MASSACHUSETTS CLEAN ENERGY CENTER®

2021

Massachusetts Clean Energy

INDUSTRY REPORT

[bw] RESEARCH PARTNERSHIP

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Since 2010 MassCEC has:

- Awarded over **$412.2M** through clean energy programs and investments and attracted over **$2.3B** in private and federal capital
- Supported over **4,400** college and vocational internships with more than **550** clean energy employers, and attracted **63%** women or minority interns
- Enabled **3,600+** clean energy related certificate trainings
- Awarded **$139M** for technology innovation and company growth
- Built the **1st** U.S. offshore wind port, in New Bedford
- Tested **50** wind turbine blades at the Wind Technology Testing Center

ABOUT MASSCEC

The Massachusetts Clean Energy Center (MassCEC) is a quasi-public state agency whose mission is to accelerate innovation of the clean energy and climate solutions that are critical to meeting the Commonwealth's climate goals, while advancing Massachusetts' position as an international climate leader. MassCEC is dedicated to accelerating the growth of the clean energy sector across the Commonwealth to spur job creation, deliver statewide environmental benefits, and to secure long-term economic growth for the people of Massachusetts.

MassCEC utilizes a variety of programming to advance the clean energy industry in Massachusetts. This work includes supporting clean energy technologies and helping to bring these solutions to market. MassCEC provides financing for early-stage companies and technology development, and invests in workforce development to build a robust clean energy workforce. MassCEC serves as a test bed and support center for the clean energy sector, aiding companies to access capital and other vital growth resources.

MassCEC fosters collaboration among the industry, state government, research universities, and the financial sector to advance the state's clean energy economy. We partner with a diverse range of stakeholders, with a particular focus on companies and researchers innovating in clean transportation, high-performance buildings, net zero grid, and offshore wind.

MassCEC is committed to creating a diverse, equitable, and inclusive organization where everyone is welcomed, supported, respected, and valued. We are committed to incorporating principles of diversity, equity, inclusion, and environmental justice in all aspects of our work to promote the equitable distribution of the health and economic benefits of clean energy and support a diverse and inclusive clean energy industry.

MassCEC constructed and operates the Wind Technology Testing Center in Charlestown and the New Bedford Marine Commerce Terminal. Massachusetts Energy and Environmental Affairs Secretary Kathleen Theoharides chairs MassCEC's board of directors.

NOTE FROM THE CEO

JENNIFER DALOISIO

The Massachusetts Clean Energy Center (MassCEC) is pleased to present the results of our 2021 Clean Energy Industry Report, which provides an overview of the clean energy industry in the Commonwealth.

Massachusetts has a long history of leading the nation on climate, and 2021 was no exception. As the COVID-19 pandemic posed ongoing challenges to individuals, communities, and industries, Massachusetts set its sights on the future, enacting comprehensive climate change legislation. *An Act Creating a Next-Generation Roadmap for Massachusetts Climate Policy* committed the state to achieving net zero greenhouse gas emissions by 2050, one of the most ambitious climate targets in the nation. In October 2021, Governor Charlie Baker filed *An Act to Power Massachusetts's Clean Energy Economy*, to establish a $750 million Clean Energy Investment Fund to scale MassCEC's efforts in supporting clean energy innovation and job training. This funding will be a critical tool to expand Massachusetts' leadership on clean energy and climate.

There is no question that 2020 was a difficult year for many industries and sectors across the state. This report, with data collected through the end of 2020, shows the Commonwealth experienced a decrease in clean energy jobs for the first time since 2010, when MassCEC first produced the industry report.

This decline of about 12,800 jobs was primarily due to the impacts of the pandemic. Similar to the statewide labor market, most clean energy jobs were lost between March and May of 2020, with increased hiring in the second half of 2020. While a full recovery has been delayed in part due to ongoing pandemic uncertainty and supply chain and labor shortage constraints, the state did see some modest gains in wind energy, electric vehicles, and energy storage. Significantly, the early estimates of data through December 2021 show this recovery continuing, underscoring the resilience of the state's clean energy industry.

THIS REPORT ILLUSTRATES THAT THE MASSACHUSETTS CLEAN ENERGY INDUSTRY IS:

Home to over **101,000** clean energy workers, **growing 68%** since 2010

Ranked #1 in the country for median clean energy wages

Powered by small business
61% have 10 or fewer employees

Growing fast, outpacing overall growth in the state
Clean energy Gross State Product has grown over **50%** since 2012, outpacing statewide growth of **31%**

While the report found an 8% increase in wind energy jobs, the offshore wind industry is poised to see unprecedented growth in the next few years, with Massachusetts leading the way. In 2022, the first large-scale offshore wind project in the United States, Vineyard Wind, will begin construction off the South Coast of Massachusetts. The Commonwealth was the first state in the nation to invest in offshore wind ports, with the development of the New Bedford Marine Commerce Terminal that will serve as the principal construction base for the Commonwealth's first two offshore wind projects. Continuing this leadership, the state recently committed an additional $90 million in funding for offshore wind ports and infrastructure investments. With 5,600 megawatts of offshore wind secured or authorized, Massachusetts has demonstrated the future of offshore wind is here.

In 2021, Governor Baker established the Commission on Clean Heat to advise the Commonwealth on a long-term framework for building decarbonization and reducing the use of heating fuels. This effort, combined with the state's *Interim Clean Energy and Climate Plan* goal of electrifying 1 million homes by 2030, will provide further growth opportunities to develop innovative, affordable, and equitable building solutions.

To meet our ambitious climate goals, it is critical that the state continues to grow and develop a well-trained and qualified clean energy workforce, one that includes individuals and communities who have historically been underrepresented. The 2021 Climate Act established a $12 million annual fund at MassCEC to support the clean energy workforce in Environmental Justice communities, minority and women business enterprises, and fossil fuel workers. MassCEC is working with state partners, local institutions, labor unions, and education providers to develop workforce programs that are diverse, equitable, and inclusive.

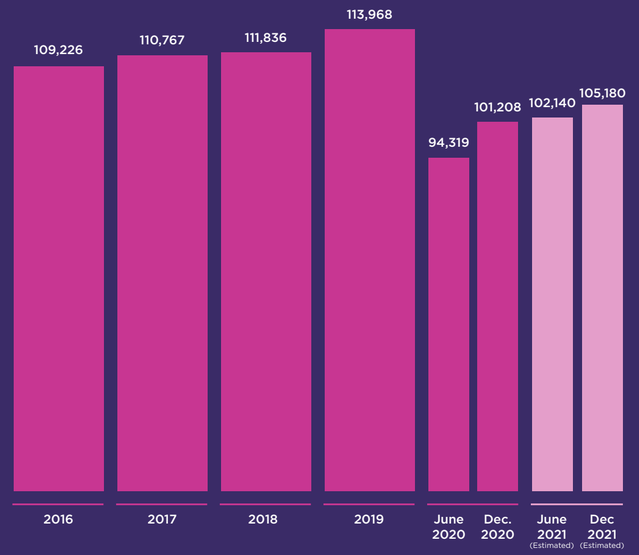
Both the urgent climate crisis and the economic downturn brought on by the pandemic present us with a once-in-a-generation opportunity to transform the ways in which we use and generate energy, while assisting the state's economic recovery from the pandemic. To meet the Commonwealth's climate goals, we will continue to leverage the state's unique assets, including a vibrant clean energy industry, strong culture of innovation and entrepreneurship, a skilled workforce, and top educational and training resources, to build the clean energy industry of the future – one that is diverse and equitable, providing economic benefits and opportunities for all residents of the Commonwealth.

A NOTE ON COVID-19 IMPACTS

The impact of COVID-19 has been experienced broadly across the Massachusetts job market, including the clean energy industry. Between December 2019 and June 2020, Massachusetts clean energy employment initially declined by **17%** (roughly 20,000 jobs), but later rebounded by **6%** (roughly 7,000 jobs). As a result, the net job loss was **11%**, or about 12,800 jobs, over the course of the year. Most job losses were concentrated in March through May 2020, at the peak of the economic shutdown in Massachusetts. The overall statewide labor market contracted by almost **9%** over the course of the year, resulting in a loss of almost 312,000 jobs.

Massachusetts clean energy employment has continued to grow in 2021, albeit at a slower pace, increasing about **3.9%** and adding roughly 4,000 jobs between December 2020 and December 2021. This was lower than overall state job growth, which was **5.7%** during the same time, and was slightly higher than clean energy job growth nationally at **3.3%**. As the Massachusetts economy continues to recover from the effects of COVID-19, ongoing investments in clean energy projects, technologies, and innovation can contribute to the state and region's overall economic recovery.

CLEAN ENERGY JOB LOSSES AND RECOVERY



COVID-19 RELATED CLEAN ENERGY JOB IMPACTS AND RECOVERY

JOBS LOST DECEMBER 2019 TO JUNE 2020: **19,800**

JOBS GAINED JUNE 2020 TO DECEMBER 2020: **7,000**

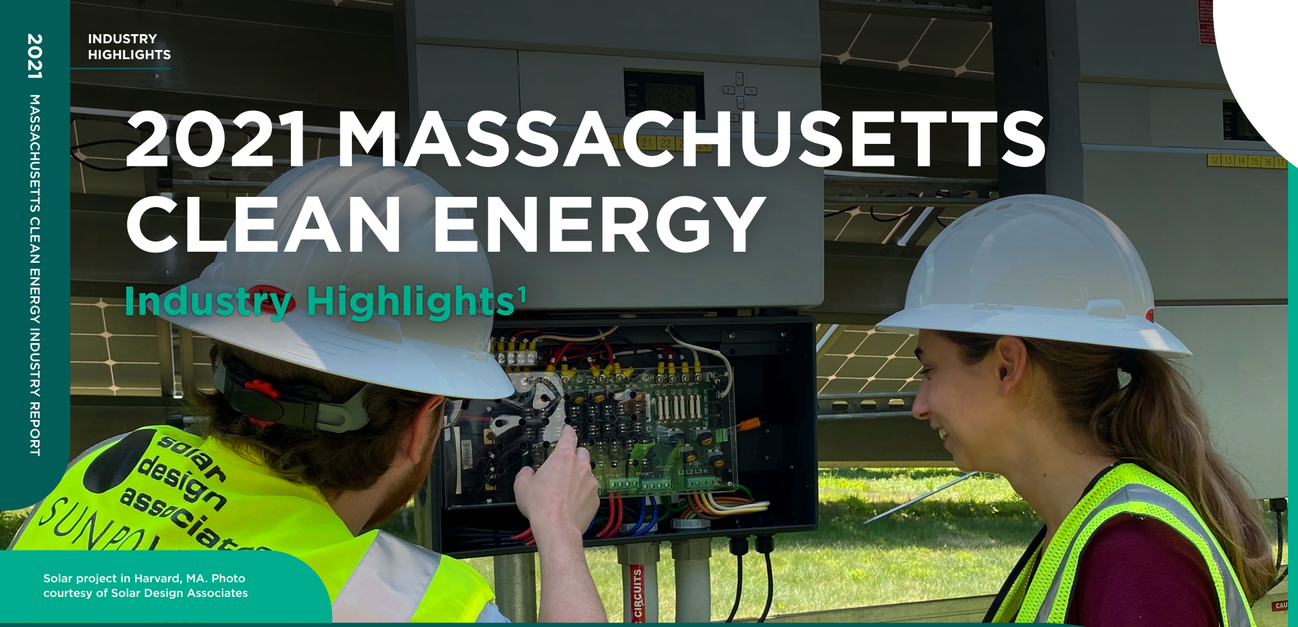
NET JOBS LOST OVER 2020: **12,800**

ESTIMATED JOBS GAINED DECEMBER 2020 TO DECEMBER 2021: **4,000**

The 2020 calendar year numbers are from the U.S. Energy and Employment Report (USEER), which is based on the Bureau of Labor Statistics' Quarterly Census of Employment and Wages dataset. Estimated job numbers through Q4 2021 are based on Unemployment Insurance (UI) filings.

2021 MASSACHUSETTS CLEAN ENERGY

Industry Highlights[1]



Solar project in Harvard, MA. Photo courtesy of Solar Design Associates

SUB-SECTORS THAT EXPERIENCED GROWTH

between 2020 and 2021 reports

Electric vehicle jobs grew by **8%**

Wind jobs grew by **8%**

Energy storage jobs grew by **1%**

[1] Unless otherwise noted, the numbers represented in the 2021 Massachusetts Clean Energy Industry Highlights are as of December 2020.

Since 2010, the Massachusetts clean energy industry has experienced:

68% job growth adding nearly **41,000** new workers

101,208 clean energy workers in Massachusetts

Clean energy jobs represent **3%** of all jobs in MA

61% of clean energy firms are small businesses (10 or fewer workers)

72% of clean energy workers are employed in the Energy Efficiency, Demand Management, and Clean Heating and Cooling sector

Clean energy companies represent more than **$13.7 billion** in Gross State Product (GSP)

Clean energy GSP increased by **$4.6 billion** since 2012, a **50%** increase that outpaced growth in Massachusetts overall GSP, which grew by **31%** over the same time

202,208 total direct, indirect, and induced jobs and **$28 billion** in additional GSP supported by the clean energy industry

Although the impacts of COVID-19 led to a loss of almost 20,000 clean energy jobs in the first half of 2020, the industry is rebounding, with roughly 7,000 jobs added in the second half of 2020, and an estimated 4,000 jobs added in 2021.

ECONOMIC CONTRIBUTION ANALYSIS

DECEMBER 2020

For purposes of this report, only those workers who are directly supporting clean energy activities, such as conducting research, manufacturing products, performing installations, or repairing and maintaining clean energy systems are included as clean energy workers. However, the impact of the industry is significantly greater than these "direct" jobs alone.[2]

[2] The economic contribution analysis in the 2021 report was calculated using IMPLAN, whereas the 2020 report used EMSI I/O modeling software. The two modeling software programs calculate economic contribution differently, so numbers should not be compared between the two reports. Please see the Expanded Methodology section of the 2021 Massachusetts Clean Energy Industry Report for updated data from the 2020 Clean Energy Industry Report Economic Contribution Analysis, modeled using IMPLAN software. Additionally, economic modeling and contribution analyses should not be viewed through a time series lens, as economic models are meant to be point-in-time estimates.

The

101,208

DIRECT CLEAN ENERGY JOBS

in Massachusetts supported an additional:

34,735

INDIRECT JOBS

(those outside of the clean energy sector that provide critical supply chain goods and services)

66,488

INDUCED JOBS

(those that result from increased spending in the economy)

ECONOMIC CONTRIBUTION ANALYSIS

Based on this analysis, the **MASSACHUSETTS CLEAN ENERGY INDUSTRY** is responsible for a total economic contribution of:

202,431
jobs

$28.2 BILLION
in MA GSP

$2.1 BILLION
in state and local taxes

$4 BILLION
in federal taxes on production and imports

2021 MASSACHUSETTS CLEAN ENERGY INDUSTRY REPORT

MASSACHUSETTS IS A LEADER

#2 for energy efficiency in the U.S. by ACEEE (2020)

#1 on the clean energy Community Power Scorecard for the 5th straight year by the Institute for Local Self-Reliance (2021)

#1 for median clean energy wage by E2 (2020)

#1 most LEED-certified square feet per capita by USGBC (2020)

#2 for innovation in the U.S. by Bloomberg (2020)

#2 Boston's clean energy ranking among U.S. cities by ACEEE (2020)

#2 for clean energy workers per capita in the U.S. by E2 (2020)

#5 for total solar workers in the U.S. by Solar Energy Industries Association (2021)

#7 for total clean energy workers in the U.S. by E2 (2021)

113,000+
solar projects in MA (through 2020)

29,000+
electric vehicles sold in MA (through 2020)

$838 MILLION
spent on energy efficiency in 2020, generating $2.8 billion in benefits (2020)

In 2021, Massachusetts enacted comprehensive climate change legislation to reduce greenhouse gas emissions and protect Environmental Justice populations.

TOTAL CLEAN ENERGY JOBS

Between 2010 and 2020, the clean energy industry in Massachusetts added **40,934** jobs, which accounts for **23%** of all jobs created in the state during that same time.

This report defines a clean energy worker as a person who spends some portion of their time working in renewable energy, energy efficiency, alternative transportation, or other carbon management technologies. In Massachusetts, **68%** of clean energy workers spend the "majority" or "all of their time" working in clean energy.

The economic impact of COVID-19 has been significant, with an **11%** net reduction in clean energy jobs in Massachusetts between December 2019 and December 2020, compared to a **9%** reduction in overall jobs in the state over the same time.[3] There are market indicators that the clean energy industry is slowly recovering though, with an estimated **3.9%** increase in jobs during 2021.

68%
growth since 2010

[3] Bureau of Labor Statistics, Quarterly Census of Employment and Wages.

Residential solar installation. Photo courtesy of ReVision Energy

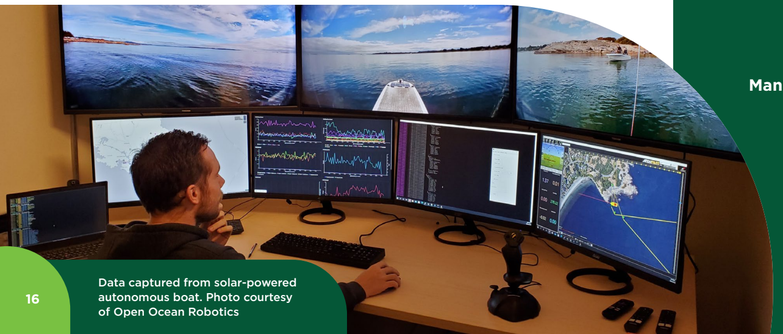
TOTAL CLEAN ENERGY EMPLOYMENT
REPORT YEARS 2010-2021[4]

[4] 2021 job numbers represented in this report were collected through December of 2020 and represent the net change in employment compared to December of 2019. The 2022 (Estimated) job numbers are calculated by combining the 2021 Report year job numbers with estimated job recovery data from January through December 2021.

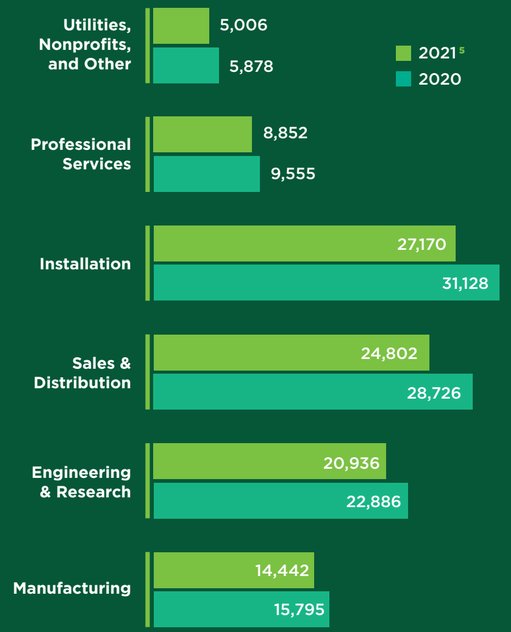
CLEAN ENERGY JOBS BY VALUE CHAIN

Clean energy Installation jobs saw the largest reduction between the 2020 and 2021 reports, with a loss of almost **4,000** workers or **13%**. By comparison, Massachusetts' overall construction and installation industry declined by **7%**. The sharper decline in clean energy Installation jobs is likely related to the drop in residential energy efficiency upgrades and installs due to social distancing measures during the COVID-19 pandemic.

The Utilities, Nonprofits, and Other segment of the value chain saw the greatest relative job loss, with a decline of almost **15%**. Alternatively, the Professional Services segment had the lowest relative job loss at **7%**, likely due to many employees being able to work remotely during the pandemic.



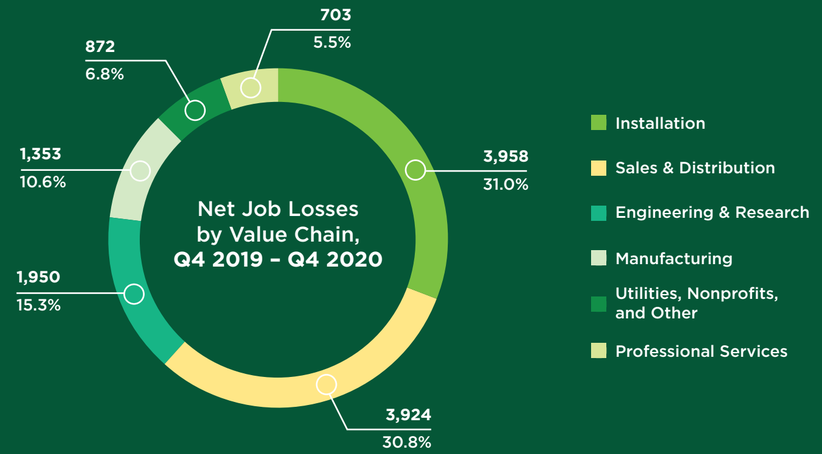
Data captured from solar-powered autonomous boat. Photo courtesy of Open Ocean Robotics

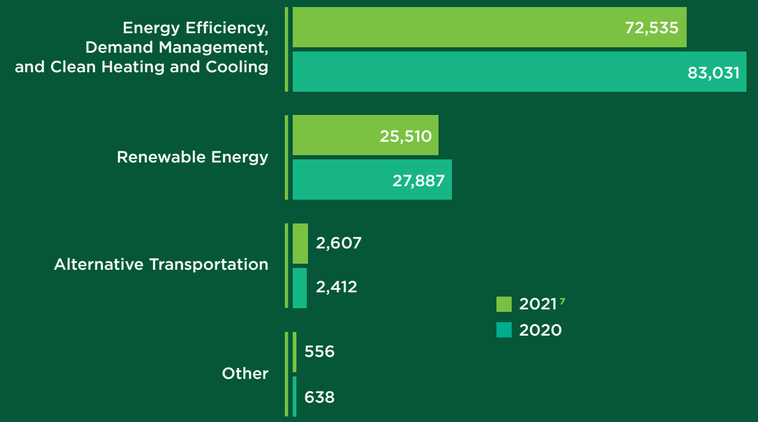


[5] 2021 job numbers represented in this report were collected through December of 2020 and represent the net change in employment compared to December of 2019.

IMPACT OF COVID-19 ON CLEAN ENERGY JOBS BY VALUE CHAIN

COVID-19 impacted segments of the clean energy value chain differently. The Installation and Sales & Distribution portions of the value chain each accounted for about **31%** of job losses between December 2019 and December 2020, likely due to COVID-19 related social distancing measures.



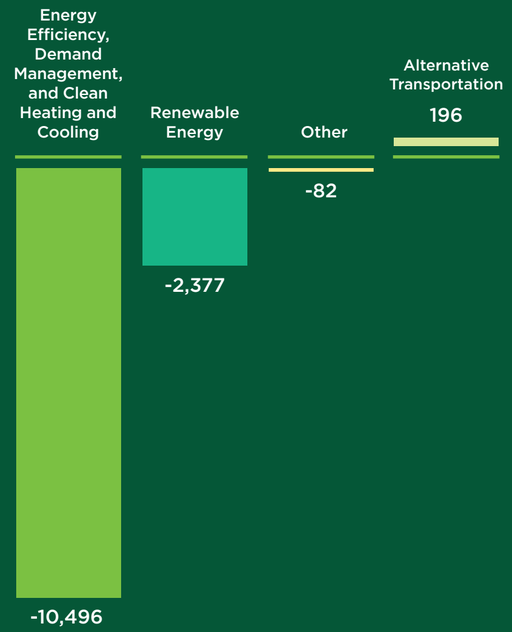


CLEAN ENERGY JOBS BY SECTOR[6]

While Energy Efficiency, Demand Management, and Clean Heating and Cooling remains the clean energy sector with the highest number of jobs, the sector experienced the greatest decline between the 2020 and 2021 reports, at **13%**. Comparatively, Renewable Energy employment declined by **9%** and Alternative Transportation employment increased by **8%**.

[6] Definitions for all clean energy sectors and sub-sectors can be found in the Glossary section of this report.

[7] 2021 job numbers represented in this report were collected through December of 2020 and represent the net change in employment compared to December of 2019.



MassCEC Wind Technology Testing Center, Charlestown, MA. Photo courtesy of Mike Condon

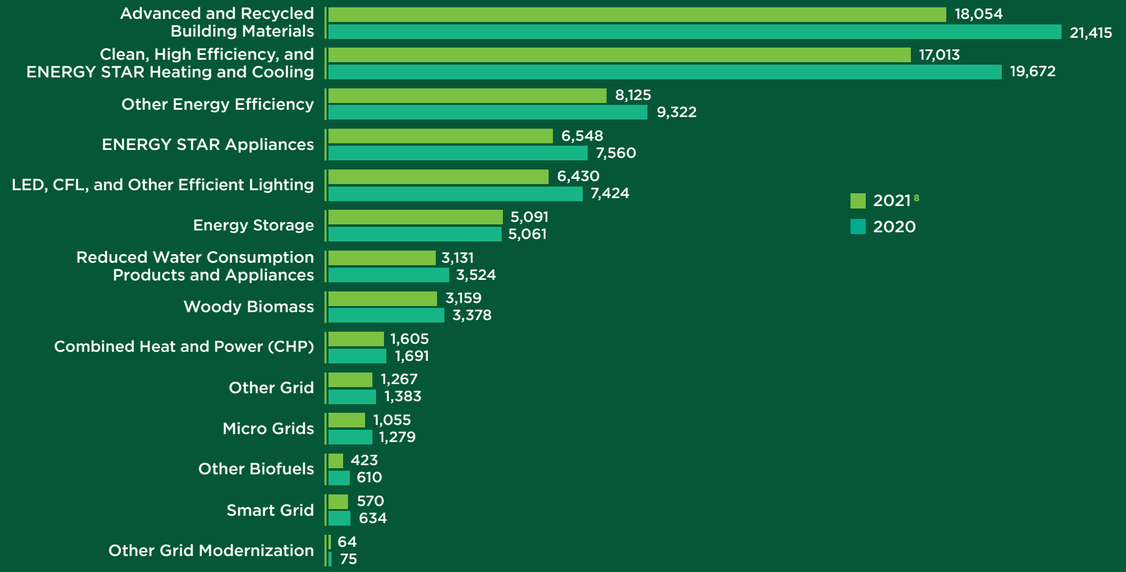
IMPACT OF COVID-19 JOBS BY SECTOR

The economic impact of COVID-19 was experienced across the clean energy industry. The Energy Efficiency, Demand Management, and Clean Heating and Cooling sector experienced the greatest number of job losses, **10,500** jobs, accounting for **82%** of overall net clean energy jobs lost between December 2019 and December 2020. Renewable Energy businesses also shed roughly **2,400** workers, accounting for **19%** of net clean energy job losses during the same time.

The Alternative Transportation sector was the only clean energy sector that experienced job gains throughout 2020, with **196** workers added.

ENERGY EFFICIENCY, DEMAND MANAGEMENT, AND CLEAN HEATING AND COOLING JOBS

Energy Efficiency, Demand Management, and Clean Heating and Cooling jobs continue to make up the largest portion of clean energy jobs within Massachusetts. Advanced Materials and Recycled Building Materials saw the largest decrease, with almost **3,400** jobs lost between December 2019 and December 2020, followed by Clean, High Efficiency, and ENERGY STAR Heating and Cooling with **2,700** jobs lost.



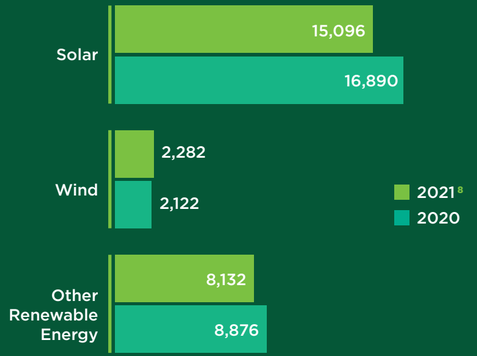
RENEWABLE ENERGY JOBS

Wind energy grew by **8%** between December 2019 and December 2020, adding about **160** new jobs. This sub-sector is likely to see accelerating growth as offshore wind projects in the region enter the construction phase. The country's first commercial-scale offshore wind farm, the **800** MW Vineyard Wind 1 project, commenced onshore construction in November 2021. Additional projects in the southern New England wind energy areas totaling almost **6,200** MW have firm contracts to sell power in Massachusetts and other states and are advancing through permitting reviews.

Despite job losses in the solar industry, Massachusetts continues to be a national solar industry leader and is ranked **5th** for the most solar workers and **6th** for the most solar workers per capita.[9]

[8] 2021 job numbers represented in this report were collected through December of 2020 and represent the net change in employment compared to December of 2019.

[9] Solar Energy Industries Association. National Solar Jobs Census 2020.



ALTERNATIVE TRANSPORTATION JOBS

The Massachusetts Electric Vehicles workforce increased between December 2019 and December 2020, creating over **190** jobs for a growth rate of **8%**. Growth in this sector was also seen nationally, likely paired with growth in electric car sales.

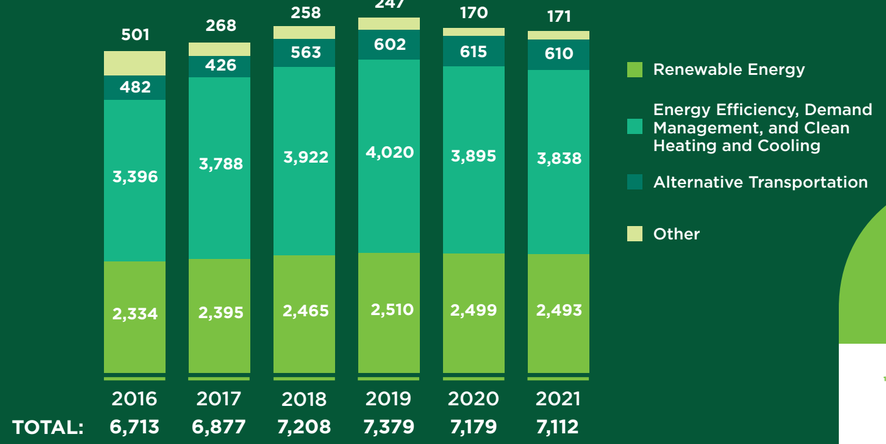
[10] 2021 job numbers represented in this report were collected through December of 2020 and represent the net change in employment compared to December of 2019.

CLEAN ENERGY BUSINESSES

The overall number of clean energy businesses[11] in Massachusetts decreased slightly by **1%** relative to the year before, with the majority (**54%**) of businesses remaining focused on Energy Efficiency, Demand Management, and Clean Heating and Cooling.

Similar to previous years, small businesses (1 to 10 employees) account for **61%** of all clean energy firms, followed by mid-size businesses (11 to 49 employees), which represent **25%** of clean energy businesses.

As of December 2020, **33%** of firms indicated not having an adequate number of qualified employees to meet current needs.



7,112
clean energy businesses in 2021

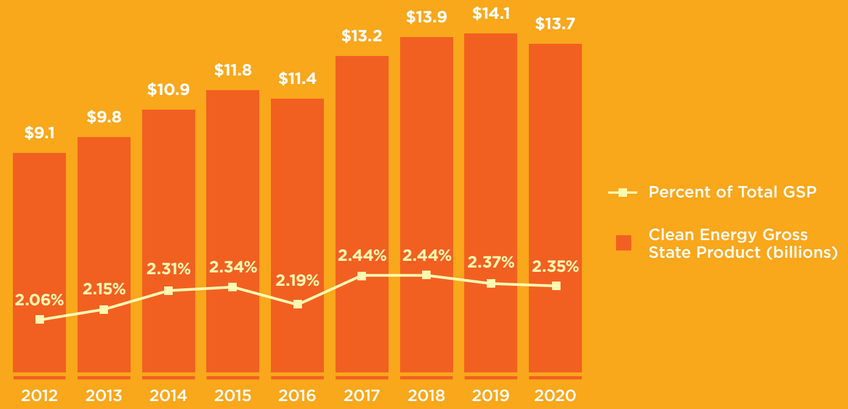
[11] For purposes of this report, a business is an establishment location. A clean energy business or firm with multiple locations would be counted multiple times in this analysis, based on the number of unique locations.

CLEAN ENERGY GROSS STATE PRODUCT

The clean energy industry contributed **$13.7 billion**, or roughly **2.4%**, to the Commonwealth's Gross State Product (GSP) in 2020.[12]

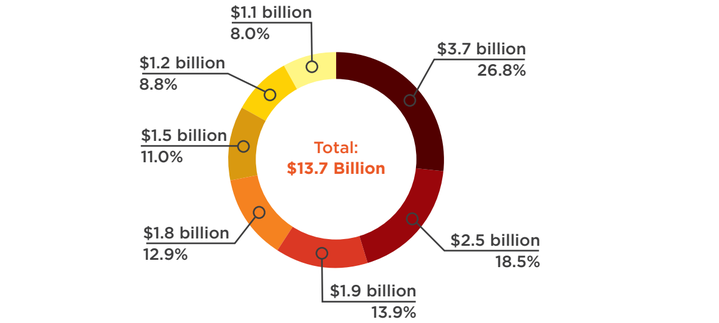
The industry's GSP increased by **50%** from 2012-2020. This outpaces overall growth in Massachusetts GSP, which grew by **31%** over the same time.

Clean energy GSP decreased by **2.9%** (over **$414 million**) between 2019 and 2020 due to the economic impacts of COVID-19.



[12] 2020 data is the most recent available. The clean energy GSP was derived from survey incidence rates and proportional revenue reporting, together with existing data from the Bureau of Economic Analysis, calculated by NAICS code. Utility data and state government spending were included as direct inputs.

Air-source heat pump installation. Photo courtesy of Jay Moody Heating & AC



CLEAN ENERGY GROSS STATE PRODUCT BY VALUE CHAIN

Both Sole Proprietors and Other Services[13] categories experienced growth of over **13%** compared to the previous year, followed by the Professional Services category, with over **9%** growth. Manufacturing accounted for **27%** of the total clean energy contributions to GSP in 2020, followed by Other Services with **19%** of total clean energy GSP.

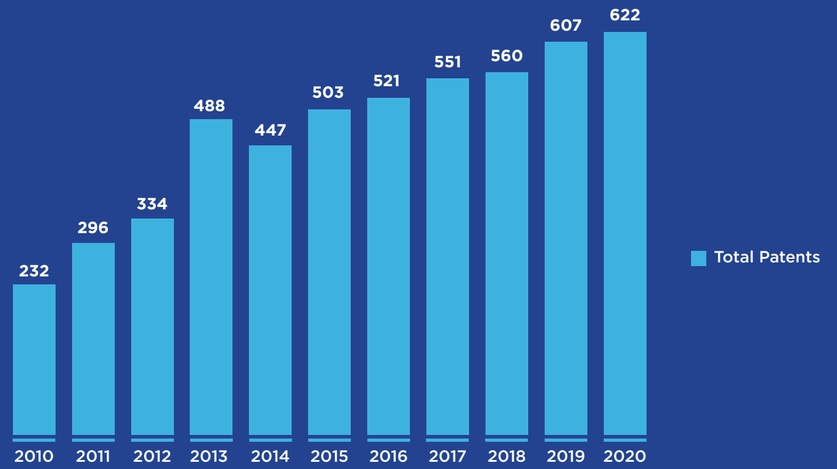
[13] Other Services includes categories like business organizations, utilities, nonprofits, and select government organizations that are all directly involved in clean energy.

CLEAN ENERGY WORKER DEMOGRAPHICS

The representation of workers by demographic group as a percentage of the clean energy workforce remained roughly unchanged from the 2020 to 2021 reports. While the Massachusetts clean energy industry is somewhat diverse, it is imperative that the industry continue to provide and support opportunities for women and people of color.[14]

[14] Data for age, race, ethnicity, and gender is from: https://www.bls.gov/lau/ptable14full2020.htm. Due to lack of BLS data, population percentages for Asian and Two or more races categories were sourced from jobseq.com. Veteran employment is from: https://www.bls.gov/news.release/vet.t06a.htm & BLS QCEW 2020 Annual Employment for Massachusetts.

	2021 Clean Energy Employment	Percent of 2021 Clean Energy Workforce	Percent of 2021 Overall MA Workforce
Male	71,823	71.0%	51.7%
Female	29,385	29.0%	48.3%
Hispanic or Latinx	16,546	16.3%	10.8%
Not Hispanic or Latinx	84,662	83.7%	89.2%
White	74,158	73.3%	80.9%
Black of African American	7,948	7.9%	8.6%
Asian	8,589	8.5%	6.6%
American Indian or Alaska Native	1,187	1.2%	0.5%
Native Hawaiian or other Pacific Islander	847	0.8%	0.1%
Two or more races	8,479	8.4%	3.3%
Veterans	10,006	9.9%	4.0%
Workers over the age of 55	13,487	13.3%	25.8%



NEW CLEAN ENERGY PATENTS[15]

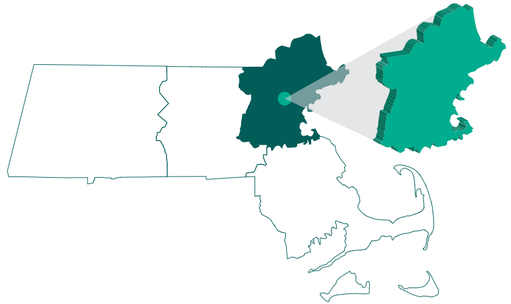
Patents across time are a helpful proxy for innovation. Clean energy patents have increased by nearly **168%** since 2010. With the exception of 2013 to 2014, there has been steady growth in clean energy patent filings from Massachusetts innovators over the last decade. Between 2019 and 2020, clean energy patent filings grew by **2.5%**.[16]

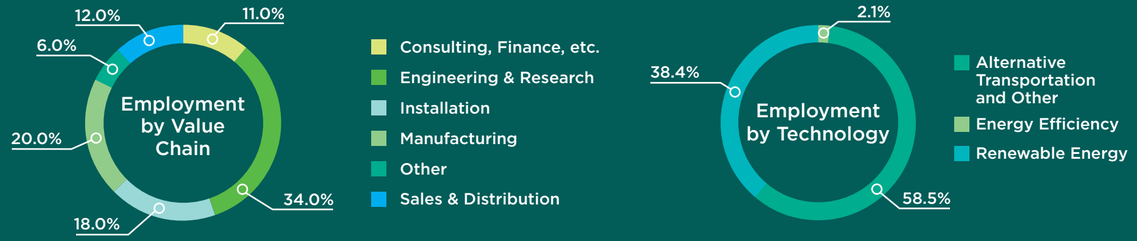
[15] PatentsView. United States Patent and Trademark Office (USPTO).

[16] The patents data for this report is based on data from the USPTO PatentsView Database. The data is organized and tagged using the Cooperative Patent Classification (CPC) system. BW Research uses these CPC codes to identify which patents are related to MassCEC's clean technology definition. This year's data pull included an update to the methodology for categorizing clean technology patents, based on expanded access to the USPTO PatentsView Database, accounting for inclusion of a broader swath of patents not captured in previous reports. As a result, the patents data for this year's reports is higher compared to last year's report.

NORTHEAST REGION

The Northeast region employs **49%** of clean energy workers and is home to over **46%** of clean energy businesses. Roughly **34%** of the clean energy jobs in the region are in Engineering and Research and **38%** are in Renewable Energy.



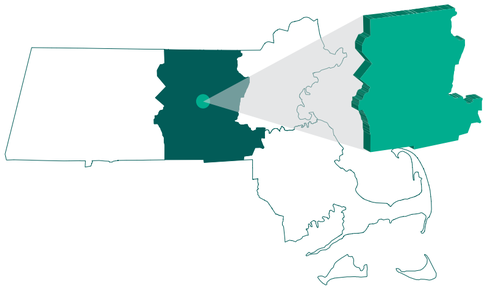


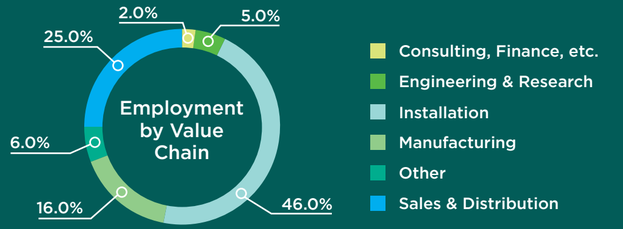
CHANGES IN NORTHEAST REGION, 2020 REPORT TO 2021 REPORT

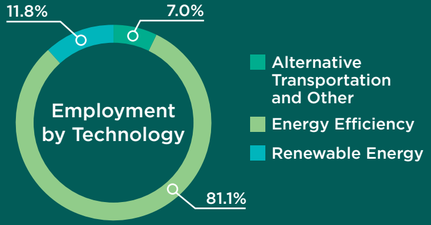
	2020 Report	2021 Report	2020–2021 Report Change	2021 Percent of Clean Energy Total in MA	2021 Percent of Total Jobs/ Businesses in Region
Employment	55,236	49,398	-10.6%	48.8%	2.7%
Businesses	3,321	3,301	-0.6%	46.4%	2.8%

CENTRAL REGION

The Central region employs the largest percentage of clean energy employees and businesses relative to the total number of jobs and businesses in the region, at **5.0%** and **4.1%** respectively. The region has the highest percentage of its clean energy workers focused on Alternative Transportation, at **7%**, and **46%** of the clean energy jobs are in Installation.





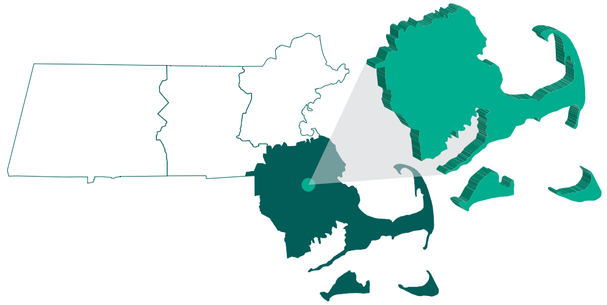


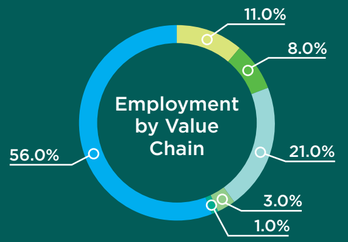
CHANGES IN CENTRAL REGION, 2020 REPORT TO 2021 REPORT

	2020 Report	2021 Report	2020–2021 Report Change	2021 Percent of Clean Energy Total in MA	2021 Percent of Total Jobs/ Businesses in Region
Employment	18,344	16,370	-10.8%	16.2%	5.0%
Businesses	1,111	1,099	-1.1%	15.5%	4.1%

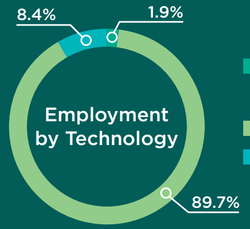
SOUTHEAST REGION

The southeast region has **56%** of its clean energy jobs in Sales & Distribution and **90%** of clean energy jobs focused on Energy Efficiency, Demand Management, and Clean Heating and Cooling.





- Consulting, Finance, etc.
- Engineering & Research
- Installation
- Manufacturing
- Other
- Sales & Distribution



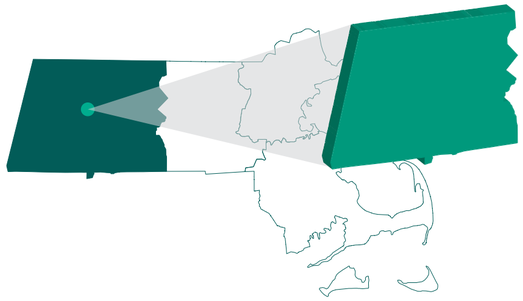
- Alternative Transportation and Other
- Energy Efficiency
- Renewable Energy

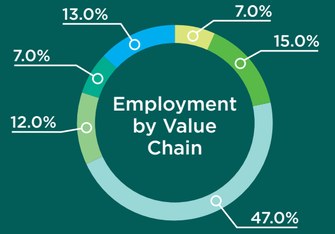
CHANGES IN SOUTHEAST REGION, 2020 REPORT TO 2021 REPORT

	2020 Report	2021 Report	2020–2021 Report Change	2021 Percent of Clean Energy Total in MA	2021 Percent of Total Jobs/ Businesses in Region
Employment	27,001	23,318	-13.6%	23.0%	2.8%
Businesses	1,694	1,675	-1.1%	23.6%	2.3%

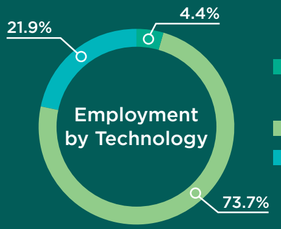
WESTERN REGION

The Western region had the second highest percentage of clean energy jobs and businesses relative to total jobs and businesses in the region, at **3.6%** and **3.3%** respectively. Installation jobs represent **47%** of the clean energy jobs, and **74%** of jobs are focused on Energy Efficiency, Demand Management, and Clean Heating and Cooling.





- Consulting, Finance, etc.
- Engineering & Research
- Installation
- Manufacturing
- Other
- Sales & Distribution



- Alternative Transportation and Other
- Energy Efficiency
- Renewable Energy

CHANGES IN WESTERN REGION, 2020 REPORT TO 2021 REPORT

	2020 Report	2021 Report	2020–2021 Report Change	2021 Percent of Clean Energy Total in MA	2021 Percent of Total Jobs/ Businesses in Region
Employment	13,387	12,122	-9.4%	12.0%	3.6%
Businesses	1,053	1,036	-1.6%	14.6%	3.3%

METHODOLOGY

The Massachusetts 2021 Clean Energy Industry Report uses publicly available data from the 2021 U.S. Energy and Employment Report (USEER)[17] on Massachusetts energy employment produced by BW Research Partnership for the Energy Futures Initiative (EFI) and the National Association of State Energy Officials (NASEO). These public data are refined and customized for Massachusetts based on additional analyses conducted on behalf of the Massachusetts Clean Energy Center by BW Research Partnership.

The 2021 USEER survey in Massachusetts involved more than 21,900 calls and 3,680 emails, with 1,308 businesses participating in the survey. 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 is +/- 4.78 percent at a 95 percent confidence level.

See the full Expanded Methodology for more details on the 2021 Massachusetts Clean Energy Industry Report.[18]

[17] The full 2021 USEER report can be found at: www.usenergyjobs.org/

[18] The 2021 Clean Energy Industry Report Expanded Methodology can be found at: www.masscec.com/2021-massachusetts-clean-energy-industry-report/methodology

GLOSSARY

Activity

For the purposes of this report, an establishment's activity refers to the primary value-chain industry to which it most associates its work. Activities include research, development and engineering; manufacturing, sales, and distribution; installation and maintenance; legal, finance, and other professional services; and other.

Advanced and Recycled Building Materials

Includes doors, windows, air sealing, floor, wall, or piping insulation and any additional building envelope materials that represent advances in efficiency over traditional materials.

Clean Energy Business or Establishment

For the purposes of this report, a clean energy business or establishment is a business location in Massachusetts with at least one employee that is involved with an activity related to the clean energy industry.

Clean Energy Industry

The aggregate of establishments that are directly involved with researching, developing, producing, manufacturing, distributing, or implementing components, goods, or services related to Renewable Energy, Energy Efficiency or Conservation, Smart Grid, Energy Storage, and/or Electric or Hybrid Vehicles.

Clean, High Efficiency, and ENERGY STAR Heating and Cooling

Includes the following

ENERGY STAR/High AFUE HVAC

HVAC that meets the international ENERGY STAR standard for energy efficient consumer products originated in the United States or has high Average Fuel Utilization Efficiency (AFUE) rating of 90 or greater or 15 SEER or greater.

Renewable Heating and Cooling

Refers to establishments that are involved with heating, ventilation, and air conditioning (HVAC) and water heating from renewable energy sources or work that increases the energy efficiency of HVAC systems.

Clean Energy Worker

Full-time and part-time permanent employees who support the clean energy portion of the business, including administrative staff and excluding interns and other temporary workers.

Combined Heat and Power (CHP)

Generating electricity and useful thermal energy in a single, integrated system. Heat that is normally wasted in conventional power generation is recovered as useful energy.

Electric Vehicles

A vehicle that uses one or more electric motors for propulsion with no onboard generator or non-electric motor.

ENERGY STAR Appliances

Appliances that meet the international ENERGY STAR standard for energy efficient consumer products originated in the United States.

Energy Storage

Includes the following

Pumped Hydro Storage

Hydroelectric energy storage used by electric power systems for load balancing. The method stores energy in the form of gravitational potential energy of water, pumped from a lower elevation reservoir to a higher elevation.

Battery Storage

Using a cell or connected group of cells to convert chemical energy into electrical energy by reversible chemical reactions and that may be recharged by passing a current through it in the direction opposite to that of its discharge.

Mechanical Storage

Includes technologies like flywheels and compressed air, which use kinetic or gravitational forces to store energy.

Thermal Storage

Temporary storage of energy for later use when heating or cooling is needed.

Firm

A business organization, such as a corporation, company, or partnership. A firm can have multiple establishment locations.

Gross State Product (GSP)

Gross State Product is a measurement of a state's output. It is the sum of value added from all industries in the state. In this report, clean energy is captured as a portion of the total Gross State Product.

LED, CFL, and Other Efficient Lighting

Energy efficient lighting sources.

Micro Grids

A group of interconnected loads and distributed energy resources within clearly defined electrical boundaries that acts as a single controllable entity with respect to the grid.

Other Alternative Transportation

Includes jobs in technologies such as biodiesel for on-road vehicles.

Other Biofuels

Other fuel derived directly from living matter.

Other Energy Efficiency

Includes variable speed pumps, other design services not specific to a detailed technology, software not specific to a detailed technology, energy auditing, rating, monitoring, metering, and leak detection, policy and nonprofit work not specific to a detailed technology, consulting not specific to a detailed technology, LEED certification, phase-change materials, or all other activities not specific to a detailed technology.

GLOSSARY

Other Grid

This sub-technology includes all other clean grid activity, where employers were unable to assign work to a single sub-technology. This includes firms that conduct clean grid activity across multiple sub-technologies.

Other Grid Modernization

Other modernization of the nation's electricity transmission and distribution system to maintain a reliable and secure electricity infrastructure that can meet future demand growth.

Other Renewable Energy

Includes geothermal, bioenergy or biomass, low impact hydro, and other electric power generation detailed technologies that are not defined by the categories presented or cannot be assigned to a single category.

Other Sector

Consists of all jobs that could not be classified into one specific clean energy technology sector because the work overlaps with multiple categories. An example of this could be greenhouse gas management or accounting.

Other Services

Includes categories like business organizations, utilities, nonprofits, and select government organizations that are all directly involved in clean energy.

Professional Services

Any sort of finance, legal, architecture, or other mathematical or scientific services that support clean energy technology development and deployment.

Reduced water consumption products and appliances

Includes technologies such as high efficiency washing machines, faucet aerators, and low flow shower heads.

Smart Grid

An electricity supply network that uses digital communications technology to detect and react to local changes in usage.

Sub-technology

For the purposes of this report, sub-technology refers to the specific technologies with which an establishment works, within each technology area. The sub-technologies for Energy Efficiency and Renewable Energy are listed under the respective definitions.

Technology

For the purposes of this report, technology refers to the primary application or end use of an establishment's produced goods or services.

Wind

Technologies that convert the wind's kinetic energy into electrical power.

Woody Biomass

Fuel developed from the by-product of management, restoration, and hazardous fuel reduction treatments, as well as the product of natural disasters, including trees and woody plants (limbs, tops, needles, leaves, and other woody parts, grown in a forest, woodland, or rangeland environment).

Harbor Village, a Passive House multifamily affordable housing building in Gloucester, MA. Photo courtesy of Action Inc.

2021 MASSACHUSETTS CLEAN ENERGY INDUSTRY REPORT

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