



Joint Committee of the CT EE Board & CGB Board of Directors

Meeting Date

March 20, 2024



JOINT CGB/EEB COMMITTEE MEMBERS

Brenda Watson

Chair
Executive Director
North Hartford Partnership
(Green Bank Designee)

Hank Webster

Vice Chair
CT Department of Energy and
Environmental Protection (DEEP)
(Ex Officio)

John Harrity

Chair
CT Roundtable on Climate and Jobs
(Green Bank Designee)

John Viglione

Office of Consumer Counsel
(EEB Designee)

Melissa Kops

Project Manager, Architect
City of New Haven
Department of Engineering



AGENDA

Joint Committee of the CT Energy Efficiency Board and the Connecticut Green Bank Board of Directors

Online

March 20, 2024
1:30 pm – 3:30 pm

1. Call to Order
2. Public Comments – 10 minutes
 - a. Dandelion – Ground Source Heat Pumps
3. Review and Approval of Minutes for June 21, 2023 and December 20, 2023 – 5 minutes
4. Clean Energy Jobs Report – Update – 15 minutes
5. Plan Coordination – 20 minutes
 - a. Input to FY 2025 Connecticut Green Bank Comprehensive Plan – 5 minutes
 - b. Input to 2025 to 2027 Conservation and Load Management Plan – 15 minutes
6. Update on the 2024 Legislative Session – 10 minutes
7. Opportunities and Challenges – Healthy Housing – 15 minutes
8. Other Business – 15 minutes
 - a. Brief Update: C&I - Government
 - b. Brief Update: C&I – Small and Medium/Large Business
 - c. Brief Update: Residential – Single Family and Multi-Family
9. Public Comments
10. Adjourn

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RESOLUTIONS

Joint Committee of the CT Energy Efficiency Board and the Connecticut Green Bank Board of Directors

Online

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1:30 pm – 3:30 pm

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2. Public Comments – 10 minutes
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3. Review and Approval of Minutes for June 21, 2023 and December 20, 2023 – 5 minutes

Resolution #1

Motion to approve the meeting minutes of the Joint Committee for June 21, 2023 and December 20, 2023

4. Clean Energy Jobs Report – Update – 15 minutes
5. Plan Coordination – 20 minutes
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ANNOUNCEMENTS

- **Mute Microphone** – in order to prevent background noise that disturbs the meeting, if you aren't talking, please mute your microphone or phone.
- **Chat Box** – if you aren't being heard, please use the chat box to raise your hand and ask a question.
- **Recording Meeting** – we continue to record and post the board meetings.
- **State Your Name** – for those talking, please state your name for the record.



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smart energy choices

Joint Committee

Connecticut Energy Efficiency Board and the
Connecticut Green Bank Board of Directors

Online

March 20, 2024



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Agenda Item #1

Call to Order



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Agenda Item #2

Public Comments



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Agenda Item #3

Approval of Meeting Minutes for
June 21, 2023 and December 20, 2023

Resolution #1

Resolution #1

Motion to approve the meeting minutes of the Joint Committee for June 21, 2023 and December 20, 2023



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Agenda Item #4

Clean Energy Jobs Report (Draft)



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Agenda Item #5a

FY25 Comprehensive Plan of CT Green Bank

Connecticut Green Bank

Comprehensive Plan – Green Bonds US

■ Focused Implementation

- **Incentive Programs** – Energy Storage Solutions – residential (i.e., 439 projects totaling 3.3 MW – demand) and non-residential (i.e., 37 projects totaling 80.2 MW – interconnection) end-users
- **Financing Programs** – C-PACE (including resilience), SBEA, Solar PPA (+ Storage), and Solar MAP (launching “affordable housing”)
- **Environmental Infrastructure** – inclusion within flagship products, including Smart-E (i.e., climate adaptation and resilience and water) and C-PACE (i.e., resilience)

■ Inflation Reduction Act – Greenhouse Gas Reduction Fund

- **Solar for All** – DEEP lead, with focus on “affordable housing”
- **NCIF and CCIA** – (1) Green Infrastructure, (2) Green School Buses, (3) Green Resilience Hubs, (4) Green School Buildings, (5) Green Municipal and Commercial Buildings, (6) Green Homes, and (7) Supporting Statewide or Regional AMI



REFERENCES

<https://energystoragect.com/ess-performance-report/> (as of March 20, 2024)





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Agenda Item #5b

2025-2027 Conservation & Load Management Plan

2024 Plan Progress to Date



2024 Plan Update Savings & Benefits

Year	Budgets (\$000)			Annual Savings							Lifetime Savings	
	Electric	Natural Gas	Total	Electric (GWh)*	Peak (MW)**	Natural Gas (MMcf)****	Oil (gallons)	Propane (gallons)	Annual Savings Million (MMBtus)* **	Carbon Dioxide Emissions (tons)	Lifetime Benefit (\$000)	Lifetime Savings (MMBtus)***
2022	\$199,845	\$44,878	\$244,723	197	135	382	1,548,671	294,364	1.3	126,510	\$598,196	16.8
2023	\$188,826	\$54,782	\$243,608	165	133	426	1,413,720	341,362	1.2	116,907	\$546,413	15.6
2024	\$189,003	\$57,391	\$246,394	126	126	395	1,445,555	501,596	1.1	104,890	\$569,715	14.3
Total	\$577,674	\$157,051	\$734,725	489	393	1,202	4,407,946	1,137,323	3.7	348,307	\$1,714,823	46.7



Generates \$2.33 into CT's economy for every \$1 invested



Creates and supports 34,106 jobs annually in CT



Installed measures will result in 4.3 million tons of carbon dioxide emission reductions

Developing 2025-2027 Plan

- Schedule for 3-year plan development to be released by April EEB Meeting
- Holding several public input sessions throughout the spring and summer leading up to EEB votes
- Currently discussing themes and priorities for the next plan
 - Discussed at March EEB Meeting
 - Will be holding two public input sessions

Session 1

Tuesday, March 26, 2024 5:30PM

– 6:30PM EST

Virtual Only

[Meeting Link](#)

Meeting ID: [845 4236 2211](#)

Passcode: 351325

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Session 2

Wednesday, April 3, 2024

12:00PM – 1:00PM EST

Virtual Only

[Meeting Link](#)

Meeting ID: [845 4236 2211](#)

Passcode: 351325

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2025-2027 Potential Priorities

1

Expand DEI efforts

Evaluate customer and vendor engagement, including enrollment and program experience and payment processing

2

Decarbonization goals

Develop GHG PMI goals and focus audits and equipment recommendations to reduce GHGs

3

Building electrification readiness

Weatherization to prepare for electrification for Residential and C&I Portfolios

4

Expand electrification

Focus on MMBtu Savings and encourage measures beyond space heating, such as heat pump water heaters and electric cooking

5

Bundling energy efficiency with DER

Bundle solar / batteries with heat pumps to reduce electric costs

6

Coordination with federal funding and local energy policies

IRA funding, Building Performance Standards, Rental Energy Ordinances, other initiatives to make C&LM funds go further

2025-2027 Plan Timeline and Deliverables

Planning

(March – April)

- Develop priorities
- Develop program modifications
- Develop budgets
- Review evaluation / study findings

First Drafts

(May – July)

- Draft budgets
- Draft text
- Draft savings
- Draft Program Savings Document (PSD)

Final Drafts

(September - October)

- Final budgets
- Final text
- Final savings
- Final PSD

Public Input Sessions

(March – June)

Additional Drafts and Review

(July – September)

- Draft budgets
- Draft text
- Draft savings
- Draft PSD

Approval / Submission

(October – December)

- EEB Vote: Oct 9
- File: Nov 1
- DEEP hearings / interrogatories



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Agenda Item #6

Update of the 2024 Legislative Session

Legislation of Note (Heat Pumps/C&LM)

- **HB 5004:** "*Green Monster Bill*" - Section 17 as currently written directs CGB, DEEP & PURA to "develop and implement a plan for the installation of not less than three hundred ten thousand heat pumps for residential heating systems. Date not specified but US Climate Alliance pledge references 2030.
Public Hearing on 3/8/24. Anticipated JFS vote in Environment on 3/20/24.
- **HB 5439:** E&T legislation establishing a target of deploying 310,000 heat pumps in CT by 2030. Neither plan nor funding source is identified.
Public Hearing on 3/14/24. Anticipated JF vote in E&T on 3/21/24.
- **HB 5438:** E&T legislation which appropriates \$145 million dollars to DEEP, from the General Fund by June 30, 2025, for energy efficiency programs identified in the Conservation & Load Management Program.
Public Hearing on 3/14/24. Anticipated JF vote in E&T on 3/21/24.



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Agenda Item #7

Opportunities and Challenges

Healthy Housing

Solar PV + Heat Pumps + Battery Storage

Solar PV, Heat Pumps, and Battery Storage

EDC, Green Bank, and EEB Consultants

- **December 20, 2023** – Joint Committee, at the suggestion of EEB Consultants, asked EDCs and Green Bank to assess solar PV, heat pump, and more (e.g., storage) opportunity for residential market segment
- **January 26, 2024** – EEB Consultants, Green Bank, and EDCs met to discuss state and federal incentives for solar PV, heat pumps, and storage
- **March 11, 2024** – EEB Consultants, Green Bank, and EDCs met to discuss technology findings, questions for consideration, and next steps

Solar PV

Statistics from January 26, 2024

- **Residential Renewable Energy Solutions** – administered by EDCs, including:
 - ❖ State Incentives - Tariffs
 - ❑ Single Family (i.e., 1-4 units) or Affordable Housing (i.e., Tiers I-III)
 - ❑ Buy-All Tariff (\$0.3189/kWh) with adder of \$0.0275/kWh if located in distressed communities or \$0.0550/kWh for low-income households
 - ❑ Monthly Netting Tariff (i.e., net metering) with adders of \$0.0175/kWh if located in distressed communities or \$0.0350/kWh if low-income household
 - ❖ Federal Incentives – IRA
 - ❑ Investment Tax Credits – 30% with adders for TPO systems of 10% for “energy communities” (e.g., Bridgeport), and 10-20% for “low-income communities”. ITC can be between 30-60% for solar PV (+ storage)
 - ❑ Greenhouse Gas Reduction Fund – federal requirements (e.g., Davis Bacon, BABA)
 - ❑ Solar for All “Project SunBridge” allows for financing (e.g., Smart-E IRB, GBCS RFP, MFAH Solar + Storage PPA, RLF with CHFA) and funding (i.e., additional incentives for associated storage)
 - ❑ National Clean Investment Fund allows for financing “Green Homes” (e.g., Wx, Heat Pumps, Solar PV, battery storage, EV recharging stations)

Heat Pumps

Statistics from January 26, 2024

- **Conservation and Load Management Fund** – administered by EDCs, including:
 - ❖ State Incentives
 - ❑ \$750/ton for ASHP and \$1,500/ton for GSHP with project cap on rebate of \$30,000 – HES-IE customers can receive up to \$6,500/ton with project cap on rebate of \$25,000
 - ❖ Federal Incentives – IIJA and IRA
 - ❑ IIJA
 - ❑ Home Energy Rebates Program
 - ❑ Home Efficiency and Appliance Rebates Program
 - ❑ Others?
 - ❑ IRA
 - ❑ ITC – lesser of (a) up to 30% of installed cost, or (b) \$1,200 to \$2,000 (i.e., for heat pumps)
 - ❖ Other Details – 68% of LMI (i.e., <80% of SMI) single family homes are on delivered fuels (i.e., heating oil, propane) or electric resistant heating

Battery Storage

Statistics from January 26, 2024

- **Energy Storage Solutions** – co-administered by EDCs and Green Bank, including:
 - ❖ State Incentives
 - ❑ Upfront Incentive of \$250, \$450, or \$600 per kWh for non-LMI, located in distressed community, or low-income, respectively, for passive dispatch
 - ❑ Can receive up to \$16,000
 - ❑ Additional incentive of 50% if located on “grid edge”
 - ❑ Performance Incentive of \$225/kW for Years 1-5 and \$130/kW for Years 6-10, for active dispatch
 - ❖ Federal Incentives – IRA
 - ❑ Investment Tax Credits – 30% with adders for TPO systems of 10% for “energy communities” (e.g., Bridgeport), and 10-20% for “low-income communities” if paired with solar PV. ITC can be between 30-60% for solar PV + storage
 - ❑ Greenhouse Gas Reduction Fund
 - ❑ Solar for All “Project SunBridge” allows for financing (e.g., Smart-E IRB, GBCS RFP, MFAH Solar + Storage PPA) and funding (i.e., additional incentives for associated storage)
 - ❑ National Clean investment Fund allows for financing “Green Homes” (e.g., Wx, Heat Pumps, Solar PV, battery storage, EV recharging stations)

Some Questions for Consideration

- What is the overall market potential?
 - How do we capture electrification (e.g., higher energy burden)? Better to focus on delivered fuels.
- What public policy objectives are we advancing (e.g., 40% Class I RPS by 2030, Wx 80% of household units by 2030, 1000 MW battery storage by 2030)?
 - ❖ If HB 5004 (i.e., “Green Monster”) passed, including 310,000 heat pumps deployed by 2030 (i.e., USCA commitment including Governor Lamont) – is this households or # of heat pumps?
 - ❖ Should we include EV and EV infrastructure within this portfolio?
- How do we prioritize? What is our target market:
 - ❖ Single Family (i.e., 1-4 units) vs. Multifamily (i.e. 5+ units)
 - ❖ Income – state definitions of distressed communities, low-income (i.e., SMI vs. AMI), and vulnerable communities vs. federal definitions of CEJST, EJ Screen, and/or other
 - ❖ Delivered fuels, electric resistant heating, grid edge, other
 - ❖ New construction vs. retrofits
- What is timing of federal formula and competitive grant opportunities?
- What about supply chain issues (e.g., inflation impacts)? Labor shortages (e.g., increase in customer demand)?

Next Steps

1. Pursue joint effort between CT Green Bank and EDCs within Comprehensive Plan for FY25 and C&LM Plan for FY25-FY27, respectively, through Joint Committee
2. In relation to DEEP:
 - Connect on statistics, questions for consideration, and next steps
 - Align with DEEP “Green Storm” planning activities
3. Engagement with Governance, including
 - Present update to Joint Committee
 - Present to Residential Committee of EEB (when time appropriate)
 - Present to EEB and BOD of Green Bank (when time appropriate)
4. Various “to-do’s” including:
 - Identifying priority areas of focus (e.g., delivered fuels, electric resistant heating, grid edge, income, single family vs. multifamily)
 - Understanding existing (or future) public policies to inform priority areas of focus
 - Assessing existing financing products for residential single and multifamily
 - Understanding definitions around use of federal funding (e.g., IIJA, IRA) in terms of income (e.g., state of SMI, AMI, vulnerable communities vs. federal of CEJST and EJ Screen)
 - Understanding of federal requirements (e.g., Davis Bacon, Build America Buy America) around use of federal funding (e.g., IIJA, IRA)



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Agenda Item #8a and #8b

Other Business

Brief Update: C&I – Government & Small, Medium,
and Large Business

2024 C&I Program Changes



HVAC

- Reduce air source HP rebates from \$2,000/ton to \$1,500/ton
- Reduced variable refrigerant flow HP rebates from \$3,000/ton to \$2,100/ton

Retrofit

- Reduce standard (non-controlled) LED midstream lighting incentives
- Reduce standard LED lighting incentives in Energy Opportunities program
- Develop C&I weatherization tool
- Explore offering Deep Energy Retrofit program

2024 Residential and C&I Program Changes



HVAC

- *Eliminate \$250/ton midstream heat pump instant rebate*
- *Discontinue natural gas combustion equipment incentives 12/31/2024 (Eversource only)*

Active Demand Response

- *Transition existing customers/direct new customers to PURA's EV Charging Program (Eversource)*
 - *Direct new battery storage customers to PURA's Electric Storage Program (Eversource)*
- Closed ConnectedSolutions to new enrollments (12/01/23)
- All C&I batteries eligible for transfer
 - 95% of residential batteries currently ineligible for transfer as battery partners/OEMs not participating in ESS due to certain program aspects (e.g., lack of partner-led enrollment options for active only participation, capacity rights ownership, telemetry requirements)



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Agenda Item #8c

Other Business

Brief Update: Residential – Single Family and
Multifamily

2024 Residential Program Changes



Home Energy Solutions / HES-Income Eligible

- Conditionally expand HES-IE qualifications (higher of 60% SMI or 80% AMI)
- Deploy income level qualification and certification application platform for low- and moderate-income households
- Implement measure cap for HP incentives in HES-IE
 - \$6,500/ton
 - \$25K/unit (1 unit bldg.) \$15K/unit (2-to-4-unit bldg.)
- Increase HES co-payment from \$50 to \$75
- Change past participation rules for HES & HES-IE from 3 to 6 years (may change to 10 years in 2024)

HVAC and Retail Products

- Reduce air source HP rebates from \$1,000/ton to \$750/ton
- No change to ground source HP rebates (\$1,500/ton)



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Agenda Item #9

Public Comments



Empowering you to make
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Agenda Item #10

Adjourn

[bw] RESEARCH
PARTNERSHIP

2023

CONNECTICUT

Clean Energy Industry Report

March 20, 2024



AGENDA

1

REPORT
OVERVIEW

2

METHODOLOGY

3

KEY
FINDINGS

REPORT OVERVIEW

The 4th Annual Connecticut Clean Energy Industry report:

- Measures, characterizes, and analyzes clean energy and traditional energy employment trends across technology sectors
- Explores the economic impact of clean energy jobs on the state economy

METHODOLOGY

Data from the 2023 U.S. Energy and Employment Report (USEER) based on surveys administered by phone and web.

618

Business
Establishments
in Connecticut

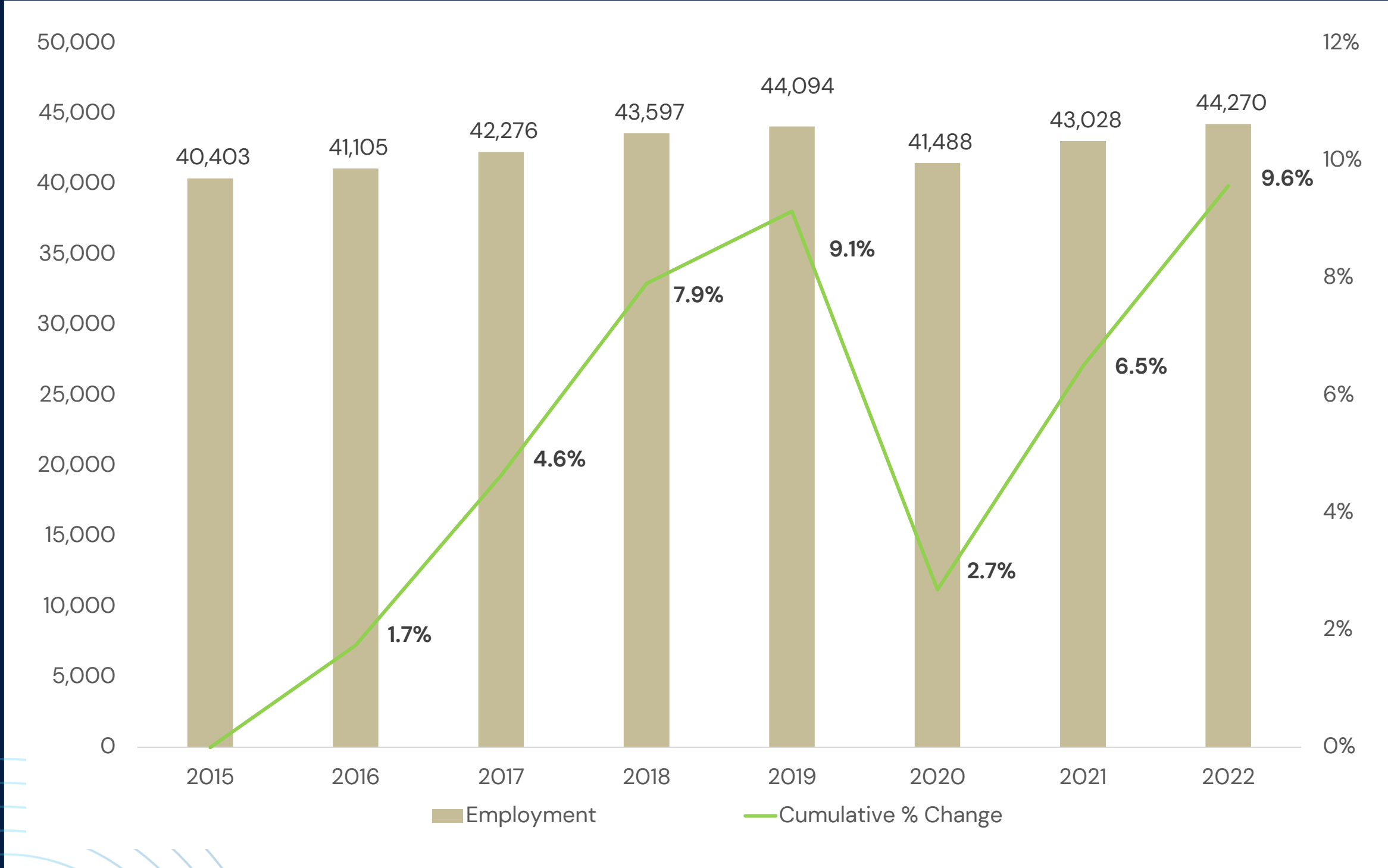
+/- 3.91%

Margin of Error with a
95% Confidence
Interval

KEY FINDINGS

- **Connecticut maintained its commitment** to leading the nation in its efforts to support clean energy in 2022, via regulatory initiatives and significant investments in offshore wind.
- **Clean energy employment has recovered** from pandemic-induced losses.
- However, high levels of hiring difficulties for clean energy workers may limit future growth potential absent **additional investments in workforce development**.
- Policymakers' efforts to foster innovation, manufacturing, and services are paying off, but **additional investments in incentives** should be considered to help bolster deployment.

Overall Clean Energy Employment in Connecticut



In 2022, clean energy jobs represented **over 2%** of all jobs in the state.

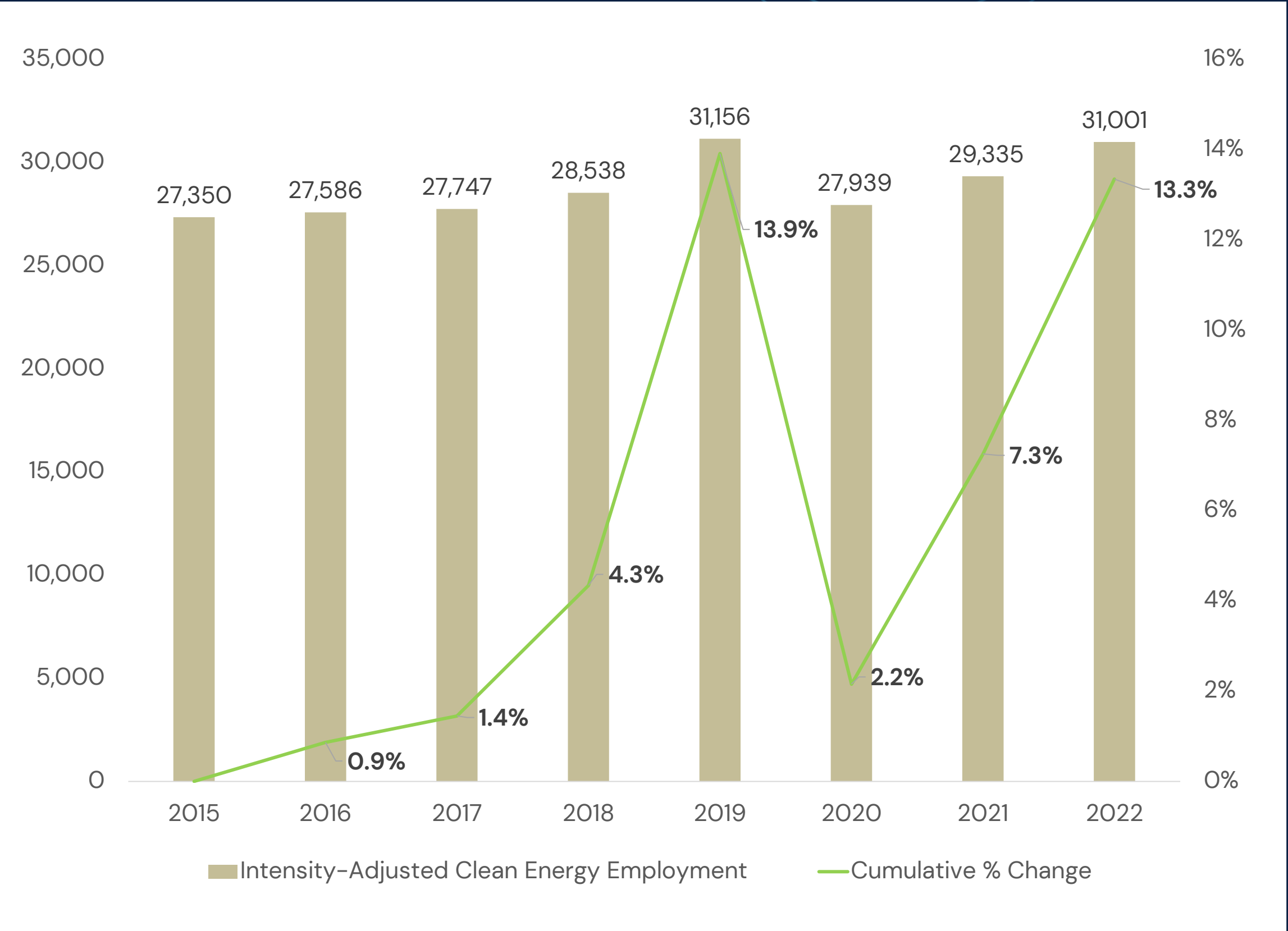
44,270

Clean Energy Jobs in Connecticut

+2.9%

Net Clean Energy Jobs Gained Y-o-Y

Full-Time Equivalent Clean Energy Jobs



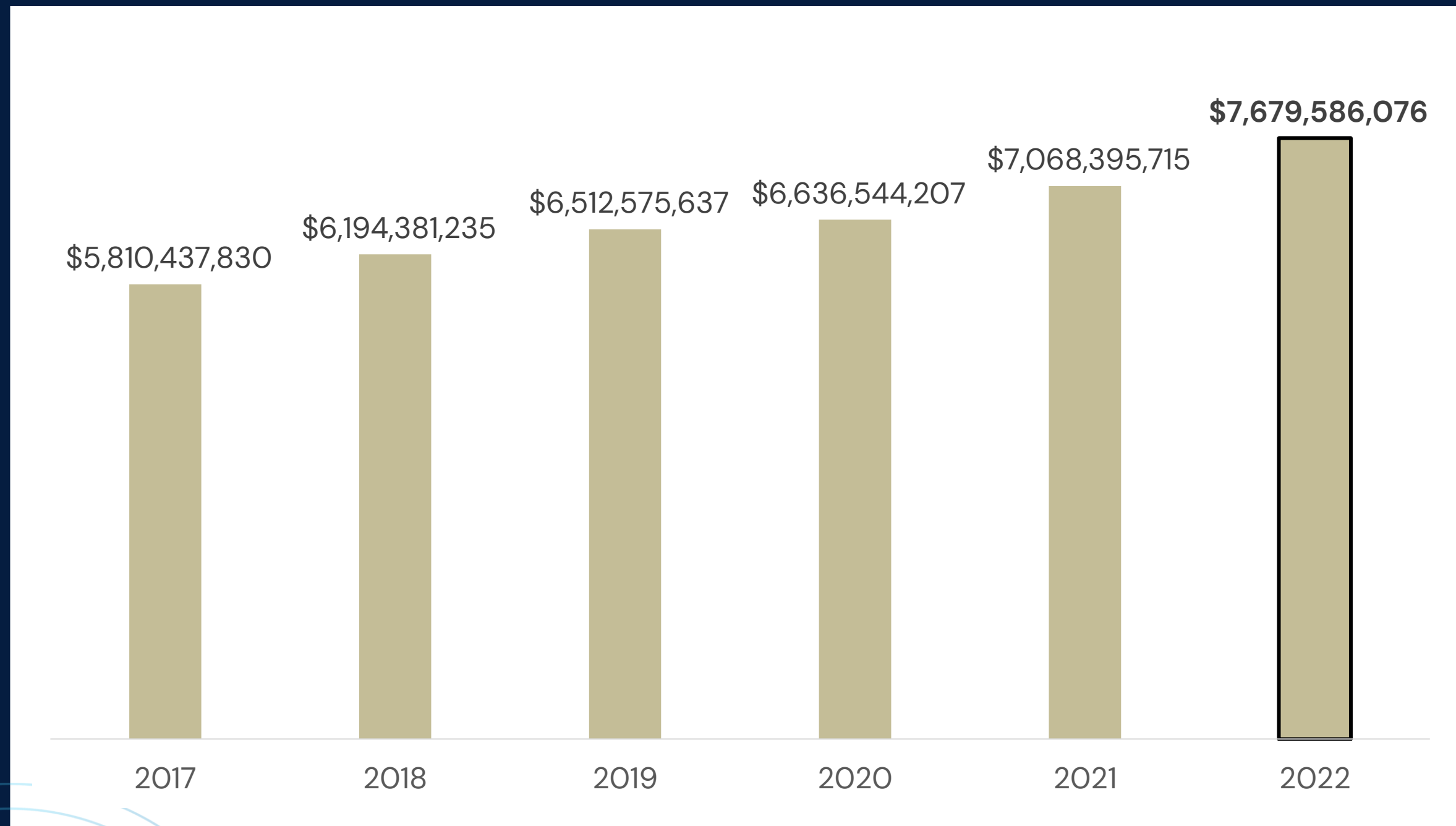
Clean energy workers are not just growing in number, but also in the **amount of time spent on clean energy activities.**

In 2022, there were approximately **31,000** full-time equivalent clean energy jobs in the state.

+1,700 | **+5.7%**

Y-o-Y Growth
in Full-Time Equivalent Clean Energy
Jobs in CT (2022)

Clean Energy Gross Regional Product (GRP)



Clean Energy accounted for **3.1%** of the state's total GRP in 2022.

**\$7.68
Billion**

Clean Energy GRP
(2022)

+8.5%

Y-o-Y Increase
(2022)

Clean Energy GRP by Value Chain, 2021-2022

	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%	

All clean energy value chain segments other than Construction saw **GRP growth** between 2021 and 2022.

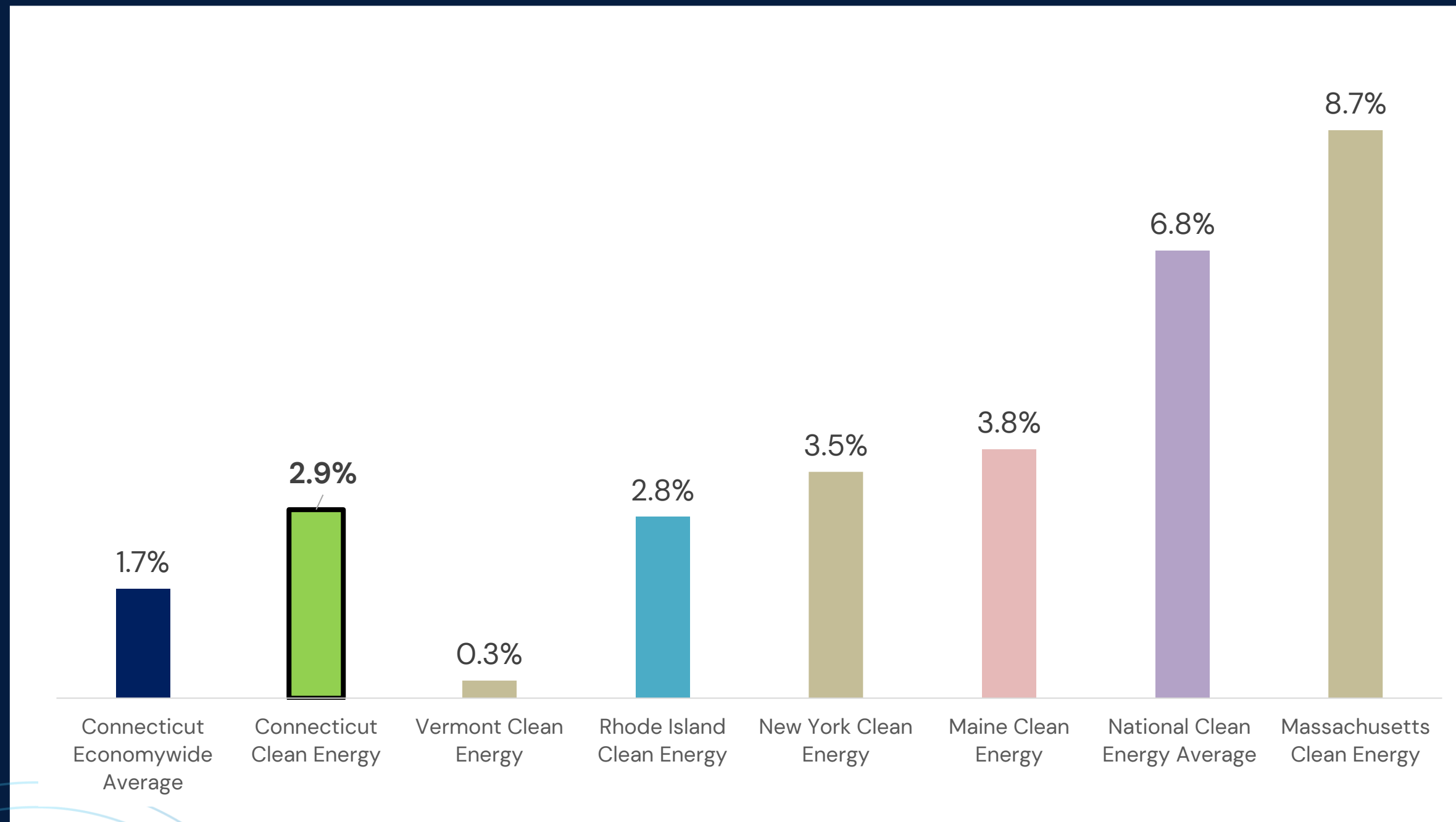
-9.7%

Y-o-Y Decrease
in Construction
Clean Energy
GRP (2022)

+128.5%

Y-o-Y Increase in
Other Services
Clean Energy GRP
(2022)

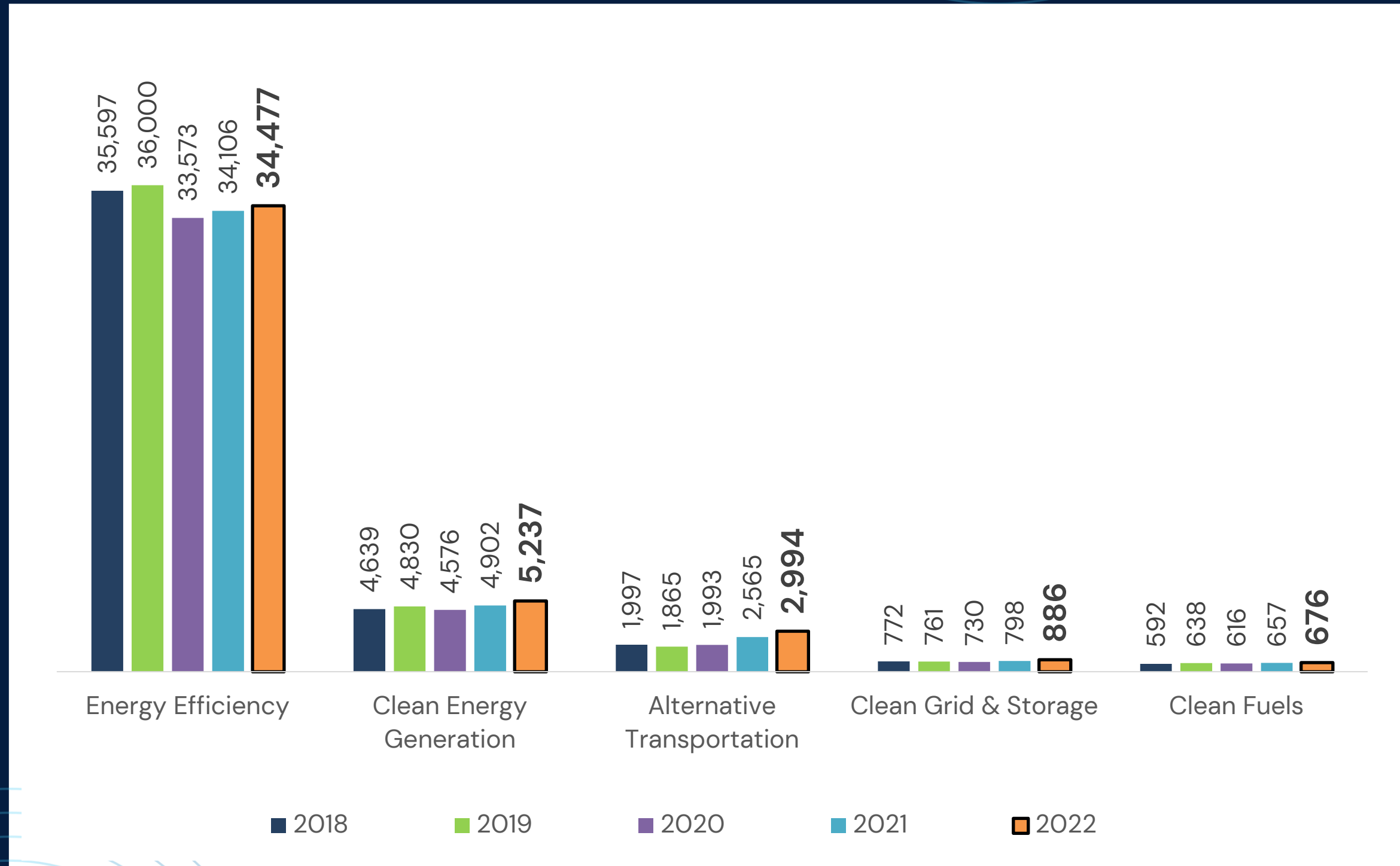
Clean Energy Employment by Region, 2022



Connecticut's clean energy employment grew **faster than the statewide average** (2.9% versus 1.7%), but **slower than the national clean energy average** (6.8%).

Regional clean energy employment growth **varied by state**, with growth in Massachusetts's clean energy jobs significantly outpacing growth in Connecticut.

Clean Energy Employment by Technology



The **Alternative Transportation** sector continued to lead the way in job growth, remaining the **fastest-growing technology sector** for clean energy jobs in the state.

+17%

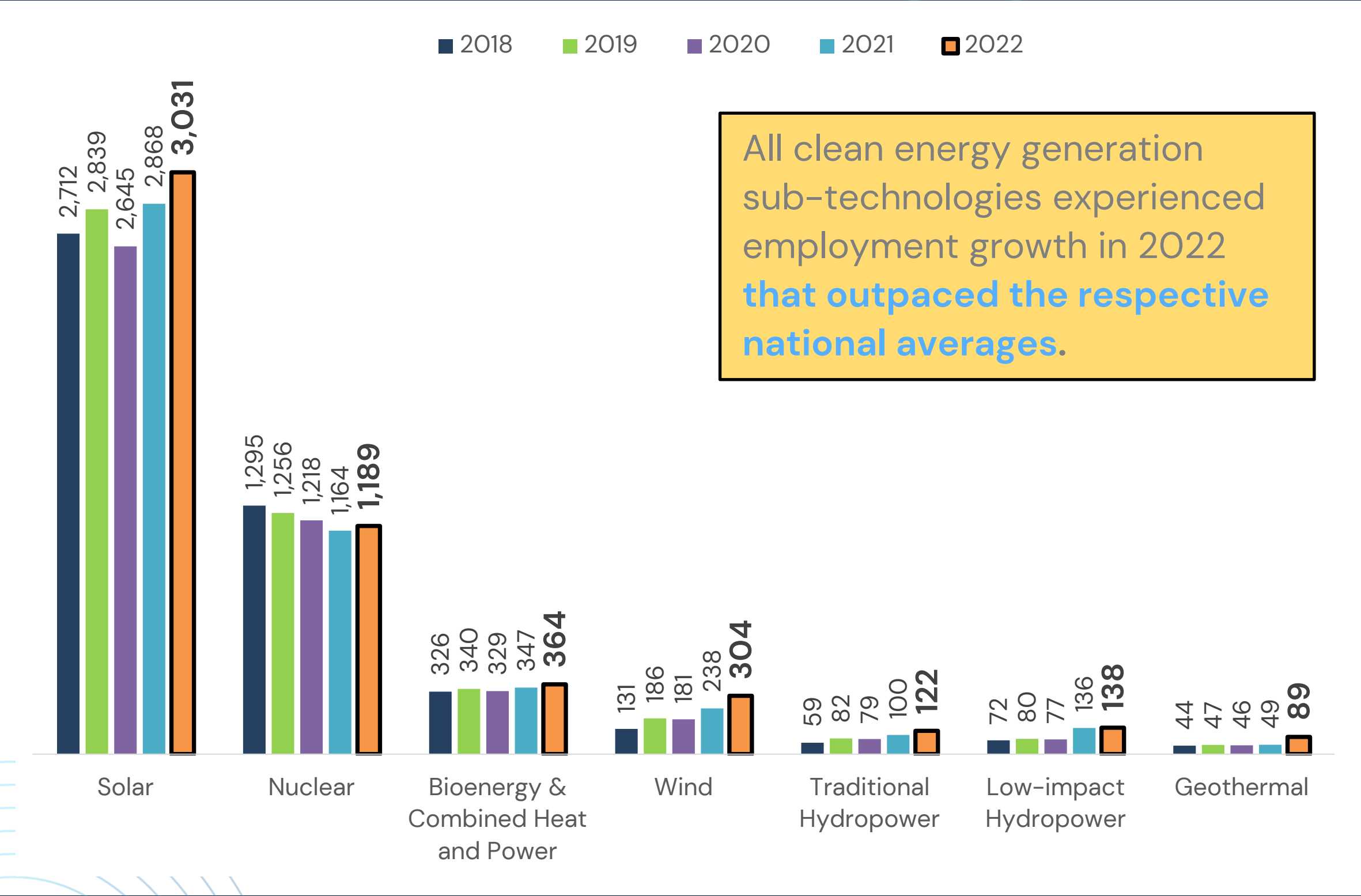
Y-o-Y Growth in
Alternative
Transportation
Jobs

429

Alternative
Transportation
Jobs Added in
2021

Jobs in the state's Alternative Transportation sector **grew faster than the national average** for this sector (15%) over the same period.

Clean Energy Generation Employment by Technology



All clean energy generation sub-technologies experienced employment growth in 2022 that outpaced the respective national averages.

Solar remains the largest clean energy generation sub-technology employer in the state.

+5.7%

Y-o-Y Growth in Solar Jobs (2022)

3,031

Solar Jobs in CT (2022)

Geothermal jobs grew the most rapidly but accounted for only a small share of total clean energy generation jobs.

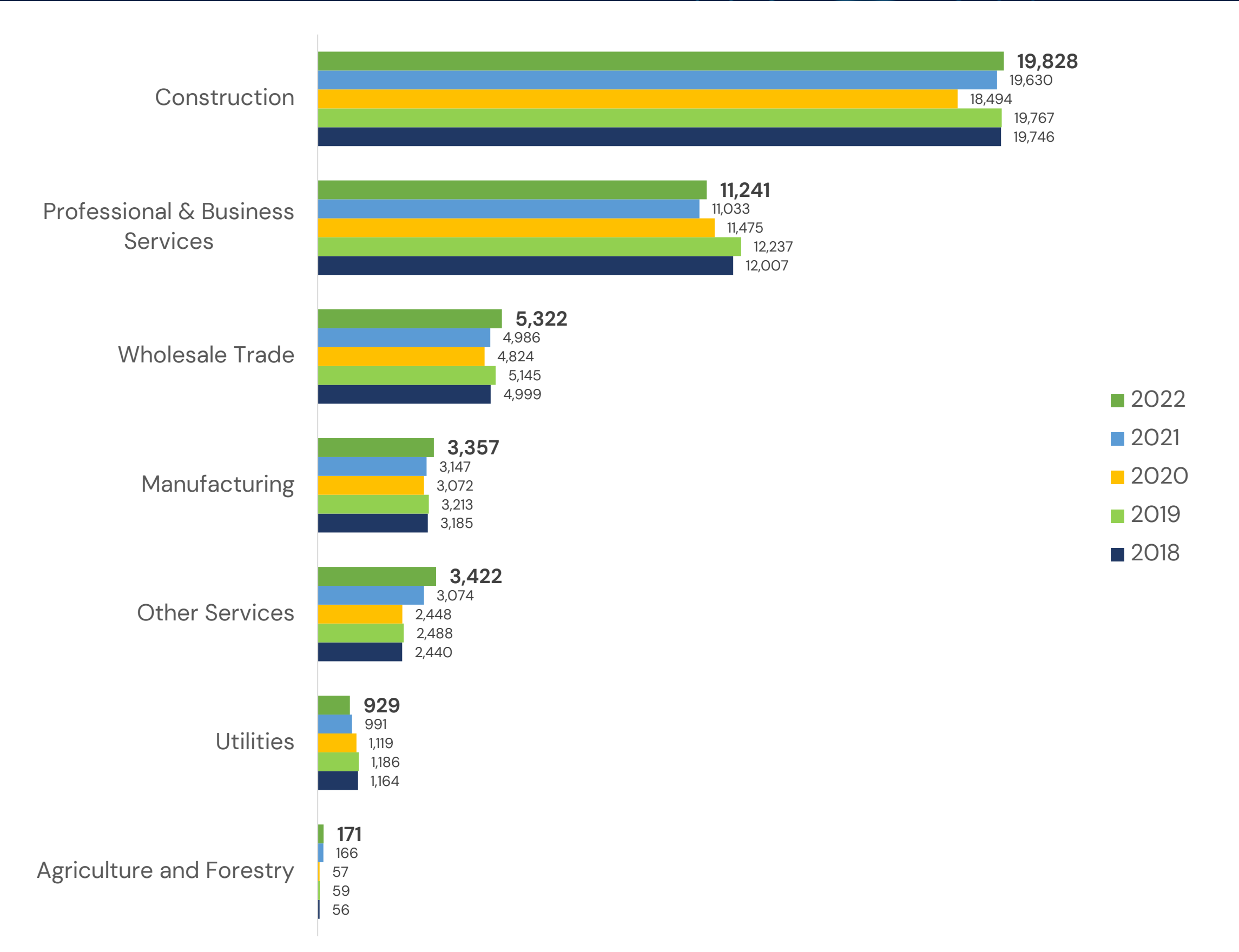
+82.2%

Y-o-Y Growth in Geothermal Jobs (2022)

+40

Geothermal Jobs Added in CT (2022)

Employment Growth by Value Chain



Barring Utilities, all clean energy value chain segments saw **employment growth** in 2022.

<p>+11.3%</p> <p>Y-o-Y Growth in Other Services Jobs</p>	<p>348</p> <p>Other Services Jobs Added in 2021</p>
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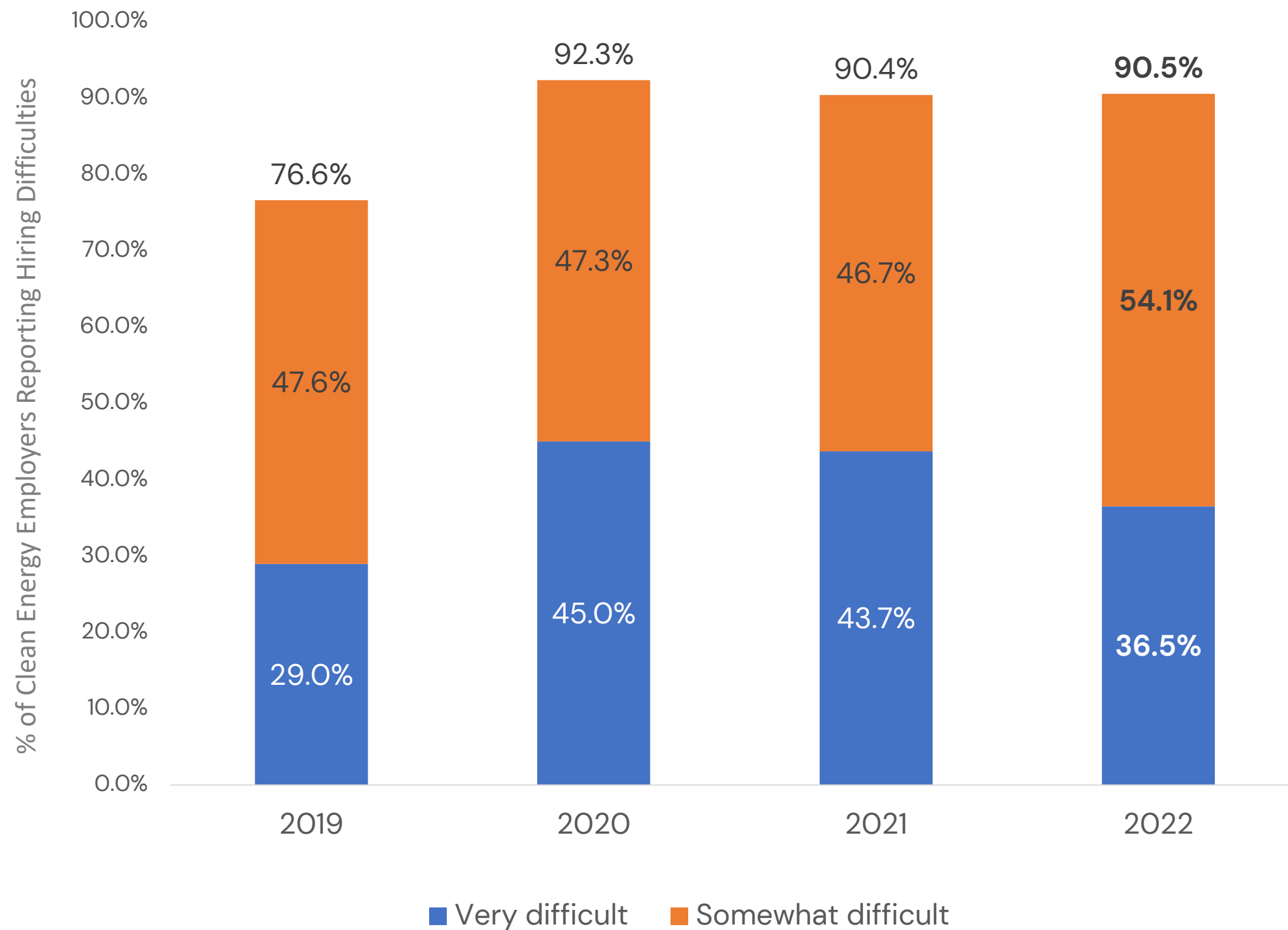
The Utilities value chain segment shed **62 jobs** in 2022, likely due to the closure of a Hartford trash incinerator plant in July 2022.

Workforce Demographics, 2022

	Connecticut Clean Energy	Connecticut Overall	U.S. Clean Energy	U.S. Overall
Women	27%	51%	28%	47%
Minorities/ Mixed-Race	21%	22%	27%	23%
Veterans	9%	4%	10%	5%
55 and Over	13%	28%	14%	24%

Connecticut's clean energy workforce was **less diverse** than Connecticut's overall workforce, the nation's overall workforce, and the nation's clean energy workforce.

Clean Energy Hiring Difficulties



Nearly all the state's clean energy employers reported hiring difficulties in 2022.

9 in 10

Clean Energy Employers in CT Reported Hiring Difficulties

52%

Cited Competition/ Small Applicant Pool

The most difficult positions to fill were **technicians** or **mechanical support positions**, according to nearly one-third of employers reporting hiring difficulties.

[bw] RESEARCH
PARTNERSHIP

2023

CONNECTICUT

Clean Energy Industry Report

March 20, 2024





Heat Without Fire



Agenda

1. Geothermal heat pump benefits to CT ratepayers
2. Creating Conditions for Geothermal Heat Pump Market Success
3. Discussion



1 Geothermal Benefits for CT ratepayers



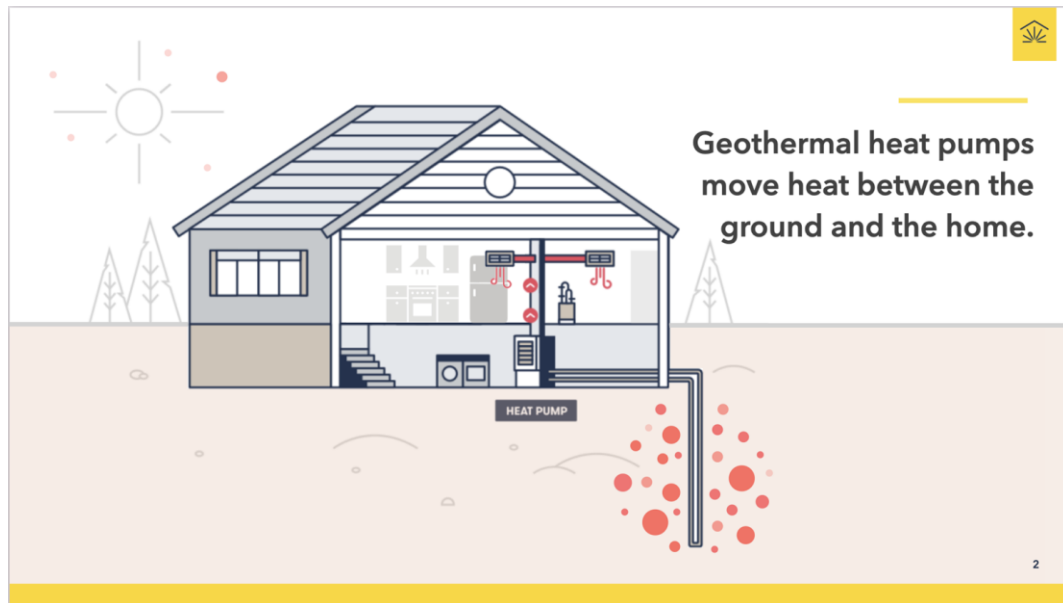
Geothermal (GSHP) are a 'whole home' solution

GSHPs displace heating fuel and deliver TRM assumed savings

- 55-80% less energy for heating*
- 25% less energy for cooling
- 65-75% less GHG emissions
- 25-55% savings on energy bills

55% for ASHP

75% for fuels and electric resistance





Geothermal heat pumps - grid benefits in CT

600 Dandelion Geothermal systems in CT

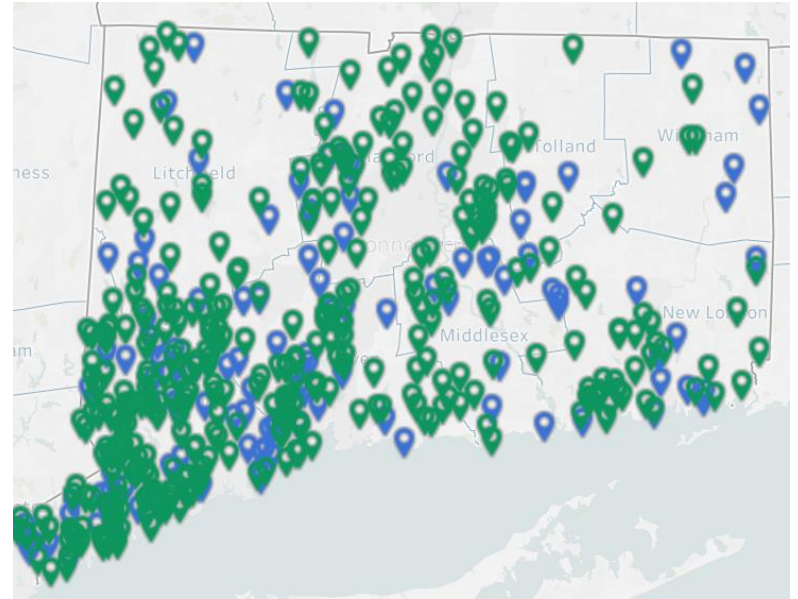
- 430 installed systems
- 170 systems being installed (under contract)

Each system shaves summer and winter peaks:

- Summer peak 3-4 kW lower than A/C
- Winter peak 3-6 kW lower than ccASHP

In total, Dandelion geothermal peak shaving in CT

- 1.8-2.4 MW summer
- 1.8-3.6 MW winter



EnergizeCT EE rebates are based on MMbtu savings (kWh and therm). Rebates do not account for the value of geothermal heat pumps relative to standard A/C and ccASHP for peak shaving.



DOE: “Geothermal heat pumps are a grid mgmt tool”

U.S. Department of Energy (DOE) [study](#) released last week.

Widespread deployment of GSHPs:

- “...creates value for the grid by reducing the need for generation capacity, storage, and transmission compared to other pathways”
- “GHPs could improve power-grid reliability and provide benefits to all electricity consumers...”
- \$1Trillion in savings for electricity grid services
- \$19 billion per year in consumer heating bill savings
- 11%-13% less electricity generation needed
- 33%-38% less electricity transmission expansion needed
- 24,500-43,500 miles of transmission that can be avoided



2 Market conditions for GSHP success in CT



GSHP success in CT - Rebate Amounts

EnergizeCT rebates are critical to the value proposition for customers putting their own capital into significant clean energy investment.

- MA is \$15,000 'whole home' or \$2,000/ton 'partial home'
- ConEd is \$35,000/\$45,000 'whole home'
- Other NY utilities are \$1,500 - \$2,000/ton
- **Recommendation:** Maintain \$1,500/ton, or return to \$2,000/ton, for multiple years.
- **Recommendation:** Prioritize whole home solutions with valuable rebate budget
- **Recommendation:** Allocate a significant % of rebate budget to GSHP (25%)



GSHP success in CT - Rebate Stability

EnergizeCT rebate program should provide market stability to customers and contractors for projects with long-lead times for installation.

- Customers and contractors are counting on rebates from when a contract is signed.

Geothermal requires drilling borehole, trenching to home, & heat pump installation.

- Requires building permit and drilling permit.
- 6-15 months
- Many projects will span calendar years

Air Source heat pumps require only heat pump installation

- Only building permit
- 3 months

Recommendation: Upfront budget set-aside for rebates - ConEd started this in January 2023.



GSHP success in CT - Financing - Max loan amounts and APRs

Even after rebates and tax credits, geothermal heat pump customers are usually financing their project to pay install costs over time with their energy bill savings.

Public loan programs are critical to making projects possible:

Maximum loan amounts and APRs:

- \$15,000 at 0.99% EnergizeCT heat loan
- \$50,000 at 6.49-7.49% Smart-e loan (three CT credit unions)
- \$50,000 at 0% MassSave (tens of local private sector lenders)
 - **Recommendation:** Transition Smart-e loan to 0% APR.
 - **Recommendation:** Increase EnergizeCT heat loan to \$50,000
 - **Recommendation:** Transition EnergizeCT heat loan to leverage private sector
 - **Recommendation:** Set dates for any 'special APR' loans. Open ended offers are VERY difficult to work with



GSHP success in CT - Financing - Loan disbursement terms

Even after rebates and tax credits, geothermal heat pump customers are usually financing their project to pay install costs over time with their energy bill savings.

Public loan programs are critical to making projects possible:

Loan disbursement terms are a KEY determinant of whether contractors can work with a loan program:

- GSHP project require 6-15 months
- Much longer than ASHP and solar
- Loans with payment terms upon project completion cause major issues
 - EnergizeCT loan currently provides 100% of loan disbursement after project install
- Contractors are fronting \$ for the length of the project
- **Positive Change:** Smart-e loan for GSHP recently changed terms to 3 x $\frac{1}{3}$ payments
- **Recommendation:** Change EnergizeCT Heat Loan payment terms to 2 x $\frac{1}{2}$ or 3 x $\frac{1}{3}$.



GSHP success in CT - Incentivizing GSHP grid benefits

EnergizeCT currently incentivizes geothermal heat pumps based on energy savings (energy efficiency), but not for the peak load shaving characteristics.

Peak load shaving is valuable, which is why CT has state-wide goals for energy storage and incentivizing home battery installations:

- 1,000 MW of Energy battery storage by 2030
- \$200 - \$400/kWh customer incentives
- Up to \$7,500 per household for installing a home battery
- **Recommendation:** EnergizeCT should create an incentive for GSHP that recognizes the peak shaving benefits, along with the benefits of decreased need for building new grid infrastructure and new generation capacity relative to electrifying with ASHP.



GSHP success in CT - Tax credits

New York and South Carolina provide individual tax credits to homeowners who install geothermal heat pumps

- NY is 25% of project cost, capped at \$5,000
- SC is 25% of project cost, capped at 50% of tax liability, but can carry-forward
- **Recommendation:** CT create geothermal tax credits for individuals and businesses



GSHP success in CT - Recommendations

Rebates

- Maintain \$1,500/ton, or return to \$2,000/ton, for multiple years.
- Prioritize whole home solutions with valuable rebate budget
- Allocate a significant % of rebate budget to GSHP (25%)
- Set aside rebate budget upfront for GSHP rebates when customers sign contracts for installation - ConEd started this in January 2023.

Financing:

- Transition Smart-e loan to 0% APR.
- Increase EnergizeCT heat loan max to \$50,000
- Transition EnergizeCT heat loan to leverage private sector
- Change EnergizeCT Heat Loan payment terms to 2 x ½ or 3 x ⅓.

Grid benefits of GSHP:

- EnergizeCT/CT Green Bank should create an incentive for GSHP that recognizes the peak shaving benefits, along with the benefits of decreased need for building new grid infrastructure and new generation capacity relative to electrifying with ASHP.

Tax Credit:

- CT create geothermal tax credits for individuals and businesses

3 Discussion

Heather Deese
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Draft MINUTES

Joint Committee of the CT Energy Efficiency Board and the Connecticut Green Bank Board of Directors

Wednesday, June 21, 2023
1:30 - 3:00 p.m.

In Attendance

Voting Members: John Harrity, Melissa Kops, Brenda Watson, Hank Webster (DEEP)

Non-Voting Members: Ron Araujo, Brian Farnen, Bryan Garcia, Lonnie Reed

Members Absent: John Viglione

Others: James Desantos, Alex Kovtunenکو, Cheryl Lumpkin, Larry Rush, Ariel Schneider, Stacy Sherwood (Energy Futures Group), Patrice Gillespie, Mike Weissmann, George Lawrence, Gannon Long, , Leigh Michael (ILLUME Advising), Douglas Presley (Dandelion Energy)

Unnamed Callers:

1. Call to Order
 - Brenda Watson called the meeting to order at 1:34 pm.
2. Public Comments
 - None
3. Review and approval of Meeting Minutes from the December 21, 2022 meeting.

Resolution #1

Motion to approve the meeting minutes of the Joint Committee for December 21, 2022.

Upon a motion made by Lonnie Reed and seconded by Brenda Watson, the Joint Committee voted to approve Resolution 1. None opposed and Hank Webster abstained. Motion approved unanimously.

4. Update on the 2023 Legislative Session
 - Hank Webster summarized some of the updates to the bills proposed, passed, and not passed in the 2023 Legislative Session so far. James Desantos and Brian Farnen provided additional information as well. Melissa Kops added that SB 979 had a stretch code which was removed in Committee.

- John Harrity expressed his disappointment in the session due to the lack of support for climate change initiatives.
- Melissa Kops asked if there was a strategy or means to better support the climate change initiatives both as members of the committee and as individuals. She also asked for clarification about the process to craft and propose legislation. Bryan Garcia responded with the general timelines for the Joint Committee and policy regarding support for legislative proposals. Hank Webster commented that it always seems to come down to education of legislators. Lonnie Reed added that a “real world autopsy” of why a bill failed may be of greater benefit right now. The group discussed it further.

5. CL&M Plan and Green Bank Comprehensive Plan – Reviews and Input

a. FY24 Green Bank Comprehensive Plan

- Bryan Garcia summarized the progress to the Comprehensive Plan to be presented on July 21, 2023. He highlighted the sections on focused implementation, the Inflation Reduction Act, and governance. He reviewed details of the Greenhouse Gas Reduction Fund as a top priority for the Green Bank. He also noted that the Green Bank staff presented a “Dream Big” strategy to the Board of the Green Bank, which received additional staffing support to achieve greater impact.
 - Brenda Watson asked about the commitment to low- and moderate-income communities and disadvantaged communities as part of the mission of the Green Bank. Bryan Garcia responded with a detailed history of how the Green Bank attained this position and that it has been a gradual evolution in commitment.

b. CY24 CL&M

- Stacy Sherwood gave an update to the CL&M Plan which includes a couple filings and awaiting determinations on those filings. The determinations are expected from DEEP soon. The 2024 Plan Update process will begin at the Annual Planning Meeting held on June 28, 2023 for filing in November 2023. She reviewed the timeline for the next few months.
 - Brenda Watson asked if there has been any efforts to incorporate water efficiency into the Energy Efficiency portion of the plan in terms of reduction measures. Ron Araujo responded that presently there are only water conservation measures that save energy, but there has not been movement beyond that. There hasn't been efforts to incorporate measures that save water but not energy and he commented on the challenges as to why.

6. Opportunities and Challenges

a. Healthy Housing

i. LIHEAP

- Bryan Garcia provided context to the Healthy Housing initiative and history. Brenda Watson summarized the key points of the ongoing discussion about the Healthy Housing initiative and how LIHEAP could be connected, especially to fund cooling measures.
 - Melissa Kops expressed her support for the concept and commented her understanding of how LIHEAP funds are used. The group discussed what possibilities are available to utilize and potential challenges.
 - Brenda Watson posed the discussion of how to define Healthy Housing so that programs and funding can remain on-track and focused. Melissa Kops questioned if there is an existing definition and examined options for how broad or narrow the definition could be if there isn't one already. The group discussed possibilities further.

ii. Inflation Reduction Act

- Alex Kovtunenکو summarized the key updates to the Inflation Reduction Act which could benefit multifamily and affordable housing which includes the Section 48 Investment Tax Credit adders. Bryan Garcia added that pursuing these efforts are part of the Dream Big initiative of the Green Bank. Mackey Dykes summarized the Green Bank's efforts in coordination with other organizations to provide recommendations to PURA regarding the implementation of affordable housing participating in the residential solar program and other relevant points to those efforts.

7. Other Business

a. Research and Development

i. Clean Energy Jobs Study

- Bryan Garcia summarized an effort to the Clean Energy Jobs Report, including the completion of the 2022 report, some of its findings, and progress to the 2023 report. He also highlighted the importance of the mentality to not just look back but also to plan ahead.
 - Hank Webster stated that a first step may be to discuss details with OWS as they work on a similar assessment. As well, examining any similar reports published by neighboring states.
 - Melissa Kops commented that one other element that may need to be identified for the report is that the funding can support the workforce, which should be hand in hand with the energy efficiency goals. Ron Araujo agreed with Melissa Kops' suggestion as one of the pitfalls of the ARRA funding was the boom-and-bust nature of the funding. Creating something sustainable and long term with consistent funding will be key.

ii. Heat Pump – Marketing Assessment

- Bryan Garcia provided some context to the focus on heat pumps and John Harray summarized the need to developing a marketing assessment for ground heat pumps due to their high cost for customers, and whether they need to be so costly. Brenda Watson agreed that a study is needed.
 - Bryan Garcia asked Ron Araujo about for the next meeting doing a section on heat pumps. Brenda Watson added that some states are using LIHEAP funding to install heat pumps in their home system repair-replacement programs. Ron Araujo said he liked the idea to use LIHEAP funding and responded to Bryan Garcia that there can be preliminary information gathered to begin examining.
 - Melissa Kops suggested investigating bulk purchasing and other ideas to make it more cost efficient. Bryan Garcia and Ron Araujo discussed possibilities to reduce hard costs versus soft costs.

b. Other Business

- John Harray expressed his concern about the issues facing off-shore wind efforts and that the solar farm in East Windsor, CT is encountering opposition due to noise pollution.

8. Public Comments

- None.

9. Adjourn

Brenda Watson adjourned the Joint Committee Meeting at 3:14 pm.

Respectfully submitted,

Brenda Watson, Chairperson

DRAFT



Draft MINUTES

Joint Committee of the CT Energy Efficiency Board and the Connecticut Green Bank Board of Directors

Wednesday, December 20, 2023

1:30 - 3:30 p.m.

In Attendance

Voting Members: John Harrity, Brenda Watson,

Non-Voting Members: Stephen Bruno, Bert Hunter, Bryan Garcia

Members Absent: Melissa Kops, John Viglione, Hank Webster (DEEP)

Others: Ron Araujo, Sergio Carrillo, James Desantos, Mackey Dykes, Richard Faesy, Brian Farnen, George Lawrence, Cheryl Lumpkin, Ariel Schneider

Unnamed Callers:

1. Call to Order
 - Brenda Watson called the meeting to order at 1:43 pm.
2. Public Comments
 - None
3. Review and approval of Meeting Minutes from the June 21, 2023 meeting.

Resolution #1

Motion to approve the meeting minutes of the Joint Committee for June 21, 2023.

This Resolution was tabled until the next meeting as a quorum was not met.

4. Joint Committee – Regular Meeting Schedule

Resolution #2

Motion to approve the regular meeting schedule for 2024 of the Joint Committee.

This Resolution was tabled until the next meeting as a quorum was not met.

5. Plan Coordination

a. Input to FY 2024 Connecticut Green Bank Comprehensive Plan (Revisions)

- Bryan Garcia summarized the progress to the current Comprehensive Plan, which should remain steady to what was planned contingent upon if Connecticut wins any of the Greenhouse Gas Reduction Fund moneys. He highlighted the Green Bank's current project deployment success as well as the shifting mindset to keep recycling and waste management in mind as projects are created and maintained. He summarized the future goals of the Green Bank for the first half of calendar year 2024.
 - Brenda Watson asked for clarification about the 100 MW of solar energy reported to be deployed this year. Bryan Garcia responded that the Solar Energy Industry Association and Wood Mackenzie releases a quarterly study on residential and non-residential utility scale solar which allowed the Green Bank to update the Power BI system to look at megawatts so far, which is the 100 MW deployed, putting the EDCs on track for 125 to 150 MW within one year – which is twice the volume delivered under the RSIP, which itself was the most effective, efficient and equitable in the entire Northeast region.
 - George Lawrence asked about the viability and particulars of recycling solar panels given their long use life, generally. Bryan Garcia responded that much of it depends on third party owners, which is 75% of the residential solar market. However part of mitigation efforts may be to look closely at the usability of those panels being removed and see how to reuse them if possible, to keep them out of the waste stream for as long as possible.

b. 2022-2024 Conservation and Load Management Plan

- Richard Faesy summarized the progress to the current CL&M Plan, which is transitioning into the third year in 2024. Demand for green energy programs and investments in them continues to be high resulting in significant savings across the state.
 - Brenda Watson asked how the cumulative savings translates for the average person. Richard Faesy responded that it is a system-wide benefit which affects all ratepayers but essentially they invest into the programs and as part of their electric and gas bill, and if they participate in the programs, they will individually benefit generally more than what they put in, because not 100% of every customer and every business enrolled in the program. Stephen Bruno added that average residential customer spends about \$50 per year towards energy efficiency fund but if you participate in the programs, you could save at minimum \$200 per year. Ron Araujo commented that also some of the non-energy saving impacts that the programs have to offer, and through things such as our avoided cost study, we're able to monetize those and that goes into our planning model. So when it's stated there is \$2.35 billion in benefits, some of those are going to be Direct Energy saving benefits to the customers, but some are going to be system benefits as well as non-energy benefits.
 - George Lawrence asked if the health and comfort benefits are being applied to residential customers as non-energy benefits yet. Richard Faesy responded that they are and described part of the screening process.
- Richard Faesy discussed some of the challenges and budget pressures on the residential side of programs due to the robust demand but limited budgets. Stephen Bruno summarized the Eversource budgeting challenges from 2019-2024 and meeting the current growing demand, especially in residential.
 - Bryan Garcia asked how the tax credits from the Inflation Reduction Act may be able to be leveraged. Ron Araujo responded that the tax credits don't appear in the data presented but that funding is available to customers and there have been efforts to make

sure customers are informed of those programs whenever a HES or HES-IE visit is done. Richard Faesy noted the difficulty to incorporate that information due to the nature of trying to provide accurate tax information to customers.

- John Harranty commented that driving down the cost of energy is great story and hopes as much information can be distributed about it as possible and asked if there have been any marketing opportunities taken advantage of, such as Public Service Announcements, in order to further promote it. Brenda Watson agreed that there may be more marketing opportunities not being utilized.

6. Opportunities and Challenges – Healthy Housing

a. Solar PV & Battery Storage

- Mackey Dykes summarized the history and progress around providing assistance in getting solar for affordable multifamily housing. The Green Bank has been working hard to get legislation passed to make the process easier in several ways, both for getting projects created and getting financing for them.

- Brenda Watson asked if there was a marketing plan in place for the programs Mackey described. Mackey Dykes responded that there is a marketing plan being developed, but there is more that can be done.

- Sergio Carrillo summarized the update on the decisions made by PURA for the battery storage docket as it related to residential customers and designations of underserved and low-income. Due to the decision, the Green Bank can now get a 50% increase in the upfront incentive for both underserved and low-income customers. As well, inspections will now be optional which will accelerate the time it takes from a project being submitted as complete to the time the installers get their payments.

b. Weatherization and Heat Pumps

- Richard Faesy summarized the progress to the HES-IE and Weatherization Assistance Program coordination for heat pump financing as well as goals for the program. He reviewed some slides that were shared at DEEP's recent Technical Conference of the 2024 CL&M Plan some changes to the heat pump and Smart-E programs which should help make things easier for customers.

- Brenda Watson asked if the Energize CT Heating Loan payments were on customer bill payments or as a separate bill. Ron Araujo responded that it is on customers' utility bill, but the Smart-E Loan is typically invoiced direction from the credit union or bank, so that would not appear on the utility bill.

c. Health and Safety

- Richard Faesy reviewed an update regarding the Residential Energy Preparation Services which DEEP has been heading to address weatherization barrier issues.

7. Plans for the 2024 Legislative Session

- James Desantos summarized the proposals coming to the 2024 legislative session, which he noted are not specifically Green Bank proposals.

8. Other Business

- a. Brief Update: C&I – Government
- b. Brief Update: C&I – Small and Medium/Large Business

- Mackey Dykes summarized the collaboration between the EDC and the Green Bank around the Small Business Energy Advantage and Business Energy Advantage programs as the Green Bank purchased the loans from Amalgamated Bank.

- c. Brief Update: Residential – Single Family and Multi-Family

- Mackey Dykes reviewed an update regarding the Smart-E program which is on pace to surpass the expectations put in place within the Green Bank's fiscal year.
 - Brenda Watson asked if there was a map of product and program usage to see the visual impact. Mackey Dykes responded he believes there is and can get that from the Smart-E people.

9. Public Comments

- None.

10. Adjourn

Brenda Watson adjourned the Joint Committee Meeting at 3:15 pm.

Respectfully submitted,

Brenda Watson, Chairperson

2023 Connecticut Clean Energy Industry Report

PRODUCED FOR

THE CONNECTICUT GREEN BANK; THE DEPARTMENT OF ENERGY AND ENVIRONMENTAL PROTECTION; EVERSOURCE; AND, UNITED ILLUMINATING

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A Message from the Joint Committee

[PLACEHOLDER]

Executive Summary

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*.¹ 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.²

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.

¹ https://www.aceee.org/sites/default/files/pdfs/State_Scorecard/2022/one-pagers/Connecticut.pdf

² <https://www.advancect.org/our-economy/key-industries/renewable-energy/>



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.

Key Findings

CLEAN ENERGY LABOR MARKET & ECONOMIC ACTIVITY

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, representing an additional 1,700 FTE clean energy workers³ 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 services⁴ 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 2022.⁵

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

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.

⁴ 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.

⁵ <https://www.ctmira.org/>

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.

Introduction

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.⁶ 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).⁷

⁶ 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.

⁷ <https://www.energy.gov/policy/us-energy-employment-jobs-report-useer>

Connecticut Clean Energy Industry Overview

New and Notable Clean Energy Policies

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

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

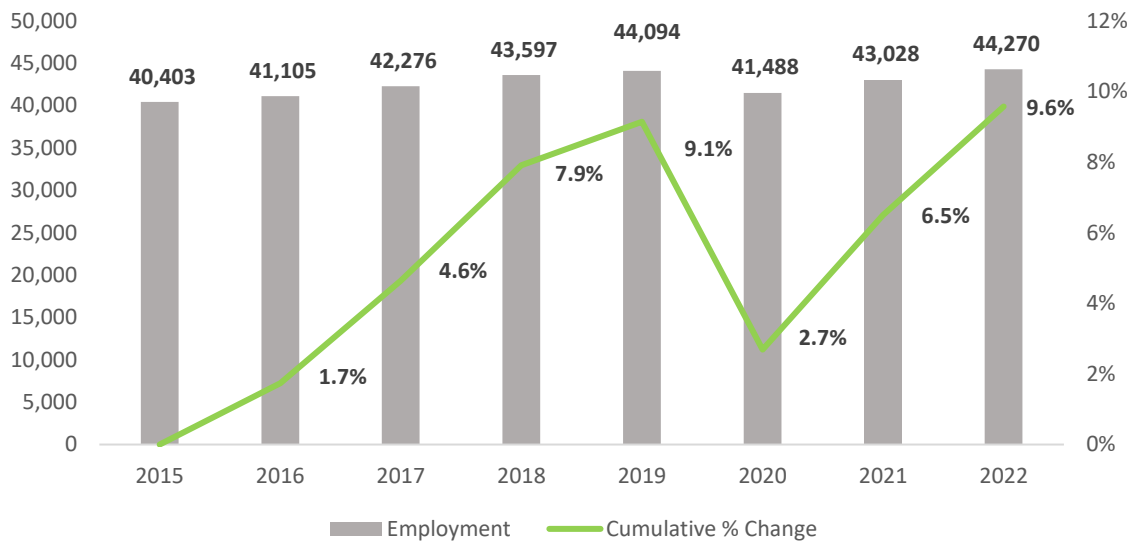
Overall Clean Energy Jobs

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 (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

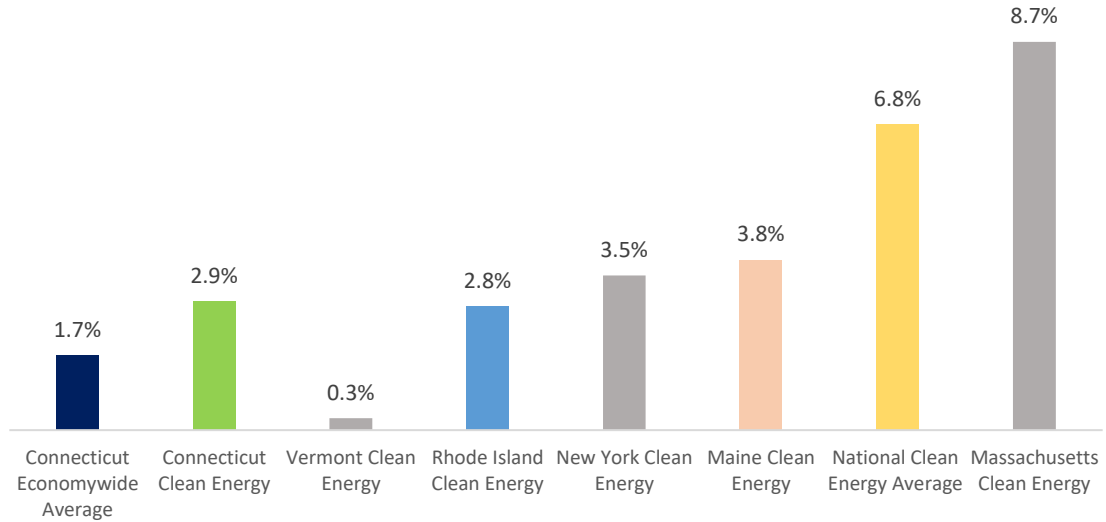
Connecticut’s clean energy industry exhibited slower growth than in the national clean energy labor market, which grew by nearly 7 percent during 2022, as well as compared to some other regions in the Northeast. Clean energy employment growth in Massachusetts was nearly three times greater than that 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). (Figure 2).

FIGURE 1. CLEAN ENERGY EMPLOYMENT IN CONNECTICUT, 2015-2022



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

FIGURE 2. EMPLOYMENT CHANGE COMPARISONS, 2021-2022



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 (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 (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 services¹⁶ industry saw nearly 130 percent GRP growth from 2021 and 2022 (Table 1).

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.

FIGURE 3. CLEAN ENERGY GROSS REGIONAL PRODUCT (GRP), 2017-2022

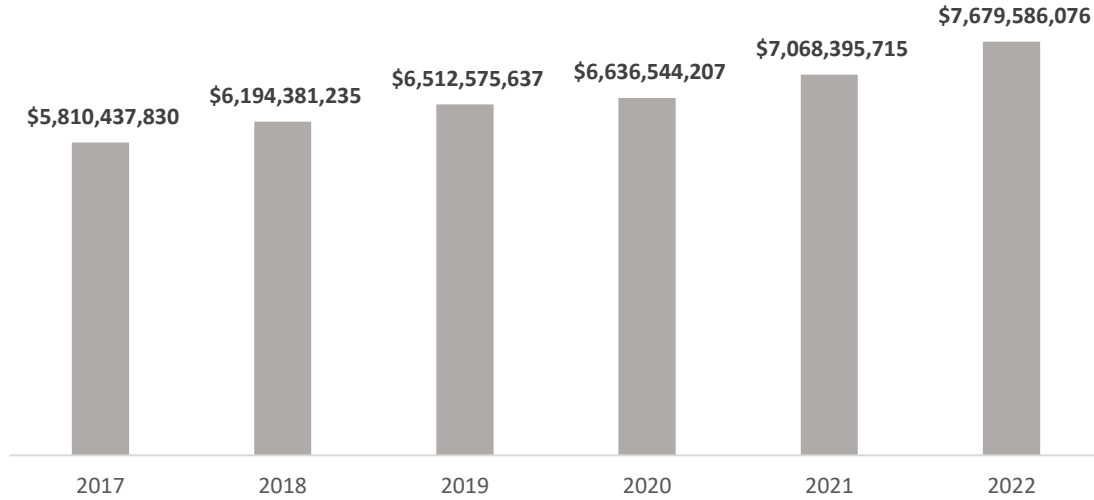


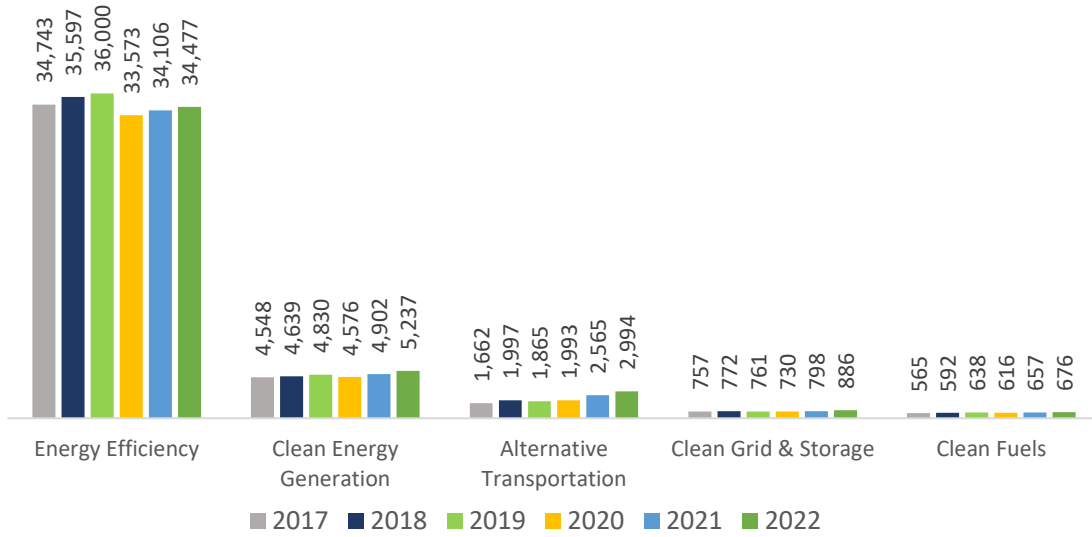
TABLE 1. CLEAN ENERGY GROSS REGIONAL PRODUCT (GRP) BY VALUE CHAIN, 2021-2022

	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%	

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 (Figure 4).

FIGURE 4. CLEAN ENERGY EMPLOYMENT BY SECTOR, 2017-2022



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 (Table 2).

TABLE 2. CLEAN ENERGY ESTABLISHMENTS BY SECTOR, 2017-2022

	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
TOTAL	4,159	4,253	4,347	4,284	4,392	4,455

Full-Time Equivalent Clean Energy Jobs

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 (Figure 5).

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.

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.

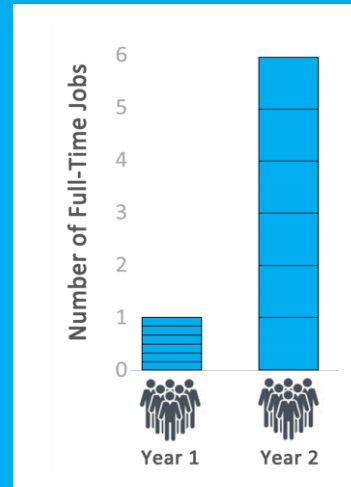
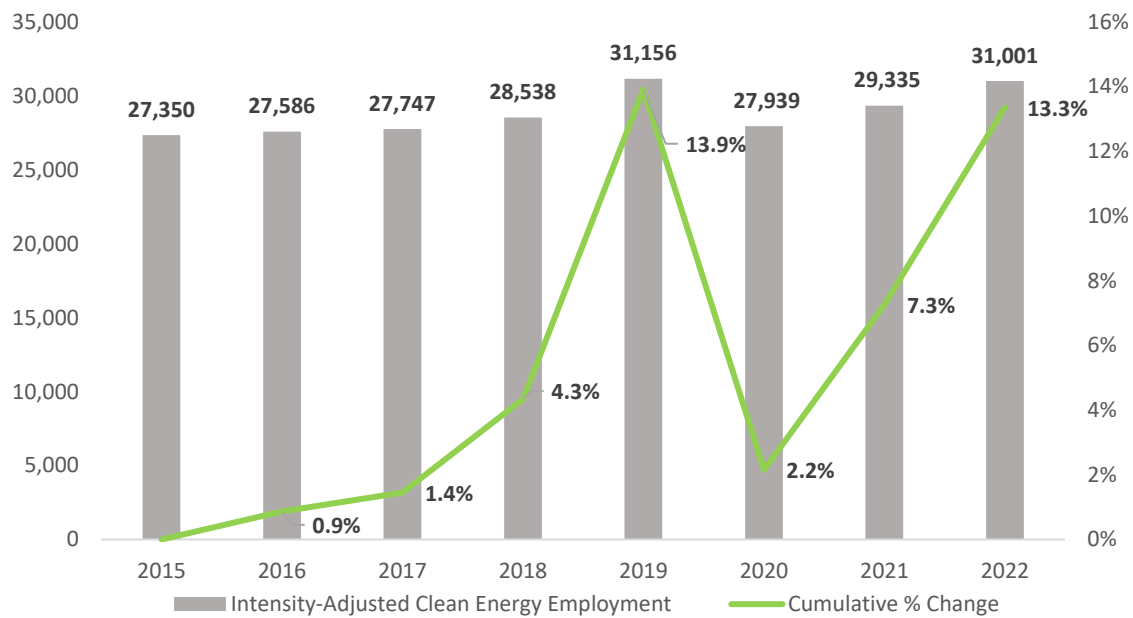


FIGURE 5. FULL-TIME EQUIVALENT CLEAN ENERGY JOBS, 2015-2022¹⁸



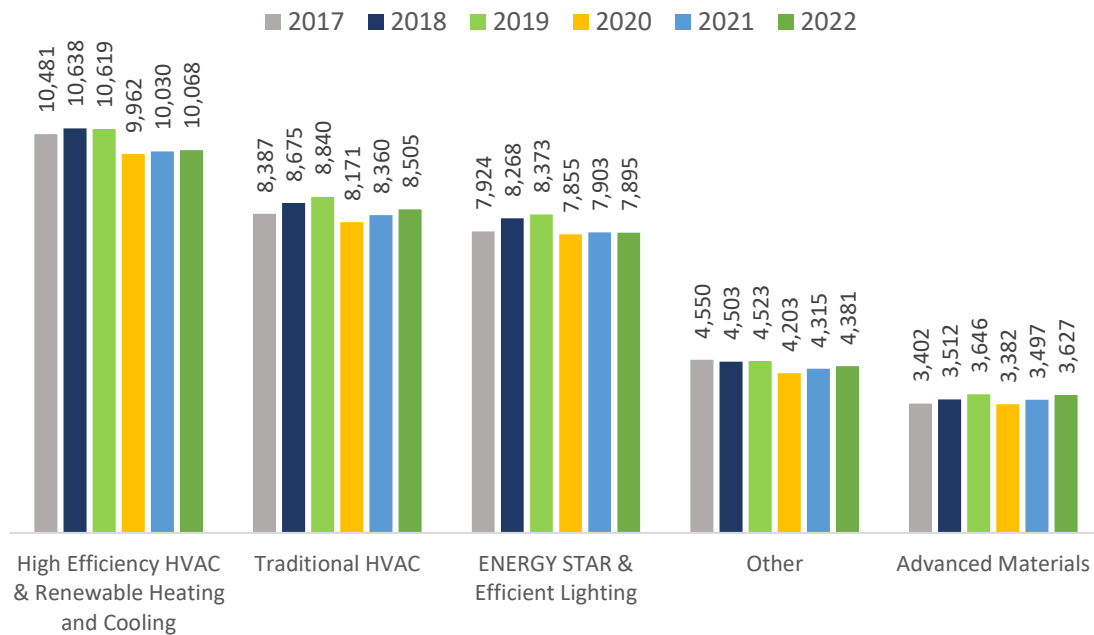
¹⁸ FTE jobs were extrapolated using a combination of state-level and census region data. The data was adjusted based on revenue distribution by technology and weighted according to how much time workers were reported to spend on clean energy activities (0-49 percent, 50-99 percent, or 100 percent). For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

Detailed Clean Energy Sector Employment

Energy Efficiency

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 (Figure 6).

FIGURE 6. ENERGY EFFICIENCY EMPLOYMENT BY SUB-TECHNOLOGY, 2017-2022¹⁹



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.

Clean Energy Generation

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 (Figure 7).

FIGURE 7. CLEAN ENERGY GENERATION EMPLOYMENT BY SUB-TECHNOLOGY, 2017-2022

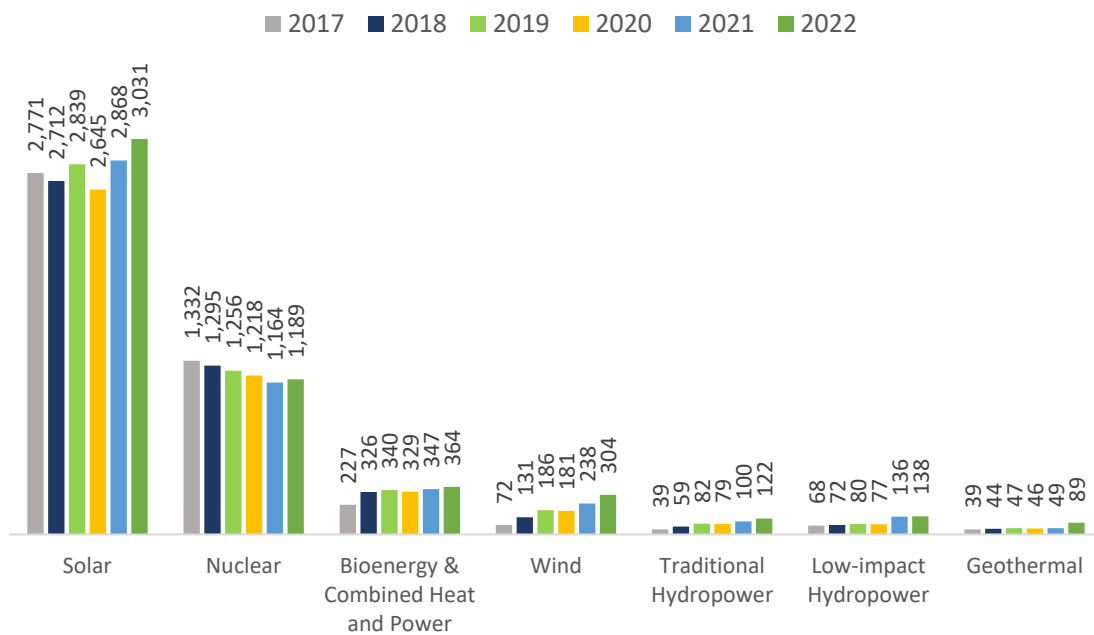
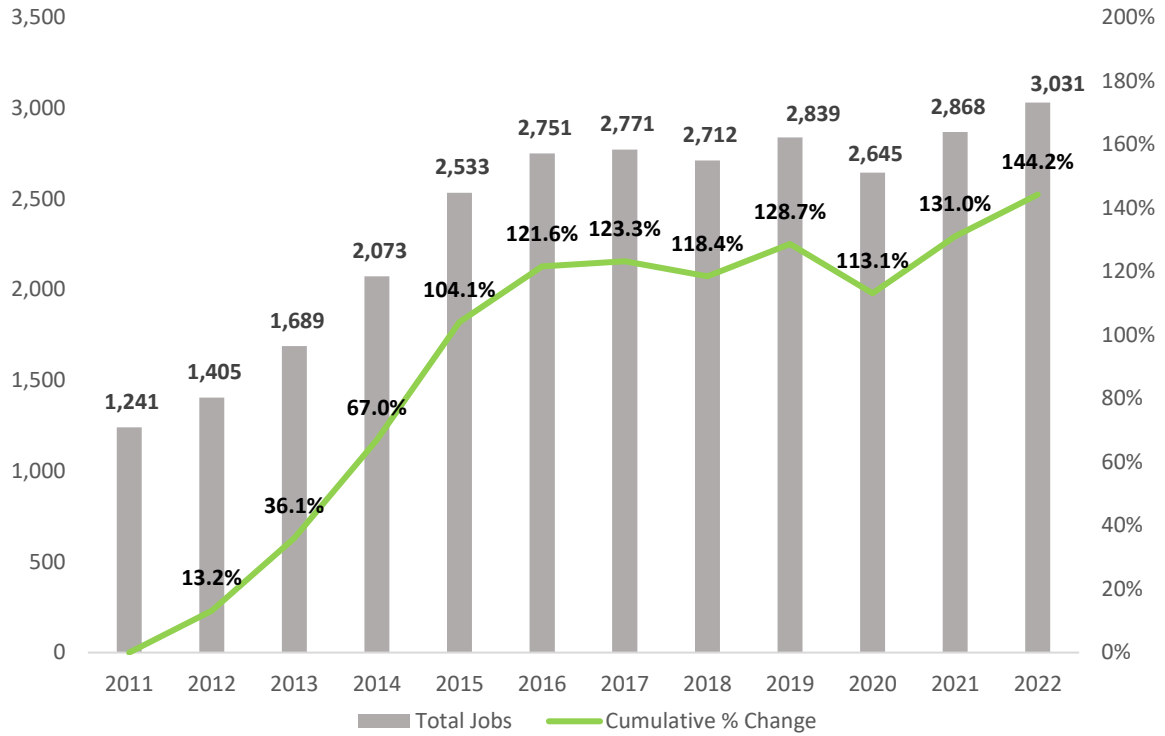


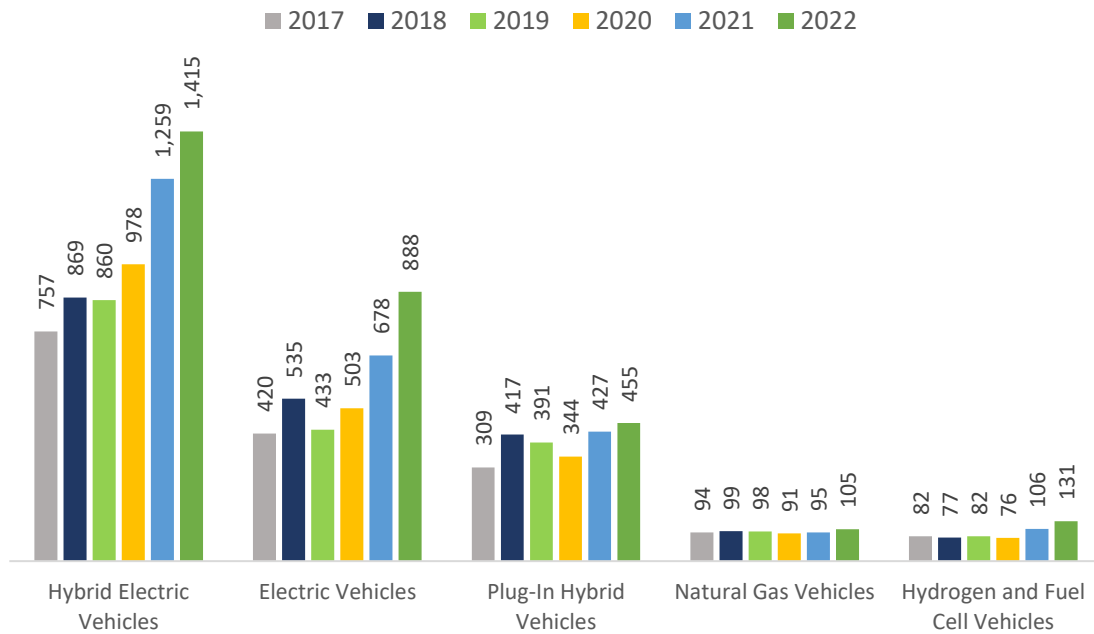
FIGURE 8. SOLAR EMPLOYMENT, 2011-2022



Alternative Transportation

Employment in all alternative transportation (AT) sub-technologies grew between 2017 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 (Figure 9).

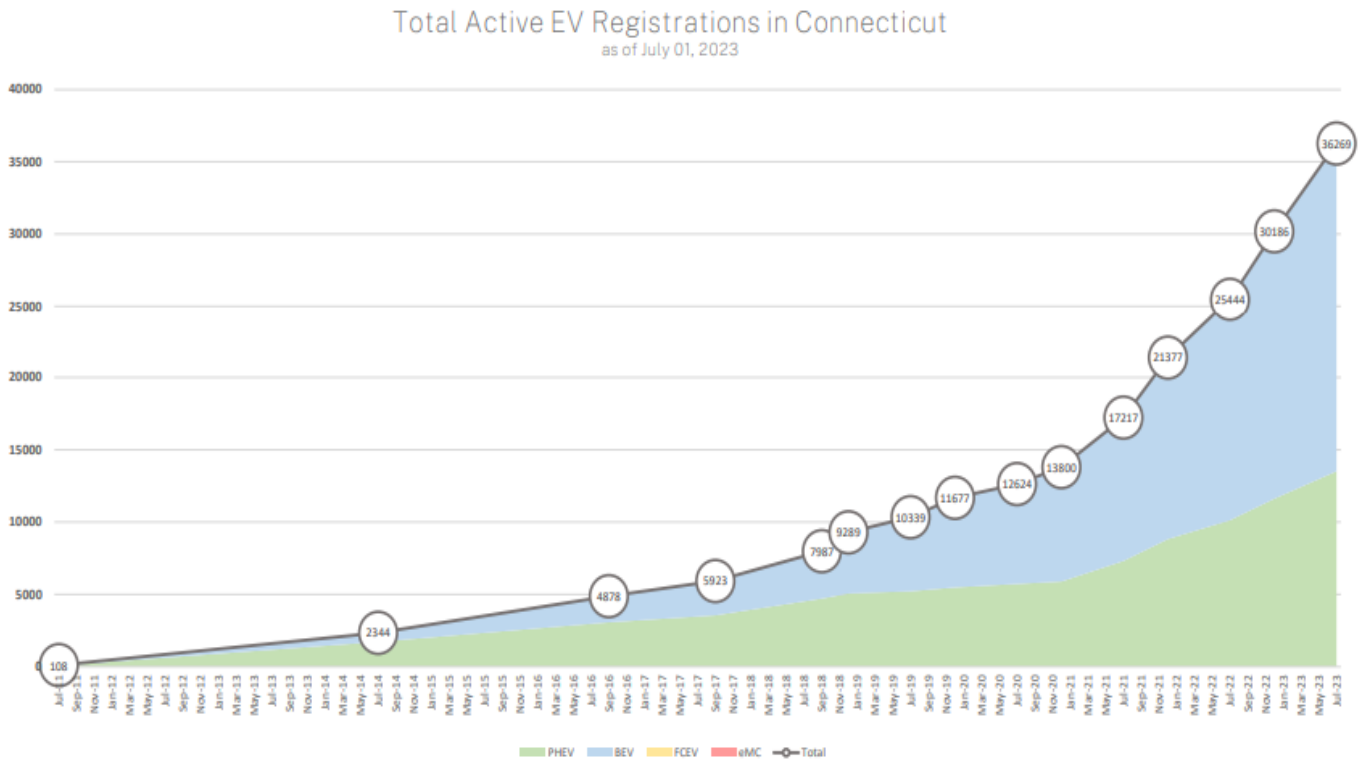
FIGURE 9. ALTERNATIVE TRANSPORTATION EMPLOYMENT BY SUB-TECHNOLOGY, 2017-2021



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) (Figure 10).²⁰

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

FIGURE 10. TOTAL ACTIVE EV REGISTRATIONS IN CONNECTICUT²¹

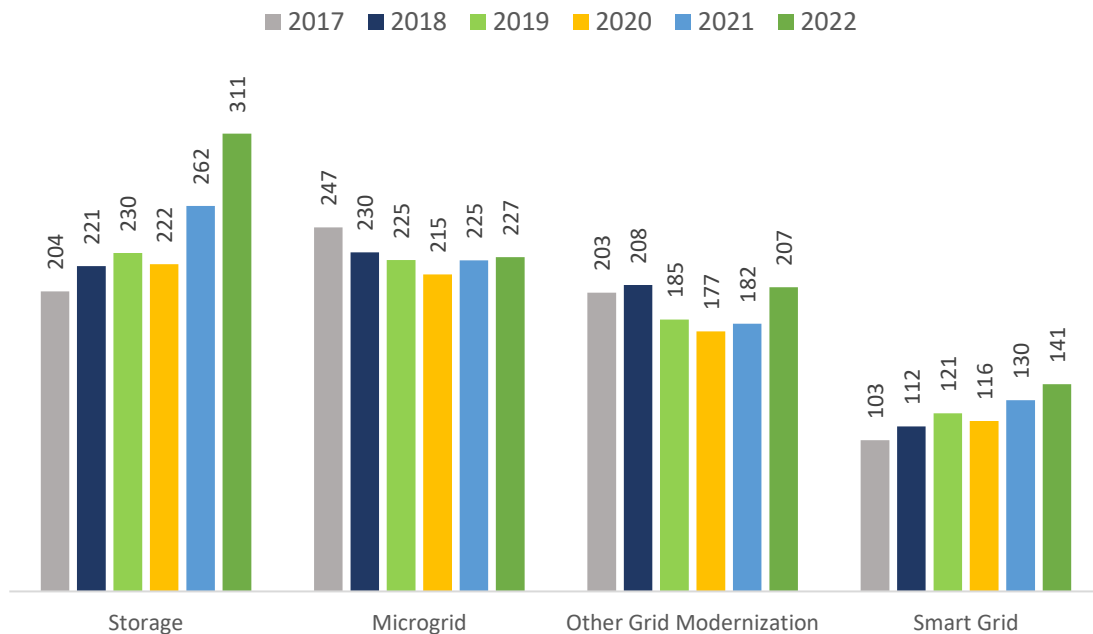


²¹ Connecticut’s Official State Website. Expanded EV Registration Fact Sheet. <https://portal.ct.gov/-/media/DEEP/air/mobile/CHEAPR/EV-Reg-Fact-Sheet.pdf>

Clean Grid & Storage

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) (Figure 11).

FIGURE 11. CLEAN GRID AND STORAGE EMPLOYMENT BY SUB-TECHNOLOGY, 2017-2022²²

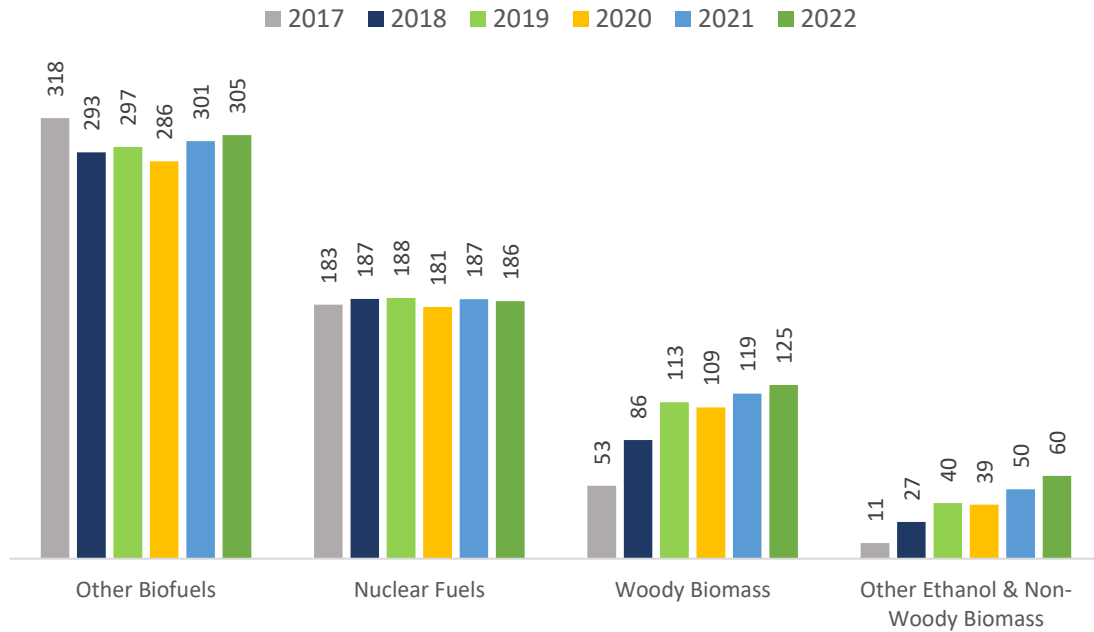


²² Per the Connecticut definition, storage companies include pumped hydropower storage, battery storage (including battery storage for solar generation), mechanical storage, thermal storage, biofuels (including ethanol and biodiesel), and nuclear fuels.

Clean 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 (Figure 12).

FIGURE 12. CLEAN FUELS EMPLOYMENT BY SUB-TECHNOLOGY, 2017-2022²³



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.

Clean Energy Demographics

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 (Table 3).

TABLE 3. CLEAN ENERGY WORKFORCE DEMOGRAPHICS, 2022²⁴

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

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.

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 Value Chain Employment

Overall Value Chain Jobs

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 construction²⁵, manufacturing²⁶, wholesale trade²⁷, professional and business services²⁸, other services²⁹, 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 (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.

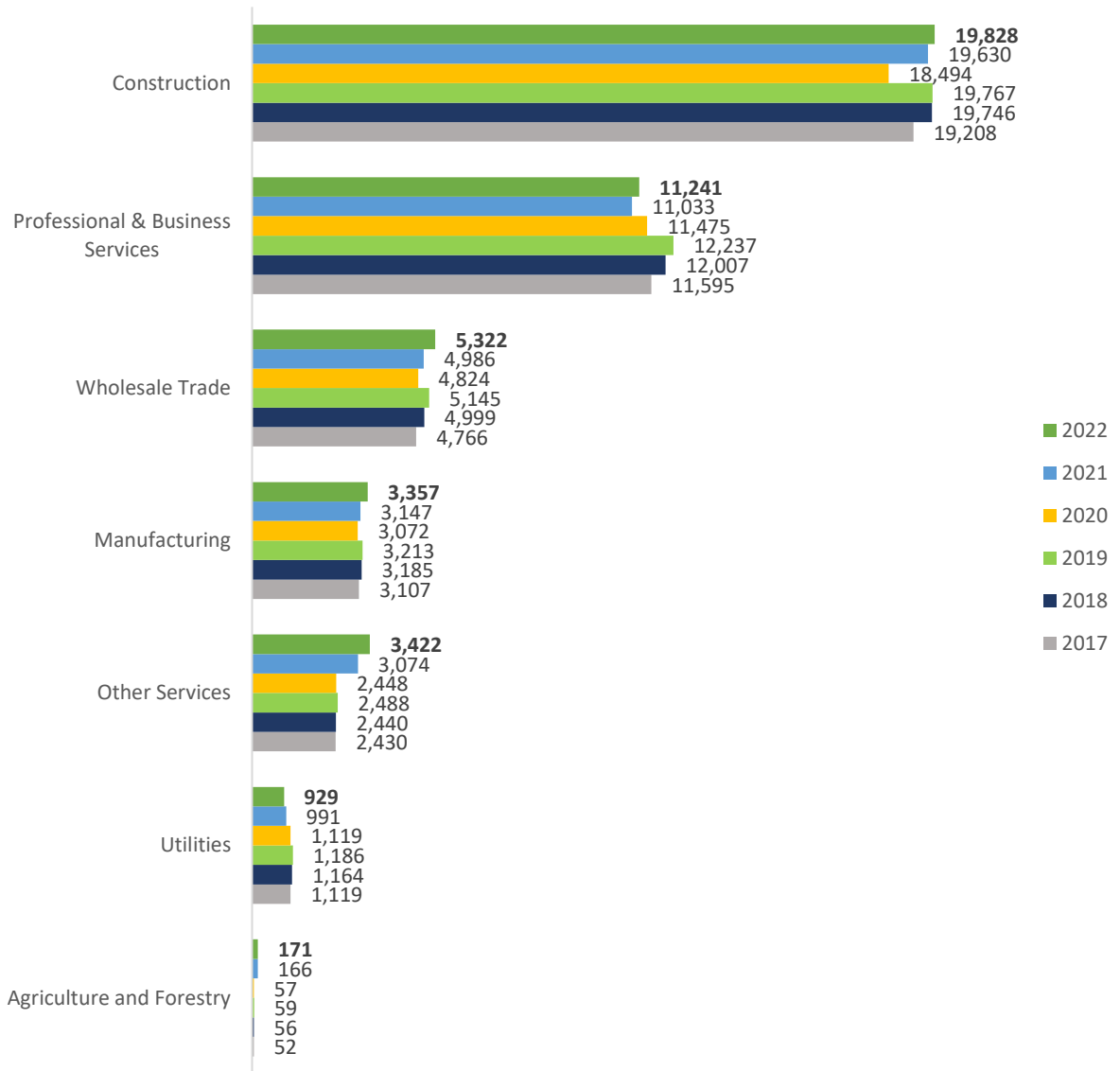
²⁶ Manufacturing encompasses petrochemical, industrial gas, ethyl alcohol, or other basic organic chemical manufacturing as well as heating and air conditioning equipment manufacturing, engine and compressor manufacturing, semiconductor manufacturing, and energy efficient product, appliance, or lighting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

FIGURE 13. CLEAN ENERGY EMPLOYMENT BY VALUE CHAIN SEGMENT, 2017-2022



Value Chain Jobs by Sector

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 (Table 4).

TABLE 4. VALUE CHAIN EMPLOYMENT BY CLEAN ENERGY SECTOR, 2022

	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
Wholesale 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 services³⁰, which added 125 and 214 jobs in the sector from 2021 to 2022, respectively (Table 5).

TABLE 5. VALUE CHAIN PROPORTIONAL EMPLOYMENT BY CLEAN ENERGY SECTOR, 2022

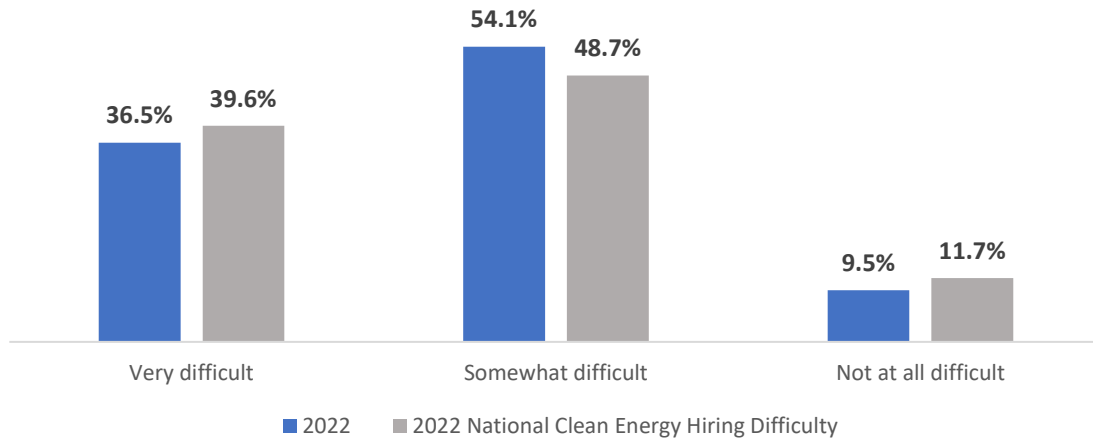
	Connecticut Clean Energy Average	Clean Energy Generation	Clean Grid & Storage	Energy Efficiency	Clean Fuels	Alternative Transportation
Agriculture and Forestry	0.4%	0.0%	0.0%	0.0%	25.3%	0.0%
Utilities	2.1%	17.7%	0.0%	0.0%	0.0%	0.0%
Construction	44.8%	24.2%	60.5%	52.3%	0.0%	0.0%
Manufacturing	7.6%	8.7%	8.1%	6.2%	21.3%	18.8%
Wholesale 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.

Clean Energy Hiring

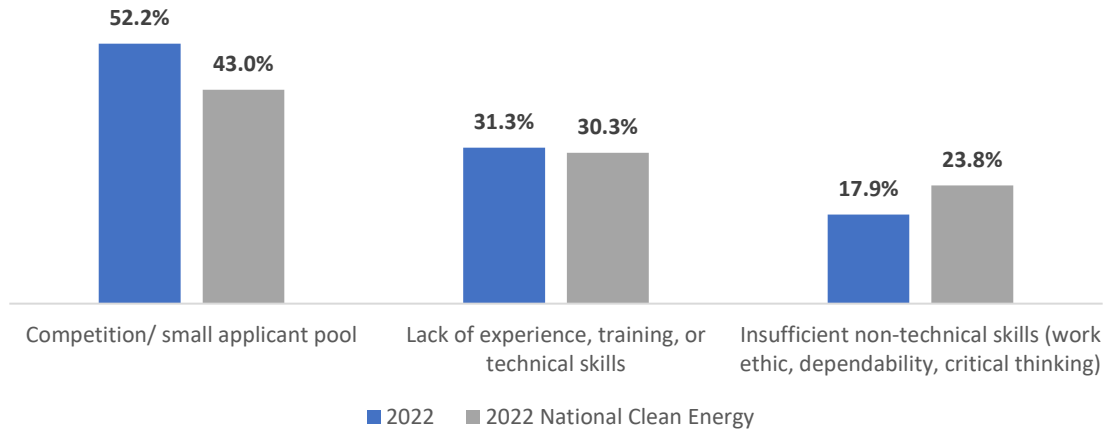
Nearly all of Connecticut clean energy employers hiring in 2022 (90.5 percent) indicated that they had experienced some level of hiring difficulty. Over one-third (36.5 percent) considered hiring “very difficult” over the past year, and over half (54.1 percent) considered hiring “somewhat difficult.” 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 (Figure 14).

FIGURE 14. EMPLOYER-REPORTED HIRING DIFFICULTY, 2022



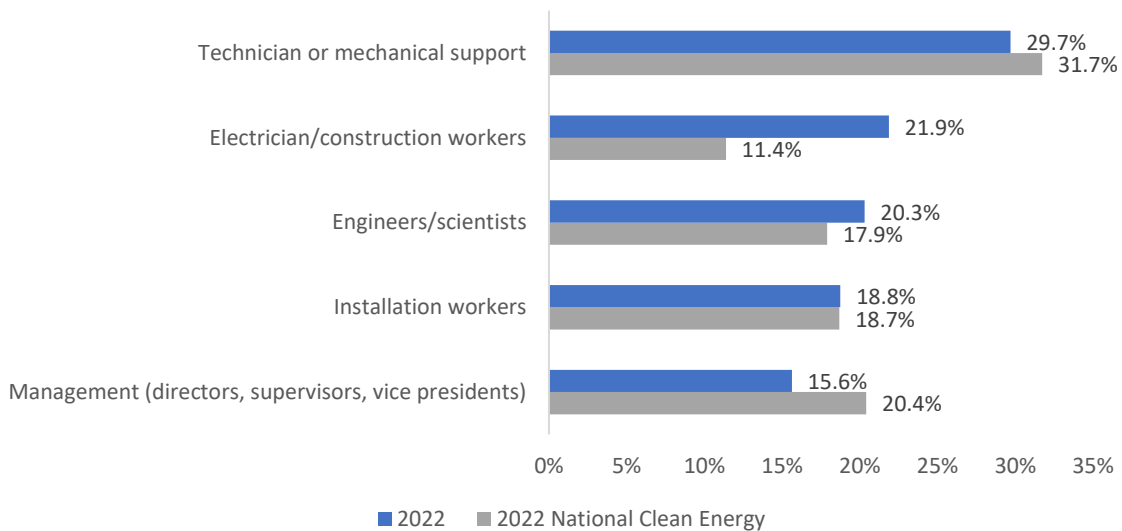
Among Connecticut employers who reported any level of hiring difficulty in 2022, the most cited reasons were competition from other employers or small applicant pools (52.2 percent), lack of experience, training, or technical skills (31.3 percent), and insufficient non-technical skills (17.9 percent). 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) (**Error! Not a valid bookmark self-reference.**).

FIGURE 15. MOST COMMON EMPLOYER-REPORTED REASONS FOR HIRING DIFFICULTY, 2022



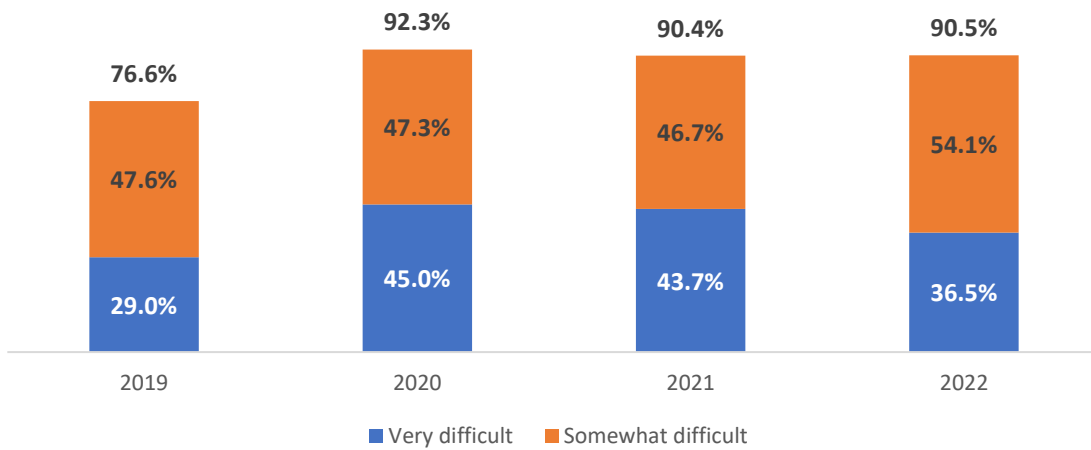
Connecticut employers facing any level of hiring difficulty also identified the most difficult positions to fill within their organization – nearly one third (29.7 percent) of employers identified technicians or mechanical support positions as difficult to fill, followed by electricians and construction 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) (Figure 16).

FIGURE 16. EMPLOYER REPORTED MOST DIFFICULT POSITIONS TO FILL, 2022



The number of employees reporting overall hiring difficulty³¹ 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 (**Error! Not a valid bookmark self-reference.**).

FIGURE 17. EMPLOYER REPORTED HIRING DIFFICULTY, 2019-2022

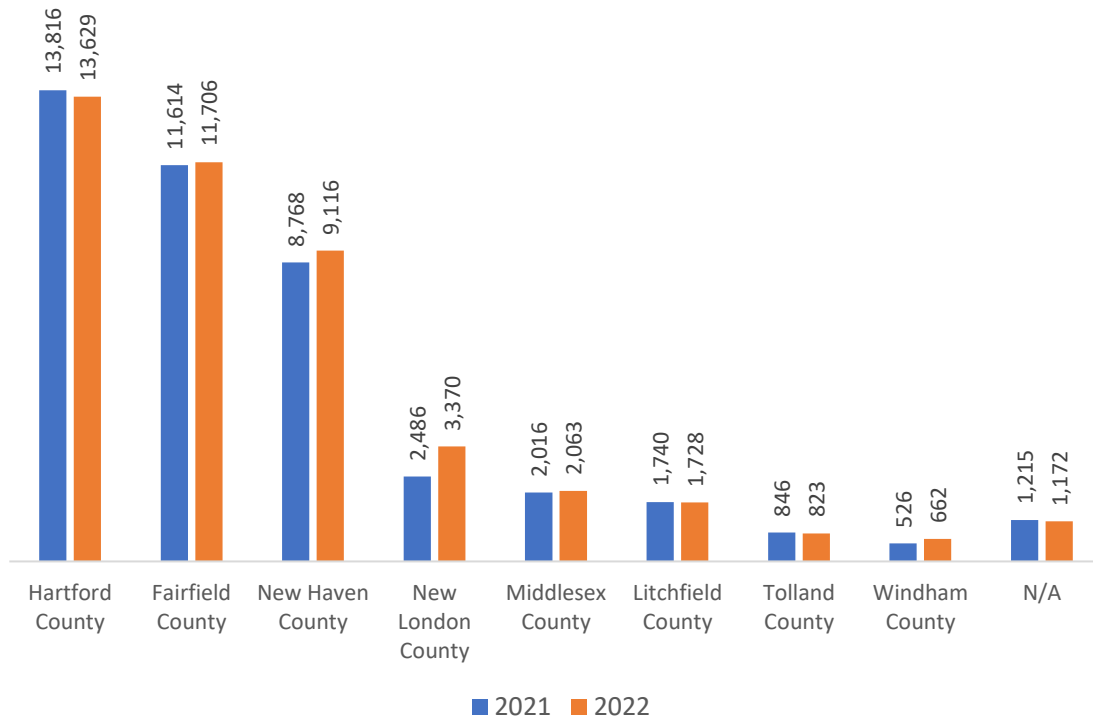


³¹ Overall hiring difficulty is defined as the sum of employers who reported hiring as “somewhat difficult” or “very difficult.”

Regional Clean Energy Employment

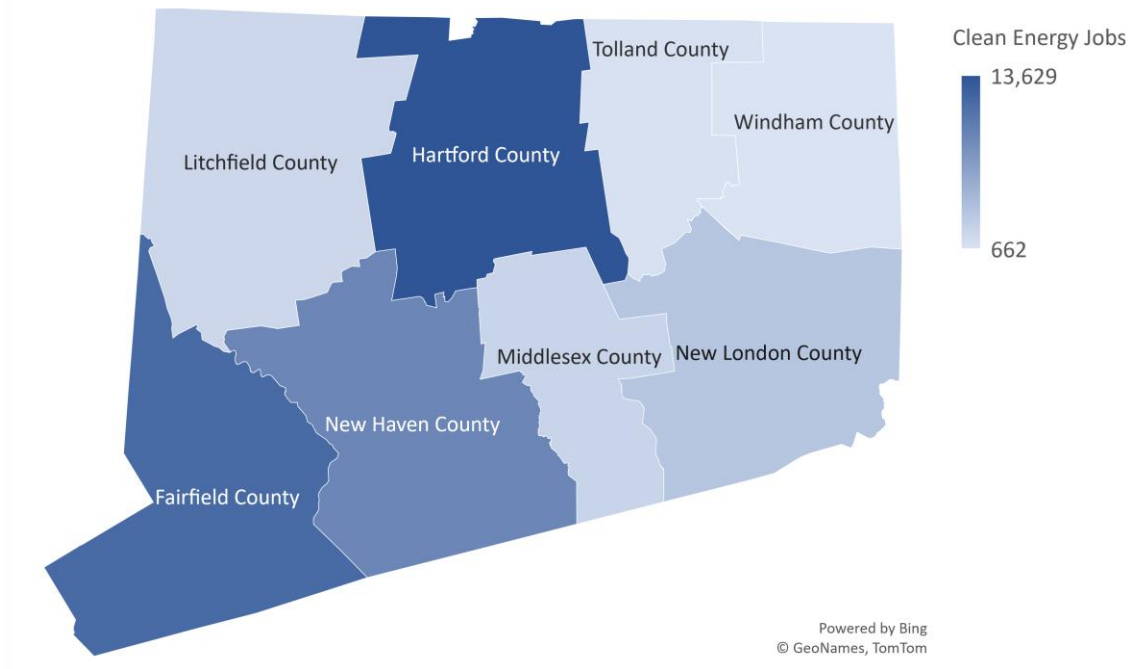
The geographic distribution of clean energy employment remained relatively constant from 2021 to 2022, with Hartford, Fairfield, and New Haven Counties maintaining the largest shares of clean energy employment in the state. New London County experienced remarkable clean energy employment growth in 2022, 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.

FIGURE 18. CLEAN ENERGY EMPLOYMENT BY COUNTY, 2020-2022³²



³² Employment categorized as “n/a” could not be assigned to a single location.

FIGURE 19. MAP OF CLEAN ENERGY EMPLOYMENT BY COUNTY, 2022



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 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:

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.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

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.

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 services³⁴
- 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

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.

- 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



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