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# Connecticut Clean Energy Industry Report



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|--------------------------------------------------------------------------------|-----------|
| <b>Introduction .....</b>                                                      | <b>3</b>  |
| About this report .....                                                        | 3         |
| Note from the Chair of the Joint Committee .....                               | 4         |
| <b>Highlights .....</b>                                                        | <b>5</b>  |
| COVID-19 impacts on clean energy industry jobs in CT .....                     | 6         |
| COVID-19 Clean Energy Contractor Survey .....                                  | 7         |
| Connecticut is a leader .....                                                  | 8         |
| <b>Overview .....</b>                                                          | <b>9</b>  |
| 5 Consecutive Years of Job Growth .....                                        | 9         |
| Clean Energy Employment By Sector .....                                        | 10        |
| Clean Energy Establishments by Sector .....                                    | 11        |
| Top Five Fastest Growing Sub-Sectors .....                                     | 11        |
| Full-Time Equivalent Clean Energy Jobs (2015 – 2019) .....                     | 12        |
| Clean Energy Gross State Product .....                                         | 13        |
| Clean Energy Jobs by Value Chain .....                                         | 14        |
| Value Chain Jobs by Sector .....                                               | 15        |
| <b>Detailed Clean Energy Sector Employment .....</b>                           | <b>16</b> |
| Energy Efficiency, Demand Management, and Clean Heating and Cooling Jobs ..... | 16        |
| Business Energy Solutions .....                                                | 17        |
| Clean Energy Generation .....                                                  | 18-19     |
| C-PACE Financing .....                                                         | 20        |
| The Hartford Area Habitat for Humanity (HAHFH) .....                           | 21        |
| Solar for Families and Businesses .....                                        | 22        |
| Home Energy Solutions .....                                                    | 23        |
| Hydropower and Offshore Wind .....                                             | 24        |
| Alternative Transportation Jobs .....                                          | 25        |
| Equitable Modern Grid .....                                                    | 26        |
| Connecticut's Fuel Cell Industry .....                                         | 27        |
| Clean Fuels .....                                                              | 28        |
| From Food Waste to Energy and Jobs .....                                       | 28        |
| <b>Clean Energy Talent .....</b>                                               | <b>29</b> |
| Hiring Difficulty .....                                                        | 29        |
| Workforce Development Opportunities .....                                      | 30        |
| Clean Energy Training By County .....                                          | 31        |
| Career Profiles in Clean Energy – Green Jobs in Connecticut .....              | 32        |
| Clean Energy Worker Demographics .....                                         | 33        |
| <b>Methodology .....</b>                                                       | <b>34</b> |
| <b>Appendix: Clean Energy Technology List .....</b>                            | <b>35</b> |



The following report details all clean energy-related jobs across the state from 2017 to 2019, specific to the Connecticut definition of clean energy activities. The Connecticut Green Bank, Department of Energy and Environmental Protection, Eversource, and United Illuminating, Southern Connecticut Gas and Connecticut Natural Gas, subsidiaries of AVANGRID Inc., operating through the Joint Committee, collaborated with BW Research Partnership, to develop a clean energy technology definition based on the state's clean energy and climate change policies. For a detailed list of clean energy sub-technologies for the state of Connecticut, please refer to Appendix A of this report. Employment in this report is broken out into five major technology sectors and clean energy-specific sub-technologies. The major clean energy sectors are as follows:

- **Energy Efficiency**
- **Clean Energy Generation**
- **Alternative Transportation**
- **Clean Grid & Storage**
- **Clean Fuels**

In addition to jobs data, the report details clean energy employment by value chain segment, clean energy wages and wage premiums, employer hiring difficulties, geographic opportunity zones, and the demographic distribution of clean energy workers compared to state- and nationwide averages. All data presented in this report is based on the 2020 United States Energy and Employment Report (USEER) data collection effort, a joint project of the National Association of State Energy Officials (NASEO) and the Energy Futures Initiative (EFI).<sup>1</sup>

## About Energize CT and Joint Committee

### Energize CT

- Energize CT is an initiative of the Energy Efficiency Fund, the Connecticut Green Bank, the State and your local electric and gas utilities with funding from a charge on customer energy bills. [www.EnergizeCT.com](http://www.EnergizeCT.com)

### Joint Committee

- Pursuant to Section 16-245m(d)(2) of the Connecticut General Statutes, the Joint Committee shall examine opportunities to coordinate programs and activities contained in the plan developed under Section 16-245n(c) (i.e., Comprehensive Plan of the Green Bank) with the programs and activities contained in the plan developed under Section 16-245m(d)(1) (i.e., Conservation and Load Management Plan), and to provide financing to increase the benefits of programs funded by the plan developed under Section 16-245m(d)(1) so as to reduce the long-term cost, environmental impacts, and security risks of energy in the state.

To support the Joint Committee, the following is a principal statement to guide its activities: The Energy Efficiency Board and the Connecticut Green Bank have a shared goal to implement state energy policy throughout all sectors and populations of Connecticut with continuous innovation towards greater leveraging of ratepayer funds and a uniformly positive customer experience.

## About the Partners

The Connecticut Green Bank is the nation's first green bank. Its mission is to confront climate change and provide all of society a healthier and more prosperous future by increasing and accelerating the flow of private capital into markets that energize the green economy.



The Connecticut Department of Energy and Environmental Protection (DEEP) is charged with conserving, improving and protecting the natural resources and the environment of the state of Connecticut as well as making cheaper, cleaner and more reliable energy available for the people and businesses of the state. The agency is also committed to playing a positive role in rebuilding Connecticut's economy and creating jobs – and to fostering a sustainable and prosperous economic future for the state.



United Illuminating, Southern Connecticut Gas and Connecticut Natural Gas, subsidiaries of AVANGRID Inc.



is a leading, sustainable energy company with \$32 billion in assets and operations in 24 U.S. states. AVANGRID has two primary lines of business: Avangrid Networks and Avangrid Renewables. Avangrid Networks owns eight electric and natural gas utilities, serving 3.2 million customers in New York and New England.

Eversource is New England's largest energy delivery company, with approximately 3.7 million electric and natural gas customers in Connecticut, Massachusetts and New Hampshire.



<sup>1</sup> [www.USEnergyJobs.org](http://www.USEnergyJobs.org)





By Eric Brown

This Connecticut Clean Energy Industry Report provides a glimpse into the progress we have been making to build a more vibrant and sustainable clean energy economy in Connecticut. This report,

developed in collaboration by Avangrid, Connecticut Green Bank, DEEP, and Eversource through the Joint Committee, highlights how our families, businesses, and our economy benefit from sustained growth in this sector.

During our analysis for this report, our state was hit by a global pandemic that saw “shelter in place” and “social distancing” policies stunting all economic activity. COVID-19 has had a significant detrimental impact on Connecticut’s small clean energy businesses. Sales plummeted, construction jobs stalled, and nearly 15 percent of our workforce was unemployed. The leaders of these determined small businesses suggest it could take between six and twelve months for operations to return to pre-pandemic levels. This sudden downturn reminds us of our need to strive for continuous innovation in the leveraging of ratepayer funds to create a more self-sustaining, resilient industry going forward.

**Since 2015, Connecticut has made steady progress building its clean energy industry.** Prior to the pandemic, there were more than 44,400 clean energy workers employed in over 4,300 companies within Connecticut’s \$6.5 billion clean energy economy. The sector has seen nearly 10 percent growth between 2015 and 2019. Over 80 percent of these employees work within the energy efficiency sector installing high efficiency HVAC systems and Energy Star® appliances and equipment. About 10 percent of clean energy employees work in clean energy generation, primarily solar energy and nuclear power. The clean energy workforce consists predominantly of essential construction workers, as well as professional services, trade, manufacturing, utilities, and other services.

### Connecticut continues to lead on policy innovation.

As the country progresses towards a clean energy future, the Constitution State continues to advance bipartisan-supported public policies that are leading to the deployment of cleaner energy while improving reliability and affordability, reducing the burden of energy costs on families and businesses, modernizing our energy infrastructure for a 21st century clean energy economy, and reducing greenhouse gas emissions. Through EnergizeCT and the partners of the Joint Committee, we are implementing state energy policy through award-winning programs across all sectors and populations of Connecticut with continuous innovation towards greater leveraging of ratepayer funds and a uniformly positive customer experience.

### Clean energy is delivering positive impacts on society.

In 2019 alone, over \$1.2 billion of investment in Connecticut’s clean energy economy was mobilized through Energize CT. This investment generated over \$75 million in tax revenues to the State of Connecticut through sales tax, individual tax, and corporate tax revenues. This investment in clean energy reached more than 262,000 customers, reducing the burden of energy costs from their homes and buildings, while deploying the equivalent of nearly 150 MW of clean energy from energy efficiency and renewable energy technologies. By deploying more clean energy in our communities, we not only contribute to economic development, but we also improve the environment by avoiding over 250,000 tons of greenhouse gas emissions that cause global climate change and local air pollution from NO<sub>x</sub>, SO<sub>x</sub>, and particulate matter that cause public health problems.

### Clean energy is improving the lives of our most vulnerable and small businesses.

Connecticut has been focused on reducing the percentage of household income spent on energy for our most vulnerable communities through the deployment of clean energy. Through the Home Energy Solutions – Income Eligible Program, we have reduced the energy burden on households through home energy assessments in combination with insulation. Connecticut is known as a “Solar with Justice” state since it is at “parity” when it comes to low-to-moderate income (LMI) families and “beyond parity” when it comes to communities of color (i.e., Black and Hispanic families) demanding solar PV.

Energy costs have an impact on our small businesses as well, which is why through the Small Business Energy Advantage Program, we have reduced energy costs through improved energy efficiency for businesses.

As small businesses begin to reopen from the COVID-19 pandemic, their ability to control costs and reduce usage is even more crucial than before, and the clean energy industry can play an important role during this recovery.

**While COVID-19 has impacted our progress, it has not weakened our resolve.** Through EnergizeCT, we are committed to building a vibrant, resilient, and growing clean energy industry for Connecticut that can withstand future pandemics, budget pressures or other unforeseen challenges.

## 2019 Joint Committee Achievements

Invested over **\$1.2 billion** in the clean energy industry

Impacted more than **262,000 customers**

Avoided **228,142 tons** of CO<sub>2</sub> emissions

**31 million tons** of NO<sub>x</sub>, SO<sub>x</sub>, and PM avoidance

Supported over **40,000** clean energy jobs

Contributed **\$6.5 billion** to the gross state product

Economic value of public health contribution surpasses **\$6.4 million**

Energy equivalent of **149 power plants** or the energy to power **53,703 homes** for a year

Tax revenue of more than **\$76 million generated**



**Clean energy jobs**

made up

**2.6%**

of all jobs in Connecticut.

For every **10,000** workers in the state, there are 263 clean energy jobs, compared to 238 in the U.S.

**Clean energy workers**

in 2019 totaled

**44,094**

in Connecticut, showing a

**9.1%**

increase since 2015.

**Clean energy companies**

accounted for just over

**\$6.5 billion**

of Connecticut's Gross State Product in 2019.



- Clean energy companies across the state have created 3,691 new jobs between 2015 and 2019, and full-time equivalent clean energy jobs are growing even faster than the overall clean energy labor market.
- At the end of 2019, clean energy jobs comprised 2.6 percent of all jobs in Connecticut. Clean energy employment grew by 9.1 percent between 2015 and 2019.
- Since 2015, full-time equivalent clean energy jobs in Connecticut have grown by 13.9 percent, indicating that employees are spending more of their time on clean energy work in the state. (see page 12 for more on this).
- Energy efficiency workers represent eight in ten clean energy jobs across the state. This

sector has also seen the greatest absolute growth since 2017, creating 1,257 new jobs—a growth rate of 3.6 percent. Within the sector, HVAC and ENERGY STAR® and efficient lighting technologies account for the majority of activity.

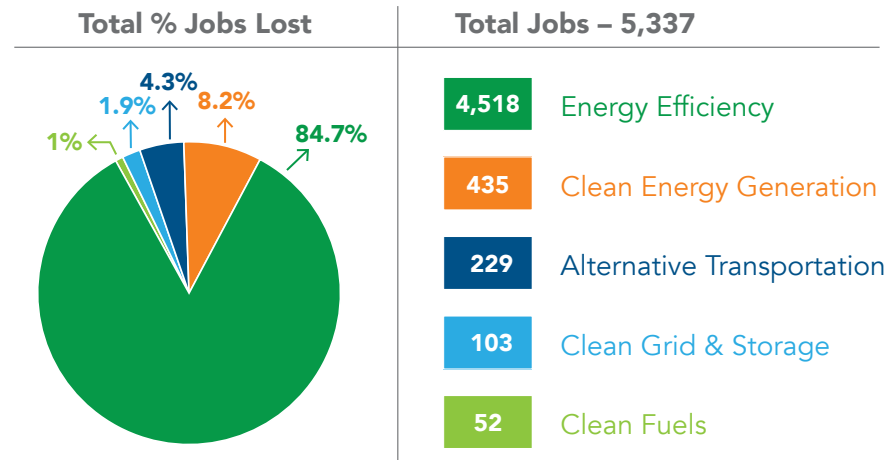
- Between 2017 and 2018, solar employment in Connecticut dropped by 2.2 percent, as a result of changing domestic business models for solar and global trade tariffs; however, this decline was less drastic compared to a nationwide job loss of 4.2 percent over the same time period. The solar industry recovered in 2019, mirroring national trends.
- The majority of surveyed clean energy jobs pay more than their corresponding occupational average, especially for entry-level workers. In total, just over three-quarters (76.9 percent) of

clean energy jobs in Connecticut earn more than the corresponding occupational average across all levels of experience. For entry-level workers in particular, 92 percent of surveyed occupations are paid a premium.

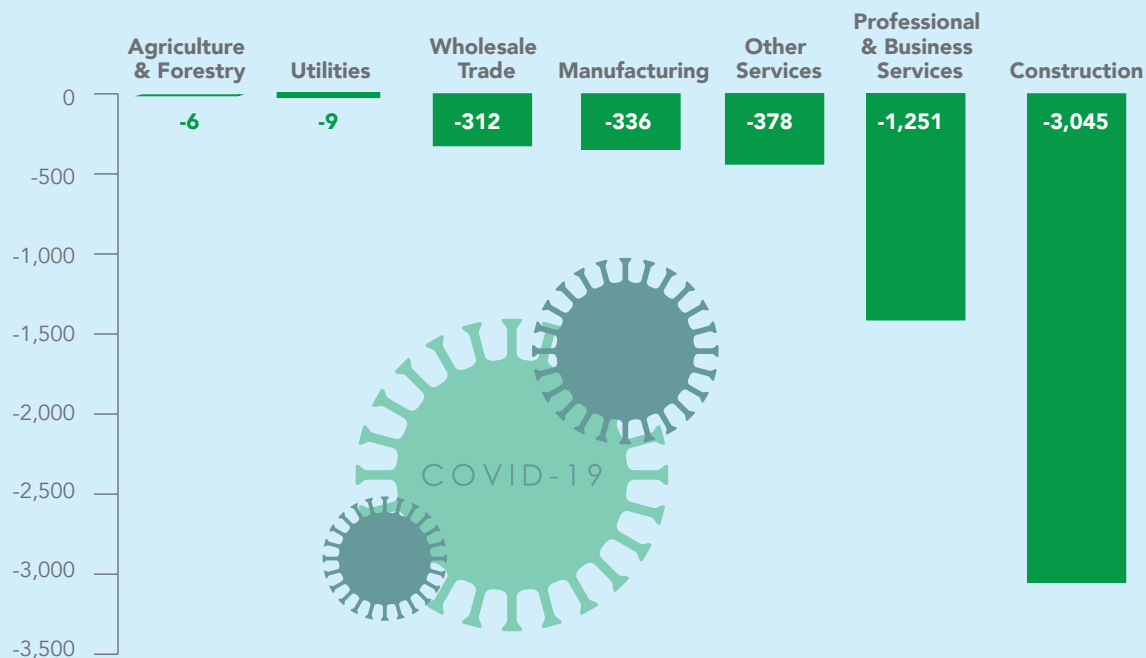
- Hiring difficulty in Connecticut was lower than the national average.
- The clean energy economy is a good source of jobs for Veterans but has low representation of ethnic and racial minorities and women.

It is important to note that this report was commissioned before the global Coronavirus (COVID-19) pandemic, which has significantly altered labor market and employment realities across nearly all industries in the United States. The 2020 Connecticut Clean Energy Industry Report is based on data collected in the last quarter of 2019, before the advent of COVID-19 and resulting social distancing and shelter-in-place orders. Due to the shuttering of doors for numerous businesses across the state and nation, employment figures included throughout this report serve as a pre-pandemic baseline of clean energy industry employment in Connecticut. While the full economic impact of the pandemic is yet unknown, BW Research estimates that Connecticut lost 5,337 jobs through August.<sup>2</sup>

**Figure 1.** Covid-19 Job Losses By Technology Sector, August 2020



**Figure 2.** Covid-19 Job Losses By Value Chain Sector, March-August 2020



In the aftermath of the pandemic-induced recession, Connecticut will have an opportunity to capitalize on the previously strong clean energy job growth. The clean energy industry is likely well-poised to see a more rapid comeback compared to other sectors of the economy. Since many jobs in the clean energy sector can be conducted while maintaining physical distancing and using personal protective equipment (PPE). Furthermore, the state's clean energy industry is supported by policies and programs that ensure the continued deployment of clean energy technologies, maintaining steady demand that should return as shelter-in-place policies have subsided.

<sup>2</sup> Further analysis related to the COVID-19 pandemic's economic impacts can be found at <http://bwresearch.com/covid19>.



In April, the Connecticut Green Bank and the Connecticut Department of Energy and Environmental Protection, in collaboration with the Governor's Office and AdvanceCT, with assistance from Eversource, Connecticut Natural Gas, Southern Connecticut Gas and United Illuminating conducted a survey of Connecticut's clean energy industry to assess the impacts of COVID-19 and to help guide recovery efforts.

Administered from April 14 – 24, the survey garnered 153 total responses. Over 60% of the respondents were small business owners (52%) and executives (9%) with remaining from managers (26%), accounting (5%), and human resources (1%). There were 121 unique clean energy companies represented, with 91% of these companies having less than 50 employees and 48% with fewer than 10 employees.

The negative impact on clean energy industry workers was more pronounced than the average impact across Connecticut job sectors. Higher percentages of clean energy industry employees had their schedules reduced (47.15%), were laid off (32.52%), and were furloughed (31.71%) than the State averages.

*"All small business" is based on an analysis of corresponding questions from a survey administered by AdvanceCT from April 17-24, 2020 comprising about 1,800 responses from all Connecticut businesses as a benchmark for comparison.*

## The results of the 33-question survey painted a stark picture of the impact:

**COVID-19** was an  
**8 out of 10**  
in terms of detriment  
to business (average  
response) with 26%  
responding 10/10, &  
18% responding 9/10

**67%** of existing  
business was  
delayed or  
cancelled

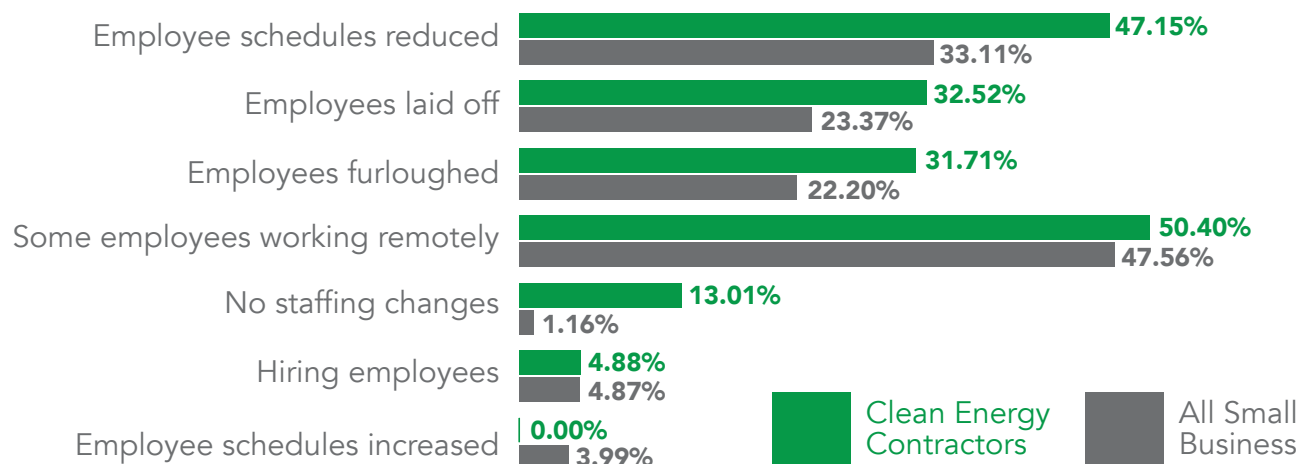


**6-12** month recovery  
process after  
"stay at home"  
order is lifted



**71%** decrease in demand  
for new business

**Figure 3.** How has your business been impacted by COVID-19 in terms of its employees?





Connecticut Green Bank wins the 2017 Innovations in American Government Award from the Kennedy School of Government at Harvard University.



According to SEIA since 2017, Connecticut has the highest residential installed watts per capita in the Northeast region of the US.



Connecticut Green Bank honored by Environmental Finance for green bond issuance



American Council for an Energy-Efficient Economy (ACEEE) has consistently ranked Connecticut as one of the top states for energy efficiency (2017 – 2019)

#### 2019 Awards:



Energize Connecticut, in partnership with Eversource and AVANGRID, Inc. subsidiaries CNG, SCG and UI, received the ENERGY STAR® Partner of the Year – Sustained Excellence Award in Energy Efficiency Program Delivery in 2017, 2018 and 2019

#### 2018 Awards:

AESP Outstanding Award for residential program delivery



ACEEE Exemplary Award for two programs, small business and multifamily

#### 2017 Awards:



EPA Merit Award for the Second Year in a Row for Portfolio Manager Implementation



Green Circle Sustainability Award



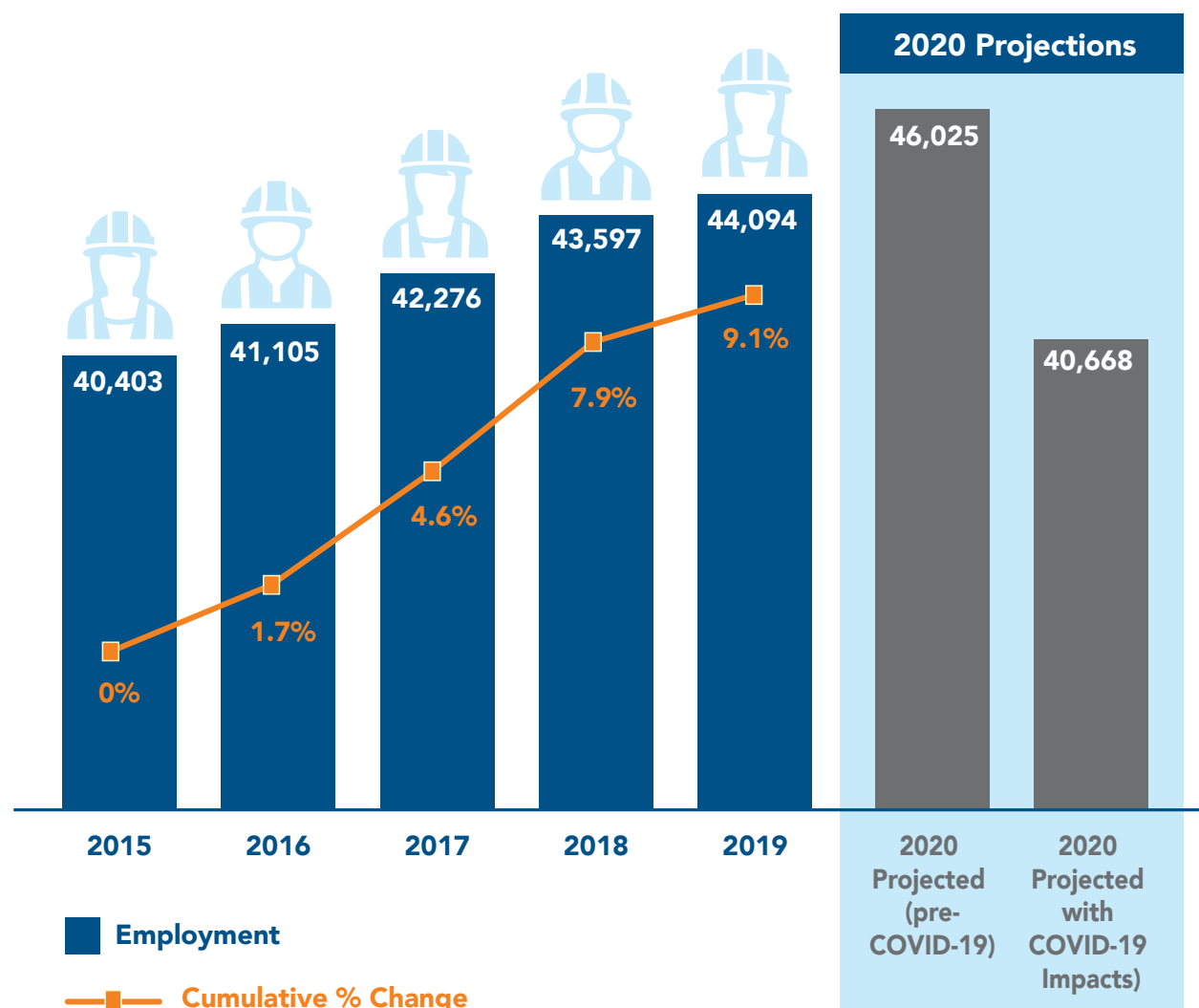
Energy Star Certified Homes Marker Leader Award



As of the end of 2019, there were just over 44,000 clean energy workers across the state of Connecticut. Clean energy jobs increased by 9.1 percent between 2015 and 2019, creating 3,691 new jobs in four years. In total, clean energy jobs accounted for 2.6 percent of all jobs in Connecticut at the end of 2019. In fact, while total jobs in Connecticut declined between 2018 and 2019, clean energy jobs continued to grow.<sup>3</sup> In 2019, Connecticut accounted for one percent of all clean energy jobs nationwide.

Connecticut has an above average concentration of clean energy jobs compared to the nation. Clean energy jobs were 10 percent more concentrated in the state compared to the national average. This metric indicates that across Connecticut, clean energy jobs account for a larger-than-average share of total jobs. For every 10,000 workers in Connecticut, there were 263 clean energy jobs while for every 10,000 workers in the United States, there are a total of 238 clean energy jobs.

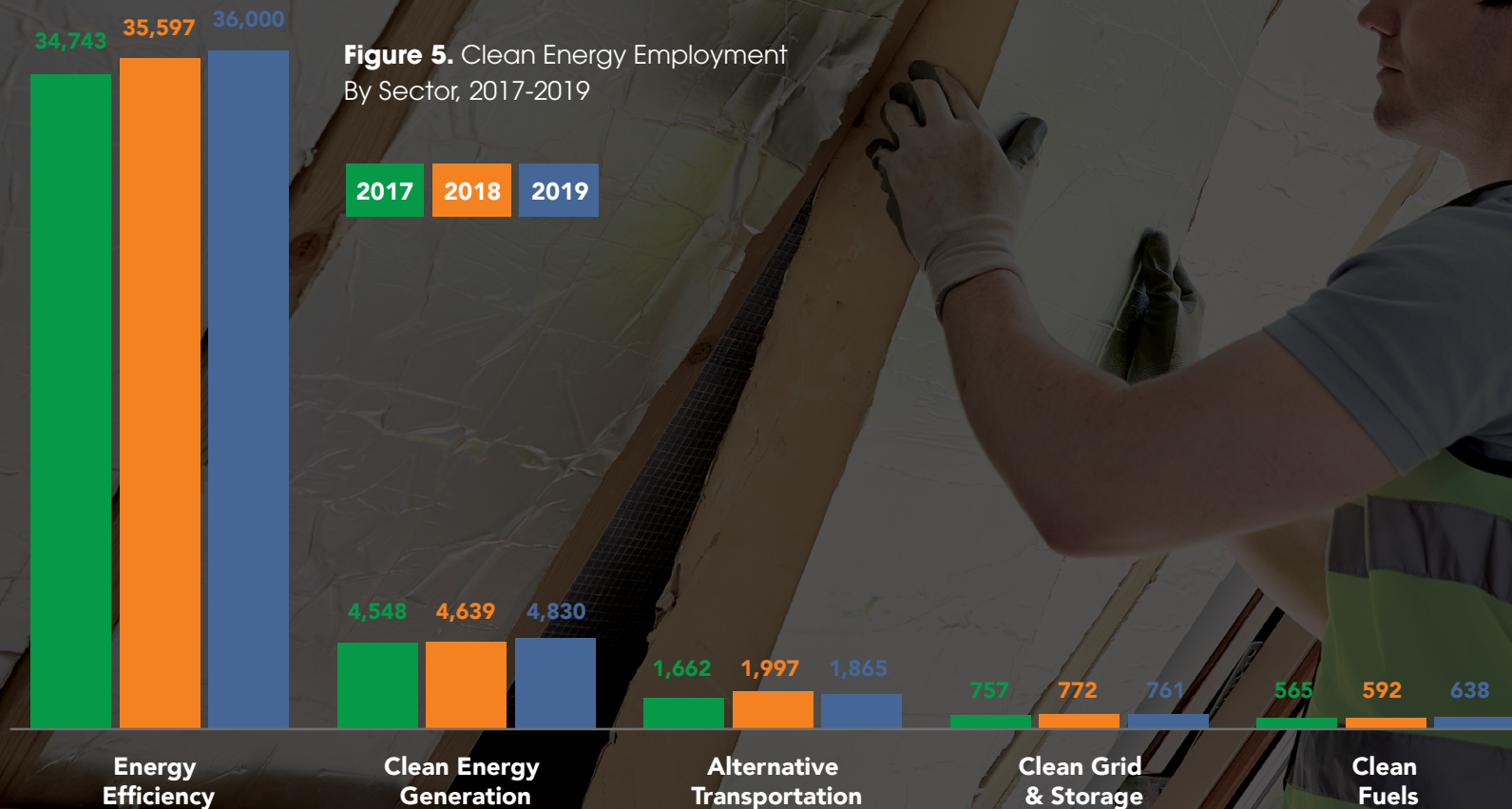
**Figure 4.** Clean Energy Employment In Connecticut, 2015-2020 Projected



<sup>3</sup> Total employment for Connecticut is from the Bureau of Labor Statistics, Quarterly Census of Employment and Wages (QCEW), 2018 Annual Average and Q2 2019. Data was extracted on February 10, 2020.

Roughly eight in ten clean energy jobs (81.6 percent) are found in the energy efficiency sector. Energy efficiency jobs total to 36,000 workers across the state and grew by 3.6 percent, or 1,257 jobs, in two years. Following energy efficiency, clean energy generation is the second largest clean energy sector. These businesses employ 4,830 clean energy workers and created 282 jobs since 2017—a growth rate of 6.2 percent.

Alternative transportation firms comprise just over four percent of clean energy jobs in Connecticut. These companies increased employment by 12.2 percent since 2017, creating an additional 203 jobs for a total of 1,865 workers. The clean grid and storage and clean fuels sectors are smaller components of Connecticut's clean energy industry. Together, these two sectors account for 3.2 percent of the clean energy workforce and created 77 new jobs since 2017.





There were 4,347 clean energy establishments in 2019 across Connecticut. Nine in ten (88.2 percent) clean energy businesses were found in the energy efficiency sector, followed by clean energy generation, alternative transportation, clean fuels, and clean grid and storage. The high prevalence of energy efficiency firms is due to the fact that many energy efficiency businesses have one or two technicians that work on energy efficiency-related goods and services. On the contrary, while there are more than 4,830 clean energy generation workers total, many are found at Millstone Power Station, which employs over 1,000 workers, driving down the overall total of clean energy generation businesses.<sup>4</sup>

**Table 1.** Clean Energy Establishments By Sector, 2017-2019

| Sectors                    | 2017         | 2018         | 2019         |
|----------------------------|--------------|--------------|--------------|
| Energy Efficiency          | 3,677        | 3,728        | 3,833        |
| Clean Energy Generation    | 223          | 241          | 258          |
| Alternative Transportation | 172          | 194          | 177          |
| Clean Grid & Storage       | 28           | 31           | 27           |
| Clean Fuels                | 58           | 59           | 52           |
| <b>TOTALS</b>              | <b>4,159</b> | <b>4,253</b> | <b>4,347</b> |

### Top Five Fastest Growing Sub-Sectors

#### Top 5 Highest Growth Sub-Sectors (Absolute Job Growth):

|                                                                       |
|-----------------------------------------------------------------------|
| Traditional HVAC (453 new jobs since 2017)                            |
| ENERGY STAR® and Efficient Lighting (449 new jobs)                    |
| Advanced Materials (244 new jobs)                                     |
| High Efficiency HVAC and Renewable Heating and Cooling (138 new jobs) |
| Wind (114 new jobs)                                                   |

#### Top 5 Highest Growth Sub-Sectors (Proportional Job Growth):

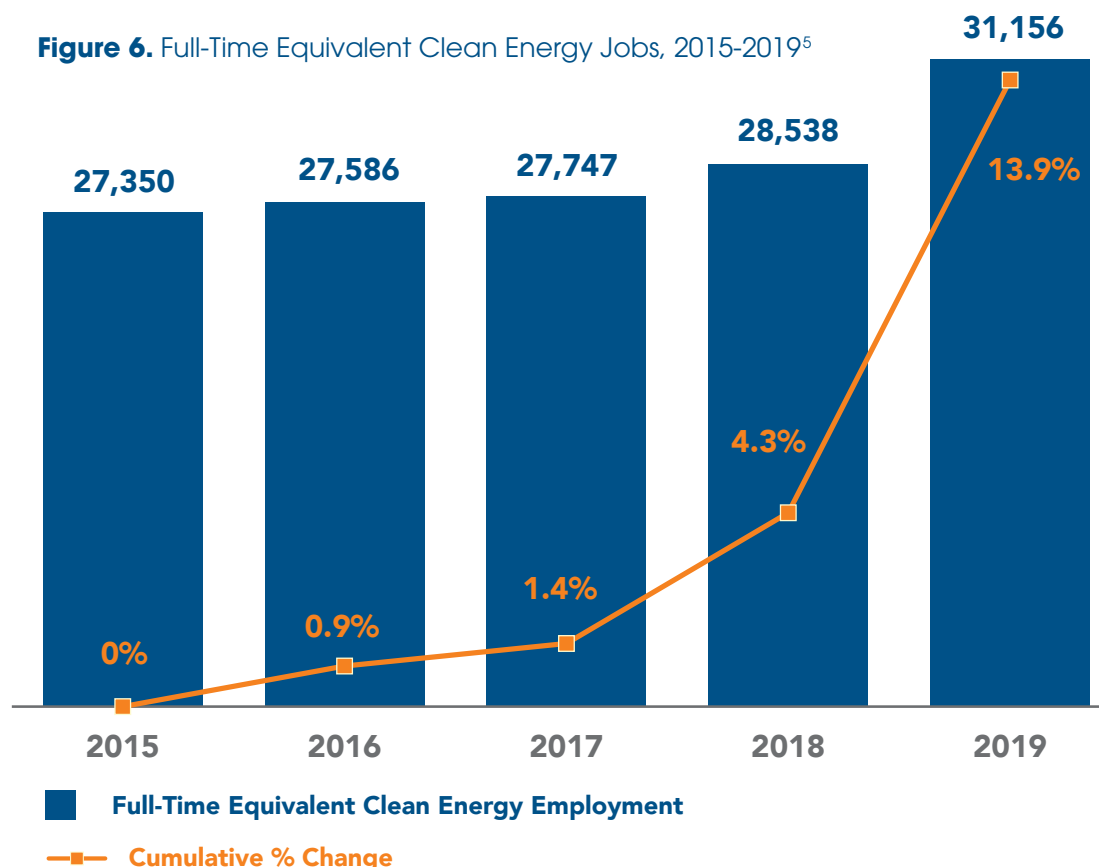
|                                                                       |
|-----------------------------------------------------------------------|
| Other Ethanol and Non-Woody Biomass (254.8 percent growth since 2017) |
| Wind (158.7 percent growth)                                           |
| Woody Biomass (114.2 percent growth)                                  |
| Traditional Hydropower (108.5 percent growth)                         |
| Bioenergy and Combined Heat and Power (49.8 percent growth)           |

<sup>4</sup> <https://www.nei.org/CorporateSite/media/filefolder/resources/fact-sheets/state-fact-sheets/Connecticut-State-Fact-Sheet.pdf>

An increase in FTE jobs indicates that more clean energy workers are dedicating an increasing amount of their work week, or labor hours, to clean energy-specific activities possibly due to increased policy support and financial incentives creating more demand for clean energy goods and services.

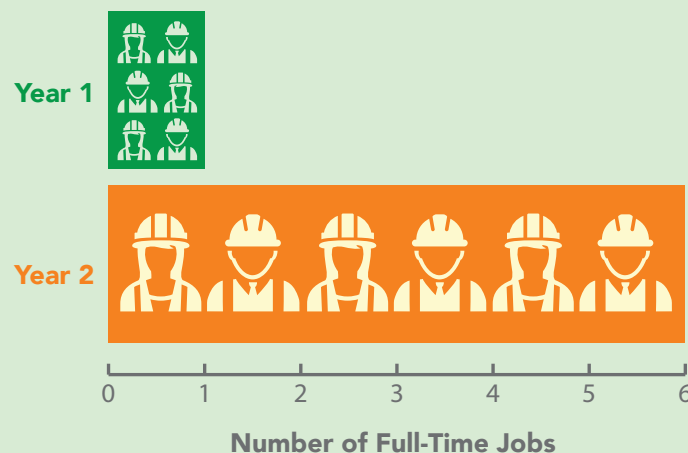
Intensity, or concentration, of clean energy work has been on the rise in Connecticut. In fact, full-time equivalent clean energy jobs are growing faster than the overall clean energy labor market. Between 2015 and 2019, the number of full-time equivalent clean energy workers in Connecticut increased by 3,805 jobs, for a growth rate of 13.9 percent in four years. As of the last quarter of 2019 there were 31,156 FTE clean energy jobs in Connecticut. This indicates that employees are spending more of their time on clean energy work in the state.

**Figure 6.** Full-Time Equivalent Clean Energy Jobs, 2015-2019<sup>5</sup>



### FTE Clean Energy Jobs Explained

An example can illustrate the importance of tracking FTE clean energy employment. If a Heating Ventilation, and Air Conditioning (HVAC) firm had 6 installers in 2018 who occasionally installed heat pumps, and now has 6 installers who exclusively do so, there would be no change in the total number of clean energy workers reported. However, because the number of labor hours working with heat pumps has increased, FTE jobs would show a corresponding increase.



**Figure 7.** FTE Clean Energy Jobs Explained

<sup>5</sup> These jobs were extrapolated using a combination of state-level and census region data. The data was adjusted based on revenue distribution by technology and weighted according to how much time workers were reported to spend on clean energy activities (0-49 percent, 50-99 percent, or 100 percent). For a full description of this methodology, please refer to Appendix A.



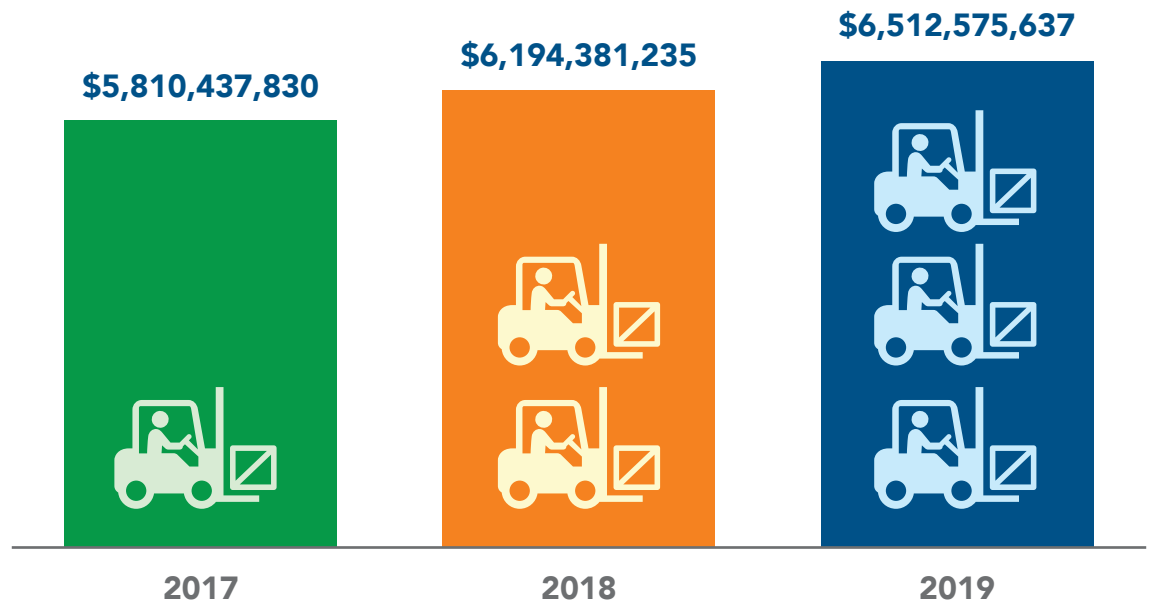
In 2019, clean energy accounted for \$6.5 billion of Connecticut's Gross State Product (GSP). This represents a 12 percent increase since 2017. To date, the clean energy industry accounts for 2.6 percent of total gross domestic product in the state.<sup>6</sup>



**Table 2.** Clean Energy Gross State Product (GSP) By Value Chain, 2019

| Value Chain                        | 2019 Clean Energy GSP  |
|------------------------------------|------------------------|
| Manufacturing                      | \$2,078,550,282        |
| Professional and Business Services | \$2,132,314,807        |
| Sales                              | \$527,047,848          |
| Construction                       | \$692,684,480          |
| Utilities                          | \$1,057,284,841        |
| Other Services                     | \$18,662,105           |
| Agriculture                        | \$6,031,270            |
| <b>TOTAL</b>                       | <b>\$6,512,575,637</b> |

**Figure 8.** Clean Energy Gross State Product (GSP), 2017-2019



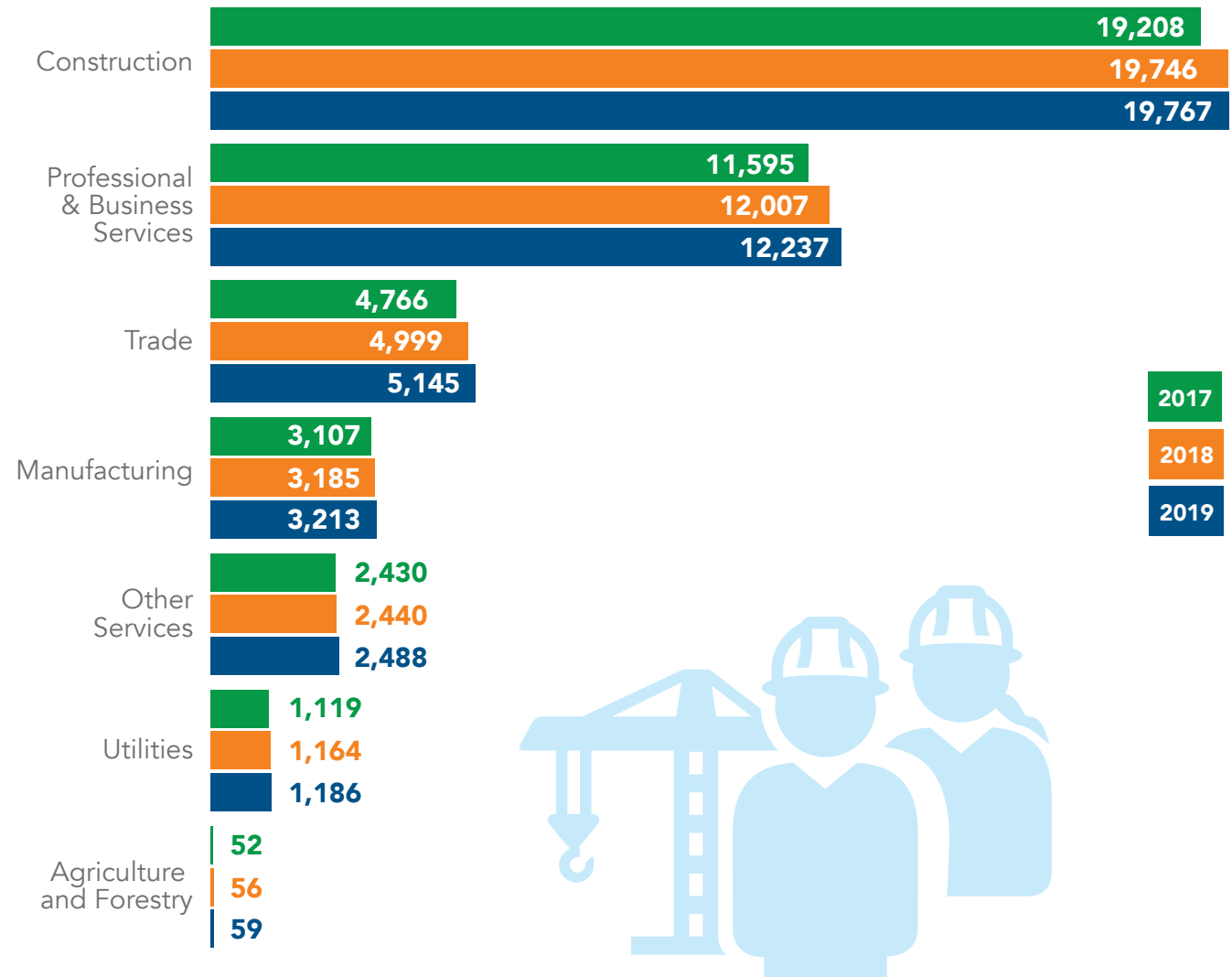
<sup>6</sup> Total Connecticut Gross Domestic Product from Bureau of Economic Analysis (BEA), 2019.

Construction jobs account for just under half of all clean energy jobs in Connecticut (44.8 percent). Between 2017 and 2019, the construction industry grew by 2.9 percent adding 559 jobs to the clean energy labor market.

Connecticut's clean energy economy also includes a significant proportion of professional services, such as engineering, software development, research and design, or finance. These individuals represent about a quarter of all clean energy jobs (27.8 percent). Clean energy professional services grew by 5.5 percent in two years, adding 642 jobs for a total of just over 12,200 workers.

Wholesale trade, manufacturing, utilities, agriculture, and other activities such as non-profit work altogether comprise the remaining 27.4 percent of clean energy jobs. All value chain segments grew between 2017 and 2019.

**Figure 9.** Clean Energy Employment By Value Chain Segment, 2017-2019





The energy efficiency and clean grid and storage sectors have the majority of employment concentrated in the construction industry; these two sectors have an above-average concentration of construction workers compared to Connecticut's overall clean energy industry average of 45 percent.

Professional service workers are mostly found in the energy efficiency sector, followed by clean grid and storage and clean energy generation.

The 58 percent of workers in "other services" for alternative transportation are focused on automotive repair and maintenance.



**Table 3.**  
Value Chain  
Employment By  
Clean Energy  
Sector, 2019

| Clean Energy Sector              | Clean Energy Generation | Clean Grid & Storage | Energy Efficiency | Clean Fuels | Alternative Transportation | TOTAL         |
|----------------------------------|-------------------------|----------------------|-------------------|-------------|----------------------------|---------------|
| Agriculture and Forestry         | –                       | –                    | –                 | 59          | –                          | 59            |
| Utilities                        | 1,186                   | –                    | –                 | –           | –                          | 1,186         |
| Construction                     | 1,277                   | 476                  | 18,014            | –           | –                          | 19,767        |
| Manufacturing                    | 351                     | 64                   | 2,316             | 164         | 318                        | 3,213         |
| Trade                            | 433                     | 39                   | 3,950             | 351         | 371                        | 5,145         |
| Professional & Business Services | 867                     | 146                  | 11,065            | 60          | 99                         | 12,237        |
| Other Services                   | 716                     | 37                   | 655               | 3           | 1,076                      | 2,488         |
| <b>TOTAL</b>                     | <b>4,830</b>            | <b>761</b>           | <b>36,000</b>     | <b>638</b>  | <b>1,865</b>               | <b>44,094</b> |

**Table 4.**  
Value Chain  
Proportional  
Employment By  
Clean Energy  
Sector, 2019

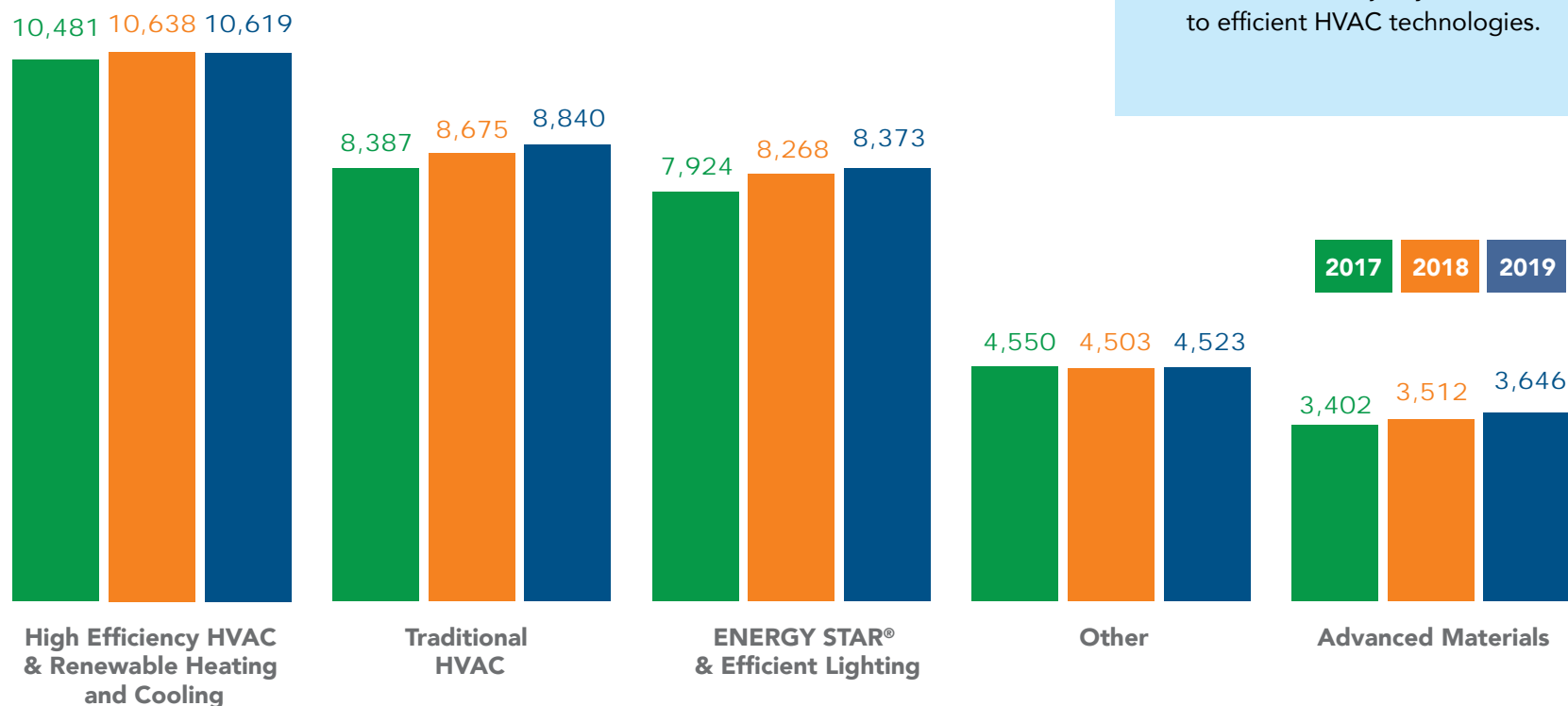
| Clean Energy Sector              | Clean Energy Generation | Clean Grid & Storage | Energy Efficiency | Clean Fuels | Alternative Transportation | Connecticut Clean Energy Average |
|----------------------------------|-------------------------|----------------------|-------------------|-------------|----------------------------|----------------------------------|
| Agriculture and Forestry         | 0.0%                    | 0.0%                 | 0.0%              | 9.3%        | 0.0%                       | 0.1%                             |
| Utilities                        | 24.6%                   | 0.0%                 | 0.0%              | 0.0%        | 0.0%                       | 2.7%                             |
| Construction                     | 26.4%                   | 62.5%                | 50.0%             | 0.0%        | 0.0%                       | 44.8%                            |
| Manufacturing                    | 7.3%                    | 8.4%                 | 6.4%              | 25.8%       | 17.1%                      | 7.3%                             |
| Trade                            | 9.0%                    | 5.1%                 | 11.0%             | 55.1%       | 19.9%                      | 11.7%                            |
| Professional & Business Services | 17.9%                   | 19.1%                | 30.7%             | 9.5%        | 5.3%                       | 27.8%                            |
| Other Services                   | 14.8%                   | 4.9%                 | 1.8%              | 0.4%        | 57.7%                      | 5.6%                             |



The major areas of energy efficiency activity include HVAC as well as ENERGY STAR® and efficient lighting technologies. Together, high efficiency HVAC and renewable heating and cooling<sup>7</sup> plus traditional HVAC account for 54 percent of the energy efficiency workforce, with high efficiency HVAC technologies accounting for a slightly larger portion of jobs (29.5 percent).

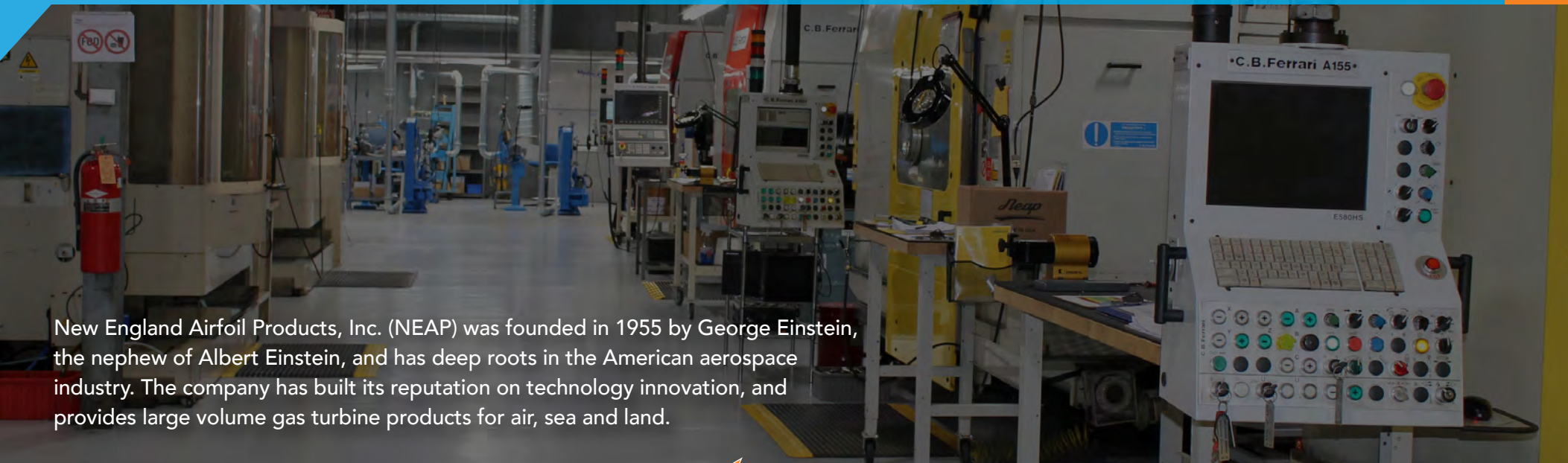
It should be noted that traditional HVAC workers are those individuals that spend at least a portion, or less than half, of their time on energy-efficient heating and cooling technologies and the remainder on traditional, non-efficient technologies. High efficiency HVAC workers dedicate the majority to all of their labor hours to efficient HVAC technologies.

**Figure 10.** Energy Efficiency Employment By Sub-Technology, 2017-2019



<sup>7</sup> Renewable heating and cooling refers to establishments that are involved in heating, ventilation, and air conditioning (HVAC) from renewable energy sources or work that increases the energy efficiency of HVAC systems, such as solar thermal or air source heat pumps.





New England Airfoil Products, Inc. (NEAP) was founded in 1955 by George Einstein, the nephew of Albert Einstein, and has deep roots in the American aerospace industry. The company has built its reputation on technology innovation, and provides large volume gas turbine products for air, sea and land.

### Results Summary

- More than \$50,000 in annual energy savings
- 600 million kilowatt-hours saved over the anticipated lifespan of the new equipment, LED lighting and controls
- NEAP added more than 125 full-time employees and took on new assignments over the past three years

### Annual energy savings & environmental benefits are equivalent to:

- 470 tons of carbon dioxide emissions avoided
- 90 cars taken off the road for a year

### The Challenge

Purchased in 2016 by Pietro Rosa TBM, a leading international manufacturer of compressor airfoils and mission-critical components, NEAP set out to update the machinery and equipment and expand the Farmington, CT, facility's production capacity to serve customers including the USAF and NASA.

### The Eversource Solution:

The international manufacturer turned to Eversource for technical expertise. To date, NEAP has invested more than \$20 million in new manufacturing equipment, expanded its workforce and worked with Eversource on facility upgrades to enhance energy efficiency. Together, several new energy efficient improvements were introduced including:

- An energy-efficient LED lighting system that uses up to 75 percent less electricity and reduces operating and maintenance costs by nearly 80 percent.
- Specification and installation of a new air compressor with variable-frequency drives (VFDs) to regulate air handlers, exhaust heat and cut energy use by more than 35 percent, as compared to non-VFD models.

The savings from the completed projects has freed up capital and allowed NEAP to expand production capacity, invest in workforce development and fuel business growth.



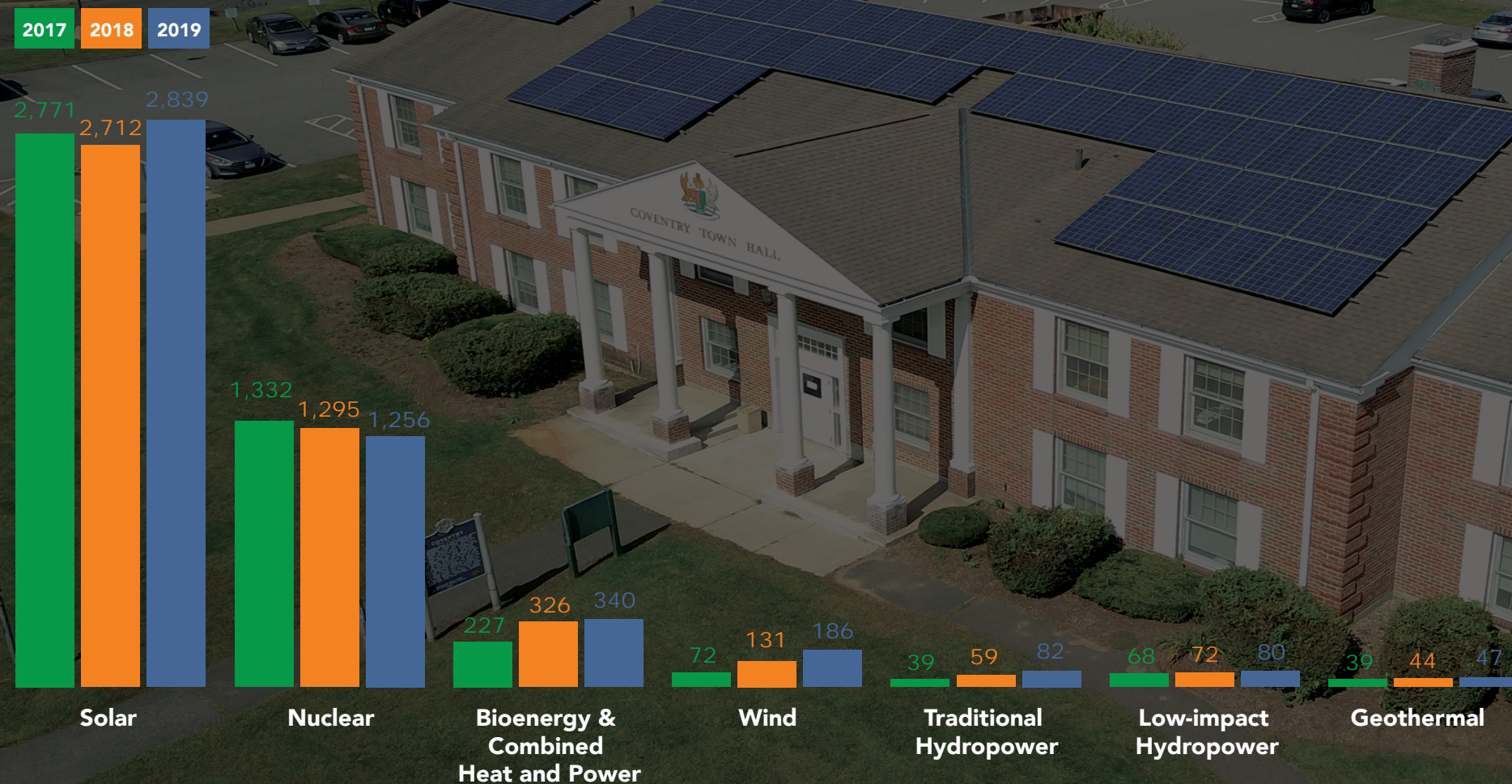


Solar and nuclear power generation are the largest components of the clean energy generation workforce in Connecticut. The state's solar industry rebounded following a two percent decline between 2017 and 2018 resulting from changes in domestic business models (e.g., collapse of Solar City) and global trade tariffs (i.e., US tariffs of

Chinese imports). In total, over the last two years, the solar sector grew by 2.4 percent, or 67 additional jobs. Between 2018 and 2019 alone, Connecticut's solar businesses grew employment by 4.7 percent, or 127 jobs—more than double the previous year's loss.

Nuclear power generation jobs have declined since 2017, shedding 76 workers for a loss of 5.7 percent over two years. These declines also mirror nationwide trends, as the United States continues to focus more heavily on natural gas and renewable electric power generation.

**Figure 11.** Clean Energy Generation Employment By Sub-Technology, 2017-2019



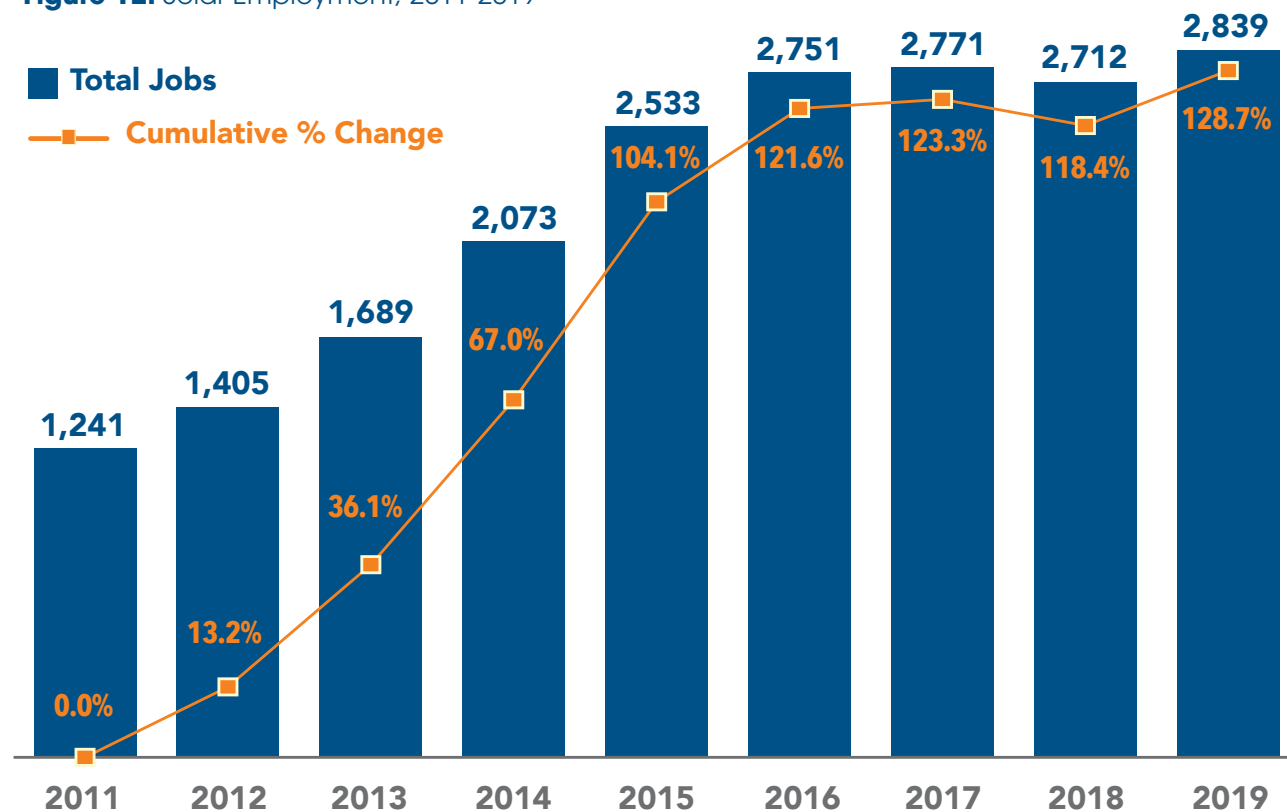




Supportive state policies and programs have helped increase demand for solar deployment in Connecticut, which has helped increase jobs in recent years. For example, the Residential Solar Investment Program (RSIP) launched in 2012 has helped more than 40,000 homeowners go solar by providing incentives. According to recent findings from Solar Energy Industries Association (SEIA), Connecticut had a higher watts per capita residential solar installation rate from 2017-2019 than seven neighboring northeast states.

On the non-residential side, the Zero Emissions Renewable Energy Credit (ZREC), offered through the utility companies, provides a revenue stream to commercial property owners based on kilowatt hour (kWh) of solar energy produced. The increased promotion of solar power purchase agreements (PPAs) has also supported solar deployment on municipal, nonprofit and other commercial properties.

**Figure 12.** Solar Employment, 2011-2019







Commercial Property Assessed Clean Energy (C-PACE) financing has created nearly 1,800 jobs across more than 300 projects at businesses across the state, like this solar installation on a recreational facility in Trumbull.



The Hartford Area Habitat for Humanity (HAHFH) and partners Eversource, Home Energy Technologies, Posigen and Connecticut Green Bank celebrated the construction of Habitat's first Zero Energy Ready Home (ZERH), located at 153 Roosevelt in South Hartford in May 2019.

Since 2002, HAHFH has built ENERGY STAR standard homes. For their 30th anniversary, they wanted to build a high-performance, sustainable home that would decrease the burden of homeownership making it more affordable for their clients.

Home ownership has a lasting impact on families, and is critical to building stronger communities. The ZERH movement into Hartford's affordable housing sector, and partnerships like these, help lower emissions and achieve a clean-energy future.

To achieve the ZERH designation, the Roosevelt home achieved several criteria, such as optimal thermal protection, whole house water protection, high-performance heating and cooling, high-efficiency components, comprehensive indoor air quality, and solar ready construction.

The 1,200 square foot, three-bedroom home features ENERGY STAR-certified appliances, low-flow fixtures, a heat pump hot water heater, air tight construction and solar panels. It also achieved a Home Energy Rating System (HERS) index of -15, which is the industry standard for measuring a home's energy efficiency.

As a ZERH, the Roosevelt home will be at least 40-50 percent more energy efficient than a typical new home, leaving the homeowners with a net zero energy bill, and a carbon free-home.



Unveiled during a dedication ceremony on May 31, 2019, the Roosevelt home is built to Department of Energy's Zero Energy Ready Home standards, and is so energy efficient it can offset all or most of its energy consumption.





### Solar PV and EE Improves Economy for Low and Moderate Income Residents

With the highest energy costs in the continental United States, Connecticut residents are realizing the value of making their home more energy efficient to reduce demand and adding solar photovoltaic systems to create their own electricity. More than 40,000 households are using solar energy, including a growing number of low- and moderate-income families.

"Everyone said it was crazy to go solar, now they all want it. People don't realize there are savings," said Melvin, a Bridgeport homeowner who went solar in June 2015. "Our bill during the winter was \$460 and now it is \$15." After his positive experience, Melvin convinced three neighbors to also seek the benefits of going solar and having a more efficient home.



### Solar PV Increased Commercial Business Bottomline

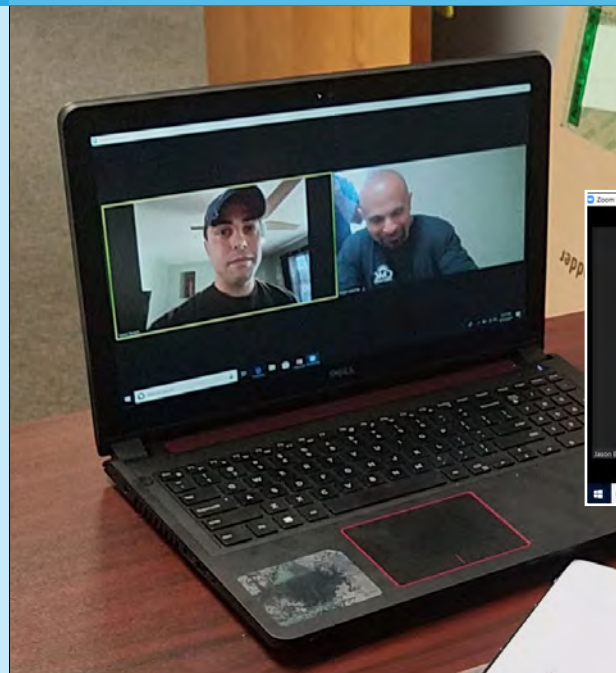
Glenbrook Industrial Park in Stamford used C-PACE financing for the installation of a 135 kW solar PV system and upgrades to their roof. Projected savings over the effective useful life of the upgrades is expected to surpass \$1 million. The 181,216-square-foot facility houses various artisans and light manufacturing firms.



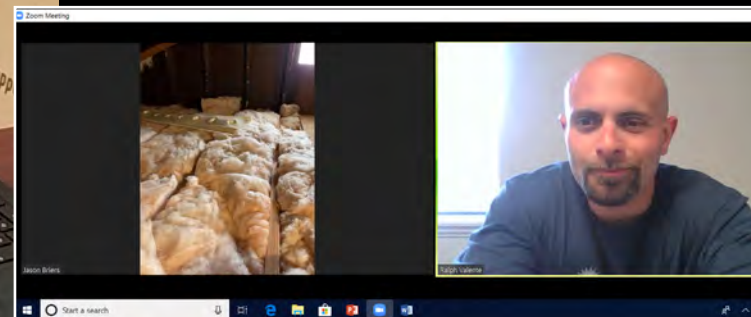
In one easy visit, utility-approved technicians will evaluate a home's energy performance and install basic weatherization and energy-saving measures such as sealing air leaks and installing energy-efficient lighting, faucet aerators and low-flow showerheads. The average home in Connecticut receives about \$1,000 in services and realizes \$200-\$250 in savings on their annual energy bills. Additionally, the technicians will provide written recommendations for deeper energy-saving measures such as Wi-Fi thermostats, insulation, high-efficiency heating and cooling, water heating, windows and appliances. To help customers make smart energy choices, recommendations will include information on rebates and financing along with payback and investment information specific to the home. These services are available for homeowners, renters, and landlords of 4 units or less and single-family homes. Additional opportunities are available for income eligible customers and multi-family building of 5 plus units.

In the wake of COVID-19, a virtual pre-assessment to Home Energy Solutions is now being offered as a safe, convenient first step for customers to make energy-saving improvements. This pre-assessment is available through live, virtual discussions with a technician at no cost.

Home energy assessments morph to meet customer needs to deliver efficiency and meet safety protocols.



Technicians connect with customers using a variety of video chat tools to virtually assess homes and collect information from customers.



Technology allows technician insights to the home before scheduling the on-site visit.

Customers can identify key information on equipment and heating types for technicians.



And when they have access, the customer can provide other key perspectives of their home and existing conditions for the technicians.



### Economic Gains Flow from Hydro Project Combined with Energy Efficiency for Mixed Use Property

A small hydroelectric retrofit project like the one at Cargill Falls Mill in Putnam can create benefits for many stakeholders. In this case, the historic mill building will be redeveloped into 82 mixed-income residential units and 30,000 square feet of commercial space, integrating the approximately 900 kW hydroelectric plant on site. When completed, this project, which uses \$6.2 million in Green Bank financing for the restoration of the powerhouse and deep energy retrofits of the property, will help revitalize downtown Putnam and provide much-needed affordable housing in the state's "quiet corner".

### Harnessing the Wind to Meet Future Goals

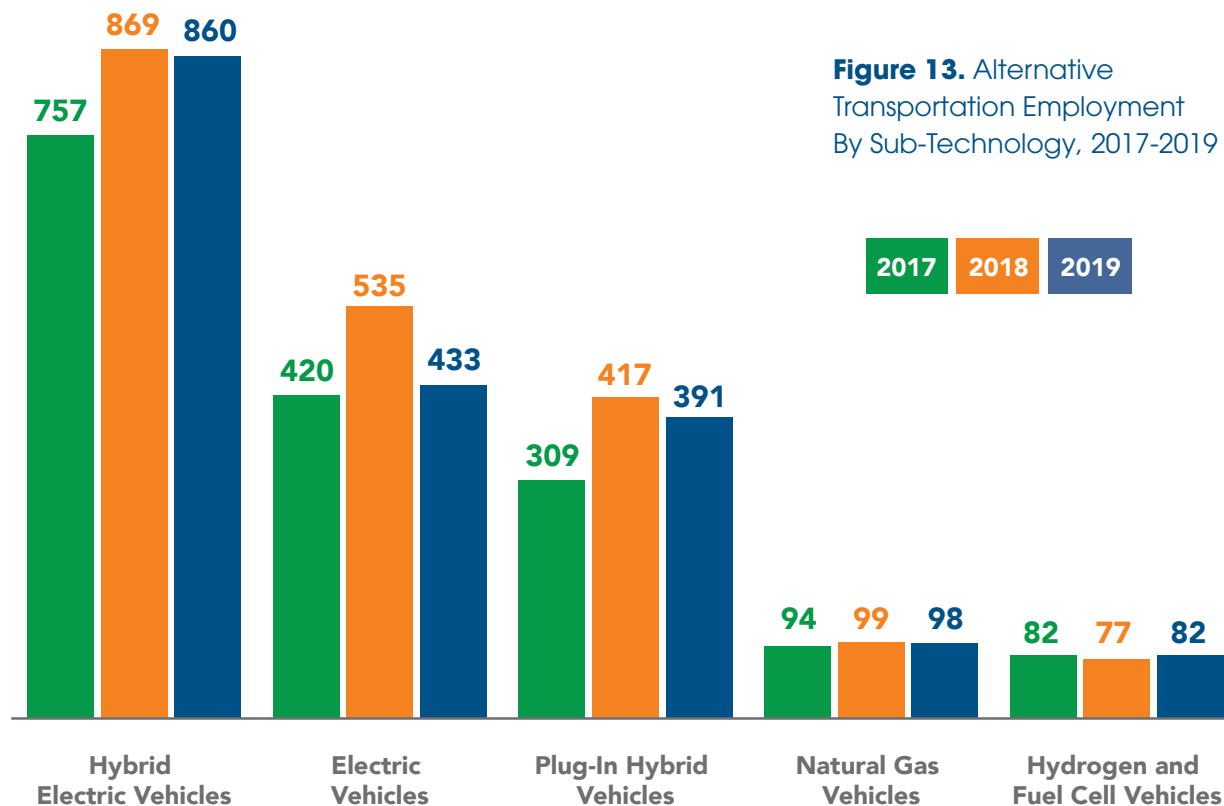
In June 2019, Governor Ned Lamont, with bipartisan support from the Connecticut General Assembly signed *Public Act 19-71, An Act Concerning the Procurement of Energy Derived from Offshore Wind*, which was a major step toward the goal of a 100% zero-carbon electricity supply by 2040. Since then, projects that would benefit coastal cities, like Bridgeport and New London, and create thousands of jobs in the process have been discussed and continue through the approval process. The development of offshore wind projects is seen as a key component of the state's clean energy future.





The largest share of alternative transportation workers is found across firms that work with hybrid electric vehicles. These companies employ 860 workers, or 46 percent of the alternative transportation workforce in Connecticut. Following hybrid electric vehicles, electric vehicle and plug-in hybrid vehicle companies comprise a respective 23 and 21 percent of clean transportation jobs. All sub-sectors have grown since 2017, together creating about 200 new jobs in two years.

Between 2017 and 2018, hybrid electric, electric, and plug-in hybrid vehicles respectively increased by 15 percent, 27 percent, and 35 percent, resulting 335 new alternative transportation workers. The following year, between 2018 and 2019, each sub-sector declined slightly—a collective loss of 136 workers.



### EV and CHEAPR Incentive

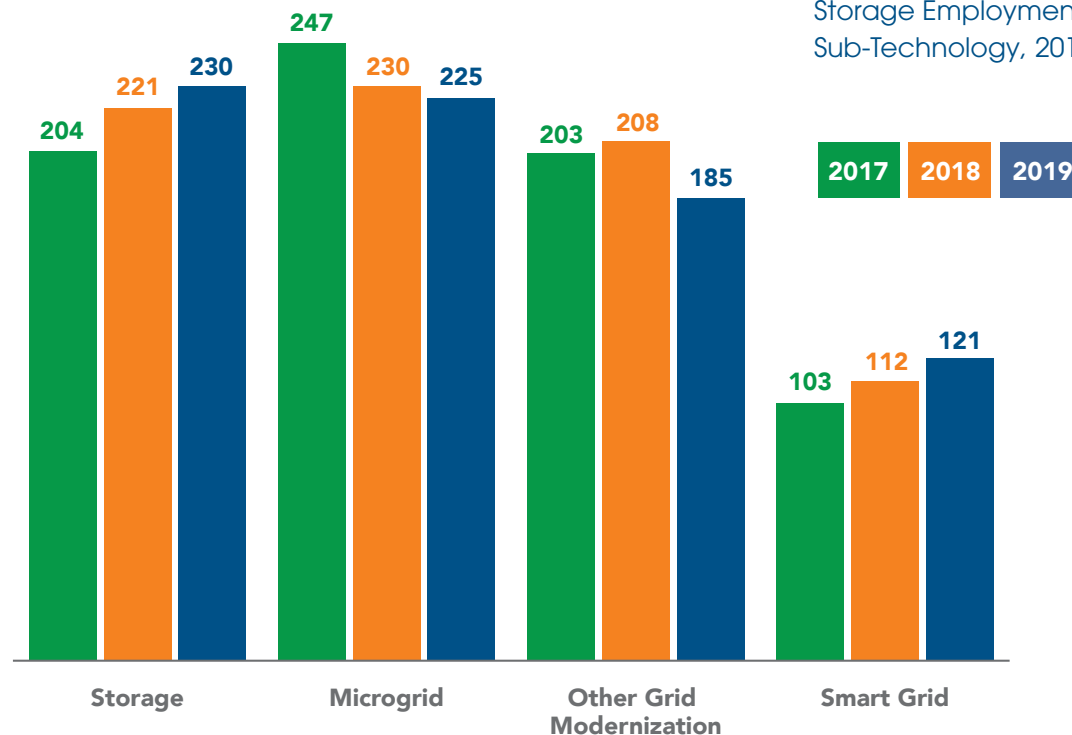
The EV and CHEAPR initiative provides incentives of up to \$5,000 for around 30 recognized battery electric vehicles, plug-in hybrid electric vehicles and fuel cell electric vehicles. These incentives can be realized on new as well as used EV's and given that the eligible vehicles are sold by automobile dealerships franchised in Connecticut. Additionally, EVConnecticut also provides incentives to municipal and state agencies for establishing EV charging stations to promote an EV charging network to provide reliance on EV's for long range travels.

A small sector in Connecticut's clean energy economy, clean grid and storage accounted for 761 jobs in 2019. Storage companies<sup>8</sup> support 30.2 percent of jobs, closely followed by microgrid firms (29.6 percent), other grid modernization (24.3 percent), and smart grid companies (15.9 percent).

Storage and smart grid companies represent all the job growth since 2017, growing a respective 12.8 percent and 17.8 percent—a net increase of 44 jobs in two years. Microgrid and other grid modernization firms lost 41 jobs over the same time frame.

<sup>8</sup> Per the Connecticut definition, storage companies include pumped hydropower storage, battery storage (including battery storage for solar generation), mechanical storage, thermal storage, biofuels (including ethanol and biodiesel), and nuclear fuels.

**Figure 14.** Clean Grid And Storage Employment By Sub-Technology, 2017-2019



### Equitable Modern Grid - Docket No. 17-12-03

On October 2, 2019, the Connecticut Public Utilities Regulatory Authority (PURA) announced its **Framework for an Equitable Modern Grid**, or Grid Modernization dockets, beginning with six dockets covering energy affordability, electric storage, advanced metering infrastructure, zero emissions vehicles, innovation pilots, and interconnection standards.

PURA's energy affordability docket is addressing the barriers to energy affordability and equity for all customer classes. PURA's docket on advanced metering infrastructure will evaluate proposals for the full deployment of smart meters in the state. PURA's docket on electric storage programs and measures looks to leverage the multiple benefits storage can provide to ratepayers. PURA's docket on electric vehicles will establish programs and enable infrastructure investments to meet Connecticut's commitment to the deploying 125,000 – 150,000 electric vehicles by 2025. PURA's docket on Innovation Pilots will identify a prospective structure to support the ongoing development of innovative technology in Connecticut. Lastly, PURA's docket on the utility's interconnection guidelines and procedures will modify the interconnection process to reduce costs and better facilitating the interconnection of distributed energy resources.





The United States Energy and Employment Report (USEER) does not explicitly capture fuel cell employment outside of the “hydrogen and fuel cell” sub-technology within the motor vehicles sector. As such, fuel cell jobs often exist across multiple sectors in addition to motor vehicles, such as electric power generation; transmission, distribution, and storage; and fuels. While it is difficult to extrapolate the total number of individuals engaged in fuel cell technologies across Connecticut, it is widely known that the state is a national leader in stationary hydrogen fuel cell technologies. Future USEER data collection will incorporate improved methodologies to fully extrapolate fuel-cell related employment totals.

In 2016, The US Department of Energy's Fuel Cell Technologies Office recognized Connecticut as one of the top 3 fuel cell states in the country due to high levels of funding and deployment. The report found that more than 600 companies are part of the state's fuel cell and hydrogen supply chain.<sup>9</sup> FuelCell Energy (378 employees), Doosan Fuel Cell America (66 employees), and Proton OnSite (125 employees).<sup>10</sup> are among the largest fuel cell companies in the country, earning Connecticut the nickname of the “Silicon Valley” for fuel cell technology.<sup>11</sup> A 2017 economic analysis found that Connecticut's hydrogen and fuel cell supply chain contributed more than \$600 million in revenue and investments and 2,800 direct, indirect, and induced jobs to the region's economy.<sup>12</sup>

Fuel cells are currently classified in Connecticut statute as a Class I renewable energy source, lending it preferential status for Renewable Energy Credits in pursuit of the state's Renewable Portfolio Standard. Fuel cells are supported through the LREC procurement, microgrid policies, and competitive procurements. In addition, Congress has extended the national investment tax credit for fuel cells—currently at 26 percent—through 2022.<sup>13</sup>

According to the Connecticut Hydrogen-Fuel Cell Coalition—which is administered by the Connecticut Center for Advanced Technology and comprised of industry, academic, and government stakeholders—the total capacity of existing or approved fuel cells in the state exceeds 105 megawatts (MW) across nearly 100 sites.<sup>14</sup> A 2018 report by the Northeast Electromechanical Energy Storage Cluster (NEESC) determined that Connecticut has the potential to install 170 MW of hydrogen fuel cells, with an annual output of approximately 1.44 million megawatt hours.<sup>15</sup>

Connecticut has also sought to leverage transportation applications of hydrogen fuel cells. The state's transit system was one of the first to demonstrate fuel cell busses, at one time boasting five fuel cell busses in their fleet.<sup>16,17</sup> The state is also home to two publicly-available refueling stations for hydrogen cars, with eleven more in development.<sup>18</sup> The NEESC recommends that the state develop six to seven hydrogen refueling stations for a goal of supporting nearly 600 fuel cell electric vehicles.<sup>19</sup>



### Supporting a State Strength: Fuel Cell Technology

Connecticut has long been a pioneering state when it comes to the fuel cell industry, particularly manufacturing and development. In recent years, the Green Bank has worked with Fuel Cell Energy (FCE) to secure financing on major deployment projects that benefit Connecticut, including a \$23 million financing facility to support the 7.4 megawatts (MW) power plant being built for the US Navy Submarine Base in Groton.

<sup>9</sup> US Department of Energy. State of the States: Fuel Cells in America 2016, 7th Edition. November 2016.

<sup>10</sup> Company employment estimates are taken from DatabaseUSA.com via Emsi Business Listings and should be used with caution. The estimate for Proton OnSite was taken from the company's Owler business listing: <https://www.owler.com/company/protononsite>.

<sup>11</sup> <https://www.ctpost.com/local/article/Fuel-cell-companies-reach-out-to-legislators-for-12653242.php>

<sup>12</sup> Northeast Electromechanical Energy Storage Cluster. Connecticut Hydrogen Economy. January 2018.

<sup>13</sup> <https://www.greentechmedia.com/articles/read/will-high-temperature-fuel-cells-scale>

<sup>14</sup> <http://chfcc.org/ct-fuel-cell-installations-and-approved-projects/>

<sup>15</sup> Northeast Electromechanical Energy Storage Cluster. Connecticut Hydrogen Economy. January 2018.

<sup>16</sup> National Renewable Energy Laboratory. Fuel Cell Buses in U.S. Transit Fleets: Current Status 2017. November 2017.

<sup>17</sup> <https://www.hartfordbusiness.com/article/ct-laying-groundwork-for-next-green-wave-hydrogen-cars>

<sup>18</sup> Northeast Electromechanical Energy Storage Cluster. Connecticut: Market Potential for Hydrogen and Fuel Cell Transportation Applications. February 2017.

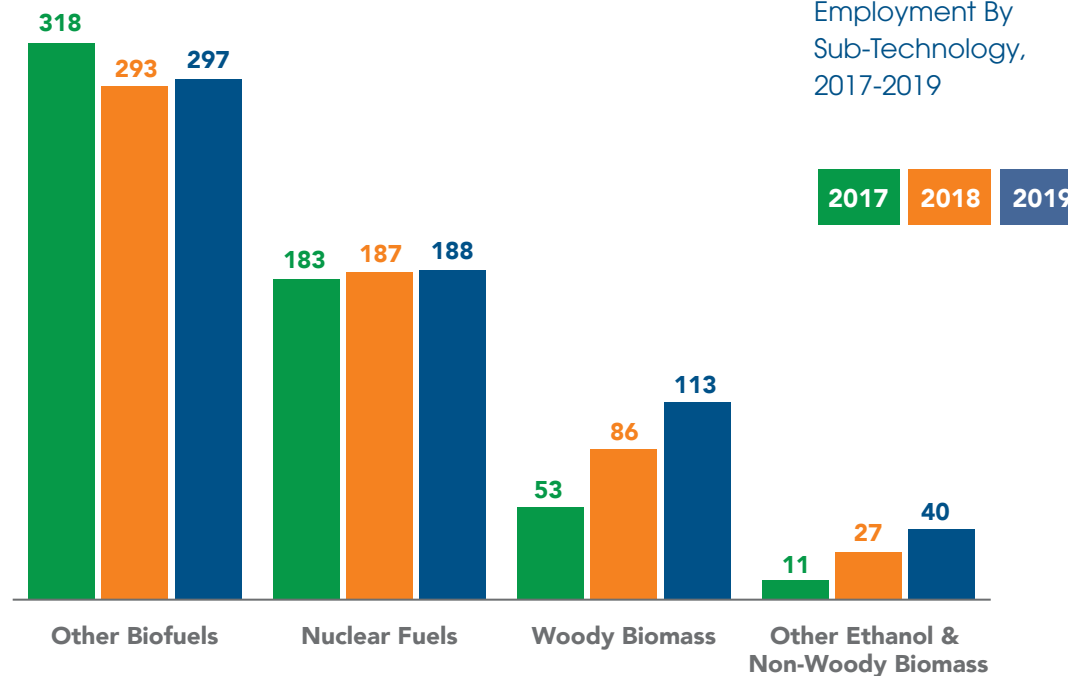
<sup>19</sup> Northeast Electromechanical Energy Storage Cluster. Connecticut Hydrogen Economy. January 2018.

Other biofuels, which is defined as any other fuel that is derived directly from living matter, accounts for 46.5 percent of total clean fuels employment in Connecticut. This is followed by nuclear fuels (29.5 percent), woody biomass (17.7 percent), and other ethanol and non-woody biomass<sup>20</sup> (6.3 percent).

Though small, woody biomass jobs have grown the most since 2017. These businesses have created 60 jobs in two years—a growth rate of 114 percent.

<sup>20</sup> Other ethanol and non-woody biomass (including biodiesel) covers all fuels made from other materials such as straw, manure, vegetable oil, animal fats, etc.

**Figure 15.** Clean Fuels Employment By Sub-Technology, 2017-2019



### From Food Waste to Energy and Jobs

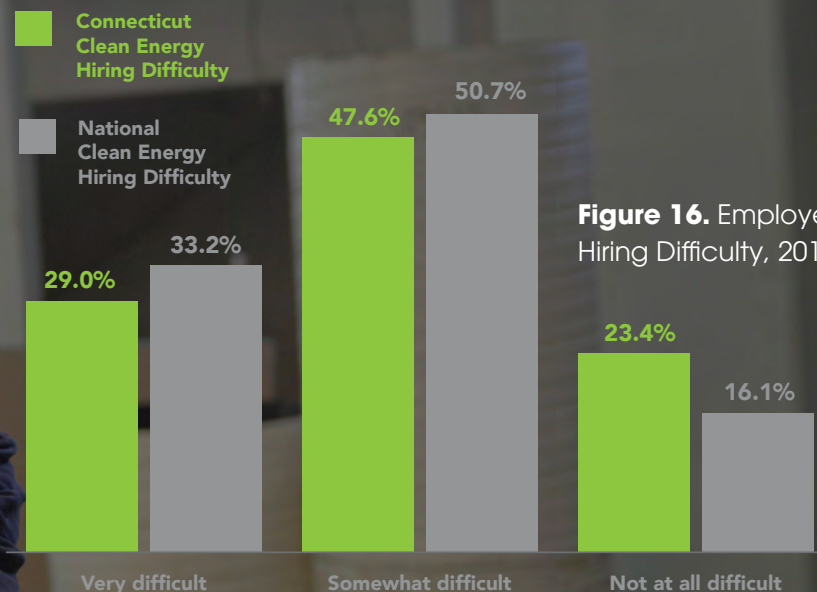
In 2016, the state's only food waste-to-energy plant, Quantum Biopower, opened in Southington, with support from the Connecticut Green Bank, People's United Bank, and the Department of Energy and Environmental Protection. The plant uses the anaerobic digestion process to generate about 1.2 megawatts of Class 1 electricity annually, offsetting an estimated 5,000 tons of greenhouse gas emissions through the recycling of 40,000 tons of food waste.





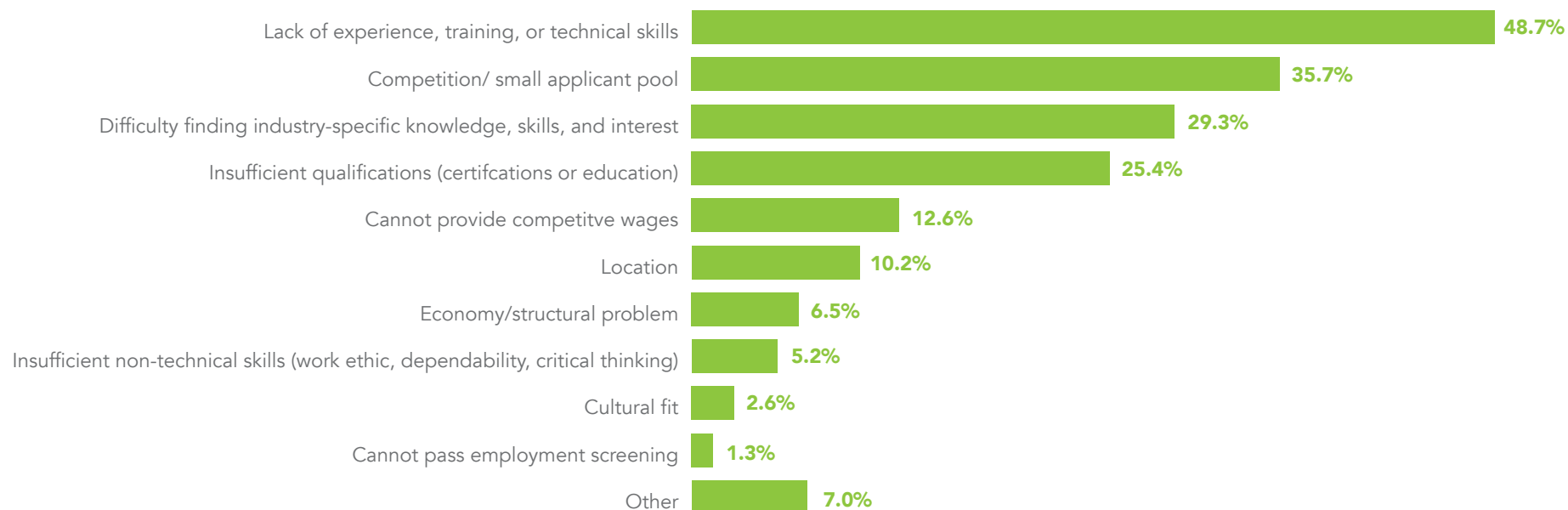
Prior to COVID-19, the majority of clean energy employers reported hiring difficulty in Connecticut. Just over three quarters (77 percent) of employers indicated that they had difficulty hiring between the end of 2018 and the end of 2019; three in ten reported that hiring was very difficult. However, hiring difficulty for Connecticut clean energy employers was lower compared to the national average. Across the United States, 84 percent of employers had hiring difficulty between 2018 and 2019.

The top reported reasons for hiring difficulty include lack of experience, competition and a small applicant pool, and difficulty finding industry-specific knowledge.



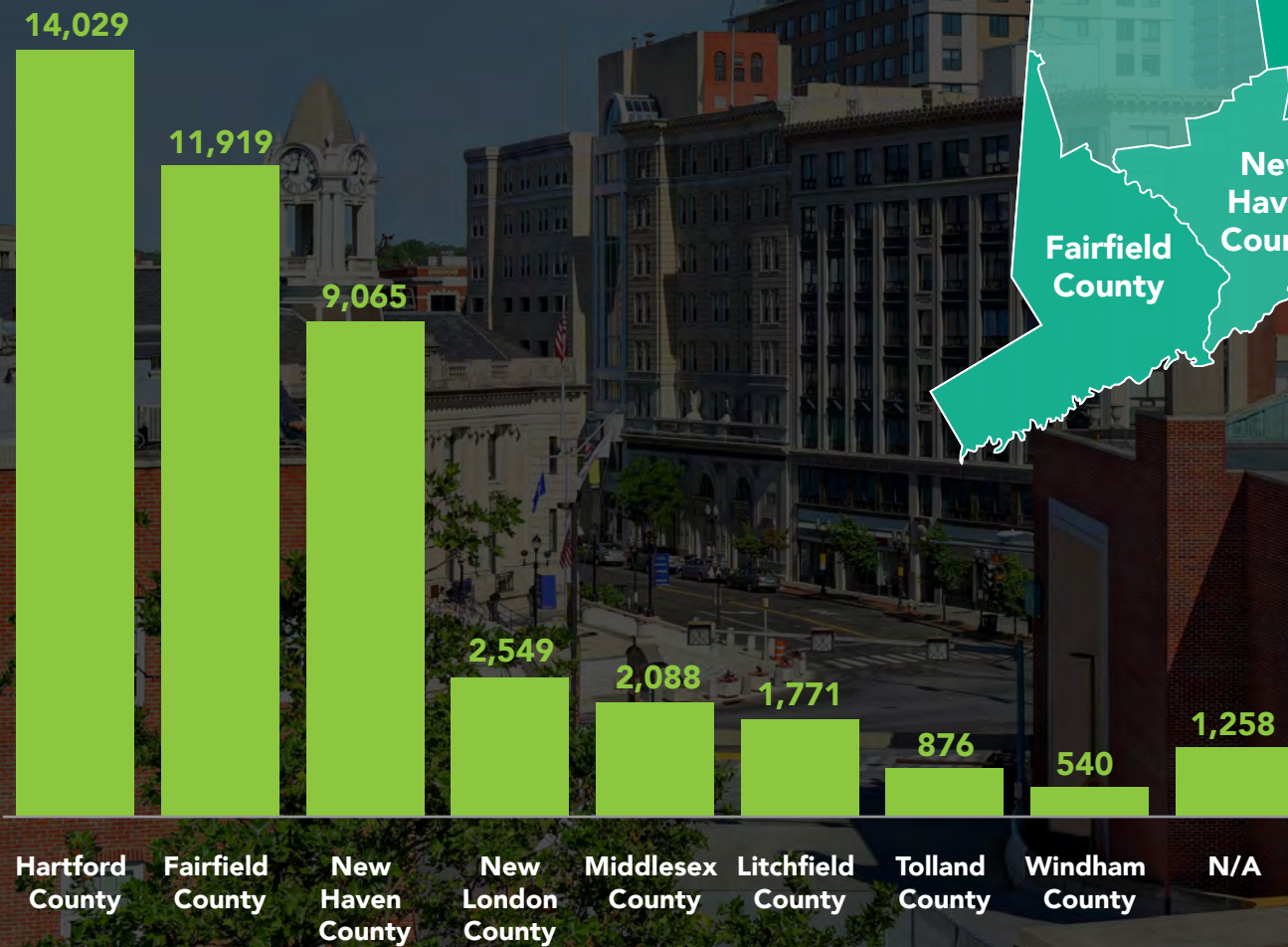
**Figure 16.** Employer-Reported Hiring Difficulty, 2019

**Figure 17.** Reasons For Hiring Difficulty In Connecticut, 2019

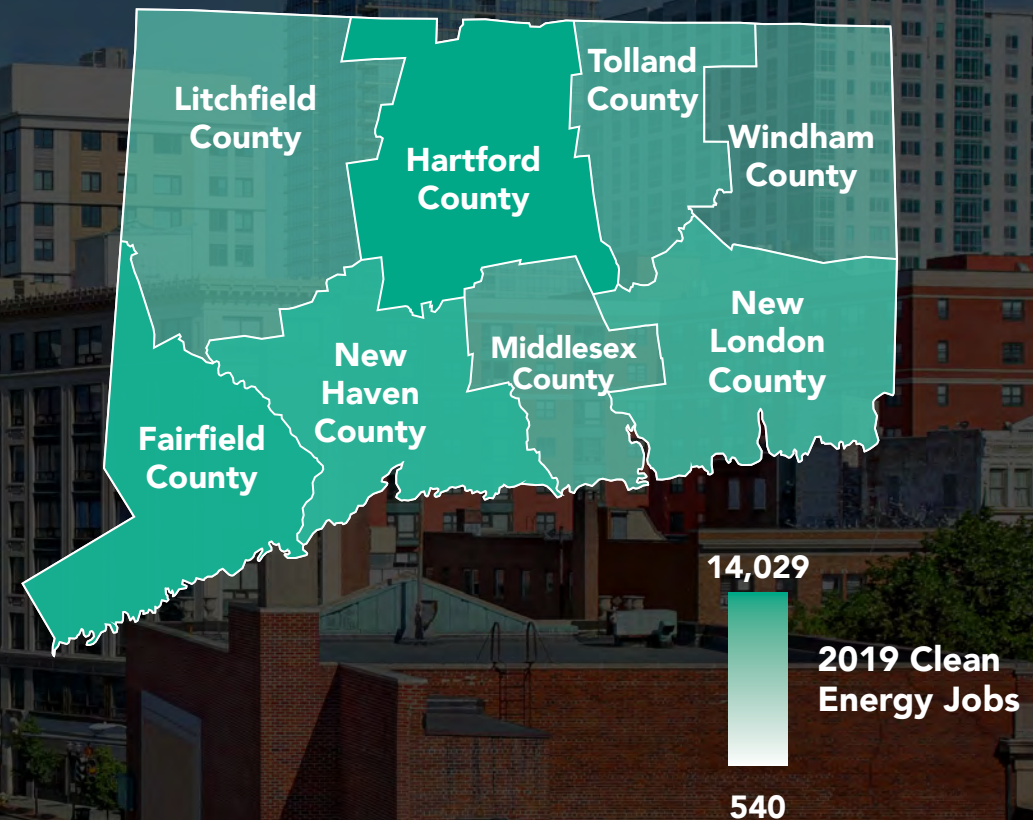


Clean energy employment is concentrated across Hartford, Fairfield, and New Haven counties in Connecticut. These three counties together account for about eight in ten clean energy workers across the state (79.4 percent).

**Figure 18.** Clean Energy Employment By County, 2019<sup>21</sup>



**Figure 19.** Map Of Clean Energy Employment By County, 2019



<sup>21</sup> Employment categorized as "n/a" could not be assigned to a single location.



Clean energy training programs are largely focused in the same counties that have a high proportion of clean energy jobs. These counties include the following: New Haven (30 percent), Hartford (19 percent), and Fairfield (14 percent).

Just over a third of programs are also offered via web-based portals, making these accessible to all residents and age groups with internet and computer access. The proportion of web offerings is likely to increase in the future, as the COVID-19 pandemic continues to change the nature of work and education.

**Table 5.** Current Clean Energy-Related Training Programs By Location, 2019<sup>22</sup>

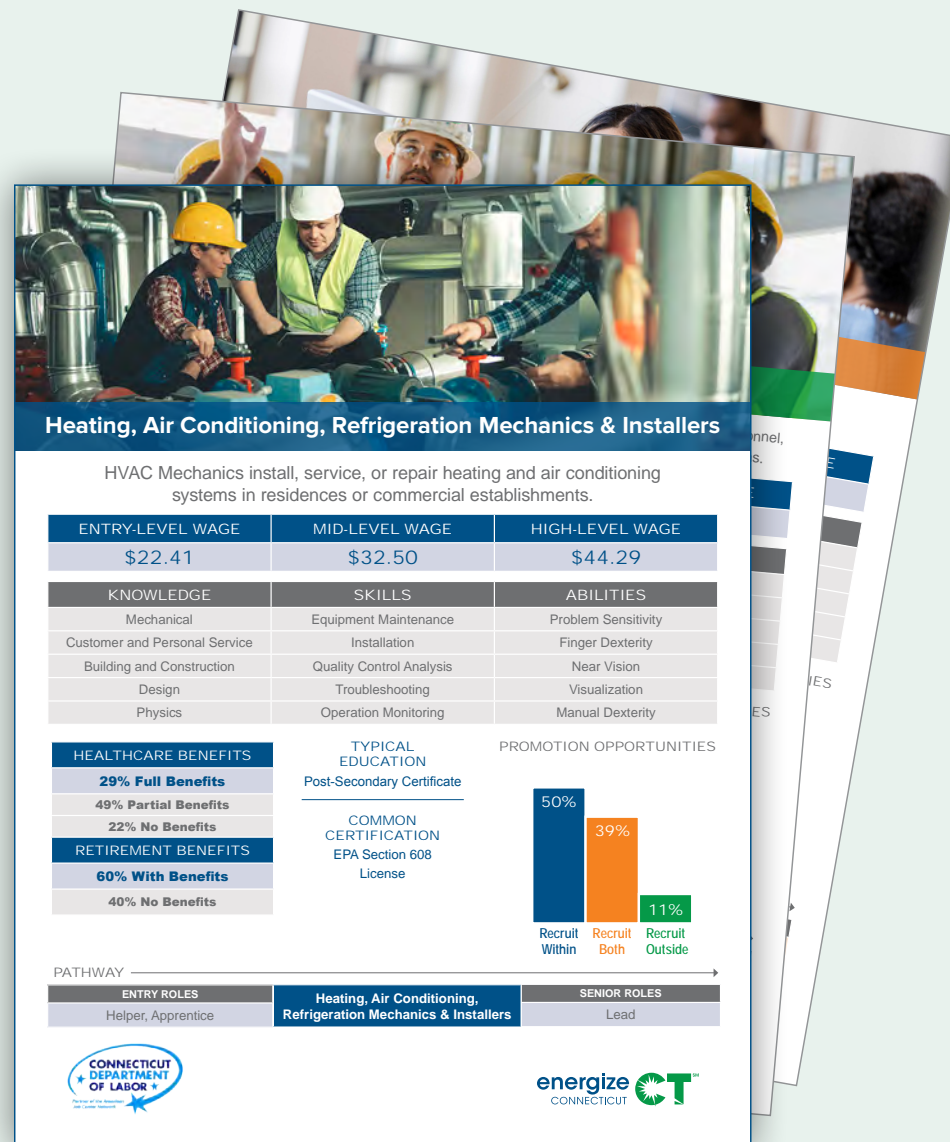
| County     | Program Offerings | Locational Distribution |
|------------|-------------------|-------------------------|
| Fairfield  | 37                | 13.9%                   |
| New Haven  | 80                | 30.0%                   |
| Hartford   | 51                | 19.1%                   |
| Middlesex  | 20                | 7.5%                    |
| Windham    | 14                | 5.2%                    |
| Tolland    | 2                 | 0.7%                    |
| Litchfield | 4                 | 1.5%                    |
| New London | 22                | 8.2%                    |
| Web        | 94                | 35.2%                   |

<sup>22</sup> The locational distribution will not sum to 100 percent because many programs are offered in multiple counties. As such, the denominator is not the number of programs, but the number of locations. For example, if one program is offered in three counties, it is counted three times in the percent distribution.

With the passage of Public Act 19-35 “An Act Concerning a Green Economy and Environmental Protection,” the Office of Workforce Competitiveness (OWC) is charged with establishing a career ladder for jobs in the green technology industry. In collaboration with OWC, BW Research and the Joint Committee, have produced ten (10) career profiles in clean energy that identify the requisite level of education, salary range, health care and retirement benefits, and more for the following clean energy technology jobs:

- Heating, Air Conditioning, and Refrigeration Mechanics and Installers
- Construction Laborers
- Insulation Workers, Floor, Ceiling and Wall
- Electricians
- Solar Photovoltaic Installers
- Sales Representative
- Construction Managers
- Bookkeeping, Accounting, and Auditing Clerks
- Engineers
- General and Operations Managers

These career profiles, as well as access to clean energy related training programs, are available at [www.ctgreenjobs.com](http://www.ctgreenjobs.com).





Connecticut's clean energy economy is slightly less diverse than the national clean energy labor market, though this may be in part due to the fact that the state in general has a lower proportion of Hispanic or Latinx and Black or African American workers compared to the nation overall.



Clean energy occupations are a good source of jobs for Veterans in the state, with 10.6 percent of clean energy positions in Connecticut held by Veterans of the U.S. Armed Forces. This is higher than the overall statewide average (four percent), the U.S. clean energy average (nine percent), and the U.S. overall proportion of Veterans in the workforce (six percent).

Union membership rates are higher-than-average for clean grid and storage (11.4 percent) and alternative transportation (8.5 percent).

**Table 6.** Clean Energy Workforce Demographics, 2019<sup>23</sup>

| Workforce Demographic                     | Connecticut Clean Energy | Connecticut Overall | US Clean Energy | US Overall |
|-------------------------------------------|--------------------------|---------------------|-----------------|------------|
| Male                                      | 72.0%                    | 51.7%               | 72.6%           | 53.0%      |
| Female                                    | 28.0%                    | 48.3%               | 27.4%           | 47.0%      |
| Hispanic or Latino                        | 10.1%                    | 16.8%               | 16.5%           | 17.6%      |
| Not Hispanic or Latino                    | 89.9%                    | 83.1%               | 83.5%           | 82.4%      |
| American Indian or Alaska Native          | 0.8%                     | 0.6%                | 1.4%            | 1.3%       |
| Asian                                     | 6.0%                     | 5.0%                | 8.2%            | 6.5%       |
| Black or African American                 | 5.8%                     | 12.1%               | 8.4%            | 12.3%      |
| Native Hawaiian or other Pacific Islander | 0.7%                     | 0.1%                | 1.0%            | 0.2%       |
| White                                     | 82.0%                    | 79.7%               | 73.1%           | 77.7%      |
| Two or more races                         | 4.8%                     | 2.5%                | 7.9%            | 2.8%       |
| Veterans                                  | 10.6%                    | 4.1%                | 9.0%            | 5.7%       |
| 55 and over                               | 14.8%                    | 27.4%               | 13.6%           | 23.6%      |
| Union                                     | 6.8%                     | 14.5%               | 7.9%            | 6.2%       |

**Table 7.** Connecticut Union Membership Rate By Clean Energy Sector, 2019

| Clean Energy Sector        | Union Membership Rate |
|----------------------------|-----------------------|
| Clean Energy Average       | 6.8%                  |
| Clean Fuels                | 4.6%                  |
| Clean Energy Generation    | 4.2%                  |
| Clean Grid & Storage       | 11.4%                 |
| Energy Efficiency          | 7.0%                  |
| Alternative Transportation | 8.5%                  |

<sup>23</sup> Demographic data is pulled from the United States Energy and Employment Report 2019 (USEER 2019); the Bureau of Labor Statistics: Current Population Survey, Veterans News Release, and Union Membership Rates; as well as Emsi Population Demographics.

Data for the 2020 Connecticut Clean Energy Industry Report is taken from the US Energy and Employment Report (USEER). The survey was administered by phone and web. The phone survey was conducted by ReconMR, and the web instrument was programmed internally. Each respondent was required to use a unique ID in order to prevent duplication.

In total, 537 business establishments in Connecticut participated in the survey effort. These responses were used to develop incidence rates among industries as well as to apportion employment across various industry categories in ways currently not provided by state and federal labor market information agencies. The margin of error for incidence is +/- 4.22 percent for Connecticut at a 95 percent confidence interval.

The full research methodology for USEER may be found at: <https://www.usenergyjobs.org/>

### About BW Research

BW Research is a full-service consulting and research firm that specializes in workforce and economic development for public entities, including workforce investment boards, economic development agencies, cities, counties, and educational institutions. BW Research has substantial experience in developing customized research projects and a deep understanding of the clean energy sector and its employers, workforce, and supply chain dynamics. BW Research has designed and conducted over 500 studies for public, private, and not-for-profit agencies throughout the United States and internationally.



The historic powerhouse at the Upper Collinsville Dam on the Farmington River in Canton will produce 1 MW of hydroelectric power when restoration is complete.



A clean energy job is defined as any worker who is directly involved with the research, development, production, manufacture, distribution, sales, implementation, installation, or repair of components, goods, or services related to the following sectors of Clean Energy Generation; Clean Grid and Storage; Energy Efficiency; Clean Fuels; and Alternative Transportation. These jobs also include supporting services such as consulting, finance, tax, and legal services related to energy.

Included in these sectors for Connecticut are the following sub-technologies that are considered clean energy-related activities. The clean energy definition for Connecticut was developed through an iterative process with the Connecticut Green Bank, the Department of Energy and Environmental Protection, Eversource, and United Illuminating. The sub-technologies below were selected based on their compliance with clean energy-specific policies across the state, such as the Renewable Portfolio Standard and Zero Emission Vehicle Standard.<sup>24</sup>

### CLEAN ENERGY GENERATION

- Solar Photovoltaic Electric Generation
- Concentrated Solar Electric Generation
- Wind Generation
- Geothermal Generation
- Bioenergy/Biomass Generation
- Low-Impact Hydroelectric Generation, including wave/kinetic generation
- Traditional Hydroelectric Generation
- Nuclear Generation
- Combined Heat and Power

### CLEAN GRID & STORAGE

- Electric Power Transmission and Distribution
- Smart Grid
- Microgrids
- Other Grid Modernization

### STORAGE

- Pumped Hydropower Storage
- Battery Storage, including battery storage for solar generation
  - Lithium Batteries
  - Lead-Based Batteries
  - Other Solid-Electrode Batteries
  - Vanadium Redox Flow Batteries
  - Other Flow Batteries
- Mechanical Storage, including flywheels, compressed air energy storage, etc.
- Thermal Storage
- Biofuels, including ethanol and biodiesel
- Nuclear Fuel

### CLEAN FUELS

- Other Ethanol/Non-Woody Biomass, including biodiesel
- Woody Biomass/Cellulosic Biofuel
- Other Biofuels
- Nuclear Fuel

### ALTERNATIVE TRANSPORTATION

- Hybrid Electric Vehicles
- Plug-In Hybrid Vehicles
- Electric Vehicles
- Natural Gas Vehicles
- Hydrogen Vehicles
- Fuel Cell Vehicles
- Other Vehicles

### ENERGY EFFICIENCY

- ENERGY STAR Certified Appliances, excluding HVAC
- ENERGY STAR Certified Heating Ventilation and Air Conditioning (HVAC), including boilers and furnaces with an AFUE rating of 90 or greater and air and central air conditioning units of 15 SEER or greater
- Traditional HVAC goods, control systems, and services<sup>25</sup>
- ENERGY STAR Certified Electronics (TVs, Telephones, Audio/Video, etc.)
- ENERGY STAR Certified Windows and Doors
- ENERGY STAR Certified Roofing
- ENERGY STAR Certified Seal and Insulation
- ENERGY STAR Certified Commercial Food Service Equipment
- ENERGY STAR Certified Data Center Equipment
- ENERGY STAR Certified LED Lighting
- Other LED, CFL, and Efficient Lighting
- Solar Thermal Water Heating and Cooling
- Other Renewable Heating and Cooling (geothermal, biomass, heat pumps, etc.)
- Advanced Building Materials/Insulation
- Recycled Building Materials
- Reduced Water Consumption Products and Appliances
- Other Energy Efficiency

<sup>24</sup> Including, but not limited to Public Act 08-98, Public Act 11-80, Public Act 17-3, Public Act 18-50, Public Act 18-82, Public Act 19-71, and Executive Order 3

<sup>25</sup> "Traditional HVAC" workers are those that spend a portion of their time on energy efficient products and services; it is not inclusive of all HVAC workers, only those that are reported to spend less than 50 percent of their labor hours on efficient products and services. "ENERGY STAR®/High AFUE HVAC" workers spend the majority of their labor hours (more than 50 percent) working with energy efficient HVAC technologies. The employment data makes this distinction in order to capture all HVAC workers that spend any portion of their labor hours on efficient HVAC technologies, but separates the two job categories in order to appropriately track how much high efficiency HVAC activity is occurring.



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