2023 Connecticut Clean Energy Industry Report

energize CONNECTICUT℠

[bw] RESEARCH PARTNERSHIP

Drone photos of solar installation at Coventry Town Hall, CT.

A Message from the Joint Committee

Brenda Watson, Chair

As Connecticut continues to make steady progress towards its clean energy and climate goals and targets, the 2023 Clean Energy Industry Report showcases impressive growth and enduring commitment to this sector. This detailed analysis highlights Connecticut's achievements in enhancing its clean energy landscape, characterized by employment growth, strong economic contributions, and strategic policy implementations.

Key Highlights of the 2023 Connecticut Clean Energy Industry Report:

- **Continued Employment Growth:** The clean energy sector in Connecticut saw a 2.9 percent increase in employment in 2022, illustrating a robust and full recovery from the COVID-19 pandemic, with more than 44,000 workers now employed in this pivotal sector of the state's economy.
- **Significant Economic Contributions:** The sector's contribution to the Gross Regional Product (GRP) surged to $7.68 billion in 2022, marking an 8.5 percent increase from the previous year and highlighting the sector's growing importance to Connecticut's overall economic health.
- **Alternative Transportation Takes the Lead:** The alternative transportation sector witnessed an exceptional employment growth of nearly 17 percent, driven largely by the expanding hybrid electric and electric vehicle markets, signaling a strong consumer shift towards cleaner transportation options.
- **Workforce Development Challenges:** While the sector has seen positive trends in employment growth, challenges remain in filling skilled labor positions. As clean energy advocates, we need to continue to support training programs to bridge the skill gap and sustain the sector demand for workers. Despite the steady progress recovering from COVID, the state continues to see a lower share of females and minorities in the clean energy sector, which represents a priority area of potential growth.

The clean energy sector's continued growth is a testament to the collective efforts of state leadership, industry stakeholders, and the broader community. **Connecticut's clean energy sector stands as a beacon of progress,** demonstrating the state's unwavering dedication to fostering a sustainable future through economic and environmental innovation.

Five Mile Point Lighthouse in New Haven, Connecticut.

2022 Connecticut Clean Energy Industry Report

This report is the fourth 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 continued to recover from the pandemic-induced economic recession. The Joint Committee commissioned BW Research Partnership to produce this 2023 report, with financial support provided by the Connecticut Green Bank, Eversource, and United Illuminating.

The 2023 Clean Energy Industry Report details historical clean energy employment from 2017 through 2022, 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, in addition to a summary of new and notable clean energy policies set forth in 2023.

All data presented in this report is based on the 2023 United States Energy and Employment Report (USEER).[2]

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**

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 Members

The Connecticut Green Bank is the nation's first green bank. Its mission is to confront climate change by increasing and accelerating investment into Connecticut's green economy to create more resilient, healthier, and equitable communities.

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.

[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

As documented in this year's Clean Energy Industry Report (CEIR), in 2022, Connecticut maintained its commitment to being a leader in the nation's efforts to support clean energy.

Connecticut ranks within the top 10 energy-efficient states, according to the ACEEE 2022 State Energy Efficiency Scorecard.[3] According to the ACEEE, the state has shown a strong commitment to advancing energy efficiency through various policy efforts, including initiatives to strengthen its building energy codes and implement a zero-emission vehicle (ZEV) program.

In addition, Connecticut has established a goal to achieve zero carbon electricity by 2040 and has made progress toward this goal via investments in fuel cell, solar, and offshore wind energy, in particular. As of 2022, Connecticut had the highest concentration of offshore wind supply chain jobs in the U.S. and had committed to 2,000 MW of offshore wind energy – enough to power 1 million homes.[4]

While overall clean energy employment grew robustly in Connecticut in 2022, clean energy employers continued to report high levels of hiring difficulties, particularly for mechanic and technician positions, consistent with nationwide statistics outlining emerging shortages of skilled labor in clean energy trades as states continued to increase their investments in clean energy. Emerging skilled labor shortages in the clean energy sector may limit future growth potential, absent significant investments in workforce development.

Furthermore, growth in manufacturing and other sectors has outpaced growth in construction, and growth in GSP has outpaced growth in clean energy employment in 2022, indicating that Connecticut has shown strength in a number of value-added activities, but that deployment has lagged. Thus, state policymakers' efforts in fostering innovation, manufacturing, and services are paying off, and should be sustained – however, policymakers should consider increasing the level of investment in incentives, particularly for solar and energy efficiency technologies, to bolster deployment, and to maintain its position as a leader in the nation's efforts to support clean energy.

2023 Highlights

Connecticut's clean energy economy accounts for over 2 percent of the state's total workforce, with more than 44,000 clean energy workers in the state as of 2022.

Connecticut's clean energy economy accounted for $7.68 billion in Gross Regional Product (GRP) in 2022, an 8.5 percent increase over the previous year, outpacing overall state GRP growth.

Alternative transportation firms continued to experience robust employment growth in 2022, led by sustained growth in the hybrid electric and electric vehicle sub-sectors, and outpacing the national average for firms in this sector.

Clean energy employment in Connecticut has fully recovered from pandemic-induced employment losses sustained in 2020.

Clean energy workers in Connecticut are not only growing in number, but also in the amount of time spent on clean energy-related activities.

All technology sectors other than the energy efficiency sector saw significant employment growth in 2022, with employment in the energy efficiency sector experiencing modest growth and remaining below pre-pandemic levels.

[3] https://www.aceee.org/sites/default/files/pdfs/State_Scorecard/2022/one-pagers/Connecticut.pdf

[4] https://www.advancect.org/our-economy/key-industries/renewable-energy/

Total clean energy employment grew by 2.9 percent in 2022, representing approximately 44,000 jobs in the state.

Connecticut's clean energy sector has now fully recovered from the job losses incurred in 2020, though employment growth has slowed relative to 2021.

Connecticut's clean energy employment grew faster than the statewide average for all industries, but more slowly than the national average.

While Connecticut's clean energy employment grew faster than the statewide average for all industries (2.9 percent versus 1.7 percent), national clean energy jobs grew by nearly 7 percent during the same period. Regional clean energy employment also rose robustly in Massachusetts, growing by approximately 9 percent, outpacing growth in Connecticut.

The alternative transportation sector exhibited robust growth in 2022 and remained the fastest-growing technology sector in the state.

The alternative transportation sector grew by 429 jobs or nearly 17 percent between 2021 and 2022, led by continued job growth in the hybrid electric and electric vehicle sub-sectors. State job growth in this sector exceeded the national average for this sector (15 percent) during the same period.

Clean energy contributions to statewide Gross Regional Product (GRP) increased by nearly 9 percent between 2021 and 2022.

The clean energy economy contributed $7.68 billion to the state's GRP, accounting for 3.1 percent of total state GRP. Clean energy GRP growth outpaced overall state GRP growth of 2.1 percent. Clean energy professional and business services accounted for 40.1 percent of total GRP contributions, followed by manufacturing at 24.3 percent and utilities at 17.1 percent. All clean energy industries except construction experienced GRP growth between 2021 and 2022.

The number of full-time equivalent (FTE) clean energy workers grew nearly 6 percent in 2022.

This represents an additional 1,700 FTE clean energy workers[5] in the state.

All clean energy generation sub-technologies experienced employment growth in 2022 and outpaced national growth levels.

Solar remains the largest clean energy generation sub-technology employer with 3,031 workers in the state as of 2022, a net increase of 163 workers (5.7 percent) relative to 2021. Geothermal exhibited robust growth in jobs in percentage terms in 2022, with an 82.2 percent year-over-year increase (40 jobs) but maintained a small share of total clean energy generation employment.

Barring utilities, all clean energy industries saw employment growth in 2022.

The other services[6] value chain saw the largest absolute and relative employment growth, increasing by 348 workers or 11.3 percent, with growth primarily concentrated in the alternative transportation sector. Manufacturing and wholesale trade each grew by 6.7 percent (210 and 336 jobs, respectively), with growth concentrated in clean energy generation and the clean grid and storage sectors. Construction—Connecticut's largest clean energy industry—experienced no significant year-over-year changes, while professional and business services and agriculture and forestry also remained relatively constant. The utilities value chain saw 62 jobs displaced in 2022, likely attributable to the closure of a Hartford trash incinerator plant in July 2022.[7]

[5] 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.

[6] The other services value chain is largely comprised of automotive repair and maintenance activities but also includes other non-automotive repair and maintenance activities in addition to organizational and non-profit work such as environment and conservation organizations, business associations, or advocacy organizations.

[7] https://www.ctmira.org/

Clean Energy Demographics

Connecticut's clean energy workforce was less diverse than the state's clean energy workforce in 2022.

The composition of the state's clean energy workforce remained relatively unchanged in 2022, and Connecticut continued to employ a lower share of minority, women, veteran, and 55 and over clean energy workers relative to the state's overall workforce as of 2022. Significantly, women, who account for more than half of the state's overall workforce, comprise only one-quarter of the state's clean energy workforce.

Clean Energy Hiring

Fewer clean energy employers reported experiencing hiring difficulty in 2022 than in 2021, though hiring difficulty remains nearly 13 percent greater than pre-pandemic levels.

Of firms engaged in clean energy hiring activity throughout 2022, 90.5 percent indicated that hiring was difficult. The number of employers reporting that hiring had been very difficult in 2022 was 36.5 percent (a decrease of 7.2 percent from 2021), while 54.1 percent indicated hiring was somewhat difficult (an increase of 7.4 percent from 2021), indicating a decline in hiring difficulty severity. However, overall reported hiring difficulty remains 13.9 percentage points higher than pre-pandemic hiring difficulty. Technician or mechanical support positions were identified as the most difficult positions to fill by nearly one-third of Connecticut employers facing hiring difficulties in 2022.

2023 saw the introduction of numerous clean energy-related policies and initiatives in the state. Several bills were passed involving the Connecticut Department of Energy and Environmental Protections (DEEP) in 2023.

On July 1, 2023, House Bill No. 6853 was passed by the State of Connecticut, requiring DEEP to set up a grant and loan program for clean energy generation for "critical facilities" such as hospitals, fire stations, and correctional facilities.[8] Effective the same date, House Bill No. 6851 requires DEEP to develop and approve a hydrogen strategic plan and seek federal funding for projects that advance hydrogen in the state by December 31, 2024.[9]

Later in the year, DEEP submitted two requests for proposals, one for a new offshore wind energy source and another for new zero-carbon electricity generating resources. These RFPs aim to help Governor Lamont's Energy Action Plan and achieve a state mandate of a zero carbon electric sector by 2040.[10]

Another notable bill passed in 2023 was House Bill No. 5628, which requires the creation of a task force team comprised of various agencies to analyze Connecticut's hydropower assets and submit a report of their findings to the joint standing committee of the General Assembly by February 1, 2024.[11]

Furthermore, in 2023 Connecticut made significant headway in accommodating the introduction and installation of electrical vehicles (EVs). Starting January 1, 2023, each new construction of a state facility that exceeds $100,000 was to be installed with level two EV charging stations in at least 20 percent of the designated parking spaces for cars or light-duty trucks. Additionally, new commercial buildings or multi-unit residential buildings with thirty or more parking spaces were required to include an EV charging station.[12] Landlords owning over fifty units were also required to approve tenants' written requests to install an EV charging station. This requirement will be updated to require all landlords to accept written requests on October 1, 2024.[13]

House Chamber of the State House, Hartford, Connecticut

[8] https://www.cga.ct.gov/2023/ACT/PA/PDF/2023PA-00157-R00HB-06853-PA.PDF
[9] https://cga.ct.gov/2023/ACT/PA/PDF/2023PA-00156-R00HB-06851-PA.PDF
[10] https://portal.ct.gov/DEEP/News-Releases/News-Releases---2023/Connecticut-Releases-Clean-Energy-Solicitations
[11] https://cga.ct.gov/2023/ACT/SA/PDF/2023SA-00008-R00HB-05628-SA.PDF
[12] https://www.cga.ct.gov/current/pub/chap_060.htm#sec_4b-77
[13] https://www.cga.ct.gov/current/pub/chap_830.htm#sec_47a-13b

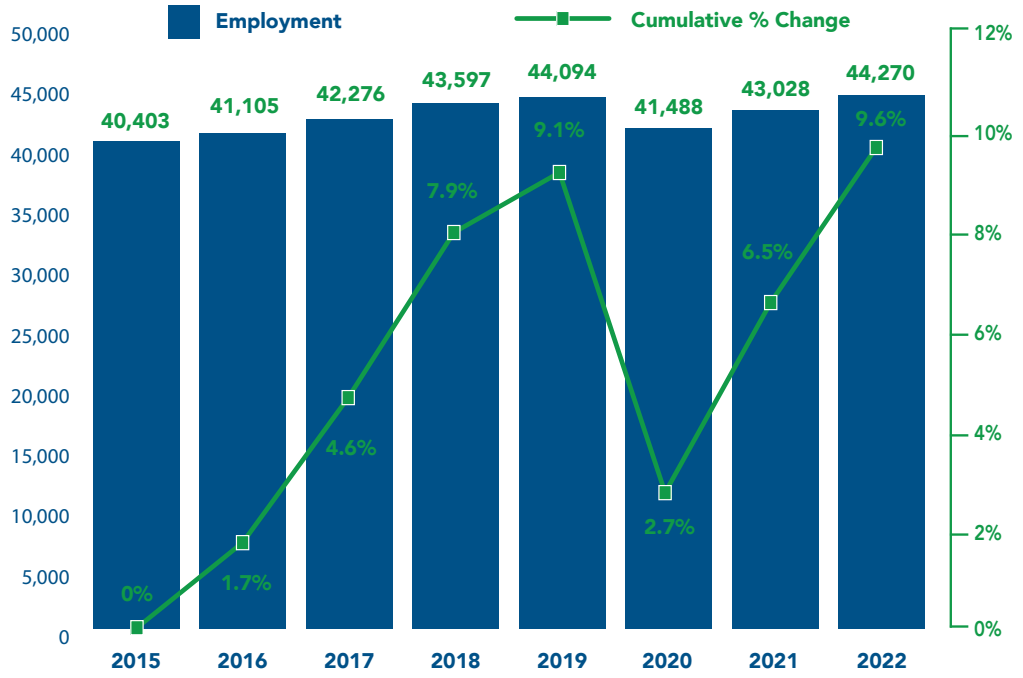
In 2022, clean energy employment in Connecticut increased by 2.9 percent, representing approximately 44,000 total jobs and an increase of over 1,200 workers from 2021 to 2022 (see Figure 1).

The state's clean energy sector has now fully recovered from the job losses incurred in 2020: as of the last quarter of 2022, Connecticut's clean energy employment slightly exceeds 2019 pre-pandemic employment by nearly 200 jobs.

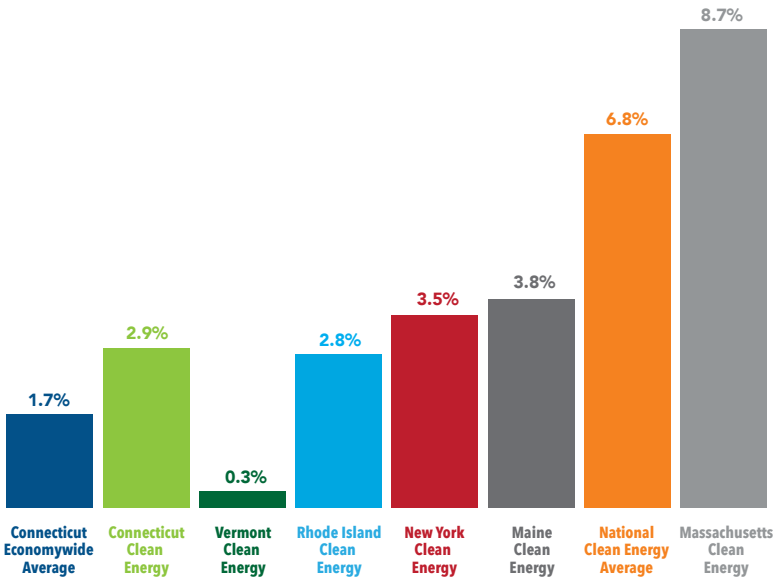
The overall statewide labor market in Connecticut grew by 1.7 percent, an increase of almost 27,500 jobs. Job growth in the clean energy industry accounted for nearly 5 percent of total statewide employment growth.[14]

Connecticut's clean energy industry exhibited slower growth than in the national clean energy labor market, which grew by nearly 7 percent during 2022, as well as compared to some other regions in the Northeast. Clean energy employment growth in Massachusetts was nearly three times greater than that of Connecticut, increasing by 8.7 percent between 2021 and 2022; however, clean energy employment growth in Maine, New York, and Rhode Island was closer to Connecticut levels (increasing by 3.8 percent, 3.5 percent, and 2.8 percent, respectively, as compared to 2.9 percent for Connecticut). (see Figure 2).

Clean Energy Employment In Connecticut 2015-2022 — Figure 1



Employment Change Comparisons, 2021-2022 — Figure 2



[14] Bureau of Labor Statistics, Quarterly Census of Employment and Wages (QCEW). December 2022. Data accessed February 2024.

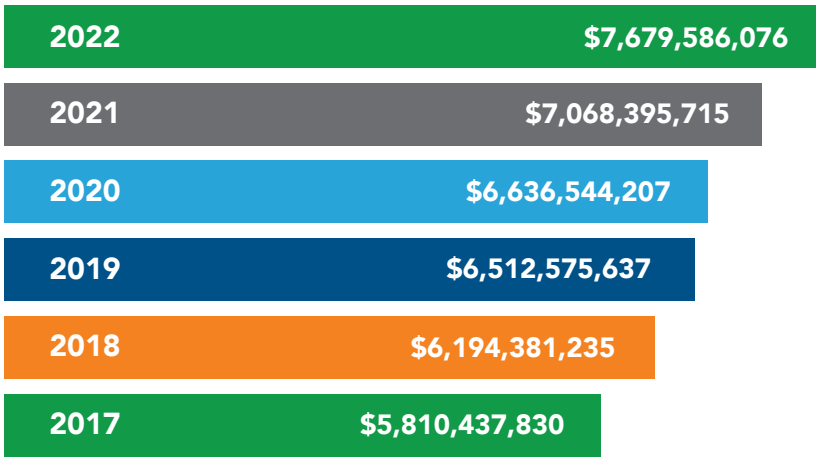
The clean energy economy accounted for $7.68 billion of Connecticut's Gross Regional Product (GRP) in 2022, representing an 8.5 percent increase over the previous year (see Figure 3).[15]

Clean energy professional and business services accounted for 40.1 percent of total GRP contributions, followed by manufacturing at 24.3 percent and utilities at 17.1 percent. The proportion of sector-specific GRP contributions remains relatively unchanged from the previous year (see Table 1).

All clean energy industries except construction experienced GRP growth between 2021 and 2022. The construction industry saw a 9.7 percent GRP decrease, while the other services[16] industry saw nearly 130 percent GRP growth from 2021 and 2022 (see Table 1).

Clean Energy Gross Regional Product (GRP) 2017-2022

Figure 3



Clean Energy Gross Regional Product (GRP) By Value Chain, 2021-2022

Table 1

	2021 Clean Energy GRP	2022 Clean Energy GRP	% Change	Proportion
Professional and Business Services	$2,912,021,428	$3,079,391,511	5.7%	40.1%
Manufacturing	$1,578,078,437	$1,867,436,889	18.3%	24.3%
Utilities	$1,305,338,000	$1,311,546,000	0.5%	17.1%
Construction	$695,516,830	$627,750,402	-9.7%	8.2%
Wholesale Trade	$556,841,556	$749,991,053	34.7%	9.8%
Other Services	$17,654,162	$40,333,602	128.5%	0.5%
Agriculture and Forestry	$2,945,302	$3,136,620	6.5%	0.0 %
TOTAL	**$7,068,395,715**	**$7,679,586,076**	**8.6%**	

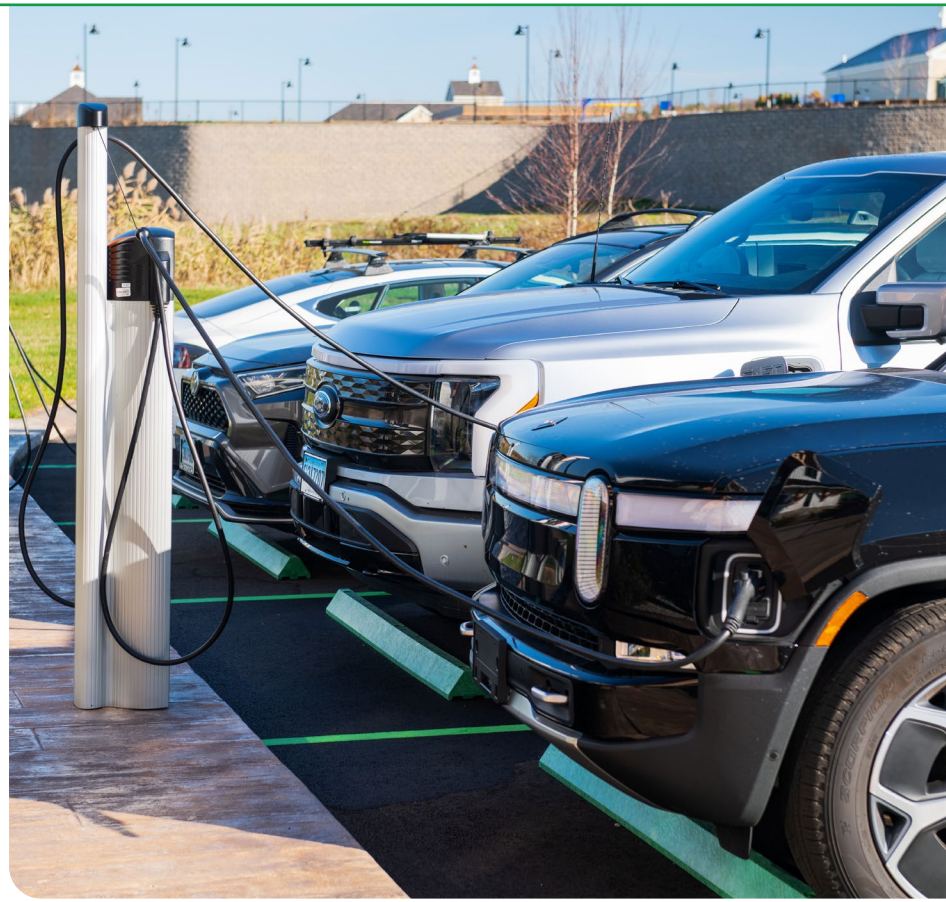
[15] Total Connecticut Gross Regional Product (GRP) from Bureau of Economic Analysis (BEA), 2022, real GRP in millions of chained 2012 dollars.

[16] The other services value chain is largely comprised of automotive repair and maintenance activities but also includes other non-automotive repair and maintenance activities in addition to organizational and non-profit work such as environment and conservation organizations, business associations, or advocacy organizations.

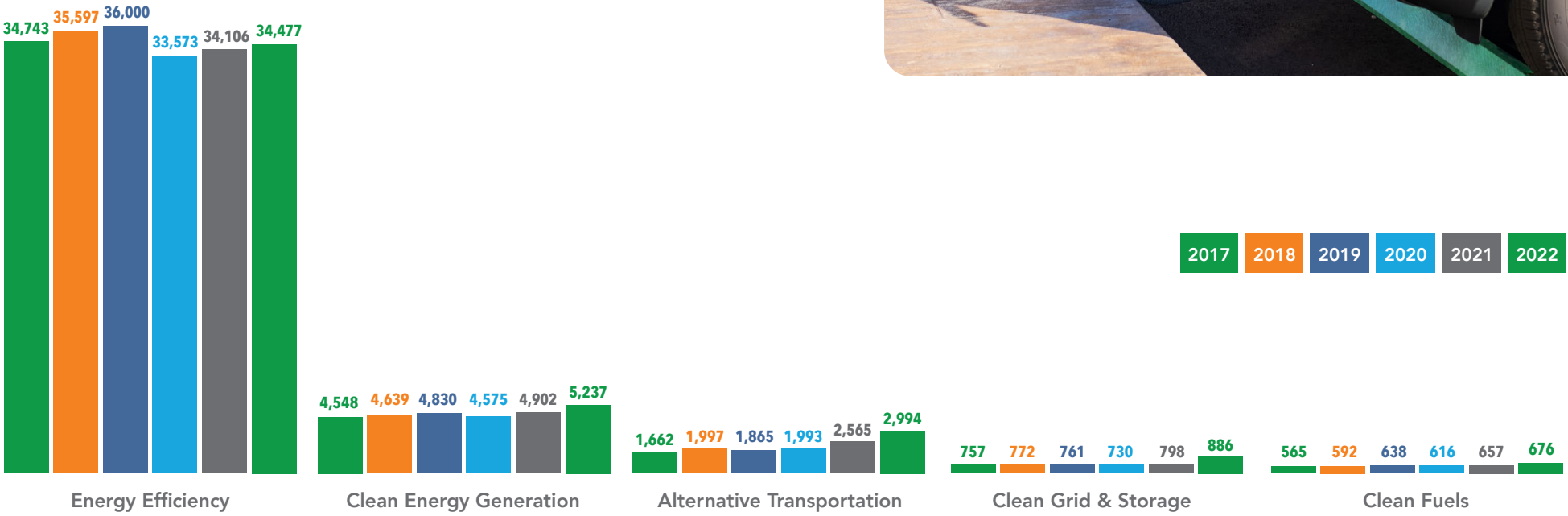
Nearly all technology sectors experienced employment growth in 2022, consistent with 2021 trends.

The alternative transportation sector continued to experience robust growth between 2021 and 2022, gaining 429 jobs and growing by nearly 17 percent. Clean energy generation employment increased by 335 jobs, or about 7 percent from 2021, while clean grid & storage employment increased by 88 jobs or 11 percent. The energy efficiency and clean fuels sectors showed no significant change compared to 2021.

Employment in all technology sectors other than the energy efficiency sector continued to exceed pre-pandemic levels in 2022 (see Figure 4).



Clean Energy Employment By Sector, 2017 – 2022 — Figure 4



As of 2022, there are 4,455 clean energy establishments located in Connecticut.

Most establishments (87.7 percent) are within the energy efficiency sector, while clean grid and storage establishments represent just 0.7 percent of all clean energy establishments in the state. The clean energy generation sector saw the largest percentage increase in clean energy establishments, gaining 12 firms for an increase of 4.5 percent in 2022 (see Table 2).

Clean Energy Employment By Sector, 2017 – 2022

Table 2

SECTORS	2017	2018	2019	2020	2021	2022
Energy Efficiency	3,677	3,728	3,833	3,771	3,860	3,909
Clean Energy Generation	223	241	258	247	261	273
Alternative Transportation	172	194	177	187	187	191
Clean Fuels	58	59	52	50	51	50
Clean Grid & Storage	28	31	27	29	32	33
TOTALS	**4,159**	**4,253**	**4,347**	**4,284**	**4,392**	**4,455**

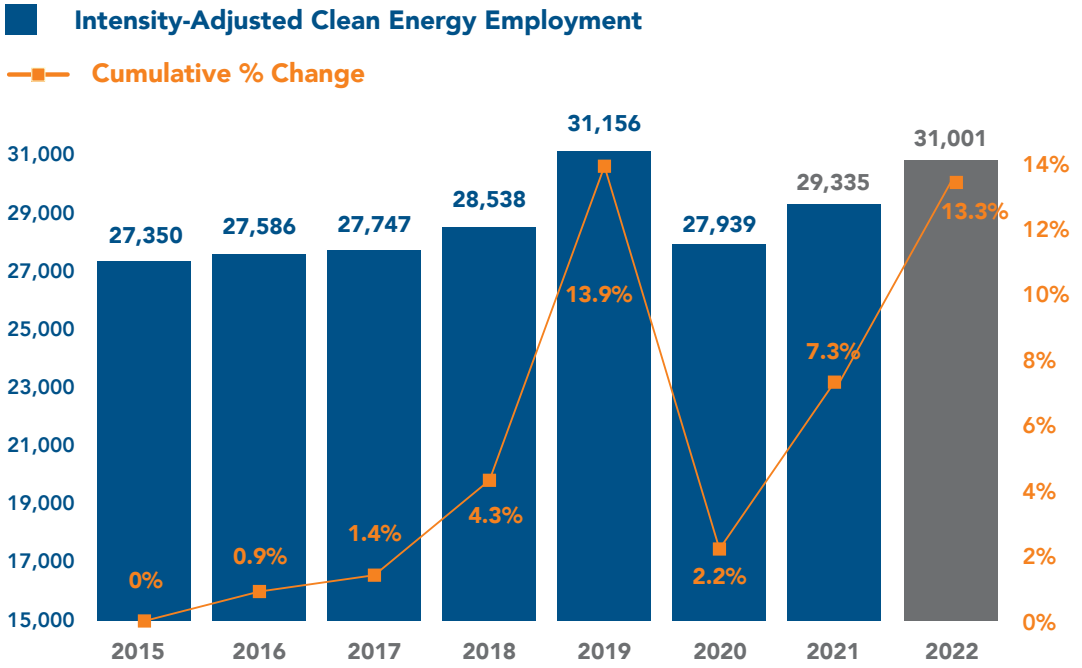
Full-time equivalent (FTE) jobs are a useful metric in identifying the concentration or intensity of clean energy activity going on in a state. The clean energy employment presented in Figure 1 in the previous section represents the total number of workers that dedicate any amount of their work week or labor hours to clean energy activities. In this case, a worker who spends any amount of time on clean energy-specific activities is counted as a clean energy worker. FTE employment instead weighs each of these jobs according to how much time workers were reported to spend on clean energy activities. An increase in total employment indicates that more workers in the overall labor market are spending any amount of time working on clean energy activities, while an increase in FTE jobs indicates that workers are dedicating an increasing amount of their labor hours to clean energy 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 2021. But if a state began offering rebates in 2022 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.[17]

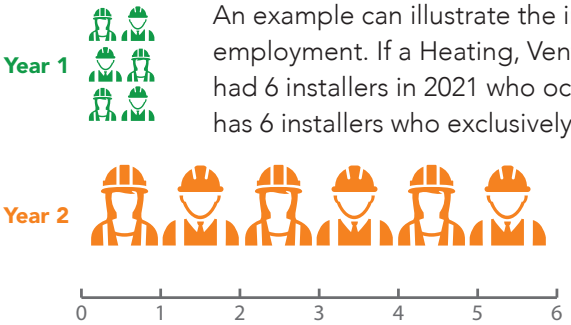
In 2022, there were approximately 31,000 FTE clean energy jobs in Connecticut, representing a 5.7 percent FTE employment increase from 2021 to 2022, or an additional 1,700 FTE clean energy workers. FTE clean energy jobs have increased by approximately 13 percent since the 2015 baseline and is now on-par with pre-pandemic FTE jobs levels in the state (see Figure 5).

Full-Time Equivalent Clean Energy Jobs, 2015-2022[18]

Figure 5



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 2021 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.

[17] 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.

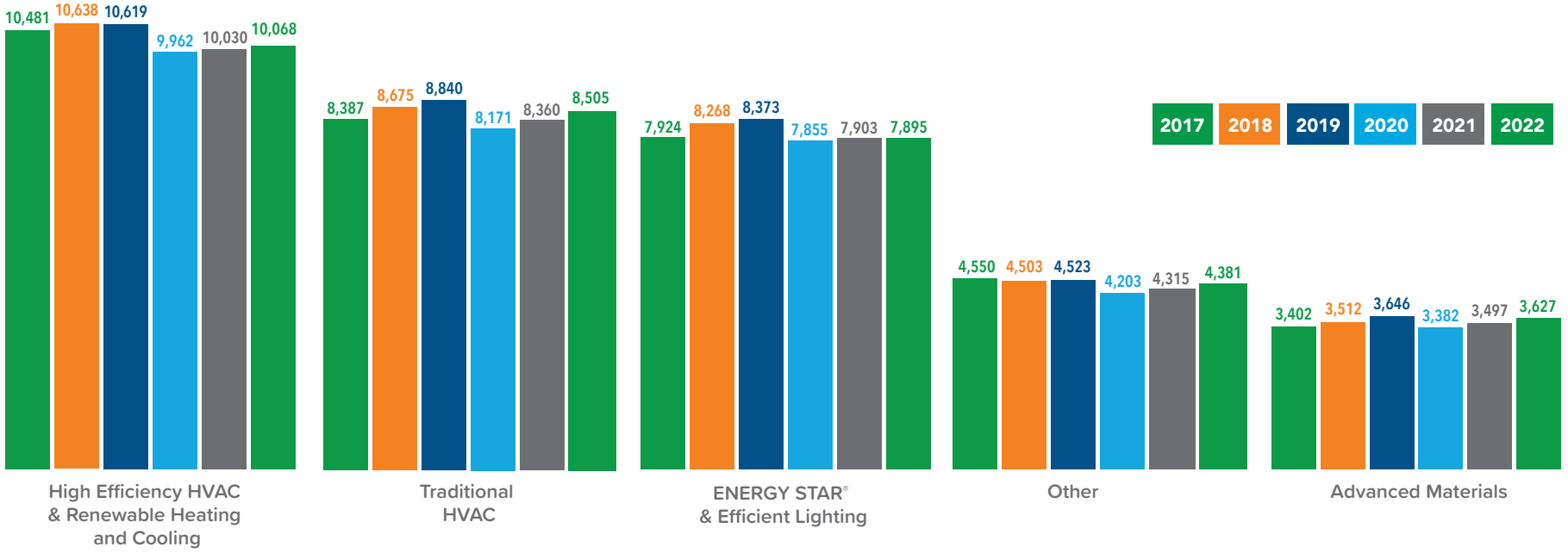
[18] FTE jobs were extrapolated using a combination of state-level and census region data. The data was adjusted based on revenue distribution by technology and weighted according to how much time workers were reported to spend on clean energy activities (0-49 percent, 50-99 percent, or 100 percent).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

All energy efficiency (EE) sub-technologies showed no significant employment changes from 2021 to 2022, falling behind national EE sector growth of 2.3 percent.

High efficiency HVAC & renewable heating and cooling remains the largest sub-sector employer in the state, representing nearly 30 percent of EE employment in 2022. However, employment in this sub-sector remains 5.2 percent lower relative to 2019 pre-pandemic employment levels. The ENERGY STAR & efficient lighting sub-sector also has yet to recover to pre-pandemic employment levels, with 2022 employment in this sub-sector remaining 5.7 percent lower relative to 2019 (see Figure 6).

Energy Efficiency Employment By Sub-Technology, 2017-2022[19]

Figure 6



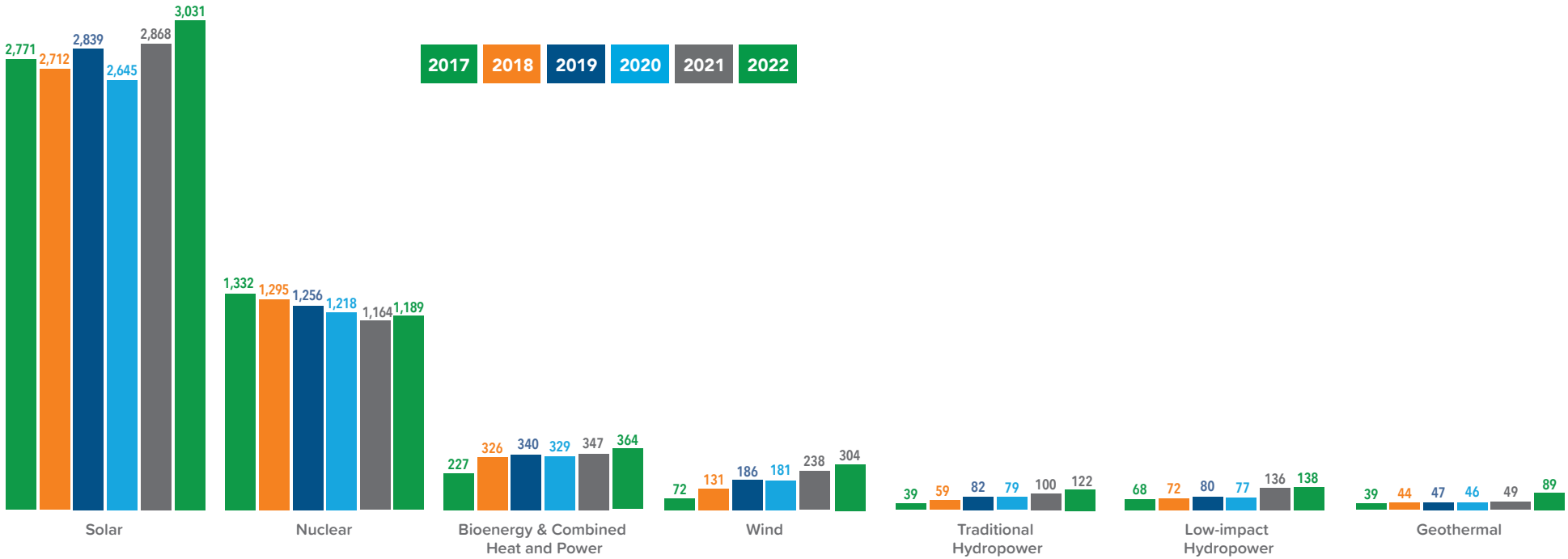
[19] Traditional HVAC workers are those individuals that spend at least a portion, or less than half, of their time on energy-efficient heating and cooling technologies and the remainder on traditional, non-efficient technologies. High efficiency HVAC workers dedicate the majority to all of their labor hours to efficient HVAC technologies. For more information, please refer to the Clean Energy Technology List and definitions in Appendix B.

All clean energy generation (CEG) sub-technologies experienced employment growth or remained relatively constant between 2021 and 2022.

Overall CEG growth in Connecticut exceeded national CEG growth of 1.4 percent during the same period. Solar, the largest CEG sub-sector employer, grew by 5.7 percent or 163 jobs from 2021 to 2022. The geothermal sub-sector grew by 82.2 percent or 40 jobs during the same period, representing the largest employment increase in percentage terms across all sub-technologies in 2022. The wind sub-sector grew by 27.6 percent or 66 jobs, while traditional hydropower grew by 21.8 percent or 22 jobs in 2022. Nuclear, low-impact hydropower, and bioenergy & combined heat and power employment remained relatively unchanged between 2021 and 2022 (see Figure 7).

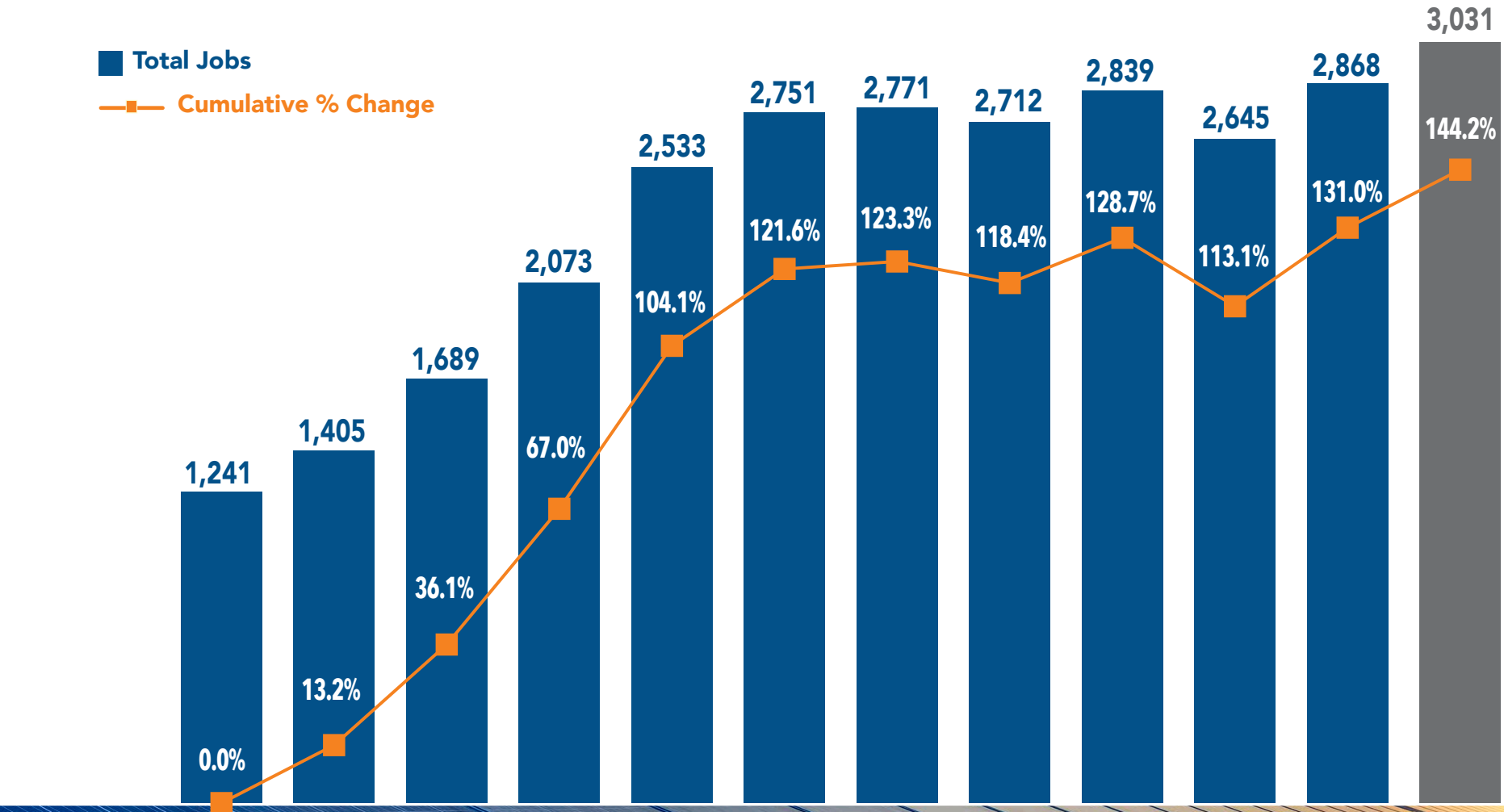
Clean Energy Generation Employment By Sub-Technology, 2017-2022

Figure 7



Solar Employment, 2011-2022

Figure 8

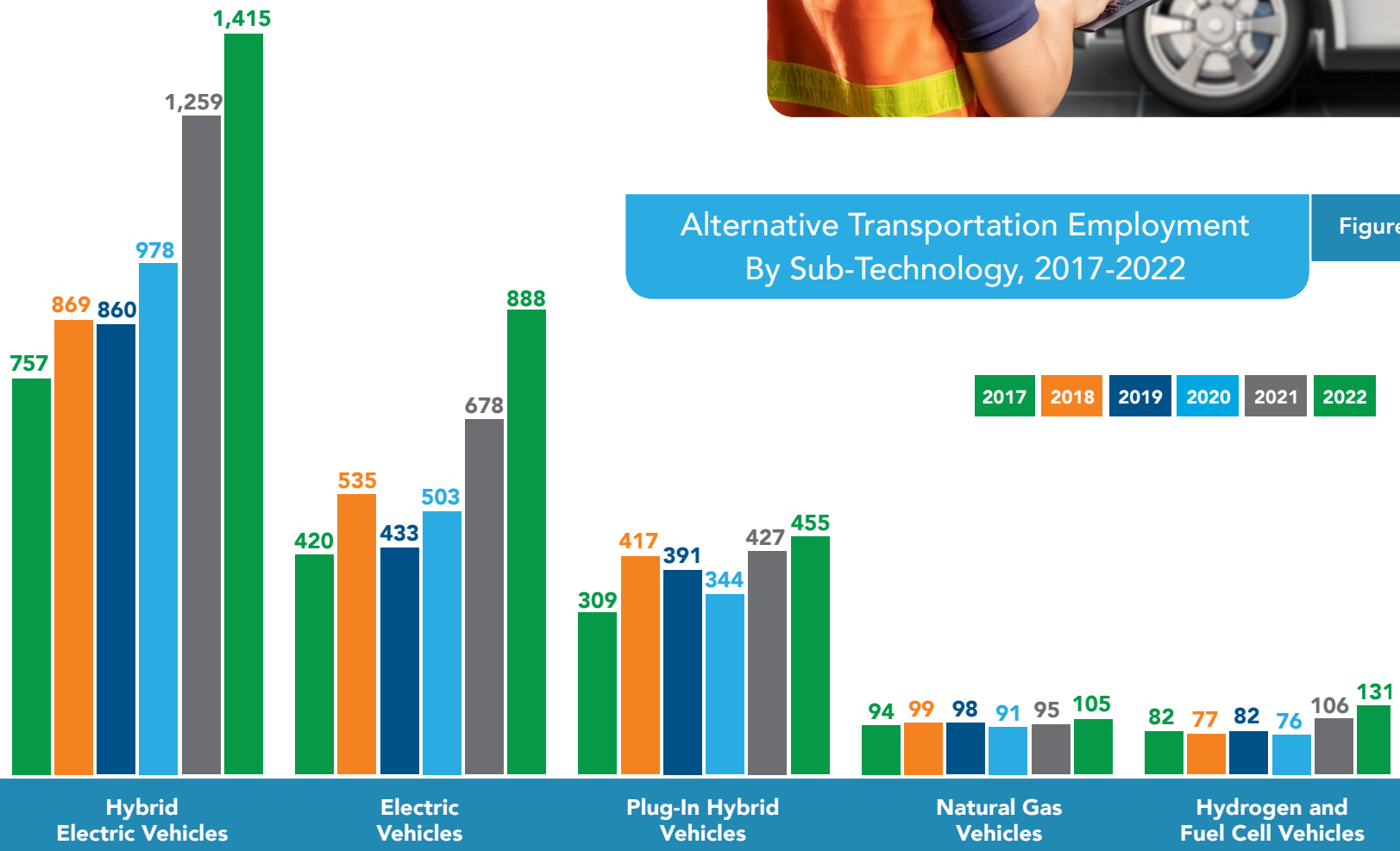


Employment in all alternative transportation (AT) sub-technologies grew between 2021 and 2022.

Connecticut's overall AT sector grew by 16.7 percent in 2022, outpacing national AT employment growth of 14.6 percent. Hybrid electric vehicles and electric vehicles remain the largest AT sub-technology employers, representing over 75 percent of AT employment in 2022. These two sub-technologies also accounted for 85.3 percent of employment growth in 2022, gaining a combined 366 jobs. The remaining AT sub-technologies experienced lower levels of employment growth in the past year (see Figure 9).

Alternative Transportation Employment By Sub-Technology, 2017-2022

Figure 9



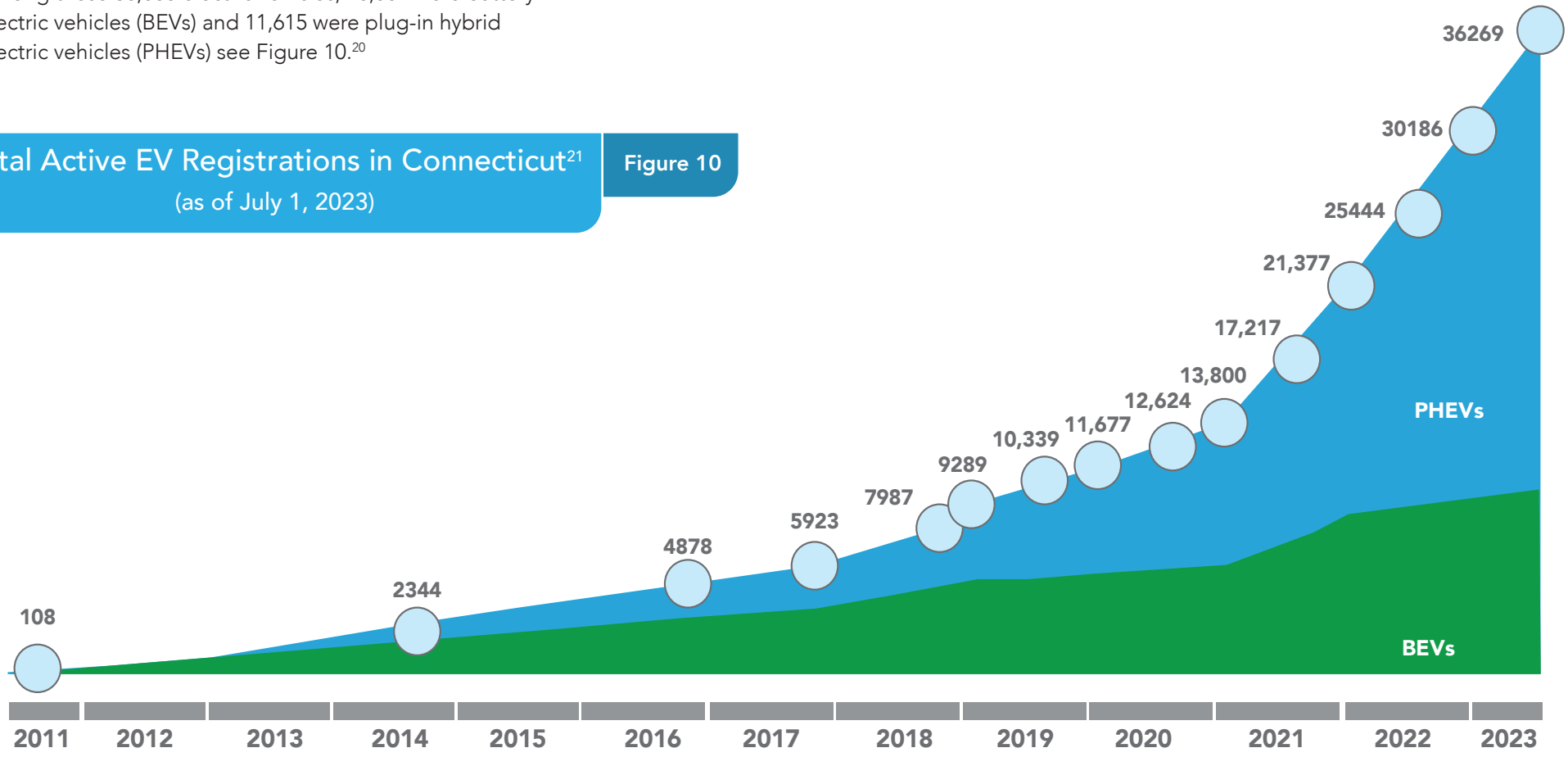
Electric vehicle registrations continued to grow in 2022, coinciding with the robust employment growth seen in hybrid electric and electric vehicles.

Total active electric vehicle registrations in Connecticut increased by 41.2 percent between 2021 and 2022, representing an increase of nearly 9,000 electric vehicles in the state and bringing the total number of electric vehicles in Connecticut to over 30,000 as of December 2022. Among these 30,000 electric vehicles, 18,509 were battery electric vehicles (BEVs) and 11,615 were plug-in hybrid electric vehicles (PHEVs) see Figure 10.[20]

Total Active EV Registrations in Connecticut[21]

(as of July 1, 2023)

Figure 10



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

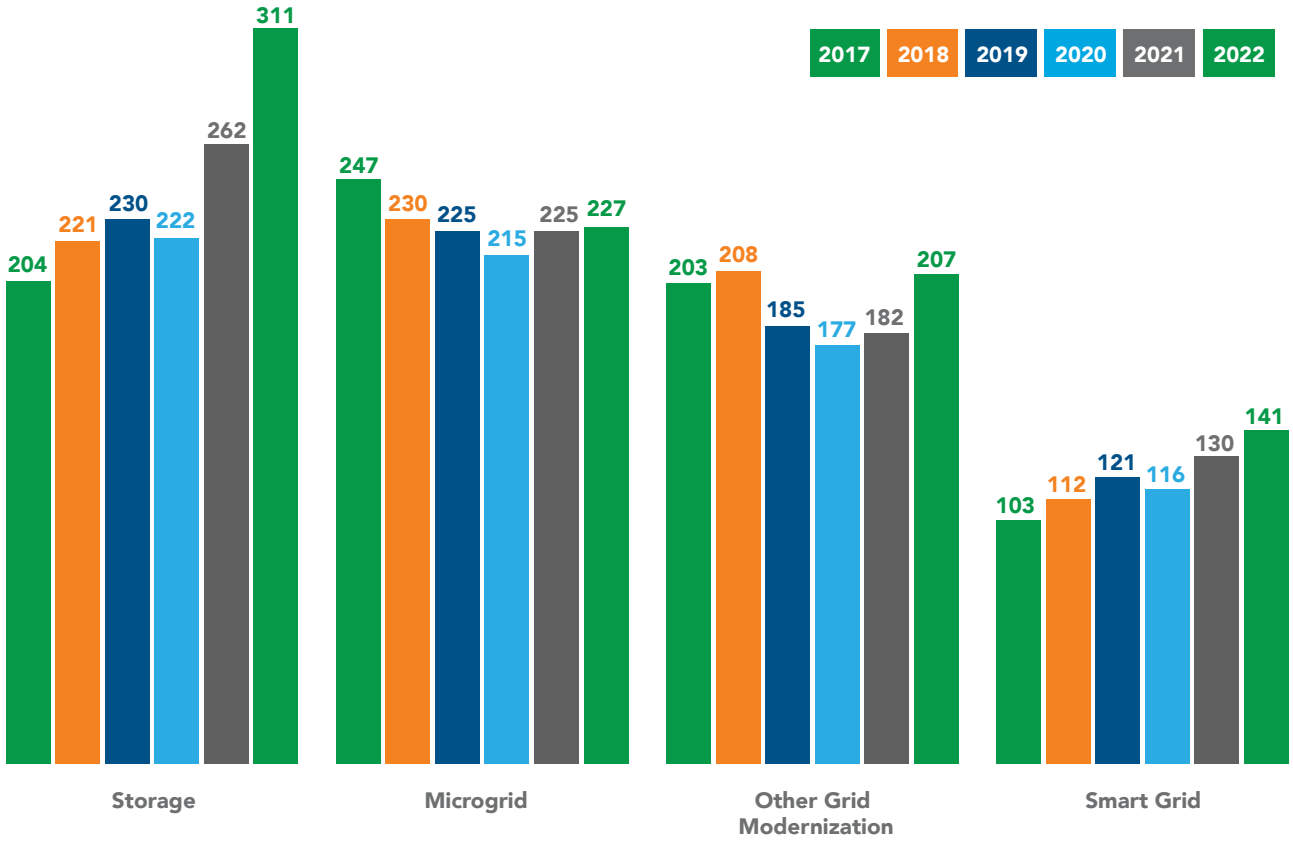
[21] Connecticut's Official State Website. Expanded EV Registration Fact Sheet. https://portal.ct.gov/-/media/DEEP/air/mobile/CHEAPR/EV-Reg-Fact-Sheet.pdf

All clean grid & storage (CGS) sub-technologies aside from microgrid experienced moderate employment gains between 2021 and 2022.

The overall CGS sector gained 87 jobs during this period, a 10.9 percent increase from 2021, more than double the growth seen in the nation's overall CGS sector (4.8 percent). Storage remained the largest CGS sub-technology and experienced the largest employment growth among all sub-technologies, adding 49 jobs, or 56.6 percent of all CGS jobs created in 2022. The other grid modernization sub-technology grew by 13.6 percent, adding 25 jobs, while the smart grid sub-technology grew by 8.3 percent (11 jobs) (see Figure 11).

Clean Grid And Storage Employment By Sub-Technology, 2017-2022[22]

Figure 11



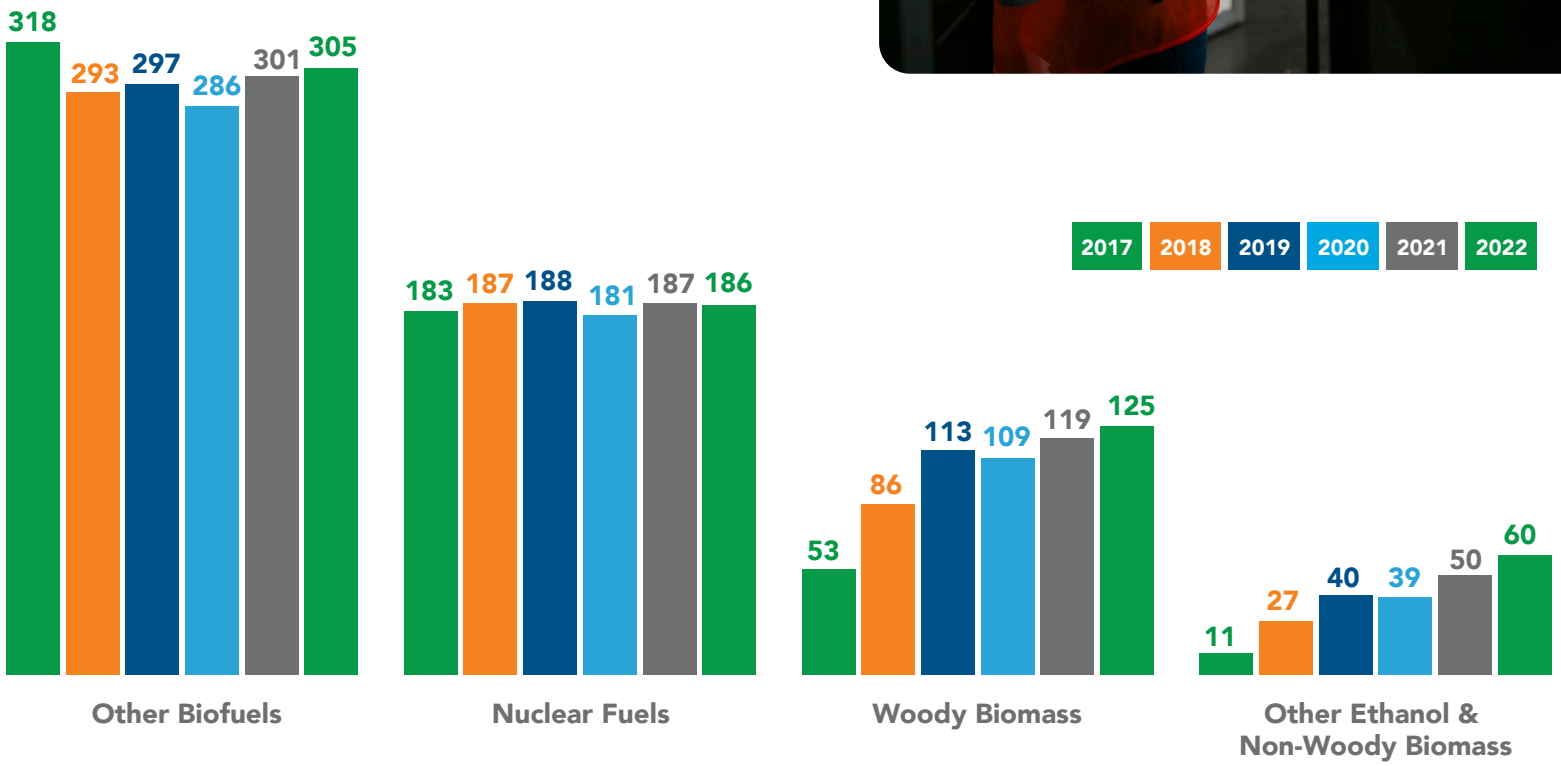
[22] Per the Connecticut definition, storage companies include pumped hydropower storage, battery storage (including battery storage for solar generation), mechanical storage, thermal storage, biofuels (including ethanol and biodiesel), and nuclear fuels.

Growth in the clean fuels sector slowed in 2022, with the sector adding just 19 jobs from 2021 to 2022 compared to 41 added jobs from 2020 to 2021.

However, the slowing clean fuels growth of 2.9 percent in Connecticut still exceeded national clean fuel sector growth of 1.7 percent. In 2022 growth was driven primarily by the other ethanol and non-woody biomass sub-technology, which experienced a 19.3 percent employment increase from 2021 to 2022. Other biofuels remains the largest clean fuels sub-technology, representing 45.2 percent of clean fuels employment in 2022 (see Figure 12).

Clean Fuels Employment By Sub-Technology, 2017-2022[23]

Figure 12



[23] 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 experienced minimal demographic shifts from 2021 to 2022, remaining less diverse than Connecticut's overall workforce, the nation's clean energy workforce, and the nation's overall workforce.

The state continues to possess a lower share of female, minority, veteran, and 55 and over clean energy workers as of 2022 (see Table 3).

Regardless, Connecticut's clean energy workforce has made progress toward increased racial diversity since 2019. The share of Hispanic or Latinx and Black or African American clean energy workers has increased by 3 and 1 percentage points since 2019, respectively, while the share of White clean energy workers decreased by 3 percentage points during the same period.

Clean Energy Workforce Demographics, 2022[24]

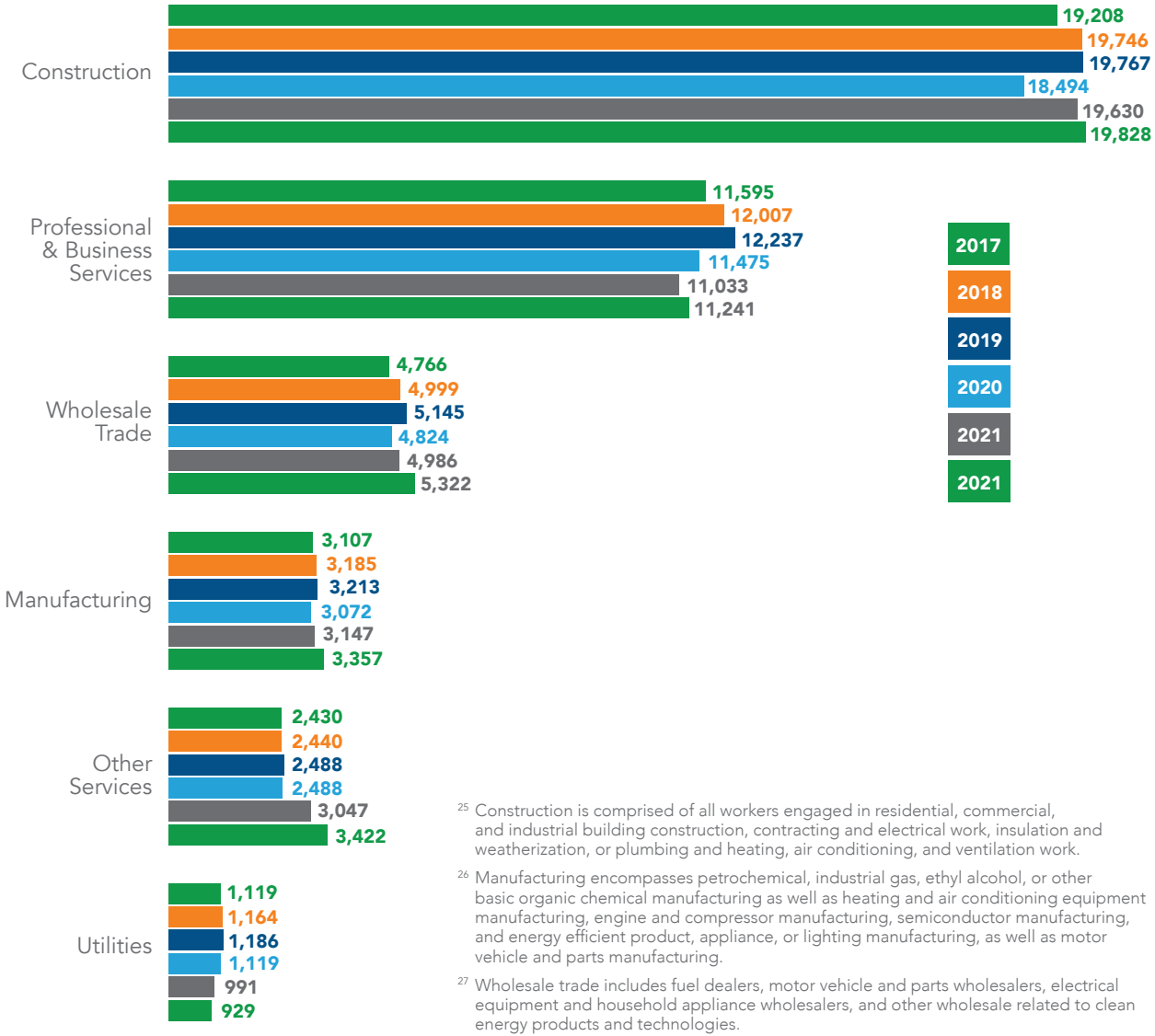
Table 3

Workforce Demographic	Connecticut Clean Energy, 2019	Connecticut Clean Energy, 2020	Connecticut Clean Energy, 2021	Connecticut Clean Energy, 2022	Connecticut Overall, 2022	US Clean Energy, 2022	US Overall, 2022
Male	72%	72%	73%	73%	49%	72%	53%
Female	28%	28%	27%	27%	51%	28%	47%
Hispanic or Latino	10%	11%	12%	13%	15%	17%	19%
Not Hispanic or Latino	90%	89%	88%	87%	85%	83%	82%
American Indian or Alaska Native	1%	1%	<1%	<1%	<1%	1%	<1%
Asian	6%	6%	6%	7%	5%	8%	7%
Black or African American	6%	6%	7%	7%	13%	8%	13%
Native Hawaiian or other Pacific Islander	1%	1%	<1%	<1%	<1%	1%	<1%
White	82%	81%	80%	79%	78%	73%	77%
Two or more races	5%	5%	5%	6%	2%	8%	3%
Veterans	11%	10%	9%	9%	4%	10%	5%
55 and over	15%	14%	13%	13%	28%	14%	24%

[24] Demographic data retrieved from the United States Energy and Employment Report 2023 (USEER 2023); the Bureau of Labor Statistics: Current Population Survey, and Veterans News Release; as well as JobsEQ Population Demographics.

Clean Energy Employment By Value Chain Segment, 2017-2022

Figure 13



[25] Construction is comprised of all workers engaged in residential, commercial, and industrial building construction, contracting and electrical work, insulation and weatherization, or plumbing and heating, air conditioning, and ventilation work.

[26] Manufacturing encompasses petrochemical, industrial gas, ethyl alcohol, or other basic organic chemical manufacturing as well as heating and air conditioning equipment manufacturing, engine and compressor manufacturing, semiconductor manufacturing, and energy efficient product, appliance, or lighting manufacturing, as well as motor vehicle and parts manufacturing.

[27] Wholesale trade includes fuel dealers, motor vehicle and parts wholesalers, electrical equipment and household appliance wholesalers, and other wholesale related to clean energy products and technologies.

[28] Professional business services include all finance, legal, consulting, engineering, research, or architectural support.

[29] Other services is largely comprised of automotive repair and maintenance, but also includes organizational and non-profit work such as environment and conservation organizations, business associations, or advocacy organizations.

Value chain jobs examine the clean energy economy by identifying the industries in which clean energy activities are concentrated in Connecticut.

Doing so provides context for what type of policy or workforce development assistance is needed to support clean energy employers across the state. The major value chain segments examined include construction[25], manufacturing[26], wholesale trade[27], professional and business services[28], other services[29], agriculture and forestry, and utilities.

Employment in all clean energy value chain segments other than utilities grew between 2021 and 2022. Other services experienced the largest relative and absolute employment increase among all value chain segments, growing 11.3 percent or adding 348 jobs between 2021 and 2022. The manufacturing and wholesale trade value chains also experienced robust employment growth of 6.7 percent each, or 210 and 336 jobs, respectively. Professional and business services and agriculture and forestry employment remained relatively constant from 2021 to 2022, while construction, the largest value chain employer, also experienced no significant employment growth. Utilities were the only value chain to experience employment declines, losing 62 jobs (-6.3 percent) in 2022.

Nearly all value chains recovered from pandemic-induced employment losses in 2022, except for utilities and professional and business services, whose 2022 employment still falls below 2019 pre-pandemic employment levels (see Figure 13).

On average, construction jobs account for 45 percent of all clean energy employment in state.

The construction value chain accounts for nearly 45 percent of all clean energy jobs in Connecticut and is heavily concentrated in the energy efficiency sector – over 18,000 energy efficiency jobs, or 52.3 percent of all energy efficiency jobs in the state, fall within the construction value chain as of 2022. Additionally, construction jobs account for 60.5 percent of clean grid & storage employment and 24.2 percent of clean energy generation employment as of 2022. Growth in the construction value chain was concentrated in the clean grid and storage sector, which experienced a 6.6 percent increase in construction jobs compared to 2021.

Professional and business services jobs account for over one quarter (25.4 percent) of all clean energy jobs in the state, 29.0 percent of energy efficiency jobs, 18.5 percent of clean grid & storage jobs, and 18.1 percent of clean energy generation jobs, while representing a much smaller share of clean fuels (7.7 percent) and alternative transportation (3.2 percent) employment. Growth in the professional and business services was primarily concentrated in the alternative transportation sector, which experienced an 18.1 percent increase of professional and business services jobs compared to 2021 (see Table 4).

Value Chain Employment by Clean Energy Sector, 2022

Table 4

Clean Energy Sector	Clean Energy Generation	Clean Grid & Storage	Energy Efficiency	Clean Fuels	Alternative Transportation	TOTAL
Agriculture and Forestry	–	–	–	171	–	171
Utilities	929	–	–	–	–	929
Construction	1,269	536	18,023	–	–	19,828
Manufacturing	454	72	2,125	144	562	3,357
Trade	559	73	3,721	307	663	5,322
Professional & Business Services	946	164	9,983	52	95	11,241
Other Services	1,079	42	626	2	1,674	3,422
TOTAL	**5,237**	**886**	**34,477**	**676**	**2,994**	**44,270**

All value chains within the energy efficiency sector other than utilities experienced job growth from 2021 to 2022.

Job growth in the energy efficiency sector was concentrated in construction (+194 jobs) and professional and business services (+108 jobs) value chains, though the proportions of value chain-specific employment remained relatively constant compared to 2021.

As in the energy efficiency sector, all value chains within the alternative transportation sector experienced job growth from 2021 to 2022. Job growth within the alternative transportation sector was concentrated in its two largest value chains, wholesale trade and other services[30], which added 125 and 214 jobs in the sector from 2021 to 2022, respectively (see Table 5).

Value Chain Proportional Employment By Clean Energy Sector, 2022

Table 5

Clean Energy Sector	Connecticut Clean Energy Average	Clean Energy Gen-eration	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	2.1%	17.7%	0.0%	0.0%	0.0%	0.0%
Construction	44.8%	24.2%	60.5%	52.3%	0.0%	0.0%
Manufacturing	7.6%	8.7%	8.1%	6.2%	21.3%	18.8%
Trade	12.0%	10.7%	8.2%	10.8%	45.3%	22.1%
Professional & Business Services	25.4%	18.1%	18.5%	29.0%	7.7%	3.2%
Other Services	7.7%	20.6%	4.7%	1.8%	0.4%	55.9%

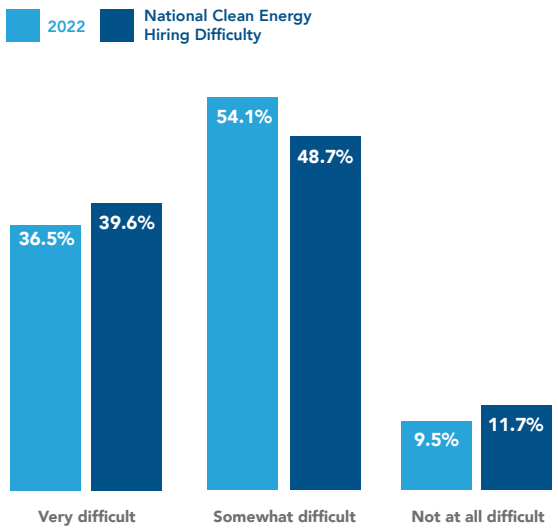
[30] Other services is largely comprised of automotive repair and maintenance, but also includes organizational and non-profit work such as environment and conservation organizations, business associations, or advocacy organizations.

Nearly all of Connecticut clean energy employers hiring in 2022 (90.5 percent) indicated that they had experienced some level of hiring difficulty.

Over one-third (36.5 percent) considered hiring "very difficult" over the past year, and over half (54.1 percent) considered hiring "somewhat difficult." However, clean energy hiring difficulties are not unique to Connecticut; a similar percentage of clean energy firms nationwide (88.3 percent) report similar hiring difficulties. Moreover, the proportion of Connecticut clean energy firms that reported high levels of hiring difficulty (36.5 percent) was lower than the national average of 39.6 percent (see Figure 14).

Employer-Reported Hiring Difficulty, 2022

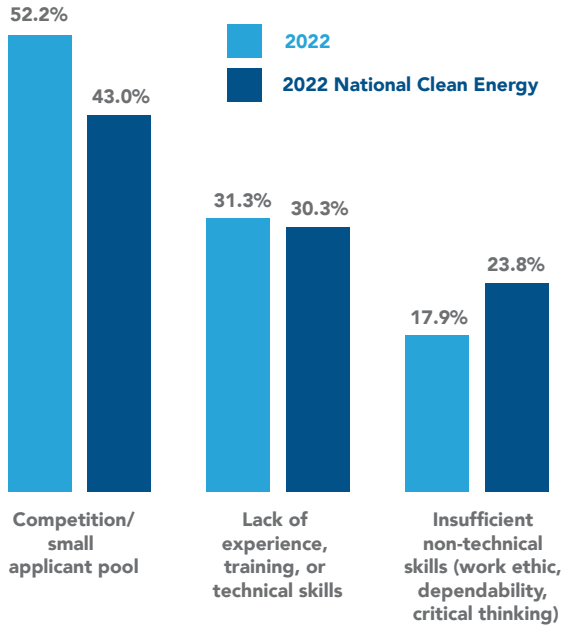
Figure 14



Most Common Employer-Reported Reasons for Hiring Difficulty, 2022

Figure 15

Among Connecticut employers who reported any level of hiring difficulty in 2022, the most cited reasons were competition from other employers or small applicant pools (52.2 percent), lack of experience, training, or technical skills (31.3 percent), and insufficient non-technical skills (17.9 percent). Connecticut employers face more difficulty with competition or small applicant pools than nationally (43.0 percent), while facing less difficulty with insufficient non-technical skills than nationally (23.8 percent) (see Figure 15).



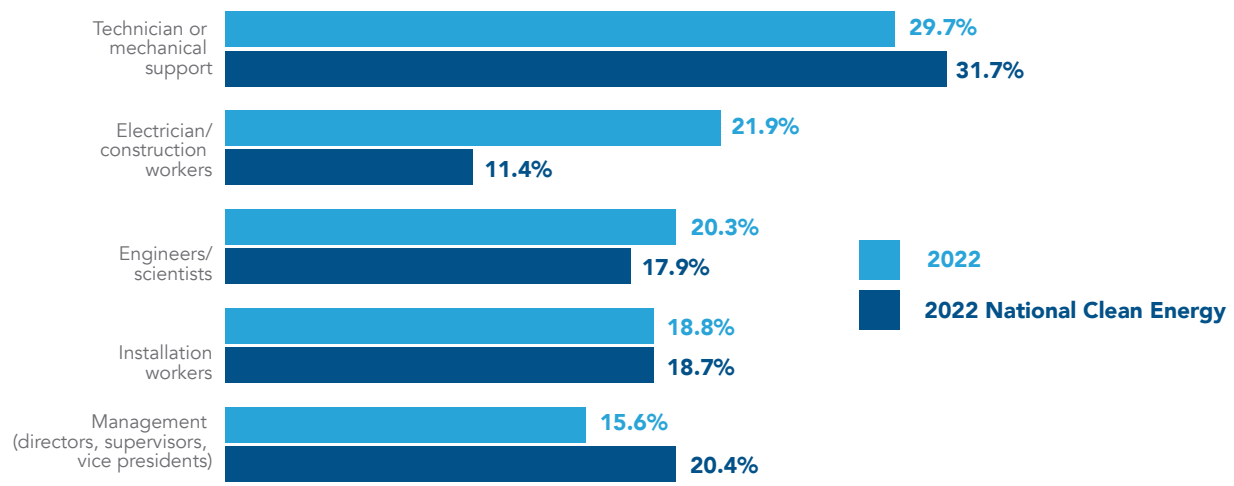
Connecticut employers facing any level of hiring difficulty also identified the most difficult positions to fill within their organization – nearly one third (29.7 percent) of employers identified technicians or mechanical support positions as difficult to fill, followed by electricians and construction workers (21.9 percent), engineers and scientists (20.3 percent), installation workers (18.8 percent), and management positions (15.6 percent). Connecticut employers face significantly more challenges filling electrician and construction worker positions than nationally (11.4 percent), while facing less challenges filling management positions than nationally (20.4 percent) (see Figure 16).

The number of employees reporting overall hiring difficulty[31] remained constant from 2021 to 2022. During this time, however, the number of employers who found hiring "very difficult" decreased by 7.2 percent while the number of employers who found hiring "somewhat difficult" increased by 7.4 percent, indicating a decline in hiring difficulty severity across the state. However, overall hiring difficulty remains 13.9 percentage points higher than pre-pandemic hiring difficulty in 2019 (see Figure 17).

[31] Overall hiring difficulty is defined as the sum of employers who reported hiring as "somewhat difficult" or "very difficult."

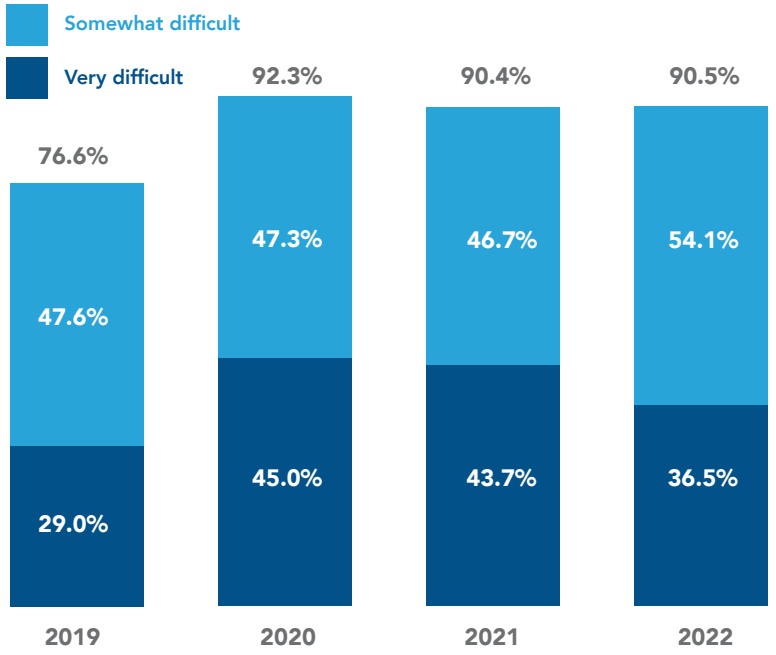
Employer-Reported Most Difficult Positions to Fill, 2022

Figure 16



Employer Reported Hiring Difficulty, 2019 -2022

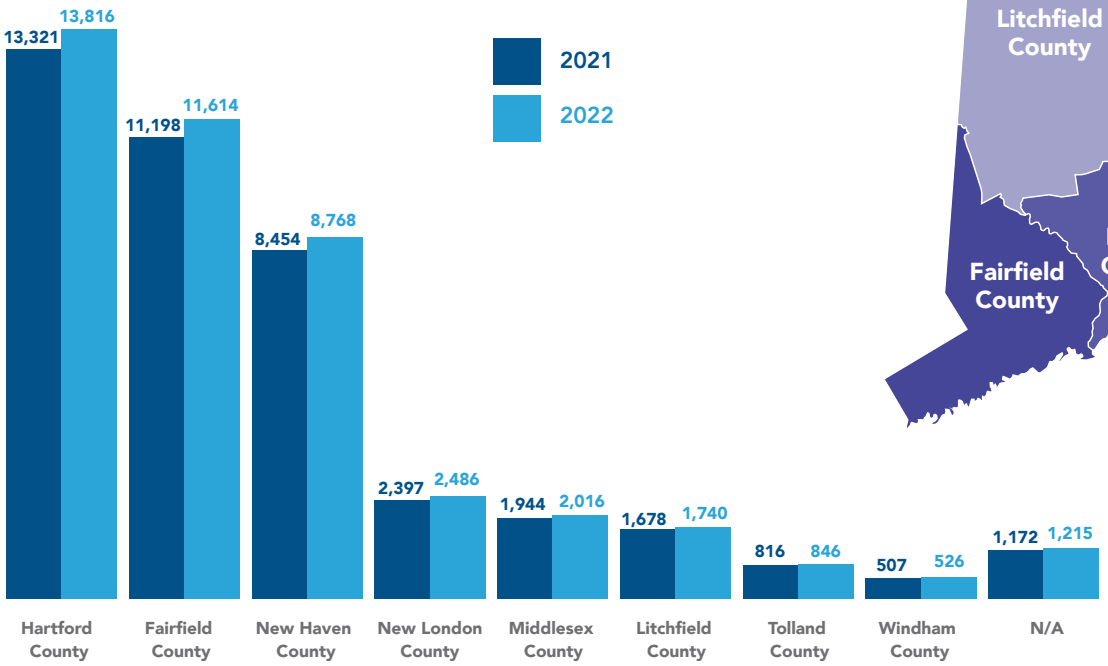
Figure 17



The geographic distribution of clean energy employment remained relatively constant from 2021 to 2022, with Hartford, Fairfield, and New Haven Counties maintaining the largest shares of clean energy employment in the state. New London County experienced remarkable clean energy employment growth in 2022, growing 35.5 percent, or 883 jobs, in the past year. Windham County also experienced a large relative increase in clean energy employment, growing 25.9 percent, or 136 jobs, in the past year, though Windham County only represents a small portion (1.5 percent) of all clean energy employment in the state.

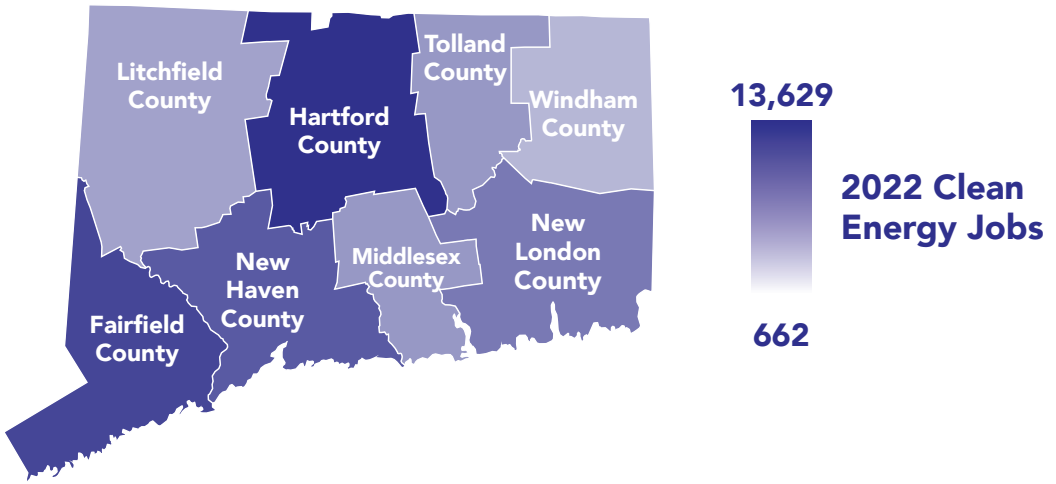
Clean Energy Employment By County, 2020-2022[32]

Figure 18



Map of Clean Energy Employment By County, 2022

Figure 19



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

Appendix A: Research Methodology

Data for the 2023 Connecticut Clean Energy Industry Report is taken from the 2023 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, 618 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 +/- 3.91 percent for Connecticut at a 95 percent confidence interval. The full research methodology for USEER may be found at: https://www.energy.gov/sites/default/files/2023-06/2023%20USEER%20REPORT-v2.pdf

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:

- Energy Efficiency
- Clean Energy Generation
- Alternative Transportation
- Clean Grid & Storage
- 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.[33]

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[34]
- 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

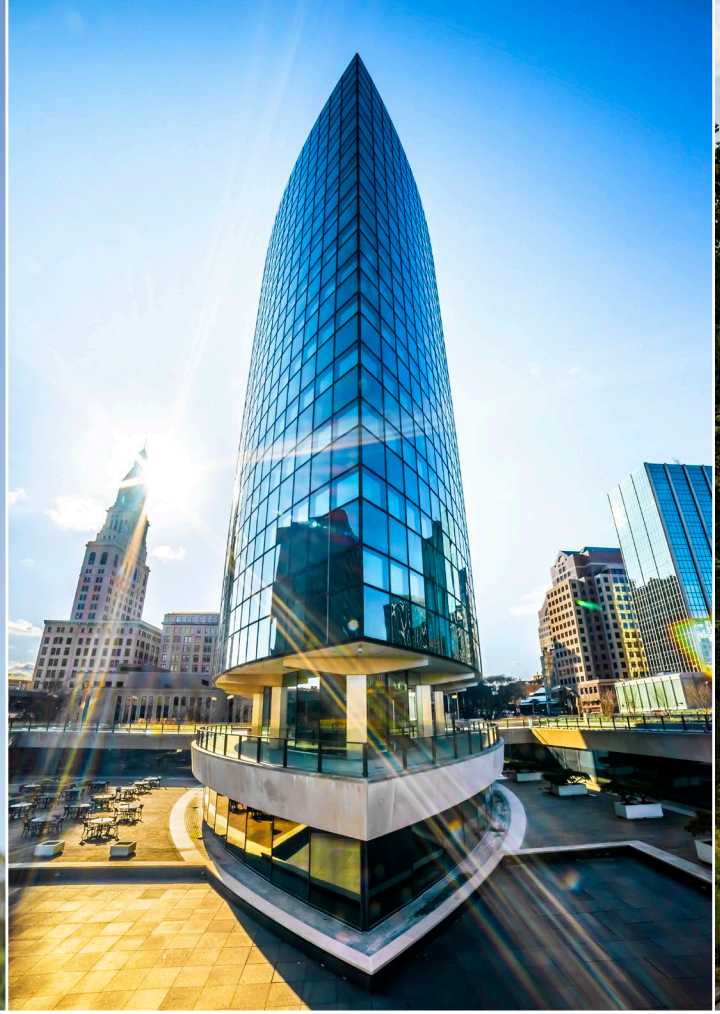
- Other Ethanol/Non-Woody Biomass, including biodiesel
- Woody Biomass/Cellulosic Biofuel
- Other Biofuels
- Nuclear Fuel

ALTERNATIVE TRANSPORTATION

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

[33] 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.

[34] "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.



energize CONNECTICUT CT℠

CONNECTICUT GREEN BANK

CONNECTICUT ENERGY & ENVIRONMENT

CNG · SCG · UI
Part of the Avangrid family

EVERSOURCE

www.energizect.com