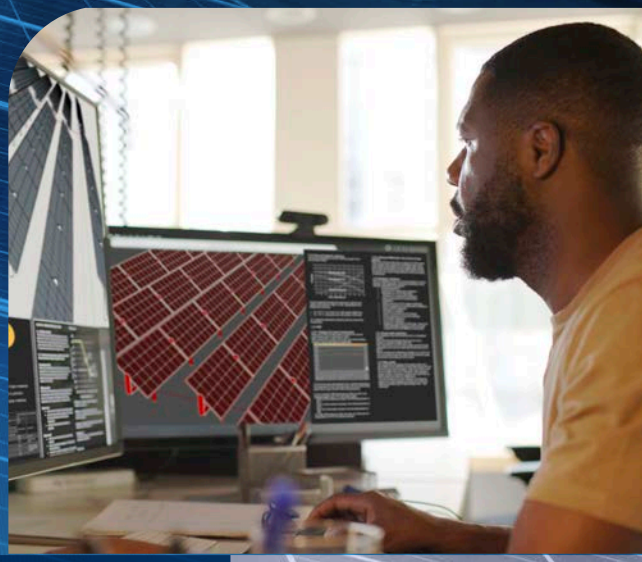
2022

Connecticut Clean Energy Industry Report

energize CONNECTICUT℠



[bw] RESEARCH PARTNERSHIP

Drone photo of solar installation at L.C. Doane in Ivoryton, CT.

A Message from the Joint Committee

Brenda Watson, Chair

While the rippling impact of the COVID-19 pandemic continues to linger on the global economy, Connecticut's clean energy industry experienced a strong rebound in 2021 with many signs of positive momentum returning to the sector, as this 2022 report will highlight. Total clean energy employment grew and clean energy contributions to statewide Gross Regional Product (GRP) increased by seven percent.

Employment growth in 2021 was the single highest gain in the past five years, however, the sector is still recovering from the impact of 2020. It's worth noting that Connecticut's clean energy industry was more resilient during the pandemic, according to the previous clean energy industry report, thanks to the efforts of clean energy companies and the administration of Governor Lamont, the Energy Efficiency Board, the utilities, the Connecticut Green Bank, and many others.

Some specific highlights of this report include:

- **More solar jobs.** Jobs in the solar subsector increased by 8.4 percent in 2021. This gain pushes the solar workforce slightly above pre-pandemic employment levels.
- **More companies in the sector.** The number of clean energy establishments also grew to a new highest level (4,392 companies), an increase of 2.5 percent. This should help create continued sustained job growth.
- **Alternative transportation leading the way.** Another highlight was the unprecedented growth of the alternative transportation sector, which increased by nearly 29 percent. This increase was spread across manufacturing, wholesale trade, and repair and maintenance.
- **Energy efficiency jobs recovering, but lagging.** All energy efficiency sub-technologies, including high efficiency HVAC, renewable heating and cooling, efficient lighting, and advanced materials, saw employment growth in 2021, however, these technologies are still lower than pre-pandemic levels.
- **Storage jobs increasing.** Jobs in storage, microgrid, smart grid, and other grid modernization sub-technologies experienced growth in 2021, recouping the jobs lost in 2020. The storage sub-tech had the highest growth at 18 percent. This growth could be helped along by the 2022 launched of PURA's Energy Storage Solutions program, which provides upfront and performance based incentives to home- and building owners installing battery storage.
- **Diversity increasing, hiring difficulties decreasing.** The state's clean energy workforce was slightly more diverse in 2021, as the share of workers of color in the sector increased. Hiring difficulties decreased slightly (2 percent) for employers seeking to add workers, but remained slightly higher when compared to the national average.

While the recovery has been strong, we understand that more work is needed to continuously support the clean energy industry, and state leadership and members of the Joint Committee (Avangrid, Connecticut Green Bank, the Department of Energy and Environmental Projection, and Eversource) are dedicated to helping this sector continue to thrive and grow. We know the tremendous value created by this sector, which can be measured in energy and cost savings for families and businesses, environmental improvements like the avoidance of greenhouse gas emissions, and tax revenues generated for the state.

2022 Connecticut Clean Energy Industry Report

This report is the third annual report tracking clean energy employment in Connecticut. This year's report follows in the aftermath of the global Coronavirus (COVID-19) pandemic and provides detail on how the state's clean energy employment has recovered since the pandemic-induced economic recession. The Joint Committee commissioned BW Research Partnership to produce this 2022 report, with financial support provided by the Connecticut Green Bank, Eversource, and United Illuminating.

The 2022 Clean Energy Industry Report details historical clean energy employment from 2017 through 2021, using the Connecticut-specific definition of clean energy technologies[1]. Employment data is described by clean energy technology sector, their component sub-technologies, and industry or value chain segment. Also included in this year's report is an update to county-level employment, employer hiring difficulty, clean energy firms' contributions to Gross Regional Product (GRP), and clean energy demographics.

All data presented in this report is based on the 2022 United States Energy and Employment Report (USEER).[2]

About Energize CT and Joint Committee

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**

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.

[1] For more information on what constitutes a clean energy job and which clean energy technologies are included in this report, please refer to Appendix B: Clean Energy Technology List.

[2] https://www.energy.gov/policy/us-energy-employment-jobs-report-useer

About the Members

The Connecticut Green Bank is the nation's first green bank. It's mission is to confront climate change by increasing and accelerating investment into Connecticut's green economy to create more resilient, healthier, and equitable communities. Our vision is a planet protected by the love of humanity.

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 4.4 million electric and natural gas customers in Connecticut, Massachusetts and New Hampshire. One of Eversource's core commitments is to lead the industry in sustainability and to bring more clean and affordable energy to New England.

2022 Highlights

Alternative transportation

firms saw unprecedented employment growth in 2021, led by job growth in the hybrid electric and electric vehicle sub-sectors.

Clean energy employment

Connecticut recovered from last year's employment losses more slowly than the overall statewide economy, the national clean energy labor market, and other clean energy economies in the Northeast.

The number of firms conducting energy efficiency, clean energy generation, clean fuels, and clean grid and storage work increased between 2020 and 2021.

Clean energy contributions to statewide GRP increased by 6.5 percent between 2020 and 2021 and by 21.6 percent since 2017.

Except for energy efficiency, **all technology sectors fully recovered** from job losses incurred in 2020 and surpassed their pre-pandemic employment levels.

Clean Energy Labor Market & Economic Activity

Total clean energy employment grew by 3.7 percent in 2021. In the last quarter of 2021, clean energy employment totaled to just over 43,000 jobs in Connecticut; this is roughly 1,500 jobs higher compared to the last quarter of 2020. Despite experiencing the largest single year employment growth in the past five years, the state's clean energy sector has not fully recovered from the job losses incurred in 2020.

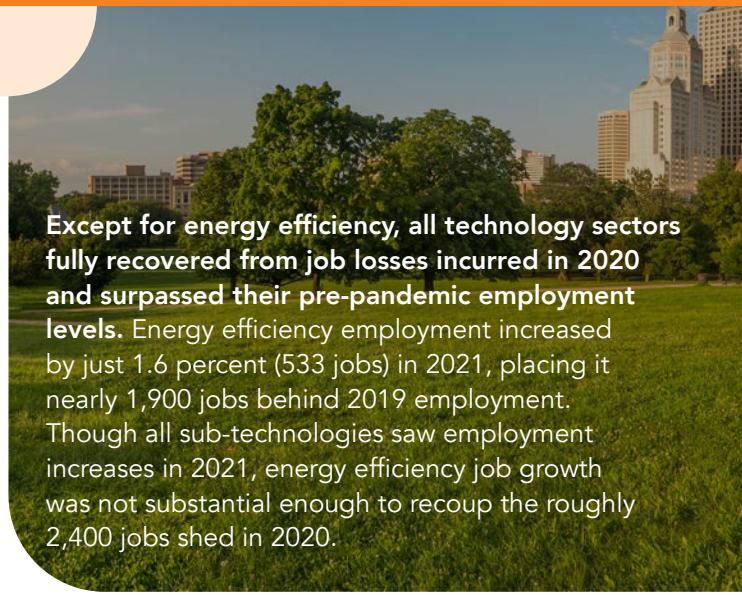
Connecticut's clean energy market is recovering from job losses incurred in 2020 more slowly than the overall statewide economy, the national clean energy labor market, and other clean energy economies in the Northeast. Economywide job gains in Connecticut totaled almost 62,500 jobs, a four percent increase over 2020 employment. Job growth in the clean energy industry accounted for 2.5 percent of total statewide employment gains. Nationally, the clean energy industry expanded by nearly five percent, while clean energy employment in other states like Pennsylvania and Massachusetts expanded by roughly four to six percent.

The alternative transportation sector saw unprecedented growth in 2021. The alternative transportation sector grew by 572 jobs or nearly 29 percent between 2020 and 2021, led by job growth in the hybrid electric and electric vehicle sub-sectors. The hybrid electric and electric vehicle sub-sectors grew by 28.7 percent (281 jobs) and 34.7 percent (175 jobs), respectively. This job growth was spread largely across manufacturing, wholesale trade, and repair and maintenance.

Clean energy contributions to statewide Gross Regional Product (GRP) increased by nearly seven percent between 2020 and 2021. In 2021, clean energy firms contributed roughly $7.07 billion to statewide GRP, accounting for almost three percent of total GRP. Clean energy GRP increased by 6.5 percent from 2020 through 2021 and by 21.6 percent since 2017. Overall, clean energy professional and business services accounted for about 41 percent of total contributions to GRP, followed by manufacturing at roughly 22 percent and utilities at about 19 percent. Construction and wholesale trade accounted for roughly 10 percent and eight percent, respectively, while agriculture and forestry and other services, such as repair and maintenance, represented less than half a percent each of clean energy GRP contributions.

There were 29,335 full-time equivalent (FTE) clean energy workers at the end of 2021. The number of FTE clean energy jobs[3] grew by five percent in 2021, an increase of almost 1,400 workers that spend all of their labor hours on clean energy-related activities. Despite this increase between 2020 and 2021, there were still about 1,800 fewer FTE jobs in 2021 compared to 2019. Compared to the baseline in 2015, however, FTE clean energy jobs remain about seven percent higher.

Solar jobs increased by 8.4 percent in 2021. There were 2,868 total solar jobs in Connecticut by the end of 2021, a net increase of 223 workers compared to the last quarter of 2020. With this job growth, the solar industry recouped the job losses incurred in 2020 and now sits just above pre-pandemic employment levels. Additionally, solar employment is 131.0 percent higher than the 2011 baseline.



Except for energy efficiency, all technology sectors fully recovered from job losses incurred in 2020 and surpassed their pre-pandemic employment levels. Energy efficiency employment increased by just 1.6 percent (533 jobs) in 2021, placing it nearly 1,900 jobs behind 2019 employment. Though all sub-technologies saw employment increases in 2021, energy efficiency job growth was not substantial enough to recoup the roughly 2,400 jobs shed in 2020.

Barring professional and business services, all clean energy industries saw employment growth in 2021. The construction industry gained over 1,100 workers for an increase of 6.1 percent between 2020 and 2021, with most of this employment growth concentrated in the energy efficiency sector. The other services value chain also saw large employment growth, increasing by nearly 26 percent (626 net jobs), concentrated largely in alternative transportation and clean energy generation. Though only expanding by 110 jobs, agriculture and forestry experienced the greatest relative job growth, nearly tripling its employment between 2020 and 2021. Professional and business services, however, declined by 3.9 percent (-442 net jobs), with job losses concentrated in the energy efficiency sector. Agriculture and forestry and other services were the only industries to recoup jobs lost in 2020 and surpass their pre-pandemic employment.

[3] It is important to note that FTE jobs are not the same as "full-time equivalent" in terms of representing 40 hours of work per week. FTE clean energy jobs are unrelated to how many hours worked but refer solely to the proportion of total hours that are dedicated to clean energy activities, whether the worker be part-time or full-time. In other words, if a clean energy worker works 20 hours per week but dedicates all 20 hours to clean energy-related work, then this worker would be counted as one clean energy FTE.

Clean Energy Demographics

Connecticut's clean energy workforce was slightly more diverse in 2021. The proportion of White and non-Hispanic or -Latinx clean energy workers each decreased by about one point while the proportion of Hispanic or Latinx and Black or African American workers increased by one percent and 0.5 percent, respectively. In 2020, White clean energy workers accounted for 80.8 percent of the workforce; this decreased to 79.7 percent in 2021. Hispanic or Latinx workers went from comprising 11.1 percent of the clean energy workforce in 2020 to representing 12.1 percent of clean energy workers in 2021. Similarly, the proportion of Black or African American workers also increased slightly, from 6.3 percent in 2020 to 6.8 percent in 2021. The gender distribution is largely unchanged, with men accounting for just under three-quarters of clean energy workers across the state.

Clean Energy Hiring

Fewer employers reported experiencing hiring difficulty in 2021 than in 2020, though hiring difficulty remains nearly 14 percent greater than pre-pandemic levels. Of firms engaged in hiring activity throughout 2021, 90.4 percent indicated that hiring was difficult, with 43.7 percent reporting that hiring had been very difficult and 46.7 percent indicating hiring was somewhat difficult. This was about 2 points lower than hiring difficulty in 2020 and 2 points higher than the 2021 national clean energy average of 88.2 percent.

Overall Clean Energy Jobs

Figure 1

In 2021, clean energy employment in Connecticut increased by 3.7 percent, totaling about 43,000 jobs for an increase of just over 1,500 workers in 12 months (Figure 1). Despite experiencing the largest single year employment growth in the past five years, the state's clean energy sector has not fully recovered from the job losses incurred in 2020, which wiped out nearly four years of clean energy employment growth across the state and sent Connecticut's clean energy labor market back to 2016 employment levels. As of the last quarter of 2021, Connecticut's clean energy employment still trails behind pre-pandemic employment levels by just over 1,000 jobs.

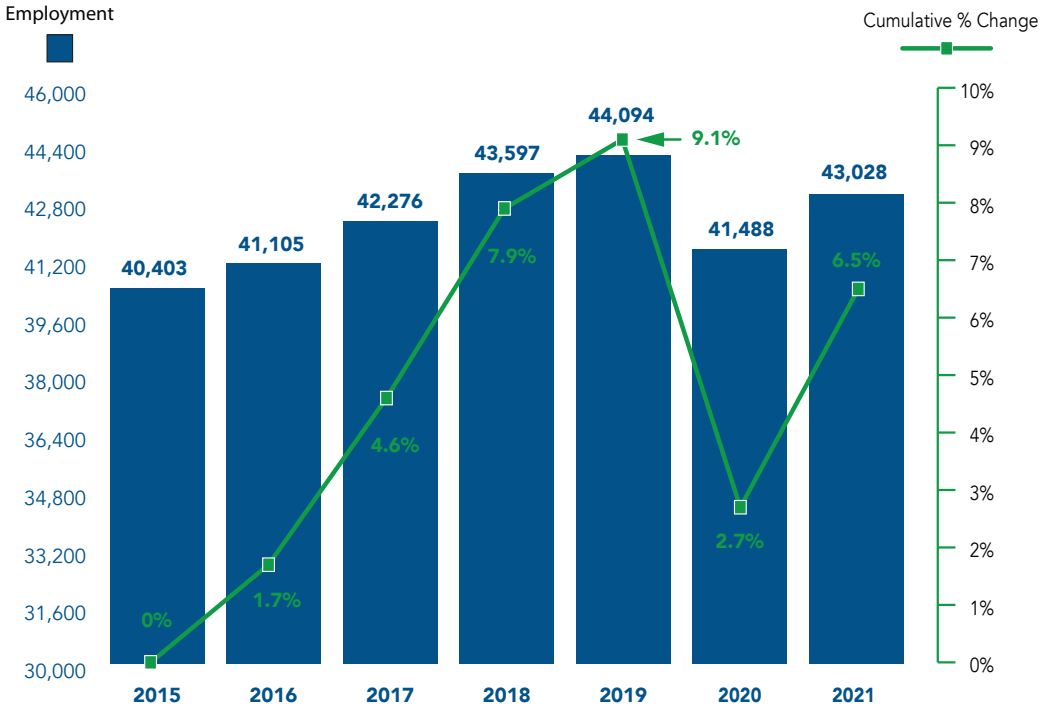
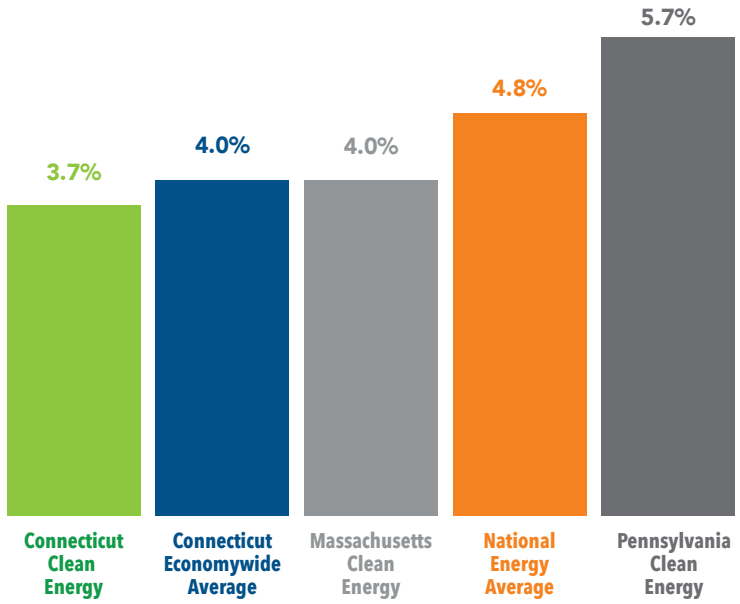


Figure 2

By comparison, using the latest available data from the Bureau of Labor Statistics Quarterly Census of Employment and Wages (QCEW), the overall statewide labor market in Connecticut grew by four percent, an increase of almost 62,500 jobs. Job growth in the clean energy industry accounted for about three percent of total statewide employment growth.[4]

Connecticut's clean energy industry has recovered more slowly than the national clean energy labor market, which grew by nearly five percent over the same time, as well as other regions in the Northeast. Clean energy employment in Pennsylvania and Massachusetts increased by four to nearly six percent between the last quarters of 2020 and 2021 (Figure 2).



[4] Bureau of Labor Statistics, Quarterly Census of Employment and Wages (QCEW). Annual 2017-2019 & September 2020. Data accessed April 2021.

Overall Clean Energy Jobs

In 2021, clean energy accounted for $7.07 billion of Connecticut's Gross Regional Product (GRP). This represents a 21.6 percent increase since 2017 and a 6.5 percent increase between 2020 and 2021[5]. Clean energy professional and business services accounted for 41.2 percent of total GRP contributions, followed by manufacturing at 22.3 percent and utilities at 18.5 percent.

Professional and business services and construction saw GRP growth between 2020 and 2021, while the manufacturing, other services, agriculture and forestry, wholesale trade, and utilities sectors saw decreased GRP.

Figure 3 Clean Energy Gross Regional Product (GRP) 2017-2021

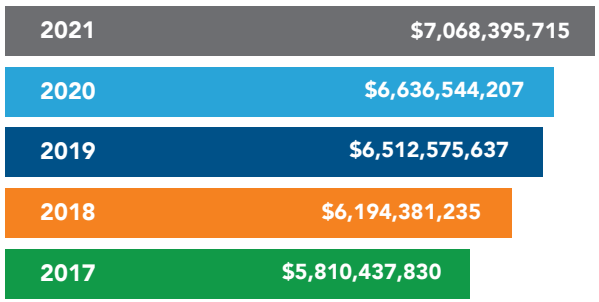


Table 1 Clean Energy Gross Regional Product (GRP) By Value Chain, 2020-2021

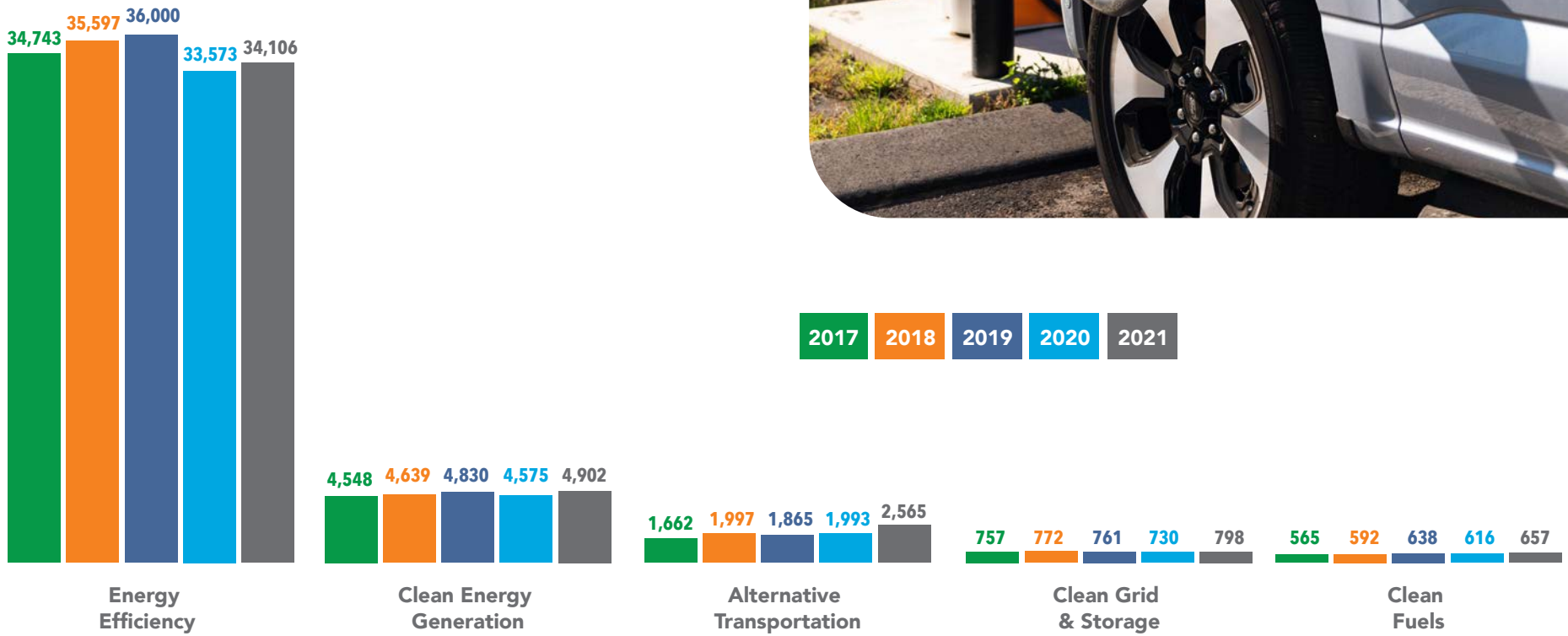
	2020 Clean Energy GRP	2021 Clean Energy GRP	% Change	Proportion
Professional and Business Services	$ 2,141,634,503	$ 2,912,021,428	36.0%	41.2%
Manufacturing	$ 1,810,522,268	$ 1,578,078,437	-12.8%	22.3%
Utilities	$ 1,364,545,000	$ 1,305,338,000	-4.3%	18.5%
Construction	$ 659,618,808	$ 695,516,830	5.4%	9.8%
Wholesale Trade	$ 635,027,082	$ 556,841,556	-12.3%	7.9%
Other Services	$ 21,312,037	$ 17,654,162	-17.2%	0.2%
Agriculture and Forestry	$ 3,884,509	$ 2,945,302	-24.2%	0.04%
TOTAL	**$ 6,636,544,207**	**$ 7,068,395,715**	6.5%	

[5] Total Connecticut Gross Regional Product (GRP) from Bureau of Economic Analysis (BEA), 2021, real GRP in millions of chained 2012 dollars.

Overall Clean Energy Jobs

All technology sectors saw employment growth in 2021. The alternative transportation sector experienced unprecedented growth between 2020 and 2021, gaining 572 jobs and growing by nearly 29 percent. The energy efficiency sector had the next largest employment increase, gaining 533 jobs but growing by only 1.6 percent. Clean energy generation employment increased by 326 jobs or about seven percent, clean grid and storage employment increased by 68 jobs or just over nine percent, and clean fuels employment increased by 41 jobs or about seven percent. Except for energy efficiency, all technology sectors fully recovered from job losses incurred in 2020 and surpassed their pre-pandemic employment levels.

Figure 4 Clean Energy Employment By Sector, 2017 – 2021



Overall Clean Energy Jobs

There were 4,392 clean energy establishments in 2021 across Connecticut, an increase of 108 firms or 2.5 percent compared to 2020. All sectors saw an increase in their number of clean energy establishments between 2020 and 2021 except for alternative transportation, which remained unchanged. Most of the increase in Connecticut's clean energy establishments was driven by the energy efficiency sector, which gained 89 firms in 2021 for an increase of 2.4 percent.

Table 2 Clean Energy Establishments by Sector, 2017-2021

SECTORS	2017	2018	2019	2020	2021
Energy Efficiency	3,677	3,728	3,833	3,771	3,860
Clean Energy Generation	223	241	258	247	261
Alternative Transportation	172	194	177	187	187
Clean Grid & Storage	28	31	27	29	32
Clean Fuels	58	59	52	50	51
TOTALS	**4,159**	**4,253**	**4,347**	**4,284**	**4,391**

Full-Time Equivalent Clean Energy Jobs

FTE clean energy jobs represent a subset of total clean energy jobs from Figure 1 in the previous section. FTE jobs are a useful metric to identifying the extent of clean energy activity going on in a state. 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.

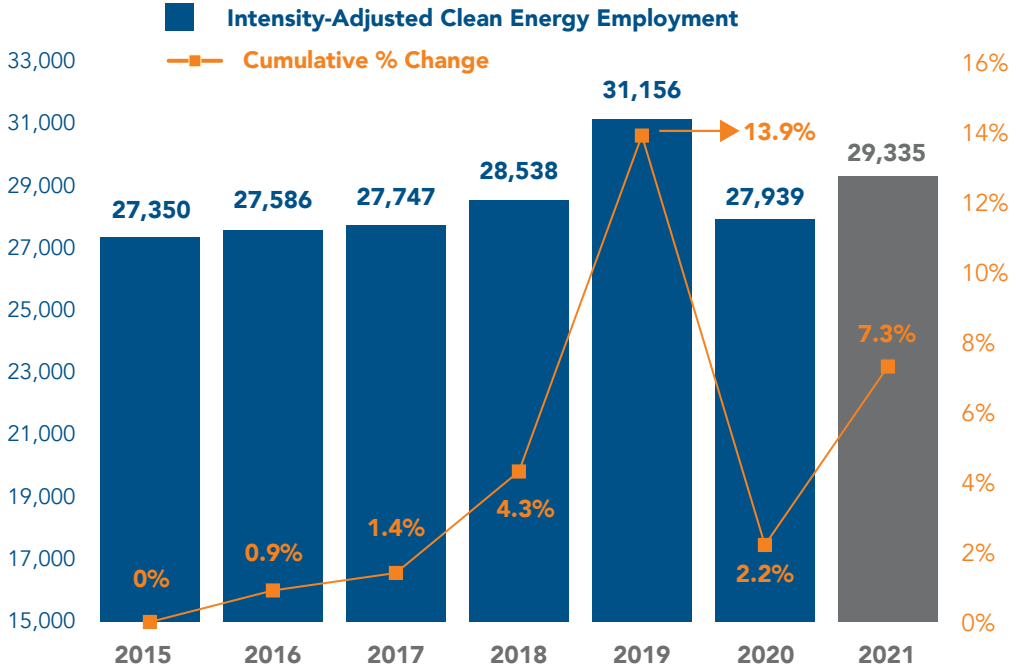
For instance, a traditional HVAC worker might have spent only a quarter of their work week installing or maintaining energy efficient HVAC technologies in 2020. But if a state began offering rebates in 2021 for efficient heat pumps, that traditional HVAC worker would likely now be spending the majority of labor hours in a work week installing high efficiency heat pumps. This increase in clean energy-related activity per worker translates to more FTE clean energy jobs.[6]

As of the last quarter of 2021 there were 29,335 FTE clean energy jobs in Connecticut—an increase of five percent in 12 months, or almost 1,400 more FTE clean energy workers. Despite this increase between 2020 and 2021, there were still about 1,800 fewer FTE jobs in 2021 compared to 2019. Compared to the baseline in 2015, however, FTE clean energy jobs remain about seven percent higher.

[6] It is important to note that FTE jobs are not the same as "full-time equivalent" in terms of representing 40 hours of work per week. FTE clean energy jobs are unrelated to how many hours worked but refer solely to the proportion of total hours that are dedicated to clean energy activities, whether the worker be part-time or full-time. In other words, if a clean energy worker works 20 hours per week but dedicates all 20 hours to clean energy-related work, then this worker would be counted as one clean energy FTE.

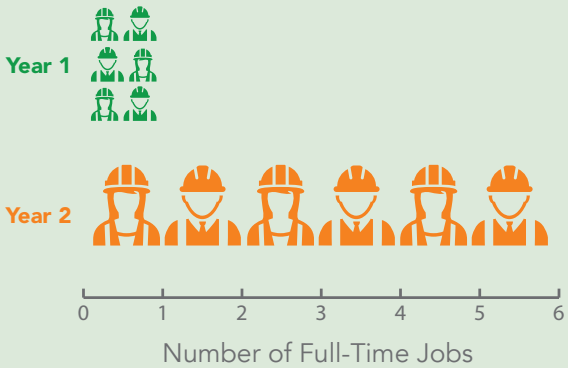
[7] These jobs were extrapolated using a combination of state-level and census region data. The data was adjusted based on revenue distribution by technology and weighted according to how much time workers were reported to spend on clean energy activities (0-49 percent, 50-99 percent, or 100 percent).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

Figure 5 Full-Time Equivalent Clean Energy Jobs, 2015-2021[7]



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 2020 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.

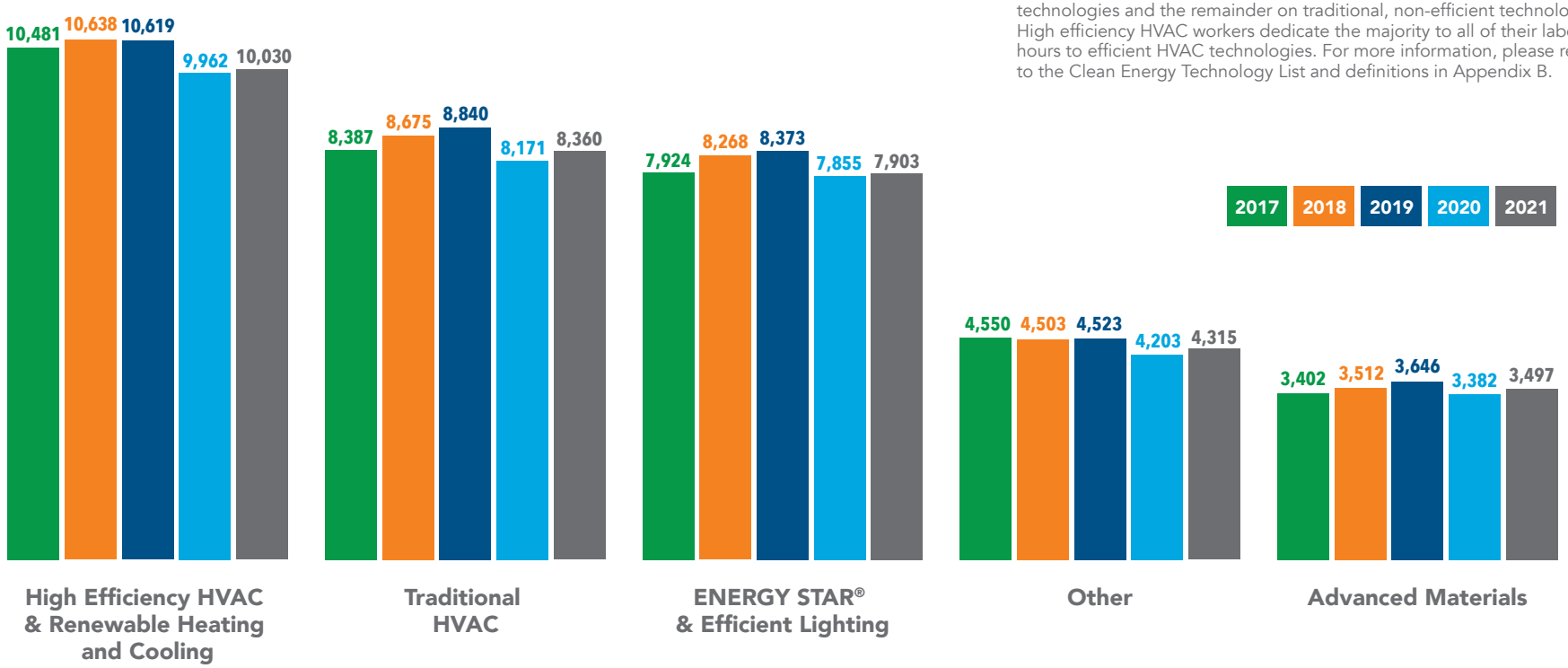


Energy Efficiency

All energy efficiency sub-technologies saw employment increases in 2021. Traditional HVAC had the largest absolute employment increase between 2020 and 2021, gaining 189 jobs and increasing by 2.3 percent. Advanced materials saw the largest relative employment increase, growing by 3.4 percent or 115 jobs.

The largest energy efficiency sub-sector in Connecticut, high efficiency HVAC and renewable heating and cooling, grew by 68 jobs or 0.7 percent, and ENERGY STAR and efficient lighting grew by 48 jobs or 0.6 percent. While employment increased in each sub-technology between 2020 and 2021, none of the sub-technologies have completely recovered from the employment losses incurred in 2020.

Figure 6 Energy Efficiency Employment By Sub-Technology, 2017-2021[8]



[8] 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. For more information, please refer to the Clean Energy Technology List and definitions in Appendix B.

Four Seasons of Colchester Apartments Colchester, Southeastern CT

Background

The Four Seasons of Colchester is a multifamily apartment complex located off Lebanon Avenue in Southeastern Connecticut. The community features one and two-bedroom apartments with amenities such as a clubhouse and fitness area. Guidance and a large incentive from Eversource helped with making the leap to all- electric, which means there is no fuel combustion of any type on-site.

The complex includes 10 buildings, totaling 100 apartments, and in addition to a highly insulated envelope, features all LED lighting, ENERGY STAR appliances, mini-split heat pumps and EV charging stations.

Goal

Alan Williams, the project's developer, approached the The Four Seasons' development plan with energy efficiency and sustainability in mind. In the summer of 2020, Alan approached Eversource to help him create buildings that were not only high-quality sustainable construction, but also built with cutting-edge energy efficiency features and with incentives from Eversource to make the project affordable.

Outcome

Alan knew that partnering with Eversource early on could help integrate the most effective energy efficiency technology. He credits the guidance from Eversource in helping The Four Seasons make the leap to being an all-electric property, showing the development team that it would make the most sense for their goals of energy savings and efficiency.

Due to The Four Seasons and Eversource partnership, the community now proudly features:

- Highly efficient insulation in the attics, blown perimeters and double insulation foam and insulated sills to help ensure comfortable temperatures throughout the year while also requiring very little energy to heat or cool indoor spaces.
- Mini-split heat pumps, which use far less energy than traditional forced air, offer a more efficient heating and cooling solution, while Energy Recovery.
- Ventilators (ERV's) in each unit allow for clean air circulation with minimal heat transfers or loss of energy.
- ENERGY STAR appliances that are all electric, meaning there is no combustion on site even for water heaters.
- LED lighting throughout the apartment complex and in the individual units.
- EV charging stations for residents looking to reduce their carbon footprint beyond the walls of their homes.

"We reached out to Eversource on this project as a result of having been working with the ENERGY STAR program on the community that we built next door. We've been to a number of their seminars and we found that they were very helpful. When you want to do it right, go to where the experts are."

Alan Williams, The Four Seasons of Colchester Developer

Clean Energy Generation

Except for nuclear, which declined by 54 jobs or 4.5 percent, all clean energy generation sub-technologies saw employment growth between 2020 and 2021. Additionally, barring nuclear, all clean energy generation sub-technologies recouped employment losses incurred in 2020 and surpassed their pre-pandemic employment levels.

Most job gains in the clean energy generation sector were from solar companies. Between 2020 and 2021, solar employment increased by 223 jobs or 8.4 percent. Low-impact hydropower companies gained 59 employees, growing by over 76 percent in just 12 months. Wind companies gained 57 employees between 2020 and 2021, growing by 31.3 percent. Geothermal employment and bioenergy and combined heat and power employment remained relatively unchanged between 2020 and 2021.

Figure 7 Clean Energy Generation Employment By Sub-Technology, 2017-2021

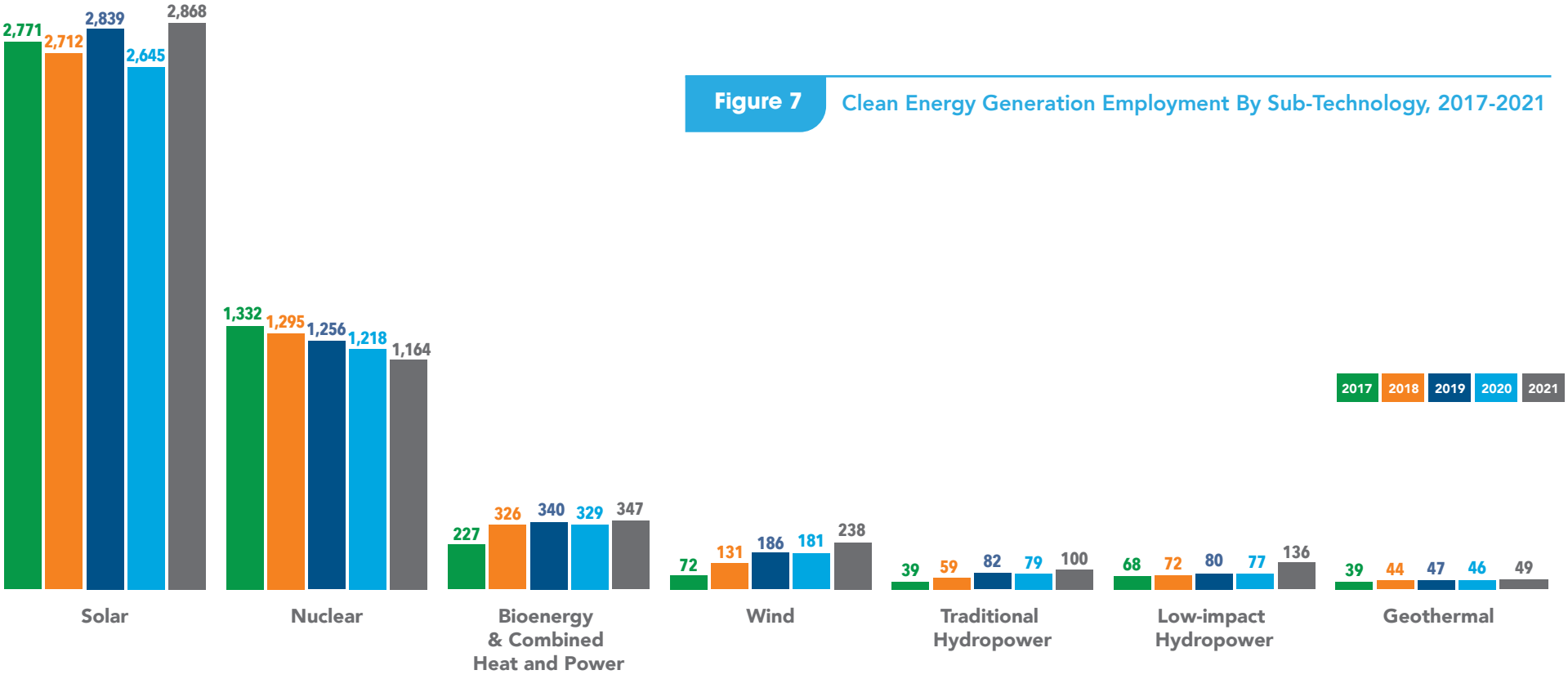
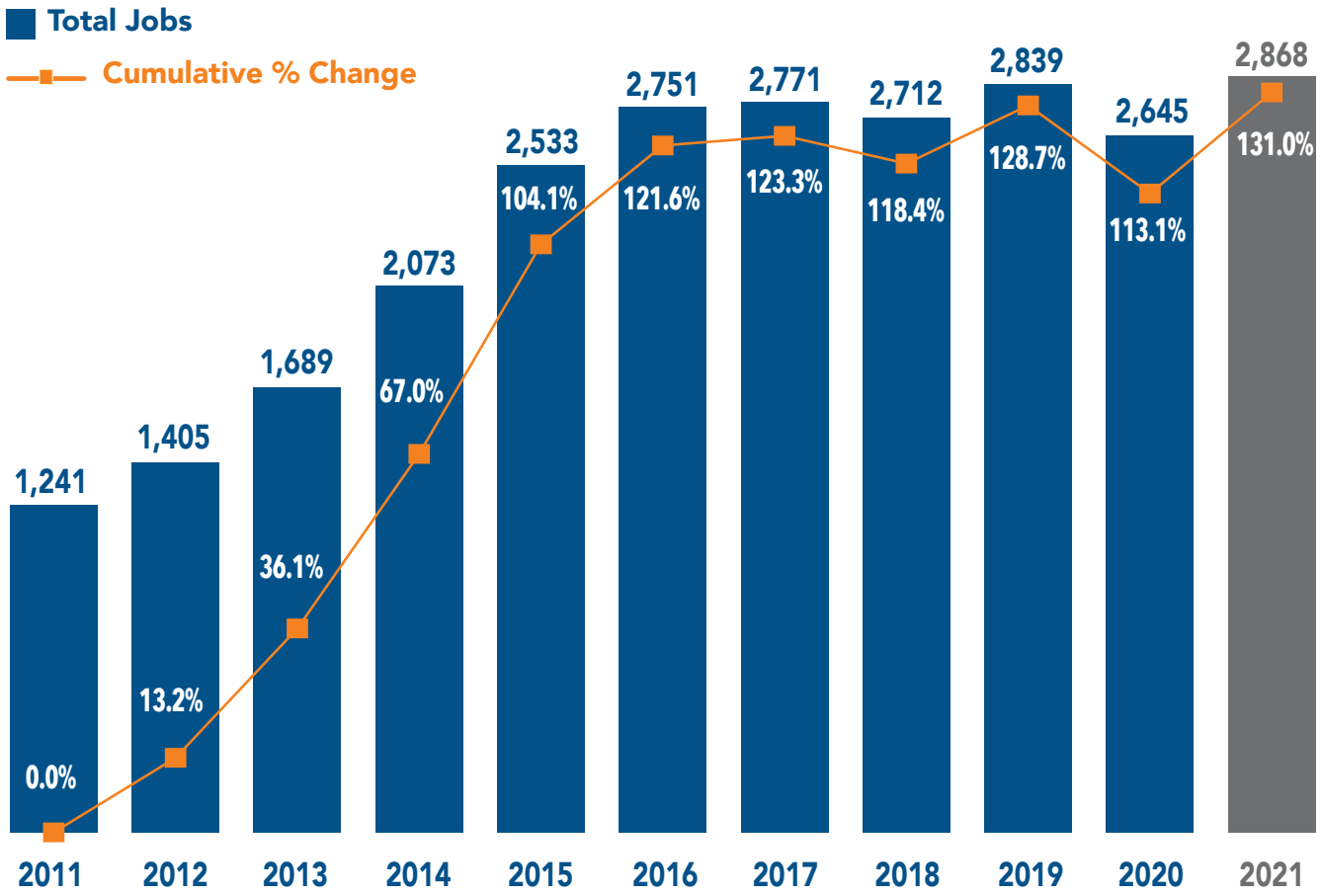


Figure 8 Solar Employment, 2011-2021



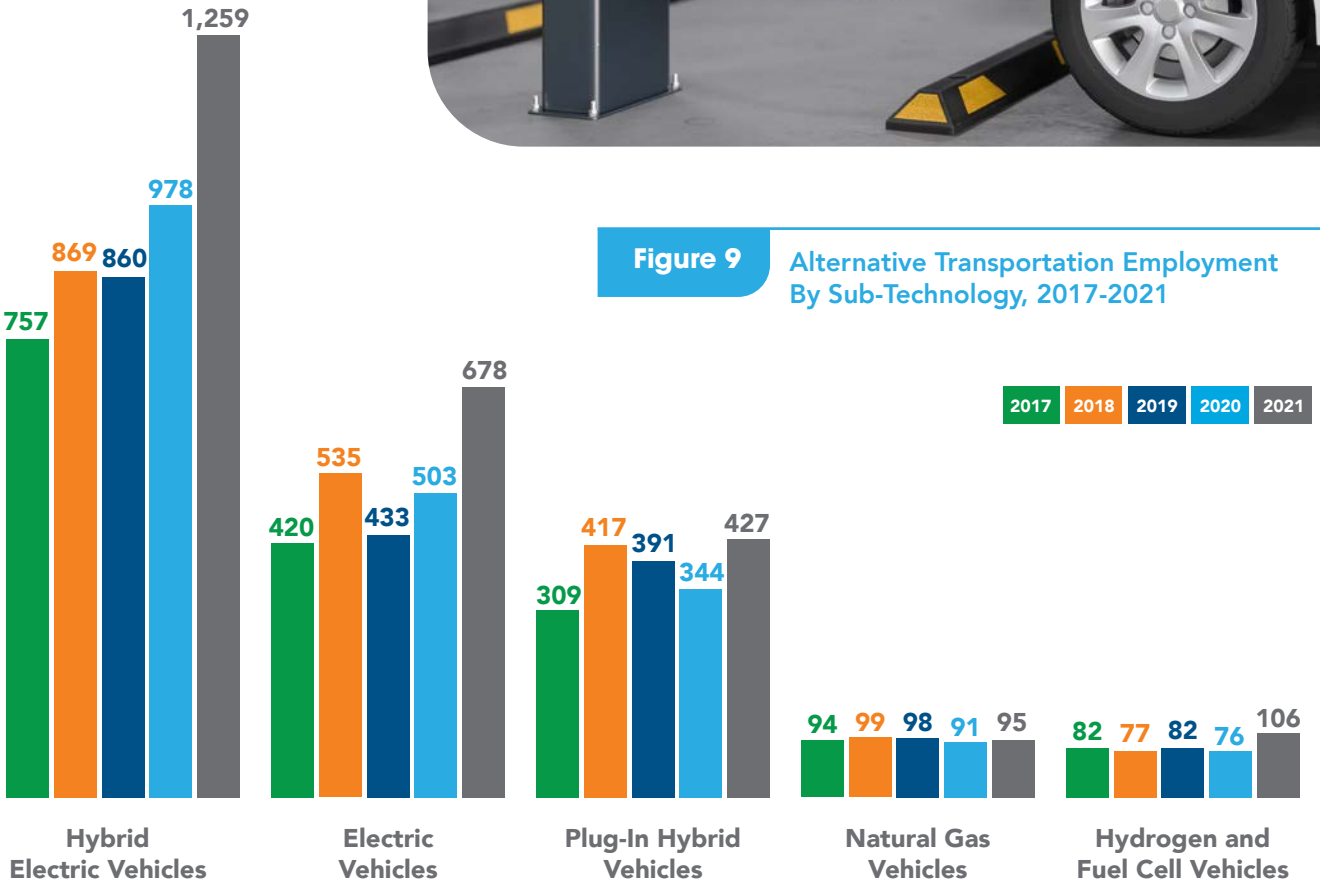
Alternative Transportation

Employment in each alternative transportation sub-technology remained relatively constant or grew between 2020 and 2021. Additionally—apart from natural gas vehicles—all alternative transportation sub-technologies recouped employment losses incurred in 2020 and surpassed their pre-pandemic employment levels.

Nearly half (49.2 percent) of job growth in alternative transportation was generated from the hybrid electric vehicle sub-technology. Collectively, hybrid electric and electric vehicles firms added 456 new jobs to the clean energy labor market in 2021.

This unprecedented job growth coincides with a boom in electric vehicle registration in Connecticut. Total active electric vehicle registrations in the state increased by nearly 55 percent between 2020 and 2021, jumping from 13,800 vehicles by the end of December 2020 to nearly 21,400 by the end of December 2021. Of the 7,577 electric vehicles registered in 2021, 4,633 were battery electric vehicles (BEVs) and 2,934 were plug-in hybrid electric vehicles (PHEVs).[9]

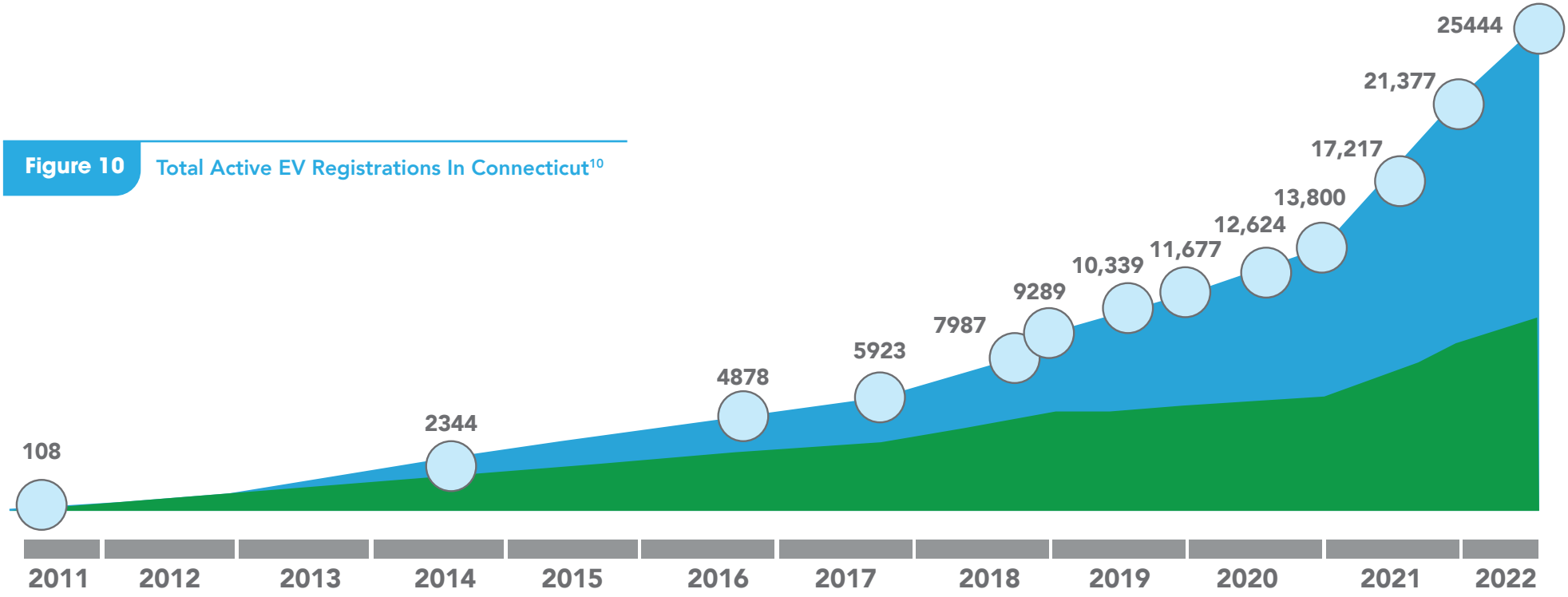
Figure 9 Alternative Transportation Employment By Sub-Technology, 2017-2021



[9] Connecticut's Official State Website. Expanded EV Registration Fact Sheet. https://portal.ct.gov/-/media/DEEP/air/mobile/CHEAPR/2022-07-01---Expanded-EV-Reg-Fact-Sheet.pdf.

Alternative Transportation

Figure 10 Total Active EV Registrations In Connecticut[10]

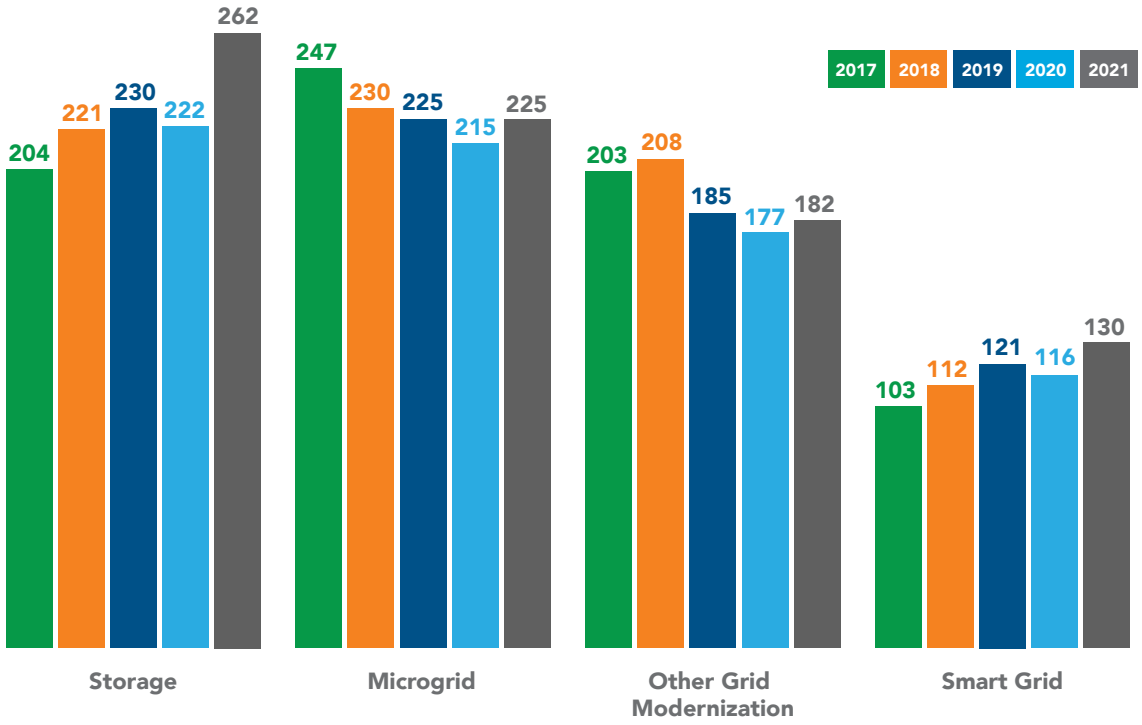


[10] Connecticut's Official State Website. Expanded EV Registration Fact Sheet. https://portal.ct.gov/-/media/DEEP/air/mobile/CHEAPR/2022-07-01---Expanded-EV-Reg-Fact-Sheet.pdf.

Clean Grid & Storage

Every clean grid and storage sub-technology saw employment gains between 2020 and 2021 and recouped the jobs lost in 2020. In total, the clean grid and storage sector gained about 70 jobs in 2021, for an increase of over nine percent. The storage sub-technology saw the greatest increase in employment, gaining 40 jobs and growing by nearly 18 percent. The smart grid subsector grew by 14 jobs or about 12 percent. The microgrid and other grid modernization sub-technologies grew by 4.5 percent (10 jobs) and 3.0 percent (5 jobs), respectively.

Figure 11 Clean Grid and Storage Employment by Sub-Technology, 2017-2021[11]

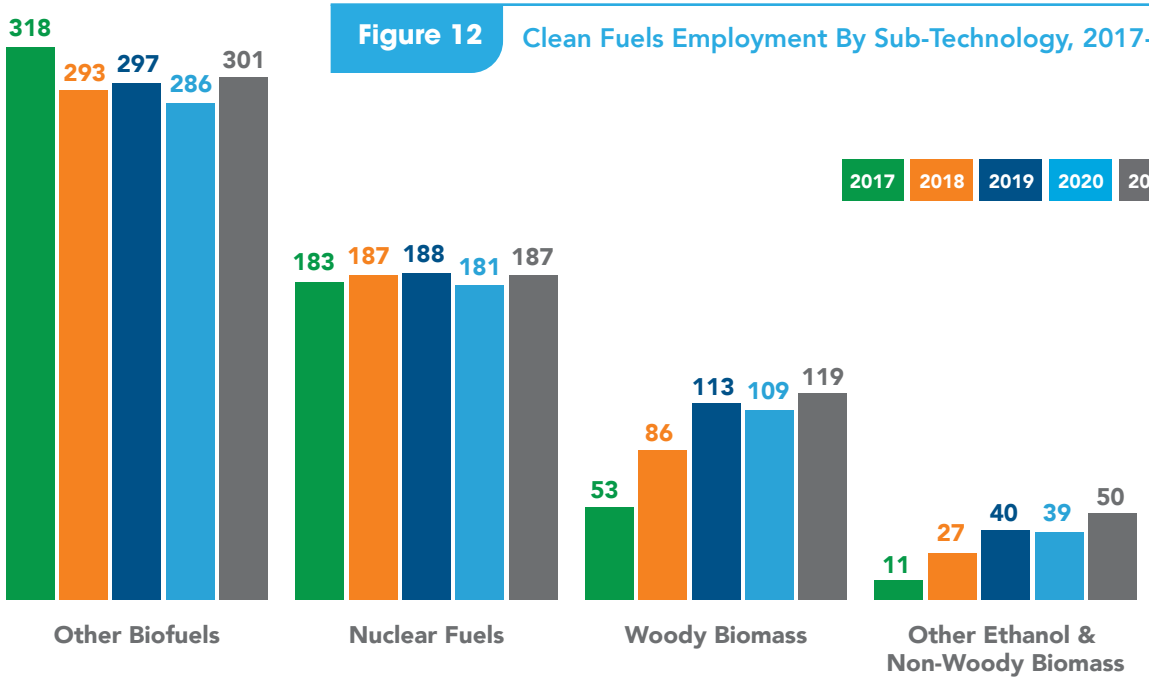


[11] Other ethanol and non-woody biomass (including biodiesel) covers all fuels made from other materials such as straw, manure, vegetable oil, animal fats, etc.

Clean Fuels

Clean fuels firms collectively gained 41 jobs across sub-technologies between 2020 and 2021, with each sub-technology gaining between 6 and 15 jobs. Additionally, all sub-technologies returned to their pre-pandemic employment levels, recouping any jobs lost during 2020.

Figure 12 Clean Fuels Employment By Sub-Technology, 2017-2021[12]



[12]Other ethanol and non-woody biomass (including biodiesel) covers all fuels made from other materials such as straw, manure, vegetable oil, animal fats, etc.

Connecticut's clean energy workforce was slightly more diverse in 2021 than in 2020. The proportion of Hispanic or Latinx and Black or African American workers increased by one percent and 0.5 percent, respectively. Hispanic or Latinx workers went from comprising 11.1 percent of the clean energy workforce in 2020 to representing 12.1 percent of clean energy workers in 2021. Similarly, the proportion of Black or African American workers also increased slightly, from 6.3 percent in 2020 to 6.8 percent in 2021. The proportion of Asian and multiracial clean energy workers remained largely unchanged, growing by 0.2 and 0.4 percent, respectively.

Conversely, the proportion of White and non-Hispanic or -Latinx clean energy workers each decreased by about one point compared to 2020. In 2020, White clean energy workers accounted for 80.8 percent of the workforce; this decreased to 79.7 percent in 2021.

The proportion of Veterans, women, and workers over age 55 also remained largely unchanged between 2020 and 2021. The number of Veterans and workers over 55 both declined by 0.6 percent, while the number of women working in clean energy declined by 0.2 percent.

While demographic changes in 2021 were incremental, they build on similar demographic shifts in past years for more substantial differences over time. For example, the proportion of White clean energy workers has decreased by 2.3 percent since 2019, while the proportion of Hispanic or Latinx workers has increased by 2.0 percent and the proportion of Black or African American workers has increased by 1.0 percent.

Table 3 Clean Energy Workforce Demographics, 2020[13]

Workforce Demographic	Connecticut Clean Energy, 2020	Connecticut Clean Energy, 2021	Connecticut Overall, 2021	US Clean Energy, 2021	US Overall, 2021
Male	72.3%	72.6%	48.9%	72.5%	53.0%
Female	27.7%	27.4%	51.1%	27.5%	47.0%
Hispanic or Latino	11.1%	12.1%	14.5%	16.6%	18.0%
Not Hispanic or Latino	88.9%	87.9%	85.5%	83.4%	82.0%
American Indian or Alaska Native	<1%	<1%	<1%	1.4%	1.0%
Asian	6.3%	6.4%	5.3%	8.1%	6.6%
Black or African American	6.3%	6.8%	13.1%	8.4%	12.3%
Native Hawaiian or other Pacific Islander	<1%	<1%	<1%	1.0%	<1%
White	80.8%	79.7%	79.0%	73.3%	77.5%
Two or more races	5.1%	5.5%	1.9%	7.7%	1.9%
Veterans	9.9%	9.3%	4.4%	9.0%	5.6%
55 and over	14.1%	13.5%	27.6%	13.5%	23.6%

[13]Demographic data is pulled from the United States Energy and Employment Report 2022 (USEER 2022); the Bureau of Labor Statistics: Current Population Survey, and Veterans News Release; as well as JobsEQ Population Demographics.

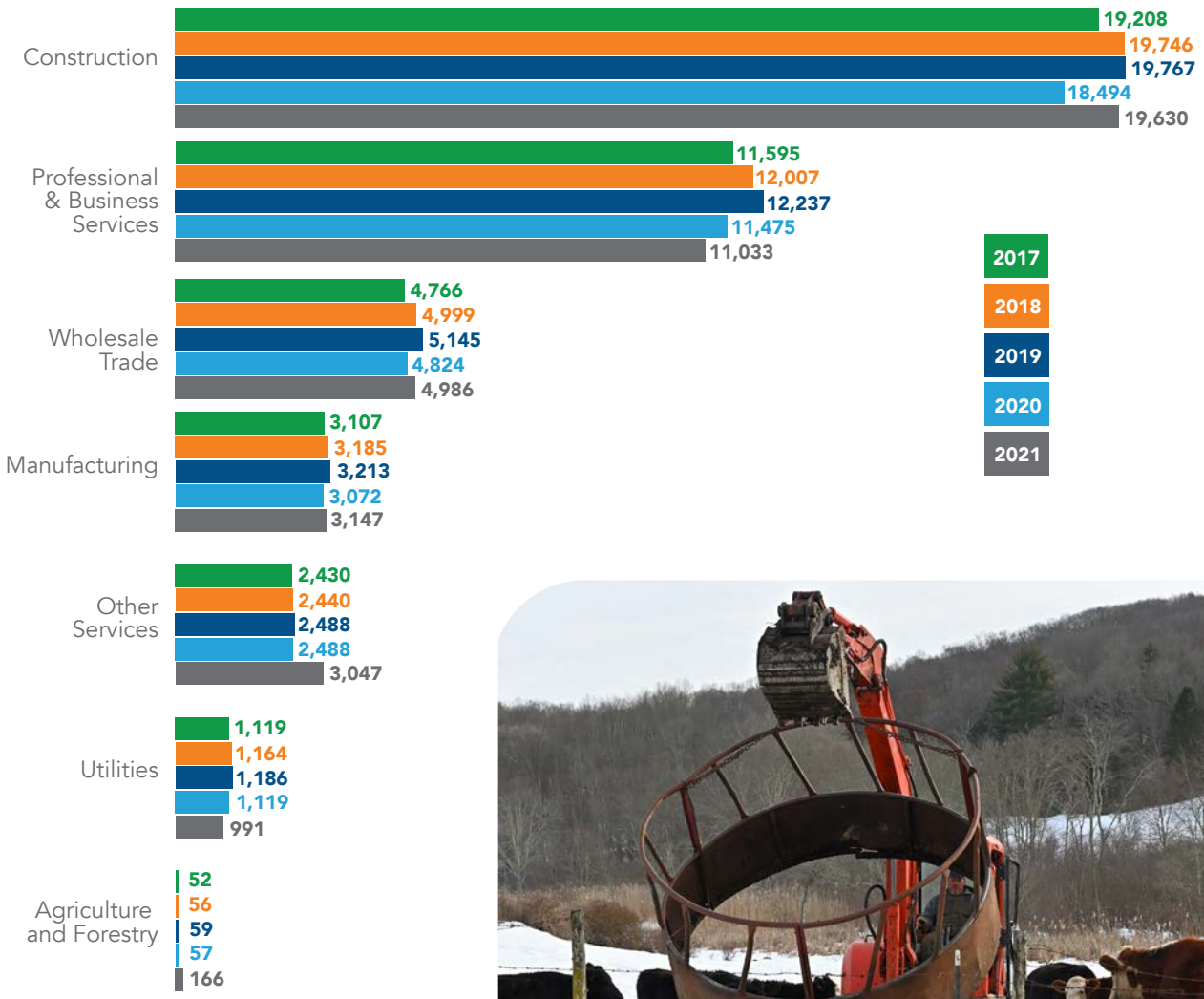
Overall Value Chain Jobs

All value chain segments except utilities and professional and business services experienced employment growth between 2020 and 2021. Agriculture and forestry saw the largest relative employment increase, nearly tripling its employment in 12 months. The other services value chain—which largely consists of automotive repair and maintenance—also saw a large relative employment increase, growing by over 25 percent or 626 jobs. Clean energy construction firms saw the largest absolute increase between 2020 and 2021, growing by 1,136 jobs or six percent. Manufacturing and wholesale trade saw more modest employment gains, increasing by 2.4 percent (75 jobs) and 3.4 percent (162 jobs), respectively.

The clean energy utilities industry saw the largest percent decline in jobs in 2021, while the professional and business services industry saw the largest total decline in jobs. Clean energy utilities firms declined by 11.4 percent (-128 jobs) between the last quarters of 2020 and 2021. Professional and business services—which includes consulting, finance, legal, or research support—shed 442 workers, for a decline of 3.8 percent.

Despite strong employment growth in five out of the seven value chains, only two value chains—agriculture and forestry and other services—recovered all the jobs lost in 2020 and surpassed their pre-pandemic employment levels.

Figure 13 Clean Energy Employment By Value Chain Segment, 2017-2021



Value Chain Jobs by Sector

On average, construction jobs account for almost 46 percent of all clean energy employment in Connecticut. For the clean grid and storage (63.0 percent) and energy efficiency (52.3 percent) sectors, construction activity accounts for half or more of total jobs, while construction activity accounts for just over a quarter (26.5 percent) of clean energy generation jobs. The construction value chain saw a net increase of 1,137 jobs between 2020 and 2021, with most of this growth concentrated in the energy efficiency sector.

Professional and business service jobs account for just over a quarter of all clean energy employment in the state, 29.0 percent of energy efficiency employment, 18.8 percent of clean grid and storage employment, and 17.9 percent of clean energy generation employment. Between 2020 and 2021, however, the professional and business services value chain saw a net decrease of 442 jobs.

Within the energy efficiency sector, employment in all value chains increased between 2020 and 2021 except for manufacturing and professional and business services. Most of the job growth was concentrated in construction, which gained over 1,000 jobs. The professional and business services value chain shed 466 jobs, with most of these job losses concentrated in the energy efficiency sector.

All job growth within the transportation sector was concentrated in manufacturing, wholesale trade, and other services, which is largely comprised of automotive repair and maintenance. The only alternative transportation value chain which shed jobs between 2020 and 2021 was the professional and business services value chain, which decreased by 26 jobs.

Table 4 Value Chain Employment by Clean Energy Sector, 2021

CLEAN ENERGY SECTOR	Clean Energy Generation	Clean Grid & Storage	Energy Efficiency	Clean Fuels	Alternative Transportation	TOTAL
Agriculture and Forestry	–	–	–	166	–	166
Utilities	991	–	–	–	–	991
Construction	1,299	503	17,829	–	–	19,630
Manufacturing	350	68	2,102	140	487	3,147
Trade	430	40	3,681	298	537	4,986
Professional & Business Services	875	150	9,875	51	81	11,033
Other Services	956	37	619	2	1,460[14]	3,074
TOTAL	4,902	798	34,106	657	2,565	43,028

Table 5 Value Chain Proportional Employment By Clean Energy Sector, 2021

CLEAN ENERGY SECTOR	Connecticut Clean Energy Average	Clean Energy Generation	Clean Grid & Storage	Energy Efficiency	Clean Fuels	Alternative Transportation
Agriculture and Forestry	0.4%	0.0%	0.0%	0.0%	25.3%	0.0%
Utilities	2.3%	20.2%	0.0%	0.0%	0.0%	0.0%
Construction	45.6%	26.5%	63.0%	52.3%	0.0%	0.0%
Manufacturing	7.3%	7.1%	8.5%	6.2%	21.3%	19.0%
Trade	11.6%	8.8%	5.0%	10.8%	45.3%	21.0%
Professional & Business Services	25.6%	17.9%	18.8%	29.0%	7.7%	3.2%
Other Services	7.1%	19.5%	4.6%	1.8%	0.4%	56.9%

[14]These jobs are mostly focused on automotive repair and maintenance for alternative and clean fuel vehicle technologies.

Figure 14 Employer-Reported Hiring Difficulty, 2021

Of clean energy firms that were hiring in 2021, 90.4 percent indicated some level of hiring difficulty, with 43.7 percent reporting that hiring had been very difficult and 46.7 percent indicating hiring was somewhat difficult. Hiring difficulty in Connecticut was slightly higher than the national clean energy average of 88.2 percent. While the number of employers who indicated hiring was somewhat difficult was three percent higher nationally than in Connecticut, the number of employers who indicated hiring was very difficult was over five percent lower nationally than in Connecticut.

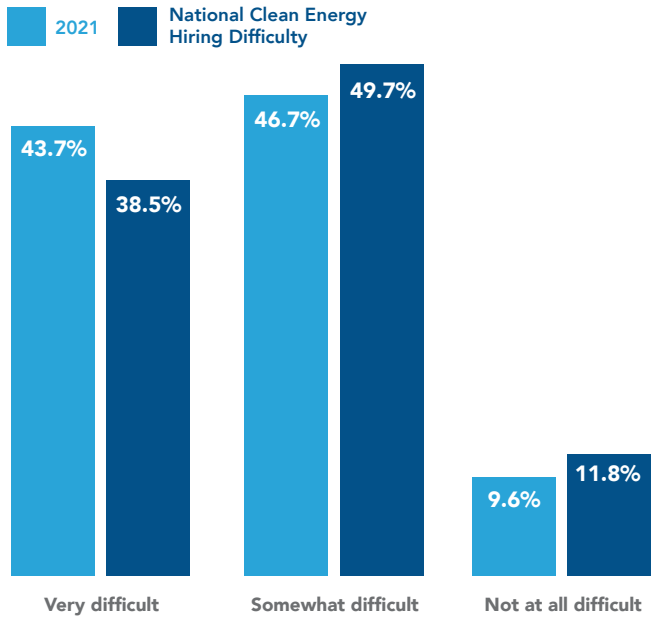
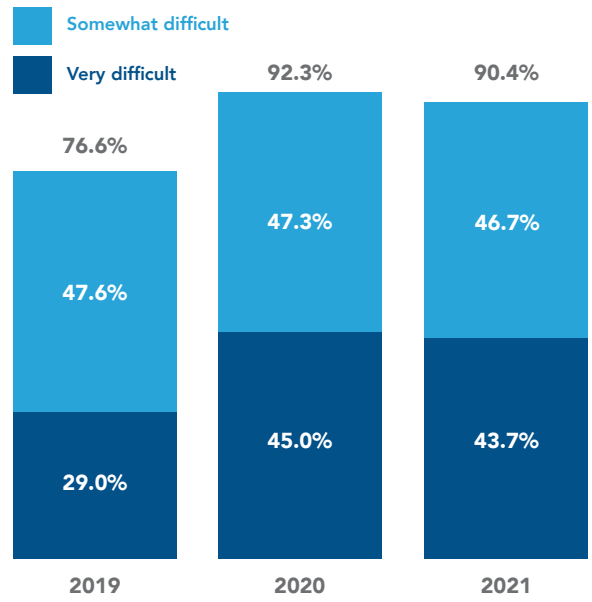


Figure 15 Employer-Reported Hiring Difficulty, 2019-2021

Employer-reported hiring difficulty was slightly lower in 2021 than in 2020, dropping by 1.9 percent, though it still remains 13.8 percent higher than pre-pandemic hiring difficulty in 2019. Most of the decrease in overall hiring difficulty in 2021 was driven by a decrease in employers who indicated hiring was very difficult; 1.6 percent fewer employers reported having a very difficult time hiring employers in 2021 compared to 2020. While the number of employers indicating hiring was somewhat difficult was 0.9 percent lower in 2021 compared to 2019, the number of employers indicating hiring was very difficult remains 14.7 percent higher in 2021.



The three counties with the highest concentration of clean energy employment—Hartford, Fairfield, and New Haven—gained about 500, 400, and 300 jobs between 2020 and 2021, respectively.

Figure 16 Clean Energy Employment By County, 2019-2021[15]

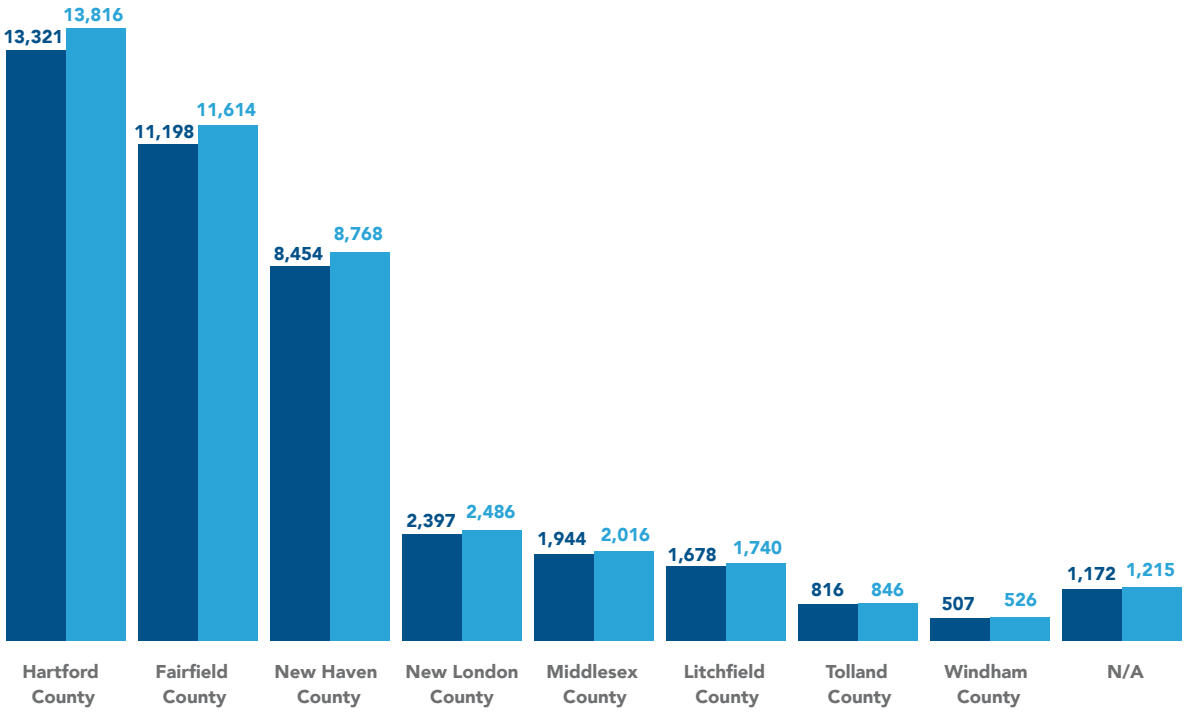
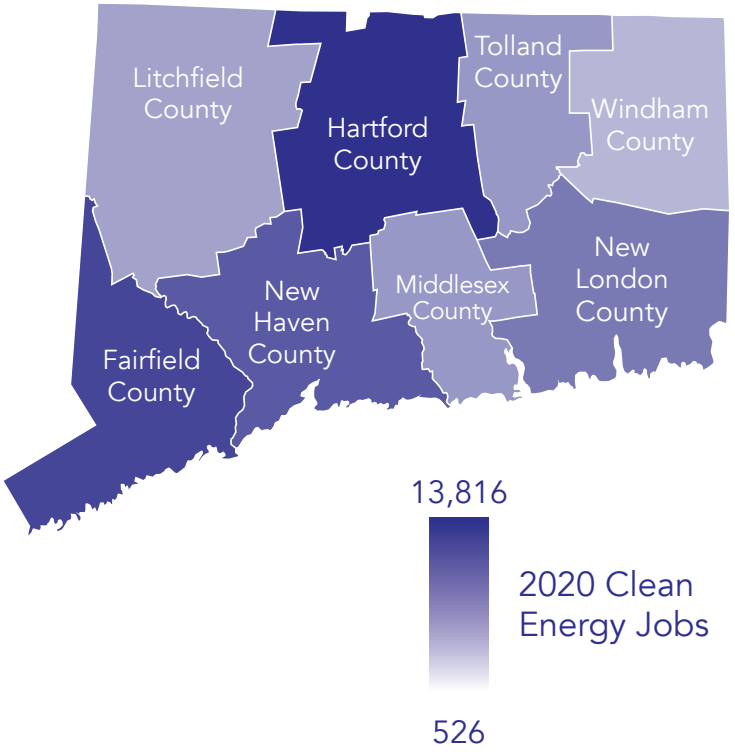


Figure 17 Map Of Clean Energy Employment By County, 2021



[15]Employment categorized as "n/a" could not be assigned to a single location.

Appendix A: Research Methodology

Data for the 2022 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 to prevent duplication.

In total, 597 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 +/- 3.99 percent for Connecticut at a 95 percent confidence interval. The full research methodology for USEER may be found at: **https://www.usenergyjobs.org/**

Appendix B: Clean Energy Technology List

The Connecticut Green Bank, Department of Energy and Environmental Protection, Eversource, and United Illuminating, 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. 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:

The major clean energy sectors are as follows:

1. Energy Efficiency
2. Clean Energy Generation
3. Alternative Transportation
4. Clean Grid & Storage
5. Clean Fuels

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 sectors described above. 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 clean energy sub-technologies. 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.[16]

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

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[17]
- 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

CLEAN FUELS

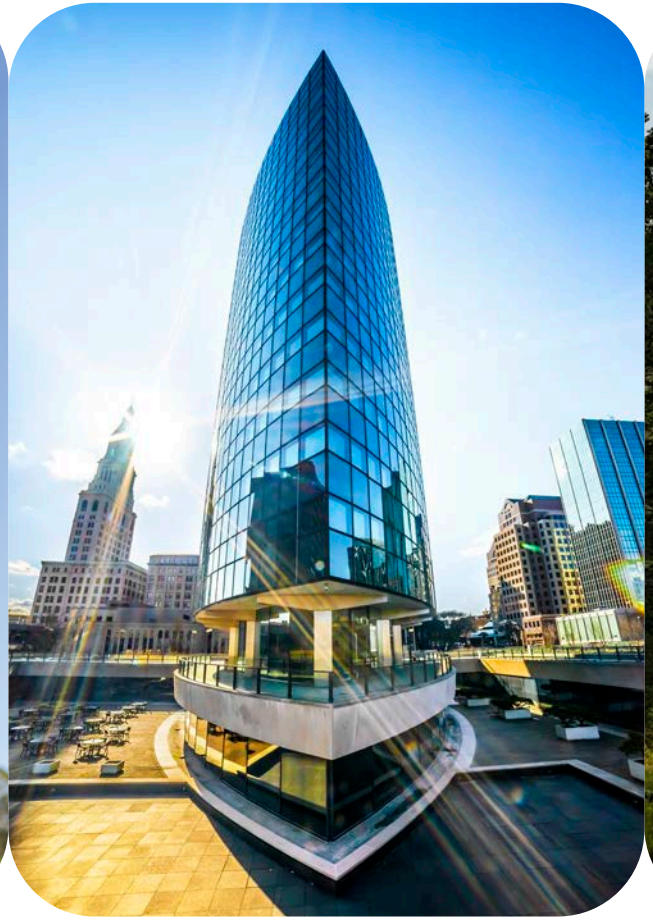
- Other Ethanol/Non-Woody Biomass, including biodiesel
- Woody Biomass/Cellulosic Biofuel
- Other Biofuels
- Nuclear Fuel

ALTERNATIVE TRANSPORTATION

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

[16] 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.

[17] "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. 71, and Executive Order 3.



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