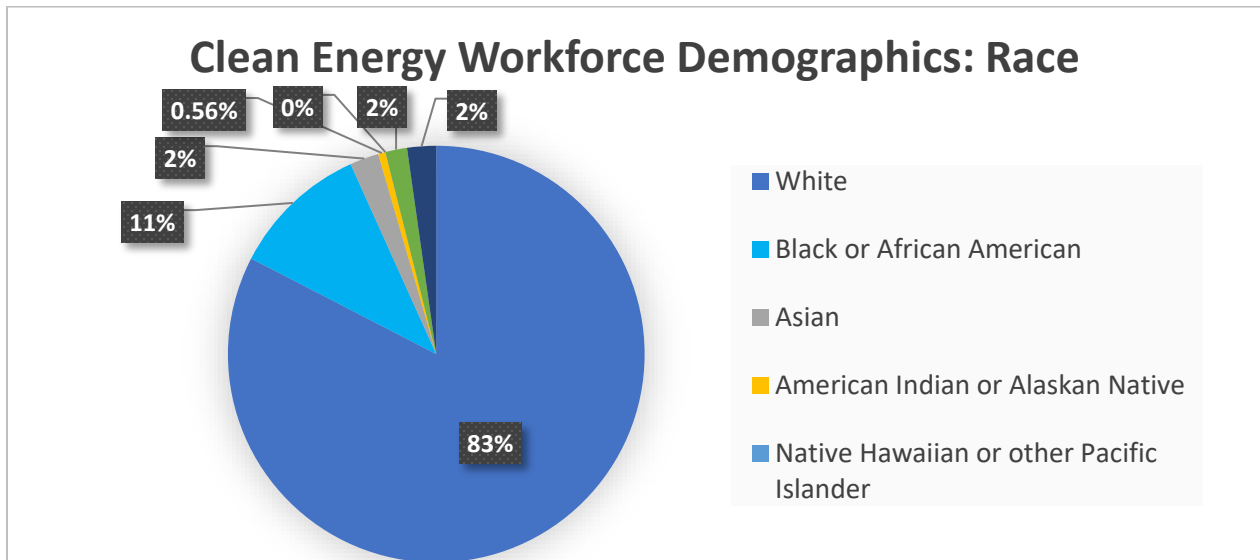
	RI Clean Energy Overall	RI State Average	US CE Workforce (including Nuclear)	US Overall Workforce
Male	63.5%	48.6%	72.8%	53.0%
Female	36.5%	51.4%	27.2%	47.0%
American Indian or Alaska Native	0.6%	0.4%	1.4%	1.0%
Asian	2.2%	3.5%	7.5%	6.6%
Black or African American	10.7%	6.5%	8.5%	12.3%
Native Hawaiian or Other Pacific Islander	0.0%	0.1%	1.1%	0.3%
White	82.6%	79.0%	74.3%	77.5%
Two or more races	1.7%	4.9%	7.3%	1.9%
Veterans	6.2%	3.3%	8.8%	5.6%
55 and over	6.5%	31.3%	13.4%	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% White workers, 11% Black or African American workers, 2% Asian workers, 1.7% as two or more races, 0.6% American Indian or Alaskan Native workers, 0% Native Hawaiian or other Pacific Islander and 2% Other.

¹⁷ Demographic data is pulled from the United States Energy and Employment Report 2022 (USEER 2022) as well as JobsEQ workforce demographics for workers across all industries in Rhode Island

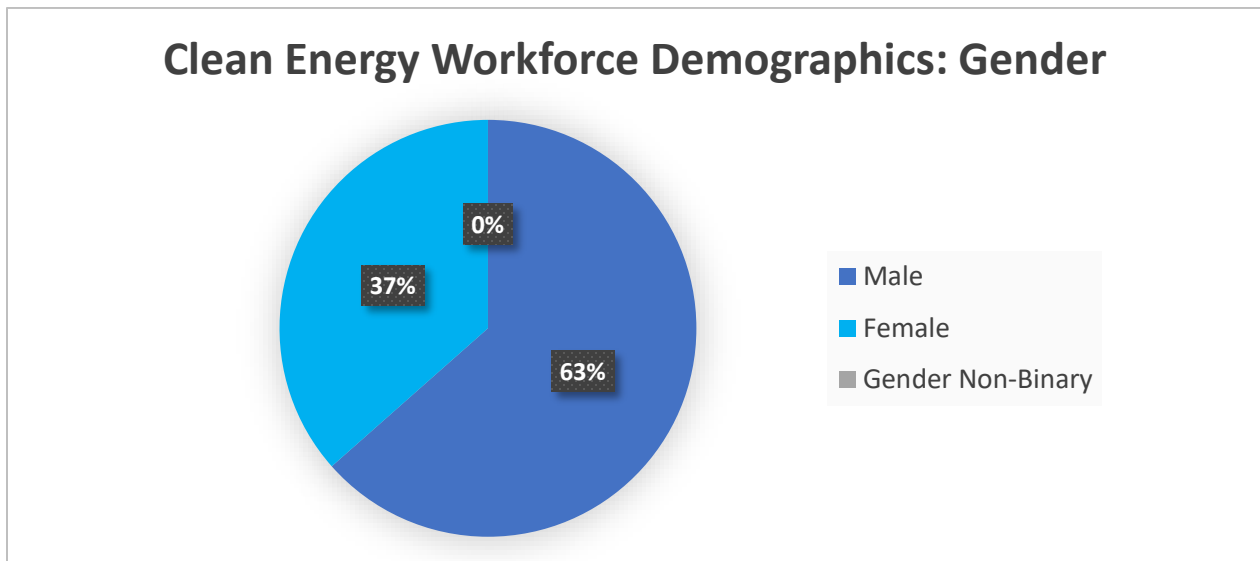
Figure 9 Clean Energy Workforce Demographics by Race ¹⁸



Demographics of Current Clean Energy Workforce by Gender

The current clean energy workforce is made up of 63% male-identifying workers and 37% female-identifying workers, with 0% responding as gender non-binary.

Figure 10 Clean Energy Workforce Demographics by Gender ¹⁹



¹⁸ Demographic data is pulled from the United States Energy and Employment Report 2022 (USEER 2022) as well as JobsEQ workforce demographics for workers across all industries in Rhode Island

¹⁹ Demographic data is pulled from the United States Energy and Employment Report 2022 (USEER 2022) as well as JobsEQ workforce demographics for workers across all industries in Rhode Island

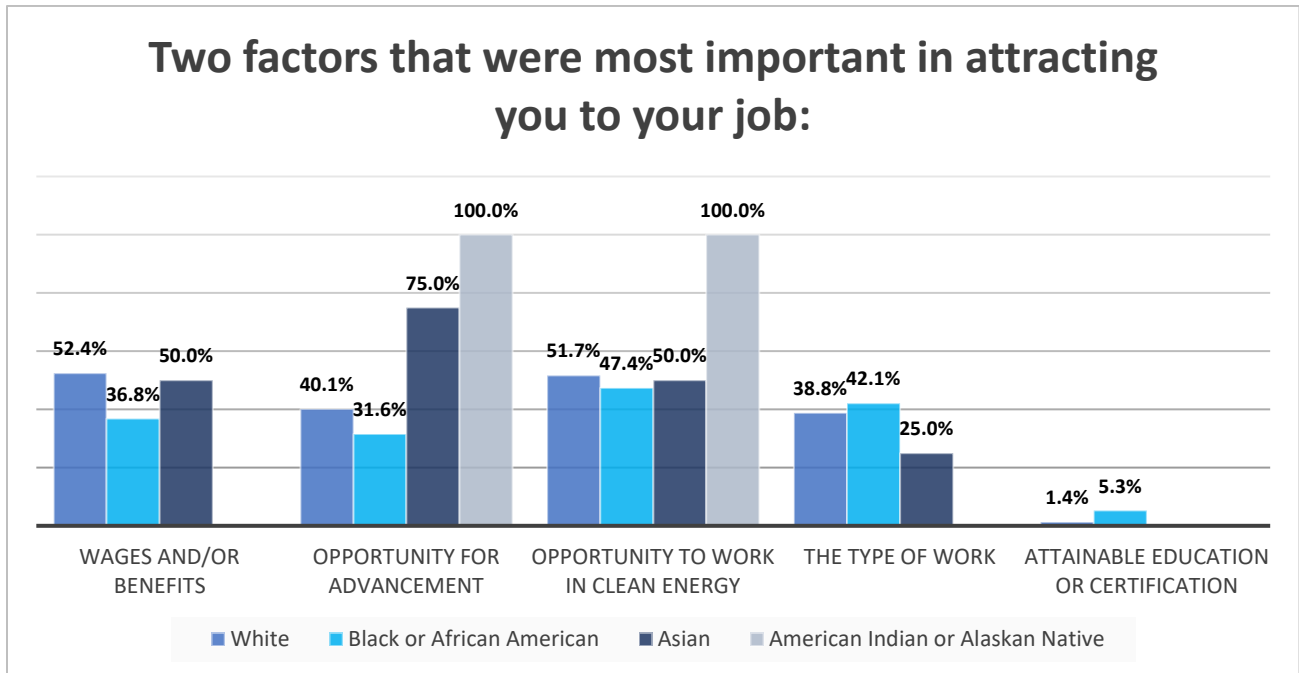
Figure 11 Benchmarks for Gender Distribution in Rhode Island Industries²⁰

	RI Clean Energy Overall	RI Construction Overall	RI Manufacturing Overall	RI Management Occupations Overall
Male	63.5%	95.9%	76.1%	57.4%
Female	36.5%	4.1%	23.9%	42.6%

Attracting a Diverse Workforce

When current workers were asked what two factors were most important in attracting you to your job, opportunity to work in clean energy and wages and/or benefits were the top two answers (51.1% responding that opportunity to work in clean energy was a top factor, and 50.5% responding that wages and/or benefits was a top factor). When broken out by race of current employees, Black or African American current workers indicated that the opportunity to work in clean energy (47.4% listed as a top priority) and the type of work (42.1% listed as a top priority) were the top two factors. White current workers listed wages and/or benefits (52.4%) and opportunity to work in clean energy (51.7%) as the top two factors. Asian current workers listed the opportunity for advancement (75%), and wages and/or benefits (50%) as the top two factors. And American Indian or Alaskan Native current workers listed the opportunity for advancement and the opportunity to work in clean energy as the top two factors (100% for each). (Note: this question allowed for multiple selections, so values will not add to 100%).

Figure 12 Attracting a diverse workforce²¹



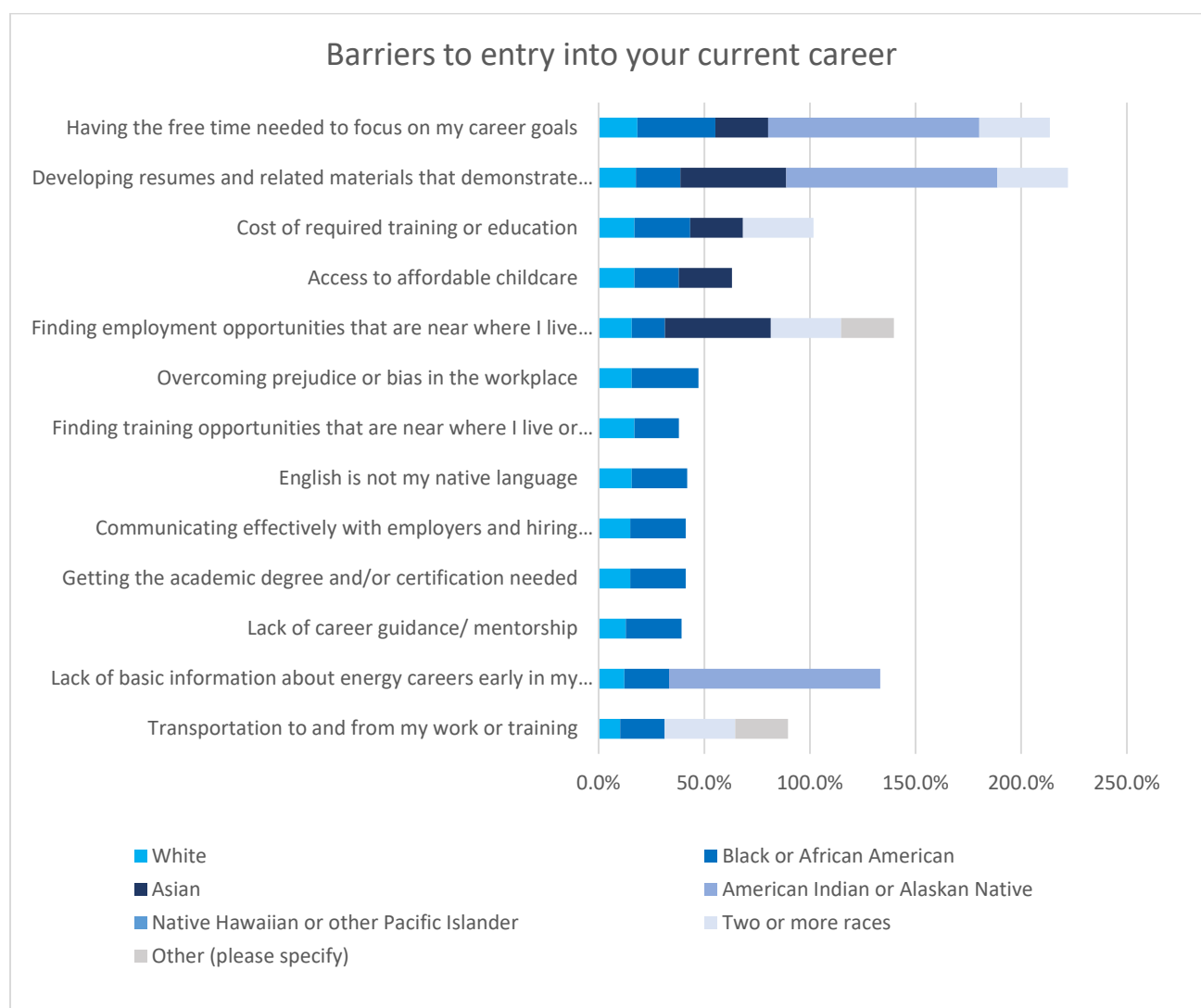
Barriers to Entering Clean Energy Careers

²⁰ Demographic data is pulled from the United States Energy and Employment Report 2022 (USEER 2022) as well as JobsEQ workforce demographics for workers across all industries in Rhode Island

²¹ BW Rhode Island Current Worker Survey, 2022

When current workers were asked what are barriers to enter into their current career, in aggregate the top two responses for strong barriers were “having the free time needed to focus on my career goals” (20%), and “developing resumes and related materials that demonstrate my qualifications” (18.9%). But when broken out by race the responses varied. For Black current workers the top two strongest barriers identified were “having the free time needed to focus on my career goals” (36.8% of Black workers identified this as a strong barrier), and “overcoming prejudice or bias in the workplace” (31.6% of Black workers identified this as a strong barrier). For White current workers the top two strongest barriers identified were “having the free time needed to focus on my career goals” (18.4%), and “developing resumes and related materials that demonstrate my qualifications” (17.7%). For Asian current workers the top two strongest barriers were tied between “finding employment opportunities that are near where I live or am willing to live” (50%), and “developing resumes and related materials that demonstrate my qualifications” (50%).

Figure 13 Barriers to entry²²

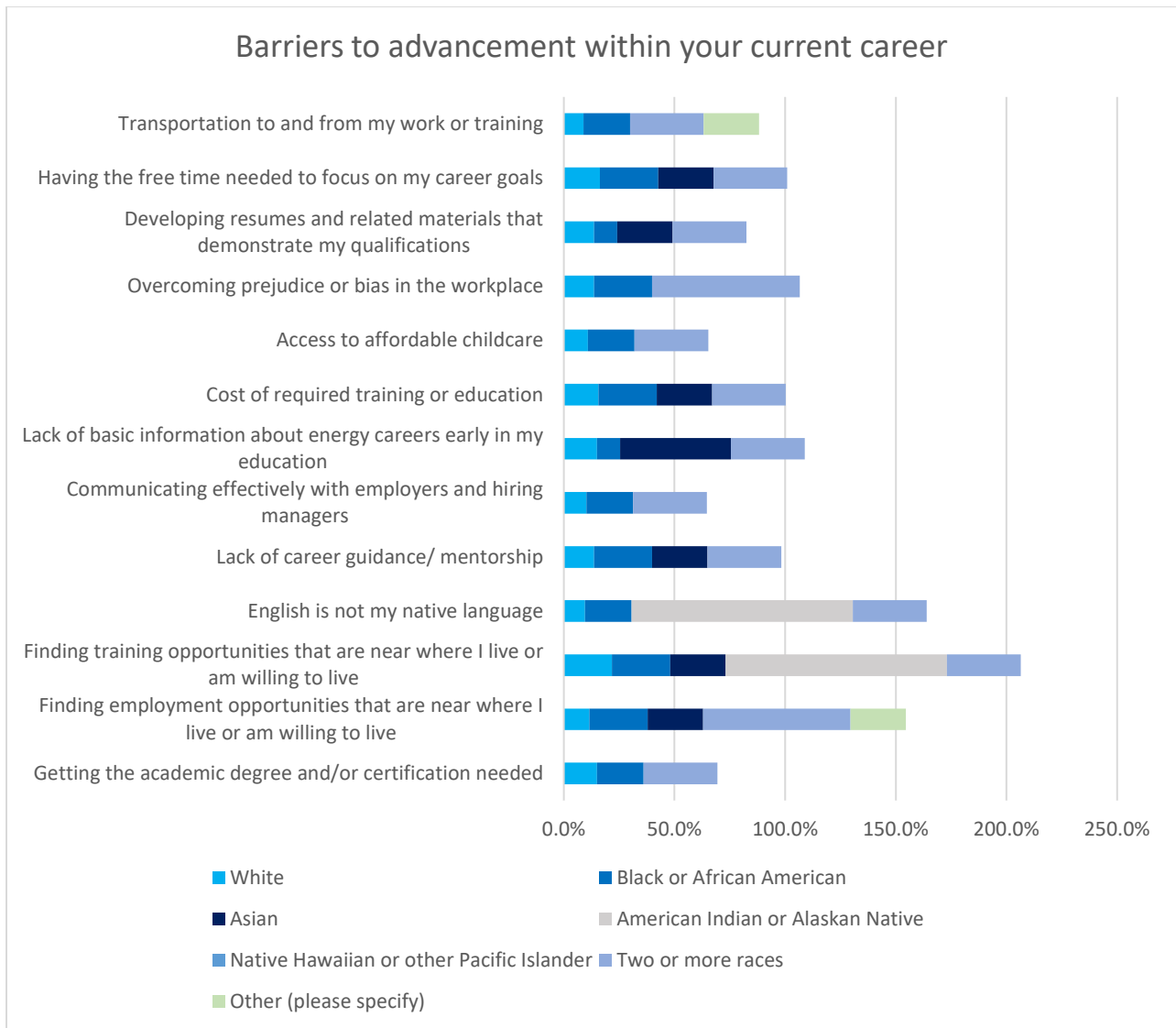


Barriers to Advancement Within Clean Energy Careers

²² BW Rhode Island Current Worker Survey, 2022. Answers will not add up to 100% as respondents could select multiple responses.

When current workers were asked what barriers they face to advancement in their current career, in aggregate the top two responses for strong barriers were “finding training opportunities that are near where I live or am willing to live” (22.3% in aggregate reported this as a strong barrier), and “having the free time needed to focus on my career goals” (17.3% in aggregate reported this as a strong barrier). When broken out by race the top barriers identified varied. For Black workers the top two barriers were almost equally distributed in a tie for multiple top barriers including “overcoming prejudice or bias in the workplace” (26%) and the “cost of required training or education” (26%). For White workers the top barriers included “finding training opportunities that are near where I live or am willing to live” (22%) and “having the free time needed to focus on my career goals” (16%). For Asian workers the top two barriers included “lack of basic information about energy careers early in my education” (50%) and “finding employment opportunities that are near where I live or am willing to live” (25%).

Figure 14 Barriers to advancement ²³

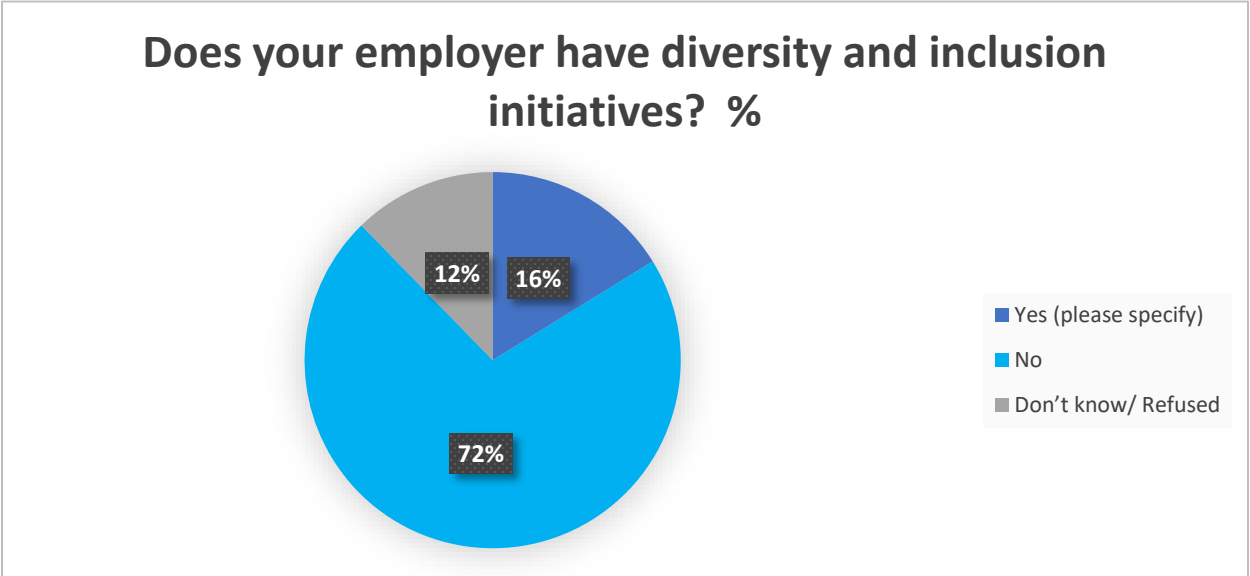


Diversity and Inclusion Initiative

²³ BW Rhode Island Current Worker Survey, 2022. Answers will not add up to 100% as respondents could select multiple responses.

When asked if their employer offered diversity and inclusion initiatives, 16% said yes, 72% said no and 12% said that they did not know.

Figure 15 Diversity and inclusion initiatives ²⁴



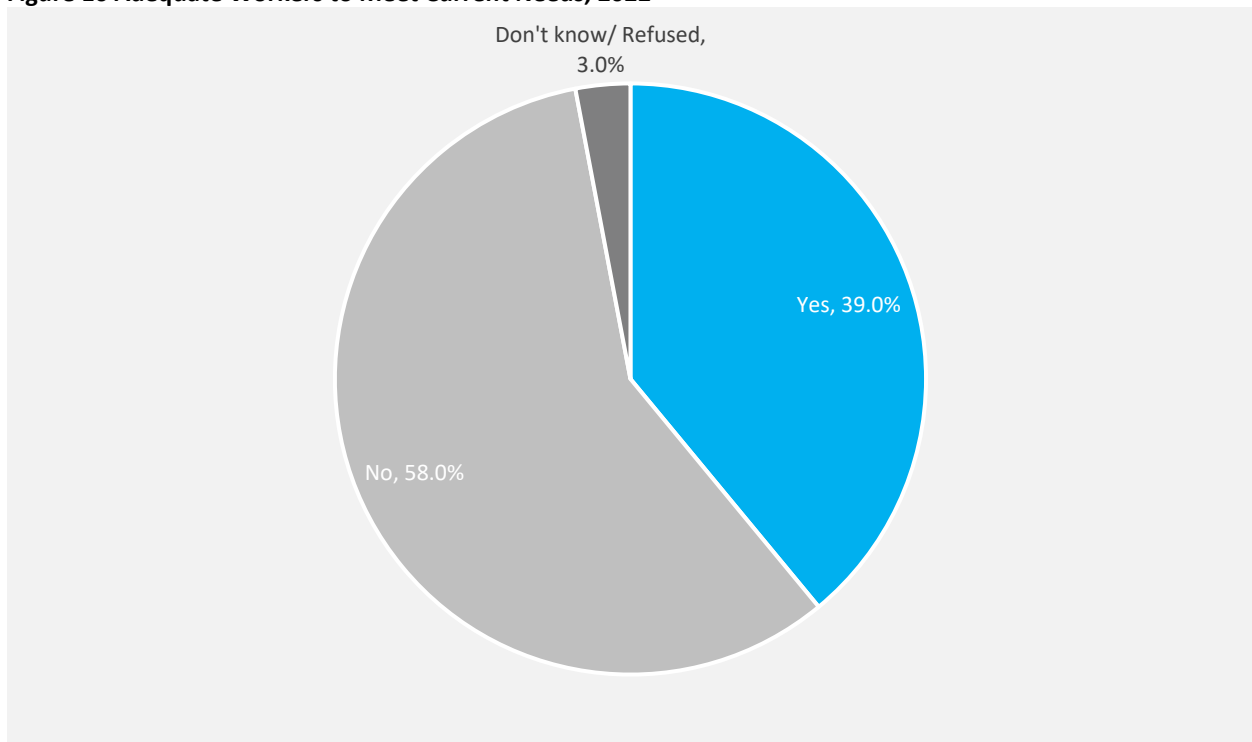
²⁴ BW Rhode Island Current Worker Survey, 2022.



Clean Energy Hiring

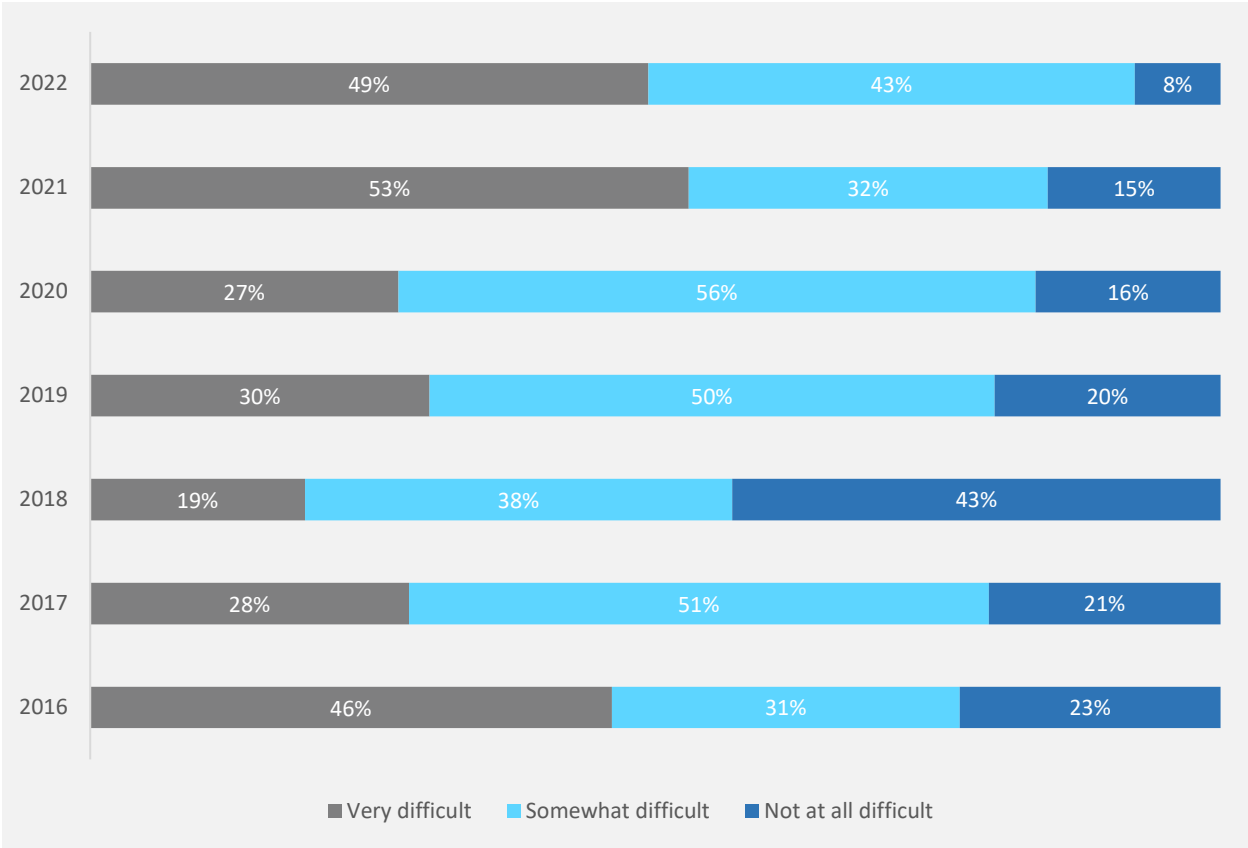
About four in ten surveyed clean energy employers (39 percent) indicated that they had an adequate number of qualified clean energy employees to meet their current needs at the end of 2021. 58 percent of employers reported that they did not, up from 28 percent in the prior year. This is a significant increase indicating that there are not enough qualified workers to fill the roles needed.

Figure 16 Adequate Workers to Meet Current Needs, 2022



Of employers hiring in 2021, 92 percent indicated some level of hiring difficulty. Just under half of businesses that were seeking new hires (49 percent) reported that hiring was “very” difficult in 2021.

Figure 17 Employer-Reported Hiring Difficulty, 2016-2022





Conclusion and Recommendations

Despite setbacks due to the unforeseen impacts of COVID-19, Rhode Island's clean energy employment from the end of 2020-2021 increased and should only continue to increase due to continued investments and policy commitments, including new federal legislation alongside the Act on Climate, the State's commitment to 100% renewable energy by 2033, renewable energy programs that all support clean energy. Given anticipated federal funding, specific attention should be paid to increasing worker supply to support the expansion of clean energy industries and including wrap around services to make these professions more accessible.

One of the primary challenges to clean energy sector growth is currently the supply of labor.

58% percent of clean energy employers reported that they did not have an adequate number of qualified clean energy employees to meet their current needs. Only four in ten surveyed clean energy employers (39 percent) indicated that they had an adequate number of qualified clean energy employees to meet their current needs.

To increase the supply of clean energy workers, opportunities include:

- Expanding Outreach and Communication to Students and Job Seekers
- Expanding paid pre-apprenticeship and apprenticeship programs
- Developing fellowship/scholarships and loan redemption programs for postsecondary schools

Increasing diversity in clean energy will require wrap around services and support structures.

When current workers were asked what barriers they face to advancement in their current career, in aggregate the top two responses for strong barriers were "finding training opportunities that are near where I live or am willing to live" (22.3% in aggregate reported this as a strong barrier), and "having the free time needed to focus on my career goals" (17.3% in aggregate reported this as a strong barrier). When broken out by race the top barriers identified varied. For Black workers the top two barriers were almost equally distributed in a tie for multiple top barriers including "overcoming prejudice or bias in the workplace" (26%) and the "cost of required training or education" (26%). For White workers the top barriers included "finding training opportunities that are near where I live or am willing to live" (22%) and "having the free time needed to focus on my career goals" (16%). For Asian workers the top two barriers included "lack of basic information about energy careers early in my education" (50%) and "finding employment opportunities that are near where I live or am willing to live" (25%). To increase diversity and inclusion in clean energy, opportunities include:

- Exploring and identify transportation barriers that limit accessibility to work or training sites
- Expanding on and promoting existing vocational reimbursement programs
- Developing a comprehensive wraparound services strategy (childcare, transportation, soft skills, etc.)
- Providing support and resources to Community Based Organizations (CBOs) to provide wraparound services

Appendix A: Survey Methodology

This year's Clean Energy Industry Report is based on the data collected for the 2022 United States Energy and Employment Report (USEER). The 2022 USEER utilizes data from the Bureau of Labor Statistics Quarterly Census of Employment and Wages (BLS QCEW 2020 Q2) 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 2022 USEER survey was administered by telephone (more than 247,500 outbound calls) and by web, with more than 104,000 emails sent to participants throughout the United States. An additional 33,000 business locations were mailed an invite letter instructing respondents to complete the survey via phone or web (included a link).

The sample was split into two categories, the known and unknown universes. The known universe includes establishments that have previously 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 2020, 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 2020 survey, 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, Emsi, 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.