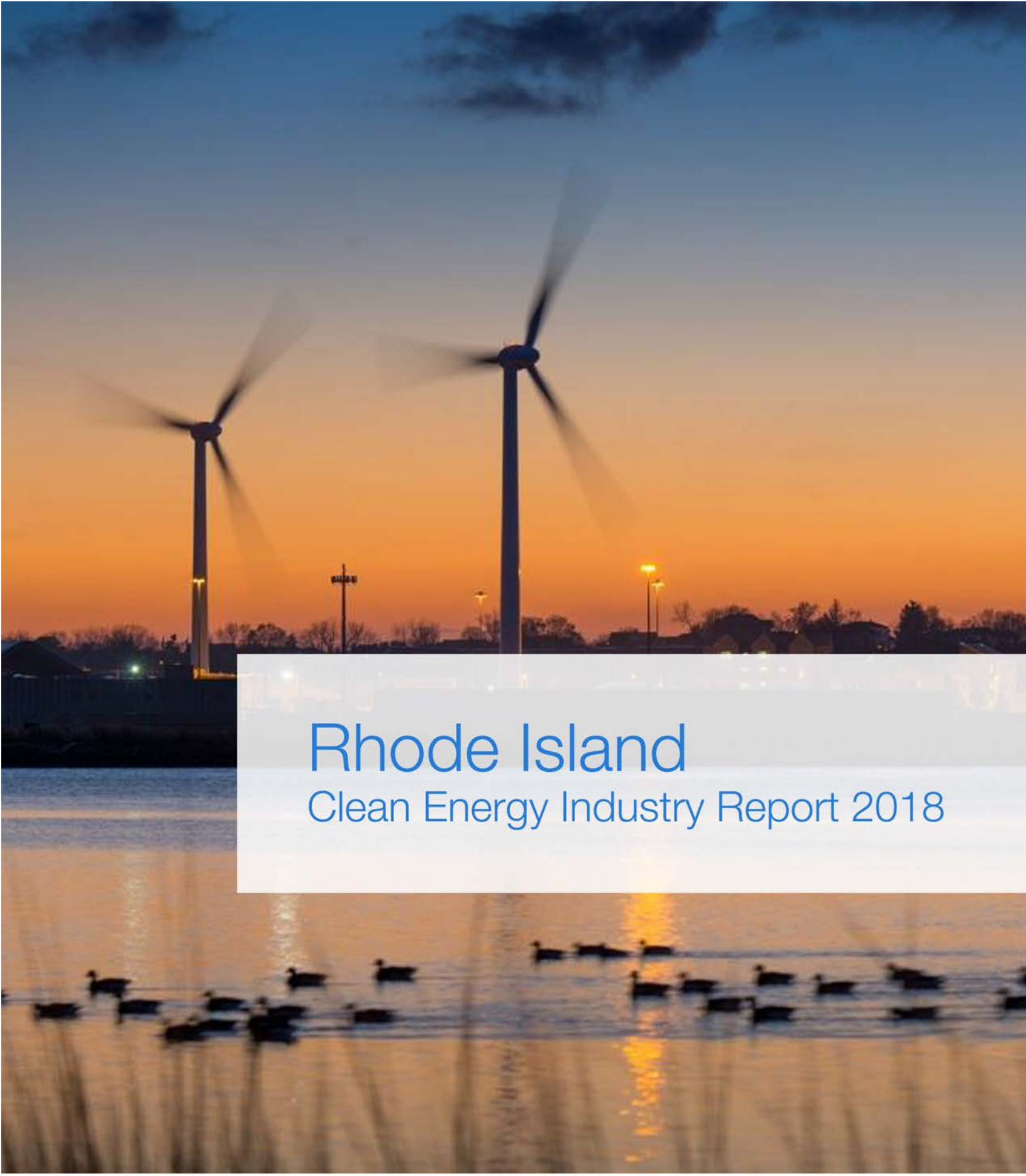

Rhode Island

Clean Energy Industry Report 2018

[bw] RESEARCH PARTNERSHIP

The Rhode Island Office of Energy Resources (OER) and the Executive Office of Commerce are pleased to present the 2018 Rhode Island Clean Energy Jobs Report. Governor Gina M. Raimondo and the General Assembly continue to implement policy that has resulted in continuous growth throughout Rhode Island's clean energy economy.

Last year, Governor Raimondo announced a goal to reach 1,000 megawatts of clean energy resources and 20,000 clean energy jobs by 2020. The state is rapidly moving toward this goal – as of this writing, we have tripled the state's clean energy resources from 100 to nearly 300 megawatts. The 2018 Clean Energy Industry Report counts more than 15,800 clean energy workers across the Ocean State. Clean energy employment has grown by 72 percent since 2014, adding 6,650 jobs in five years.

Since last year's report, our state has achieved several major milestones in the long-term growth our energy economy.

- In May, Governor Raimondo announced the selection of Deepwater Wind to construct a new, 400-megawatt offshore wind farm. The Revolution Wind project—more than ten times the size of the Block Island Wind Farm—was selected through a competitive offshore wind procurement process in collaboration with Massachusetts. This project is expected to create more than 800 direct construction jobs and 50 permanent jobs; however, it holds even greater potential for establishing Rhode Island and Southern New England as a hub for the nascent United States offshore wind industry. See the enclosed interview with Matthew Morrisey, vice president of Deepwater Wind, for more on how this will shape the local clean energy economy.

- Earlier in the year, Governor Raimondo announced that the state would be issuing a 400-megawatt clean energy RFP, due out by the end of the summer, that will seek competitive bids for clean energy projects. These projects are expected to add more jobs to our local economy in the coming years.

- Energy efficiency remains the largest sector of our clean energy economy and continues to grow due to our nationally recognized policies. In the 2017 American Council for an Energy-Efficient Economy State Scorecard, Rhode Island advanced to third in the country for its energy efficiency programs.

The State's policy efforts will continue to build out the state's solar and energy efficiency sectors. We are thankful to Governor Raimondo 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 local economy. Dedicated investment and policy support have set the stage for the Ocean State to become a major player in national and global clean technology spheres. We are looking forward to seeing what continued leadership and commitment brings for our state and its citizens.

Sincerely,

Carol Grant
Commissioner
Rhode Island Office of Energy Resources

Stefan Pryor
Rhode Island Secretary of Commerce

Acknowledgments

The 2018 Rhode Island Clean Energy Industry Report is the fourth installment of the compilation of data and survey results from clean energy employers across the state. This work could not be completed without the collaboration and support of many stakeholders, state agencies, the RI General Assembly, and the Office of Governor Gina M. Raimondo. The Rhode Island Office of Energy Resources and the Executive Office of Commerce would like to thank all the stakeholders who helped with the preparation and coordination associated with this report. Also, thank you to the respondents of the survey which resulted in the data this report summarizes. Our partners could only gather this data because each respondent's willingness to share their time and insights. The publication of this report would not be possible without the hard work and dedication of the following individuals:

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OER would like to especially thank Matthew Morrissey of Deep Water Wind for his time and commitment to the clean energy workforce in Rhode Island.

Executive Summary

With aggressive targets, Rhode Island's overall clean energy economy continues to grow. The industry's workforce has grown by 72 percent since 2014, resulting in 6,650 new jobs across the state. Employment climbed by just under four percent between 2017 and 2018, creating an additional 560 jobs in 12 months, as the sector continues to grow at a faster pace than the state's overall workforce that grew by less than one percent. Clean energy workers now account for 3.3 percent of the total labor force in Rhode Island. This amounts to nearly 16,000 jobs in 2018, with most of employment found across energy efficiency firms (9,338 jobs), followed by renewable and efficient heating and cooling technologies (4,110 jobs), renewable energy (2,114 jobs), and clean transportation (274 jobs).

This year's report highlights the responsiveness of the clean energy ecosystem to both local policies and nationwide trends. In general, the annual growth rate has slowed compared to previous years. The energy efficiency and renewable and efficient heating and cooling sectors remain strong, growing at respective rates of four and eight percent each over 12 months. Together, these two sectors created nearly 660 jobs. For the first time since 2015, the renewable energy sector took a hit and declined by a factor of four percent, largely the result an industry-wide slowdown in the solar industry. These declines were seen across the nation and are a result of both the statewide Renewable Energy Growth (REG) Small Scale program hitting the 6.55-megawatt (MW) cap earlier than expected and a new federal tariff on imported solar equipment.

This year, Rhode Island's clean energy economy showed the largest employment growth in engineering, research and professional services; this is possibly in anticipation of the new offshore wind project. The engineering value chain sector grew by almost ten percent between 2017 and 2018, creating 280 new jobs. Manufacturing firms also added 90 workers to their labor force, a growth rate of approximately 12 percent, while the installation sector grew by just under two percent, for an additional 160 new clean energy installers. Despite relatively small job growth, there are more installation firms in Rhode Island, as the proportion of installation establishments increased by ten points. Given the high energy efficiency job growth but decline in energy efficiency labor intensity, it is possible that there are more smaller construction firms entering this market space. Indeed, the proportion of small businesses increased by eight points between 2017 and 2018.

The Ocean State remains a national leader in offshore wind, taking the necessary strides to remain at the forefront of this industry. Following construction of the nation's first offshore wind farm in 2015, the Rhode Island-based offshore wind energy development group, Deepwater Wind, has recently been

selected for another offshore wind project for 400 MW. The project, Revolution Wind, will consist of up to 50 turbines located in federal waters between Block Island and Martha's Vineyard, and complements a broader industry buildout coming from similar projects in Massachusetts, Connecticut, and New York.

To ensure the state reaches its 20,000 jobs and 1,000 MW goals by 2020, this year's report identified three key areas of focus for Rhode Island's policy environment. In addition to policy, continued support and development in these opportunity areas is needed to reach the state's goals in two years. In general, stronger support for the maintenance of offshore wind leadership, infrastructure investments in energy efficiency and electric vehicle charging stations, and the solar industry will help propel Rhode Island towards its goals. Consistent policy structures that promote predictability, continued expansion of financing options for renewable energy and energy efficiency and tapping into new markets or synergies with storage technologies are paramount to continuing strong support of the solar industry. At the same time, having already established itself as an offshore wind leader, the state has significant opportunities to pursue strategic regional partnerships and act as an exporter of both goods and services to the rest of the nation with regards to offshore wind development. Lastly, infrastructure investments and rebates that incentivize electric vehicle uptake and charging station deployment, as well as energy efficiency retrofits, would capitalize on the state's already strong energy efficiency and installation workforce development and market structures. With continued commitment to renewing and adding policy measures in support of the clean energy industry, the state will be well-poised to achieve 20,000 clean energy jobs by 2020.

Industry Overview

Clean Energy Jobs and Technology Sectors

With the support of Governor Gina Raimondo and the General Assembly, Rhode Island remains a national leader in clean energy policy and the state continues to rank highly across multiple national clean energy indices. This year, Rhode Island rose yet another spot, to third overall, in the American Council for an Energy Efficient Economy's (ACEEE) state rankings. ACEEE particularly credits Rhode Island's use of Regional Greenhouse Gas Initiative (RGGI) funds and efforts to lead by example through the public sector.[1] In the most recent U.S. Clean Tech Leadership Index, Rhode Island was ranked 12th overall, rising five spots in just four years. The Index also ranked Rhode Island as second in the nation with regards to clean energy jobs as a percentage of the total workforce.[2] Meanwhile, the latest Corporate Clean Energy Procurement Index ranked Rhode Island ninth in the nation.[3] In general, Rhode Island has a total of 46 policy programs or financial incentives that support the state's clean energy industry sectors, including renewable energy, energy efficiency, and electric vehicles.[4]

This year, Rhode Island's Office of Energy Resources was awarded a State Leadership in Clean Energy Award by the Clean Energy States Alliance (CESA), a national nonprofit coalition of clean energy-focused public agencies, for their successful implementation of the nation's first offshore wind farm off the coast of Block Island.[5]

With this supportive policy climate, the state has seen clean energy employment grow by 72 percent since 2014, creating an additional 6,650 jobs in five years (Figure 1). Despite a slowdown in the annual growth rate compared to previous years, clean energy firms are still growing faster than the overall economy. In 2017 alone, the industry grew by almost four percent, while the state's overall workforce grew by less than one percent. Clean energy workers now account for 3.3 percent of the total labor force in Rhode Island.[6] This amounts to nearly 16,000 workers across the state, with the majority of employment found across energy efficiency firms, followed by renewable and efficient heating and

[1] 2017 State Energy Efficiency Scorecard (http://database.aceee.org/state/rhode-island)
[2] 2013-17 U.S. Clean Tech Leadership Index, CleanEdge, Inc.
[3] 2018 U.S. Clean Energy Procurement Index (https://cleanedge.com/reports/Corporate-Clean-EnergyProcurement-Index)
[4] DSIRE Programs (http://programs.dsireusa.org/system/program?fromSir=0&state=RI)
[5] 2018 State Leadership in Clean Energy Awards (https://www.cesa.org/projects/state-leadership-in-clean-energy/2018)
[6] Bureau of Labor Statistics, Quarterly Census of Employment and Wages. Total Covered Employment, June 2017. Extracted on 9 April 2018.

cooling technologies, such as traditional and high-efficiency HVAC and woody or non-woody biomass (Figure 2).

Figure 1. Clean Energy Employment Growth, 2014-2018

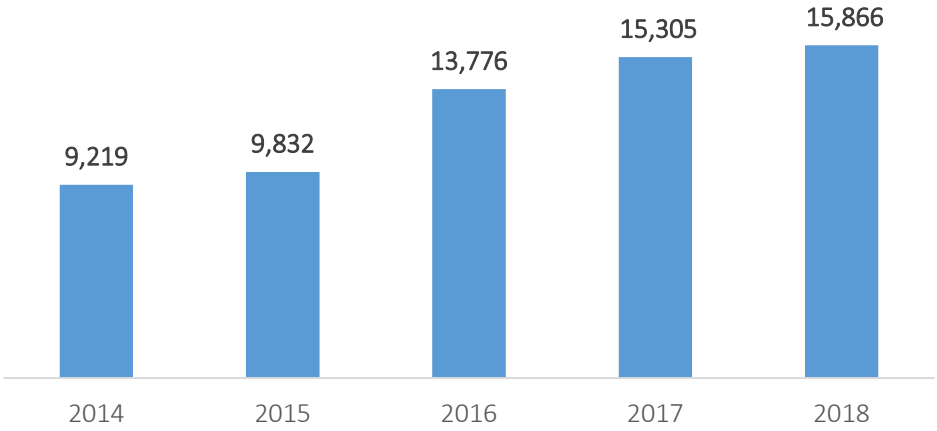
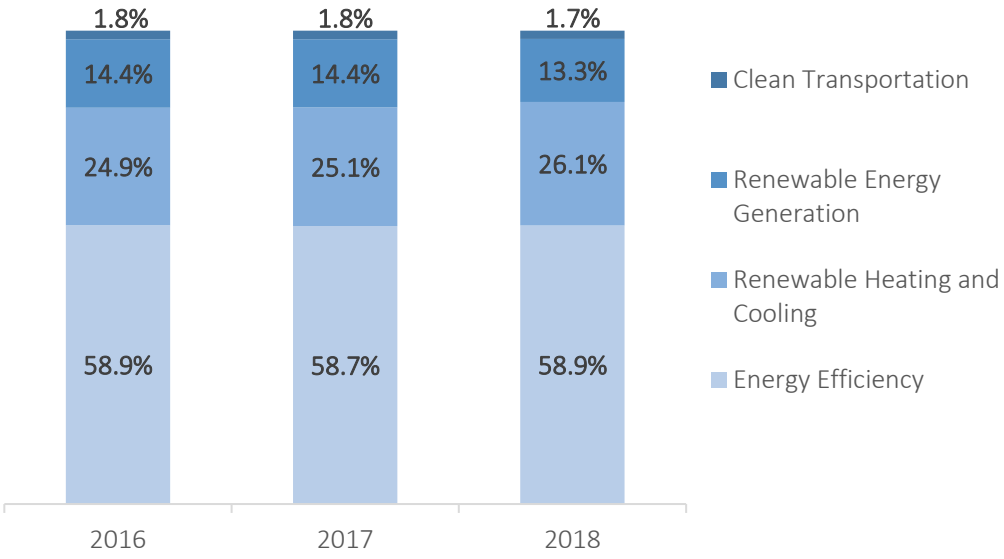


Figure 2. Clean Energy Employment by Technology, 2016-2018



For renewable energy firms, clean energy labor intensity remained steady between 2017 and 2018. Nine in ten renewable energy workers spend at least half their labor hours dedicated to clean energy business activities; the one-point increase from 2017 is likely not statistically significant. Just over 80 percent of renewable energy workers dedicate all their time to the clean energy portion of business. On the other hand, the energy efficiency sector saw a slight decline in labor intensity this year. Just over half, or 57 percent, are reported to spend the majority of their time, while 54 percent spend all of their time on clean energy-related activities. This represents a respective decline of five and seven percentage points (Table 1).

Table 1. Clean Energy Labor Intensity, 2016-2018

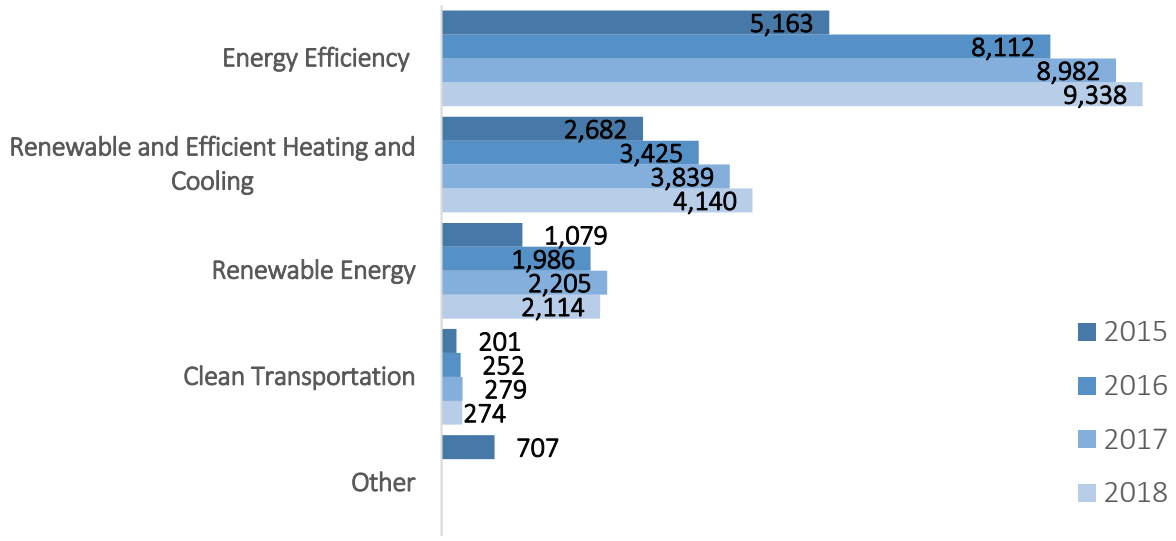
	Workers that spend at least 50 percent of their time			Workers that spend 100 percent of their time		
	2016	2017	2018	2016	2017	2018
Renewable Energy	95%	89%	90%	91%	78%	81%
Energy Efficiency	84%	63%	57%	80%	61%	54%

Rhode Island has demonstrated strong, continuous support for energy efficiency employment, the state's largest clean energy employment sector. GridWise Alliance, a coalition of electricity industry stakeholders, produces an annual Grid Modernization Index that examines state-by-state efforts to move toward a modernized electric grid through state support, customer engagements, and grid operations. Rhode Island achieved the largest jump in ranking over the last two reports, rising 25 spots to 23rd overall. GridWise credits Raimondo's clean energy initiatives and the Public Utility Commission's Power Sector Transformation Initiative, created this past year, which rethinks modernization through analysis of utility business models, distribution system planning, grid connectivity functionality, and strategic electrification of transportation and heating.[7] In line with the national Better Buildings Initiative, Rhode Island also committed to a 20 percent reduction in energy consumption in its state buildings by 2020 (based on a 2010 baseline), in addition to creating an inventory of approximately 18 million square feet using the Environmental Protection Agency's ENERGY STAR Portfolio Manager.[8]

Such statewide policies continue to support strong energy efficiency and renewable heating and cooling job growth. Rhode Island's energy efficiency sector now totals 9,350 workers, a growth rate of four percent between 2017 and 2018. As in previous years, these technologies still employ the majority of clean energy workers across the state. Renewable and efficient heating and cooling firms saw employment grow by eight percent, or about 300 workers over the same time frame; to date, these firms account for roughly a quarter of the clean energy workforce (
Figure 3).

[7] U.S. Grid Modernization Index 4, CleanEdge, Inc.
[8] US Department of Energy (https://betterbuildingsinitiative.energy.gov/partners/state-rhode-island)

Figure 3. Clean Energy Employment Growth by Technology, 2014-2018



This year's data allows for more granularity to examine sub-technology employment within both the energy efficiency and renewable heating and cooling sectors. In Rhode Island, energy efficiency workers are most engaged with advanced building materials and other energy-efficient products and services; this sub-sector accounts for 55 percent of total energy efficiency jobs, or roughly 5,160 workers. This is followed by efficient lighting (25 percent), and energy star appliances (13 percent). Grid modernization technologies account for just over 460 jobs (Figure 4).

In the renewable heating and cooling sector, most employees spend their time working with both high-efficiency and traditional HVAC technologies, followed by renewable heating and cooling, and woody and non-woody biomass (Figure 5).

Figure 4. Energy Efficiency Employment by Sub-Technology, 2018

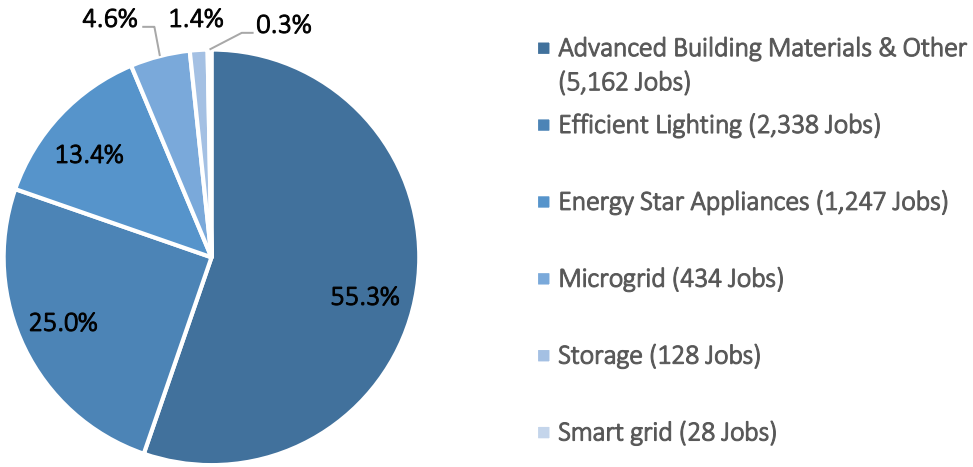
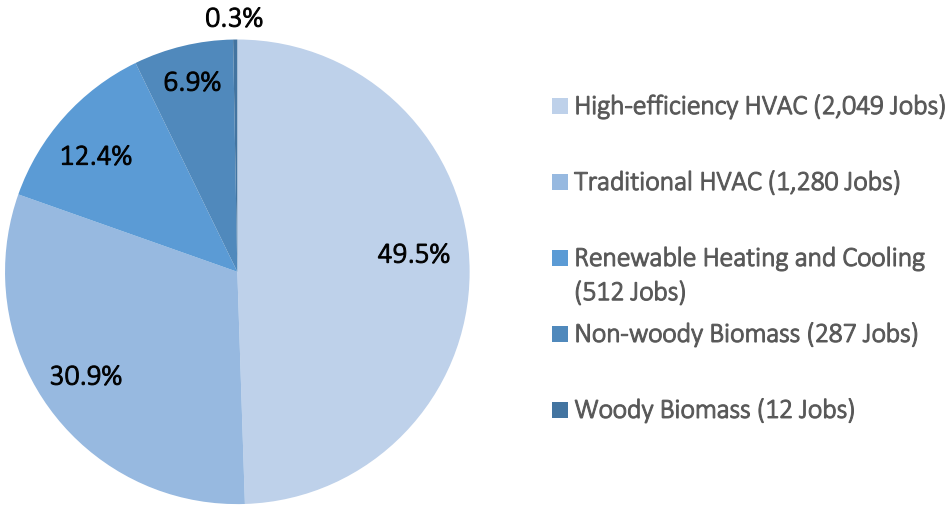


Figure 5. Renewable and Efficient Heating and Cooling Employment by Sub-Technology, 2018



For the first time since 2015, renewable energy generation declined in overall employment. These declines in the renewable energy sector are attributable to job losses in the solar industry, which were also experienced across the nation.[9] In Rhode Island, the solar workforce shrank by 8.2 percent, shedding roughly 130 jobs (Figure 6). Nationally, solar industry employment fell four percent this year. This is despite continuous long-term job growth that has seen solar employment triple since 2010. The setback comes as a result of slowdowns in the pace of new solar installations as well as uncertainty over federal trade policy.

When the Small Scale REG program hit its annual 6.55 MW limit in October of 2017, there was a slowdown in in-state solar purchases, forcing businesses to downsize, reduce labor hours, furlough their staff, or exit the market in general. Nationally, the Trump administration's February rollout of a tariff on imported solar equipment has led to solar price increases across the nation, including in Rhode Island. The tariff is expected to add $500 to $1,000 to a residential solar installation with even greater costs to commercial developers. The price increase will likely alter consumer behavior, but the plummeting costs of solar still ensure a competitive spot in the market.[10] Across Rhode Island, the price of solar has declined by 52 percent over the last five years alone.[11] A federal solar tax credit also remains in place through 2021, which provides a 30 percent reduction to the cost of solar installations for residential and commercial systems.[12]

[9] The Solar Foundation. *National Solar Jobs Census 2017.* February 2018. It should be noted that The Solar Foundation only reports solar jobs at the 50 percent threshold, or solar workers that spend the majority of their time on solar-related work activities.
[10] https://www.ecori.org/renewable-energy/2018/1/26/solar-fees-hitting-southern-new-england
[11] Solar Energy Industries Association. State Factsheets, Rhode Island. March 2018.
[12] https://www.energysage.com/solar-panels/solar-rebates-incentives/ri/

Despite uncertainty in the solar industry, wind energy firms grew employment by eight percent, or an additional 40 workers, and given the recent announcement for a new offshore wind farm, it is likely that this sector will see continued growth through 2018.

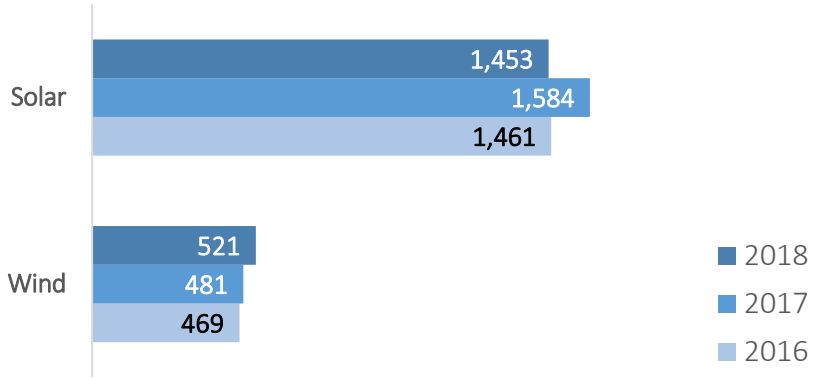
On May 23, 2018, Governor Gina Raimondo announced that Rhode Island had selected Providence-based Deepwater Wind to construct a 400-megawatt offshore wind farm in federal waters. The project, Revolution Wind, was selected at the same time that Massachusetts selected their own 800-megawatt wind farm project with another developer. Since that time, Connecticut also announced that Deepwater Wind was selected for a project that will encompass the development of a 200-megawatt wind farm equidistant between Montauk, New York and Martha's Vineyard. Once approved, Revolution Wind will represent a large step toward achieving Governor Raimondo's goal of increasing Rhode Island's clean energy resources ten-fold by 2020 to a total of 1,000 megawatts.

Deepwater Wind has already successfully installed Rhode Island's Block Island Wind Farm, the first offshore wind farm in the nation. According to Deepwater Wind, the 30-megawatt farm employed more than 300 local workers during its construction. Revolution Wind is more than ten times the size of the Block Island farm and is again expected to employ Rhode Island workers, especially in construction and offshore wind support services. While manufacturing activity has and will be initially exported to more mature European markets, the manufacturing sector will begin to play a larger part in revitalizing port communities in Quonset and Providence as economic volume of offshore wind activity increases.[13] Vice President of Deepwater Wind, Matthew Morrissey, credits the success and emergence of the offshore wind industry in Rhode Island to close partnership bonds between the Governor's Office, the Rhode Island Office of Energy Resources, Deepwater Wind, and many of the regional stakeholders involved in the state's economic development and regional collaboration efforts.[14]

The offshore wind expansion is also consistent with federal policy trends, as the US Department of the Interior (DOI) has consistently expressed support for offshore wind energy. In April, DOI announced two new leasing areas off the coast of Massachusetts and called for further information on other potential lease areas, including the area of Revolution Wind.[15]

[13] Deepwater Wind Inc. (http://dwwind.com/project/block-island-wind-farm/)
[14] Deepwater Wind Inc. Interview (VP Matthew Morrissey, 6/21/18)
[15] US Department of Interior (https://www.doi.gov/pressreleases/trump-administration-proposes-sale-wind-energy-massachusetts- coast)

Figure 6. Solar and Wind Employment Growth, 2016-2018



The Clean Energy Value Chain

In 2011, Rhode Island launched the 40-Megawatt Distributed Generation Contracts Pilot Program (DG Program), requiring National Grid to enter into 15-year renewable energy contracts with private landowners, businesses, and municipalities at a set and fixed price. Wind, solar photovoltaic, and anaerobic digestion technologies are eligible to participate in the DG program. The DG program structured and eased market entry for renewable energy companies looking to produce sustainable energy for Rhode Island's consumers. In April 2015 the state launched the Renewable Energy Growth Program (REG) Program that allows solar, wind, hydroelectric, and anaerobic digester customers to sell their clean energy output under long-term tariffs at fixed prices.[16] The REG Program has supported dozens of medium, commercial and large scale solar projects, in addition to over 2,500 homeowners participating in the REG Program over the past 3 years. The REG Program was extended by the General Assembly and signed by Governor Raimondo in June 2017 which will result in the REG Program providing 40 megawatts of capacity each year to support various forms of renewable energy development.

Possibly as a result of such programs, more than half of firms (55 percent) report that installation, maintenance, or repair is their primary value chain activity, up 10 percentage points from 2017. They are followed by trade at 16 percent and professional services at 10 percent of establishment activity. The state also has significant representation in the manufacturing sector, with one in ten employers reporting manufacturing as their primary activity (Figure 7).

This year, engineering and manufacturing firms saw the largest employment growth, 10 percent and 12 percent respectively. Installation, maintenance, and repair operations saw employment grow by just under two percent, while trade, distribution and transport shed roughly 23 jobs, or a decline of one percent (Figure 8).

[16] State of Rhode Island Office of Energy Resources (http://www.energy.ri.gov/renewable/)

Figure 7. Clean Energy Establishments by Value Chain, 2017-2018

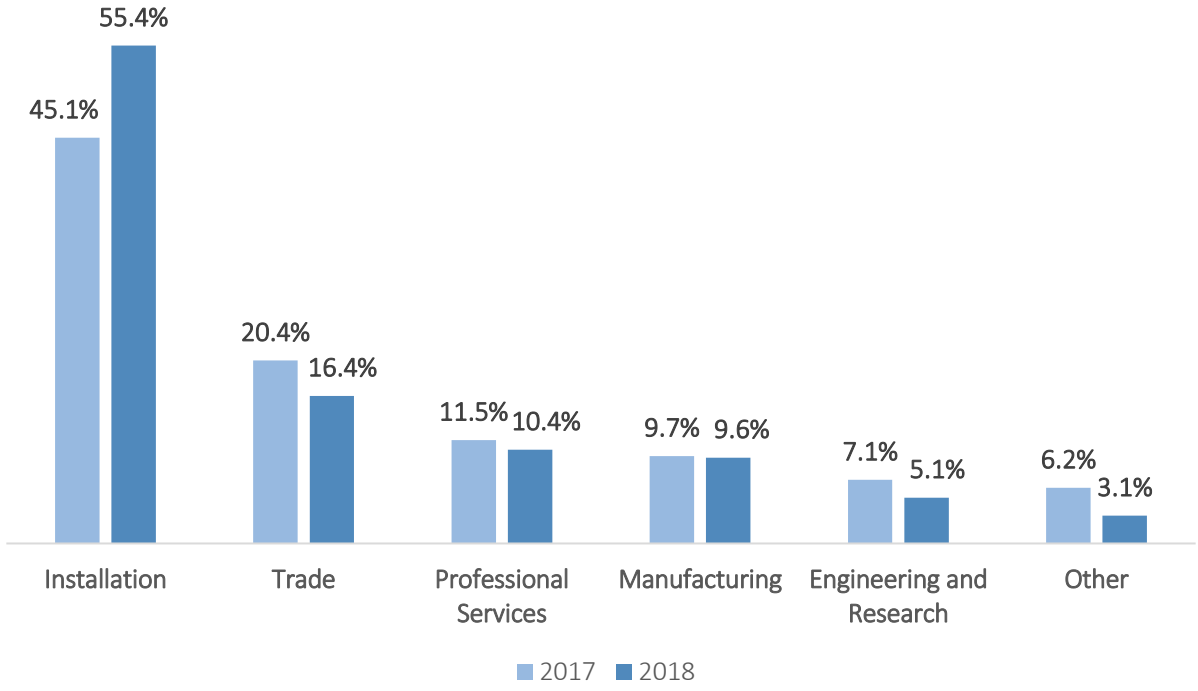
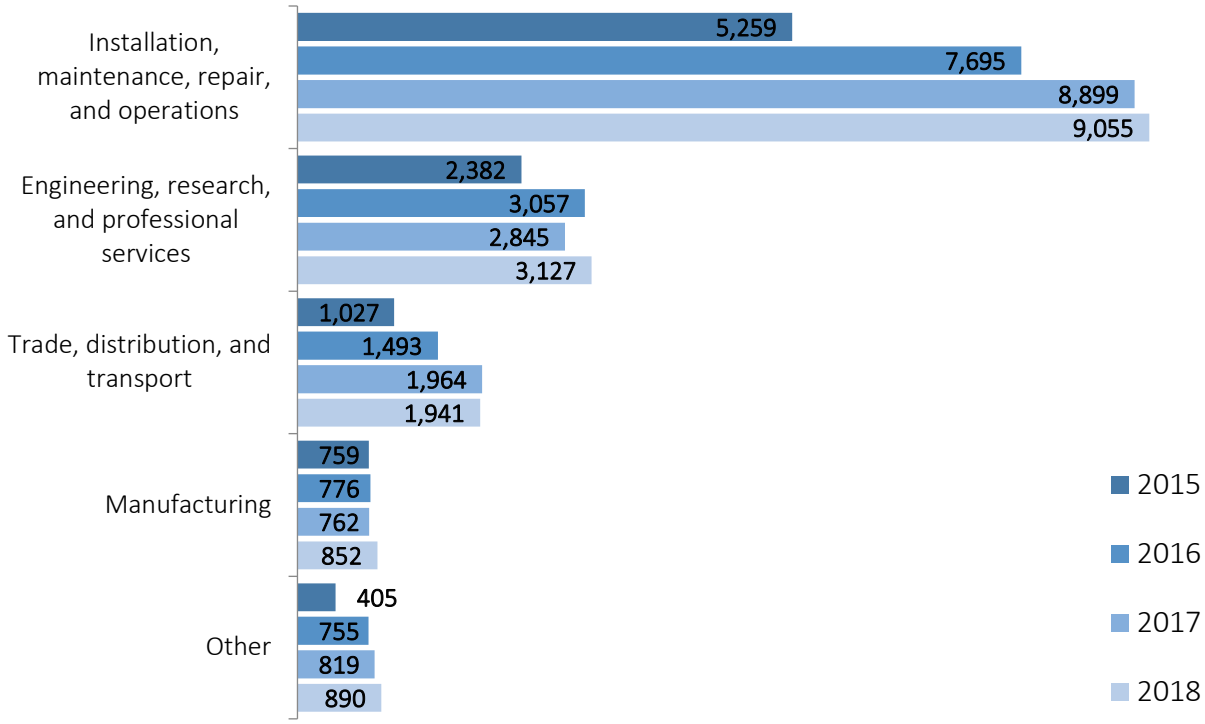


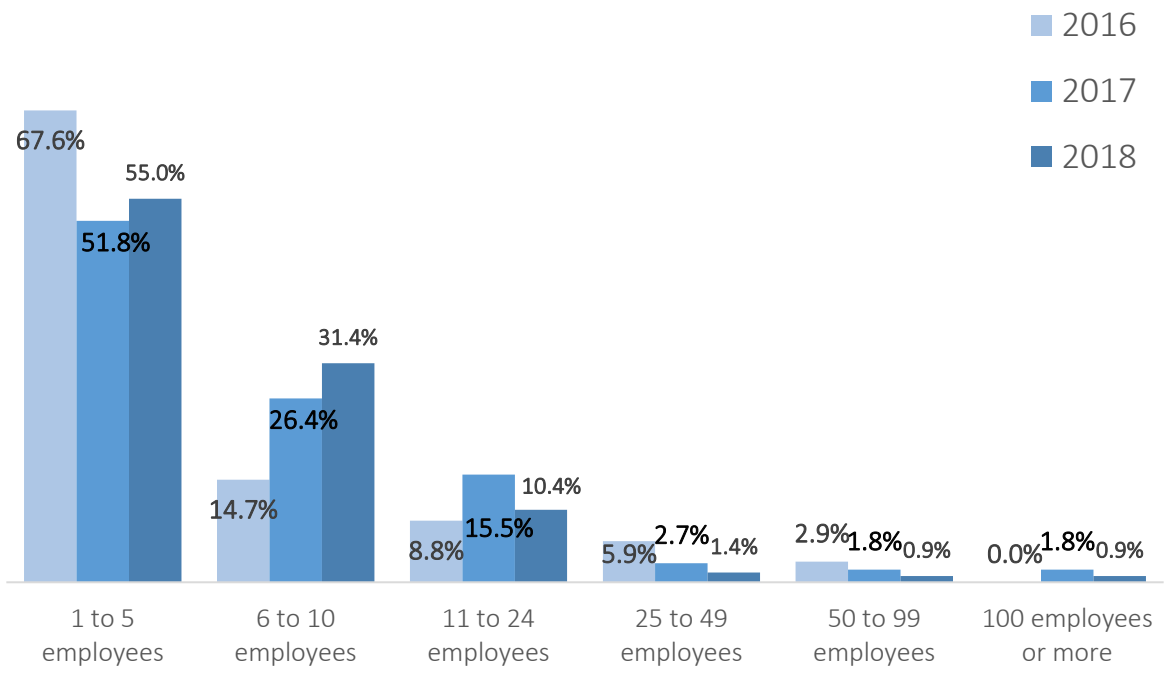
Figure 8. Value Chain Employment Growth, 2015-2018



Clean Energy Markets

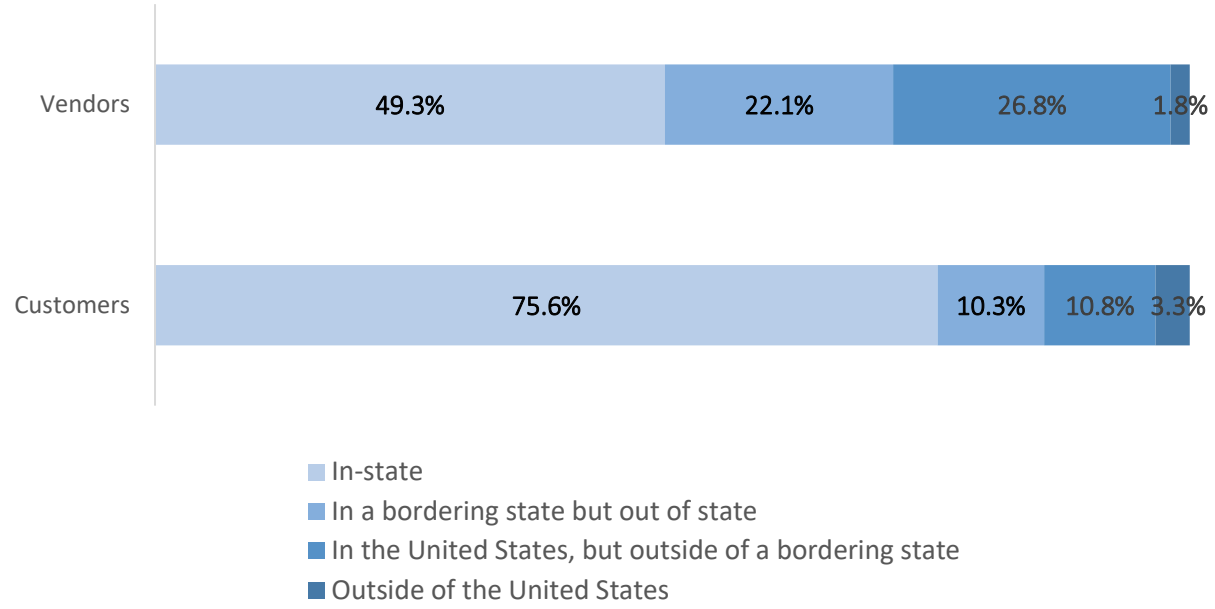
Following a shift towards larger establishments conducting clean energy work in 2017, the state's clean energy economy is slightly shifting back towards smaller firms. The proportion of smaller establishments with one to ten employees increased by eight points between 2017 and 2018; these clean energy businesses account for 86 percent of all clean energy establishments in the state (Figure 9).

Figure 9. Clean Energy Establishment Size, 2016-2018



The proportion of in-state vendors continues to grow, from 32 percent in 2016 and 43 percent in 2017, to 49 percent of employers who reported their suppliers or vendors are located primarily within the state in 2018. The proportion of in-state customers remains roughly unchanged over the last several years; about three-quarters of clean energy establishments report that their customers are primarily within the borders of Rhode Island (Figure 10).

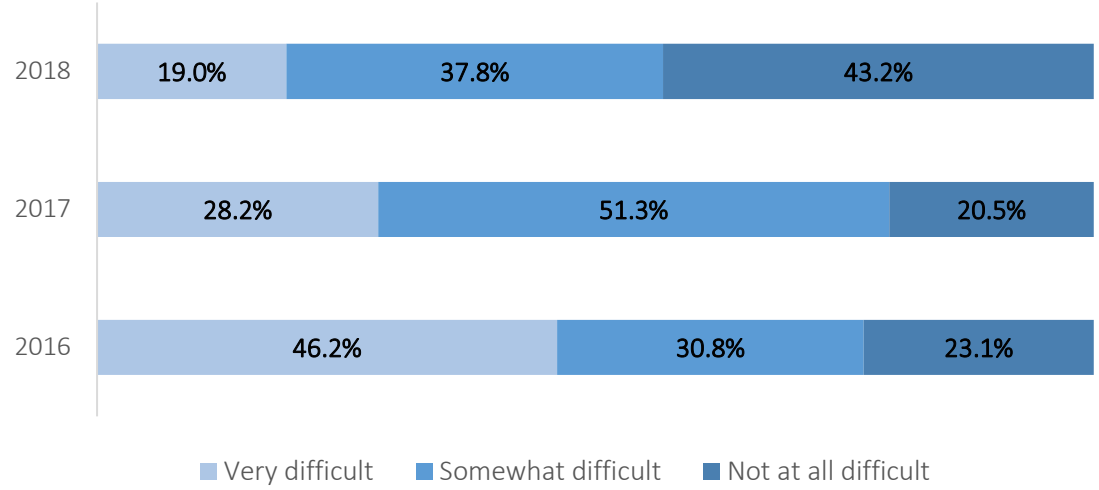
Figure 10. Customers and Vendors, 2018



The Clean Energy Workforce

Hiring difficulty has declined significantly between 2017 and 2018—roughly 23 percentage points. In fact, only 19 percent of clean energy employers indicated that hiring was very difficult, compared to 46 percent in 2016. The proportion of employers that indicated no hiring difficulty increased by 23 points from 21 percent in 2017 to 43 percent in 2018 (Figure 11).

Figure 11. Hiring Difficulty, 2016-2018



Deepwater Wind

Matthew Morrissey, VP

With construction of the 30-megawatt Block Island Wind Farm project in 2016, Deepwater Wind (DWW) illustrated that offshore wind is a viable energy source along the eastern coast of the United States. More recently, a second DWW project – Revolution Wind, sized at 400 MW – was selected for Rhode Island through a competitive procurement process coordinated with Massachusetts. Should Revolution Wind receive all necessary regulatory and permitting approvals, local construction active activities could commence in 2020, with project operation in 2023. The project will deploy up to 50 turbines approximately 15 miles south of the Rhode Island coast in federal waters.

Block Island and Revolution Wind serve as catalysts for a burgeoning offshore wind industry with its epicenter in Rhode Island and southern New England. Hiring strategies for this new offshore wind industry growth will be vital to the sustainability of the movement. While the full intention of this industry development is to provide Rhode Island residents with jobs, initially the manufacturing of turbine components will take place in more mature, European markets. However as economic volume increases, it may become sensible for companies to move manufacturing investment activity to the United States. As exhibited by the development of a local supply chain of construction and support services vendors with the Block Island Wind Project, Rhode Island is currently home to a number of support service companies and consulting resources that should be emphasized when hiring for the new Revolution Wind Project.

The offshore wind developments in Rhode Island and the broader region would not have been possible without strong leadership by Governor Gina Raimondo and the state's Office of Energy Resources, which has leveraged competitive bidding processes and strategic investments in local port infrastructure to drive positive economic outcomes. To date, the state and Deepwater Wind has stimulated 800 new offshore wind jobs (50 new jobs in perpetuity), constructed an operations and maintenance facility, and designed partnerships with local support service firms like that of Blount Boats Inc., located in Warren, Rhode Island. Local ports in Providence and Quonset will serve as infrastructure archetypes for the cluster of port infrastructure points growing in locations like New Bedford, Massachusetts; Paulson, New Jersey; and Brooklyn, New York. The partnership between the state and Deepwater Wind has put Rhode Island in pole position to continue to grow the offshore wind industry locally, provide strategy for emerging offshore wind clusters regionally, and serve as the main conduit for collaboration and interconnectivity amongst the offshore wind industry of the United States

Conclusions & Recommendations

Rhode Island's overall clean energy economy continues to exhibit positive growth. The industry saw employment rise by just under four percent between 2017 and 2018, creating an additional 560 jobs in 12 months. In total, the clean energy workforce has grown by 72 percent since 2014, resulting in 6,650 new jobs across the state of Rhode Island. This year's report emphasizes the sensitivity of the clean energy ecosystem to both local policies and nationwide trends. Though the annual growth rate has slowed relative to previous years, the energy efficiency and renewable and efficient heating and cooling sectors remain robust, growing at respective rates of four and eight percent each over 12 months. Together, these two sectors created nearly 660 jobs and will be important in achieving the state's employment goals.

The state's solar employment illustrates a rare and avoidable disappointment. Stemming from a combination of market forces, state incentive challenges, and federal trade policy, Rhode Island saw its first decline in solar employment since the inception of the Clean Energy Industry Reports in 2014. Despite this year's decline in employment, the solar industry presents significant employment opportunity, and we expect a return to growth in the near term. When considering the steady growth of energy efficiency jobs and opportunities for continued expansion of renewable energy generation and clean energy infrastructure, Rhode Island should meet its goal of 20,000 clean energy jobs by 2020 given the right policy landscape.

The Ocean State remains a national leader in offshore wind, taking the necessary actions to remain the model for offshore wind development in the United States. Following construction of the nation's first offshore wind farm in 2015, the Rhode Island-based offshore wind energy development group, Deepwater Wind, has just recently been selected for another offshore wind project for 400 MW just south of Martha's Vineyard and will complement a broader industry buildout coming from similar projects in Massachusetts, Connecticut, and New York. As a first-mover in this space, Rhode Island is uniquely positioned to capitalize on creating employment for Rhode Island residents in the offshore wind industry and to serve as the emblem for offshore wind development and regional collaboration.

This year's report includes an additional section aimed at developing recommendations for Rhode Island to achieve its goal of 20,000 clean energy jobs by 2020. This will require focused and consistent policy efforts over the next two years geared towards supporting the industry sectors that are most likely to accelerate clean energy job growth towards Governor Gina Raimondo's goal. Understanding statewide strengths and opportunity areas is especially important given the clean energy economy's sensitivity to federal policies. If employment continues to grow at a similar annual rate as the most recent 12-month period, it is unlikely the state will reach 20,000 jobs in two years. Creating the necessary supports to

continue growing the clean energy economy will also work in tandem to reach the 1,000 MW goal by 2020.

The solar industry is one of these necessary supports and its development thus far has been vital to achieving state energy and clean energy employment goals. The State has invested heavily into the growth of the solar sector in Rhode Island through the success of the Commercial Property Assessed clean energy (CPACE) program, run by the Rhode Island Infrastructure Bank, a clarified and improved solar permitting application rolled out in January of 2018 required for all residential and commercial solar projects, and stakeholder engagement on solar siting led by the Rhode Island Office of Energy Resources.

The following section uses the data from this year's report to understand the current context and changes within the state's clean energy economy, a literature review of policy instruments, as well as employer sentiments regarding solar policies in Rhode Island. In large part, renewed strong support for the solar industry, offshore wind, as well as infrastructure investments for energy efficiency and electric vehicle charging stations could take the state to the 20,000 jobs finish line.

Maintain momentum of strong support for and growth in the offshore wind industry.

As a small and densely populated state, the bulk of Rhode Island's wind potential exists in offshore wind farms, or in municipal and small-scale commercial projects.[17] In fact, an Office of Energy Resources study concluded that over 95 percent of the state's wind energy resources are offshore.[18] With this information in hand, Rhode Island has fully committed to developing this potential. The state's wind energy employment continues to climb, from 469 in 2016 to 521 total workers in 2018, for a total growth rate of 11 percent. Already positioned as a national leader in offshore wind, the state continues to lead this front with recent announcements for a new development. At the center of a small but strong offshore wind ecosystem in the Northeast, the state is set up for strategic partnerships with neighboring regions in addition to becoming a manufacturing and knowledge hub for the rest of the nation in offshore wind development.

On May 23, 2018 Governor Raimondo announced that Rhode Island had selected Deepwater Wind to construct their 400-megawatt share of a new offshore wind farm in federal waters south of Martha's Vineyard.[19] The project, Revolution Wind, was selected in a collaborative procurement process with Massachusetts, who selected their own, MA-based clean energy developer for an 800-MW farm.[20] The

[17] http://www.energy.ri.gov/renewable-energy/wind/learn-about-wind.php
[18] http://www.energy.ri.gov/documents/landwind/WindSitingDoc_2016-1-6_FINALforPublicReview.pdf
[19] https://www.windpowerengineering.com/business-news-projects/massachusetts-governor-charlie-baker-announces-major-investment-in-offshore-wind/
[20] https://www.windpowerengineering.com/business-news-projects/massachusetts-governor-charlie-baker-announces-major-investment-in-offshore-wind/

announcement is a large step toward the Governor's goal of increasing Rhode Island's clean energy resources tenfold by 2020 to a total of 1,000 megawatts.[1]

Deepwater Wind has already successfully installed Rhode Island's Block Island Wind Farm, the first offshore wind farm in the nation. According to Deepwater Wind, the 30-megawatt farm employed over 300 local workers during its construction.[21] Revolution Wind is more than ten times the size of the Block Island farm and is again expected to employ Rhode Island workers.

The offshore wind expansion is consistent with federal policy trends, as US Secretary of the Interior Ryan Zinke has consistently expressed support in offshore wind energy. In April, Zinke announced two new leasing areas off the coast of Massachusetts and called for further information on other potential lease areas,[22] including the area of Revolution Wind.[23] Rhode Island ports, particularly Providence and Quonset, remain ideal locations to support the burgeoning offshore wind industry for assembly and deployment of offshore wind turbine components.[24] The regional and national push toward increased offshore wind is clearly fostering significant potential for clean energy employment growth in Rhode Island.

Identify opportunities to expand energy efficiency retrofits and electric vehicle charging infrastructure.

Rhode Island's clean transportation sector is small, with roughly 274 jobs in 2018, and has declined by about two percent in the last 12 months likely due to the loss of a funding source for the state incentive program administered by the Office of Energy Resources. The state does have several policies in place to support clean transportation, but further incentivizing electric vehicle uptake and infrastructure development in Rhode Island is another likely source of clean energy job creation.

In a 2009 analysis of the potential impacts of electric vehicles (EVs) on cities, "Project Get Ready" concluded that, for every 10,000 more electric vehicles added in a given city, "must have" charging stations will create about 30 installation jobs. This number is only a fraction of the 250 city jobs they expect to be created per 10,000 EVs, not counting the actual manufacturing of the vehicles. The direct effect of investments in electric vehicle charging infrastructure is evidenced in California. In 2015, the state funded charging stations, increased web-based EV station locators, and provided incentive programs like "No Charge to Charge". Upon doing this, California saw employment across advanced grid technologies (including electric vehicle charging stations) more than double in a year.[25] Already leading

[21] http://dwwind.com/project/block-island-wind-farm/
[22] https://www.doi.gov/pressreleases/trump-administration-proposes-sale-wind-energy-massachusetts- coast
[23] https://www.boem.gov/Commercial-Wind-Lease-Rhode-Island-and-Massachusetts/
[24] http://www.providencejournal.com/news/20180530/deepwater-wind-to-invest-250-million-in-rhode-island-to-build-utility-scale-offshore-wind-farm
[25] https://info.aee.net/hubfs/PDF/california-jobs-report-2016.pdf

the United States in charging infrastructure density, California cities are expected to bring in 3,200 more jobs in EV charging stations from 2014 to 2020.[26]

Ramping up the rate of energy efficiency retrofits, particularly across multi-family residential units, is another potential source of job creation for the state. Evaluating multifamily residential units in the Northeast and Mid-Atlantic states, the Northeast Energy Efficiency Partnerships found that Rhode Island units tend to be older and larger than those of other states in the region.[27] Several studies have indicated the job creation potential from energy efficiency upgrades. A US Green Building Council study concluded that 11.6 jobs are created per $1 million dollars invested in residential energy efficiency retrofits.[28] A similar study in Oregon found that 9.5 jobs are created for every $1 million spent on comprehensive residential retrofits and an additional 11 jobs are created from household savings within five years of $1 million of retrofits.[29] It is likely that this will hold especially true given the state's already strong energy efficiency sector. With the infrastructure in place, such as training programs and supplier and vendor relationships, energy efficiency job creation will likely be much quicker and more streamlined compared to more nascent technology sectors like storage and smart grid.

Given nationwide declines, the solar industry needs added support, particularly in the near-term future.

Historically, Rhode Island's solar sector has done well. A supportive policy climate led to dramatic increases in installed photovoltaic capacity as well as an eight percent employment growth between 2016 and 2017. To date, the state has 95.03 MW of solar capacity across 4,619 installations. Roughly one percent of the state's electricity is derived from solar energy, and the Rhode Island Office of Energy Resources projects that the state will add approximately 590 MW over the next five years and will come from a combination of solar programs and future renewable energy procurements.[30]

Despite positive historical trends, recent local and national policy shifts indicate that the effects of the political climate are not negligible for clean energy technologies. Almost three-quarters of employers reported they are anticipating that the Small-Scale REG program will hit its annual cap prior to the end of 2018. The most recent cap in 2017 and the anticipation of another in 2018 affects solar businesses, either in terms of job growth, revenue loss or uncertainty, and market adaptation. Twenty-eight percent of solar establishments indicated that they either furloughed or permanently laid off their staff in the fourth quarter of 2017, and it is likely that employers are holding back from hiring in anticipation of the 2018 cap. Many employers also indicated either declines in revenue or revenue uncertainty, as projects in the development or application phase might miss the deadline for REG enrollment. For many firms that did not downsize their workforce, the industry is adapting by tapping into neighboring markets,

[26] http://www.evassociation.org/uploads/5/8/0/5/58052251/evca_case_study_4pg_format_outlined.pdf
[27] http://www.neep.org/sites/default/files/resources/NEEP%20Multifamily%20Report_April%202014.pdf
[28] https://www.usgbc.org/sites/default/files/USGBCGreenJobsStudy.pdf
[29] https://www.ituc-csi.org/IMG/pdf/methodology_report_mi_apr2012.pdf
[30] http://www.energy.ri.gov/renewable-energy/governor-clean-energy-goal.php

particularly in Massachusetts. Several employers noted that they have assigned their staff to split time between Rhode Island and Massachusetts or focus entirely on Massachusetts' 1,600 MW available under the MA SMART program. To alleviate some of the uncertainty for Rhode Island's solar employers, the industry requires:

1. **Novel mechanisms that tap into new markets or potential technological synergies.** There is potential to create policy instruments that incentivize solar systems along with storage technologies. Such synergies could create ripple effects on job creation in the state, particularly in the research and development space for energy storage and grid modernization; this would also have the added benefit of exporting knowledge and services to the rest of the nation. There is additional untapped potential in new construction and public buildings and infrastructure, by passing legislation that requires government-owned and newly constructed buildings to install solar panels.

2. **Improved and Expanded Financing Options.** The Rhode Island solar industry has a growing CPACE program and a developing RPACE program (residential property assessed clean energy program) that is in statute. The Rhode Island Infrastructure Bank has been specifically tasked with developing the RPACE or a residential solar financing program of a similar kind. It is the hope that these two programs stimulate more business for contractors and developers, increase cash flow for property owners, reduce the default risk for mortgage holders, expand funding opportunities for capital providers, and increase the renewable energy mix in municipalities across Rhode Island.[31]

3. **Expansion of current programs and policy instruments.** Employers note the importance of current incentives to their solar businesses, but also that expansion of programs such as net metering and the REG MW cap would significantly improve their business prospects and certainly result in increasing their payrolls. There is currently no net metering cap in the state of Rhode Island and all sectors, excluding commercial sectors, can participate in virtual net metering (VNM).

[31] https://ri-cpace.com/

Appendix A:
Methodology

The 2018 Rhode Island Clean Energy Jobs Report uses publicly available data (2018 U.S. Energy and Employment Report) on Rhode Island energy employment produced by BW Research Partnership for the Energy Futures Initiative (EFI) and the National Association of State Energy Officials (NASEO), available at: https://www.usenergyjobs.org/. These public data are refined and customized for Rhode Island based additional analyses conducted on behalf of the Rhode Island Office of Energy Resources and Commerce Rhode Island by BW Research Partnership, Inc.

The USEER survey in Rhode Island resulted in more than 3,800 calls, with more than 150 completions. The margin of error is +/-7.83 percent at a 95 percent level of confidence. The survey was administered by BW Research between November 1, 2017 and January 19, 2018 and averaged 14.5 minutes in length.

An additional survey of solar employers was conducted which yielded 26 completions. The supplemental survey was administered between April 19 and June 5, 2018.

For more details on the USEER methodology, please see: http: https://www.usenergyjobs.org/.

Appendix B:
Geographic Distribution of Clean Energy Jobs

County	2016 Employment	2017 Employment	2018 Employment
Bristol County	444	638	450
Kent County	2,282	2,586	2,826
Newport County	1,313	1,603	1,498
Providence County	8,046	8,424	9,287
Washington County	1,690	2,054	1,806