

Massachusetts Clean Energy Industry Census

August 2007



MASSACHUSETTS
TECHNOLOGY
COLLABORATIVE

RENEWABLE ENERGY TRUST

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Westborough, MA 01581

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Table of Contents

I. Results and Analysis.....	1
Highlights.....	1
Innovation and Incubation in Massachusetts	1
The Massachusetts Clean Energy Sector Is Booming.....	2
Poised to be in Top 10 Industries in Massachusetts	3
116 Companies Founded since 2001	4
Small Firms Comprise Two-Thirds of the Cluster.....	5
CEOs Focus Efforts on Revenues and Funding.....	5
Early-Stage Funding Is in High Demand.....	6
Local Customers Are Crucial to Companies.....	6
Massachusetts Companies May Miss Growth	6
California Is Massachusetts' Top Competitor	7
II. Analysis: Keeping Massachusetts Competitive	8
III. Additional Census Charts and Tables	9
Map: Clean Energy Jobs in Massachusetts	9
Map: Clean Energy Companies in Massachusetts.....	10
Employees by Sub-Industry and Year of Company Formation	11
Massachusetts Employees by Sub-Industry.....	12
Employment Growth Rate by Sub-Industry.....	13
Company Total Revenues by Sub-Industry.....	14
Company Revenues Attributable to Clean Energy by Sub-Industry	15
Expected Revenue Growth Rates by Company Size	16
IV. Entities Included in Census.....	17
V. Census Methodology	24
VI. Survey Questions	25

I. Results and Analysis

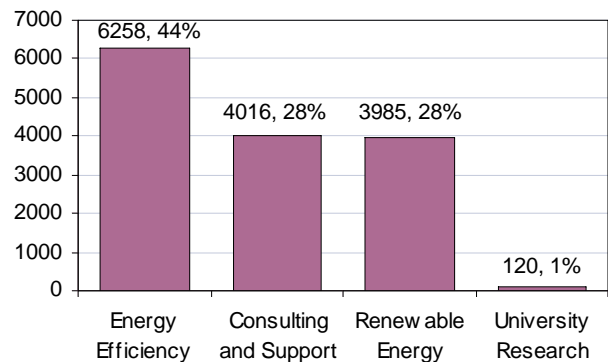
Highlights

- **Jobs:** Massachusetts’ clean energy cluster supports 14,400 jobs and is poised to be 10th largest cluster in the state.
- **Growth Rate:** Surveyed executives expect 30% job growth in renewable energy firms and 25% for energy efficiency firms over the next year. Weighting by existing employment, growth is still predicted to be 20%. This would be more than 3 times greater than the next fastest growing cluster in the state grew over the past year.
- **Fastest Growing Sector:** Renewable energy companies are the youngest and fastest growing firms.
- **Largest Job Sector:** Energy efficiency and demand response firms supply almost 6,300 jobs, or 44% of the total 14,400 jobs.
- **Company Size:** Massachusetts is an incubator for clean energy firms, with 68% of the firms operating below \$10 million in annual revenues, and 41% below \$1 million.
- **State Competitor:** Surveyed companies rate California as the most supportive region for building a clean energy cluster.
- **Survey Size:** 302 entities (companies, government agencies, and university research centers) responded to the census survey.
- **Jobs Database Size:** 556 entities, including the 302 that responded to the survey, were included in the jobs estimate.

Innovation and Incubation in Massachusetts

Massachusetts has a growing, diverse group of start-up companies coalescing with long-established companies into a clean energy technology and services industry. With 14,400 people employed in the sector, Massachusetts has a starting critical mass of technology developers, entrepreneurs, investors, and service specialists. These highly skilled and educated people operate within four industry sub-segments:

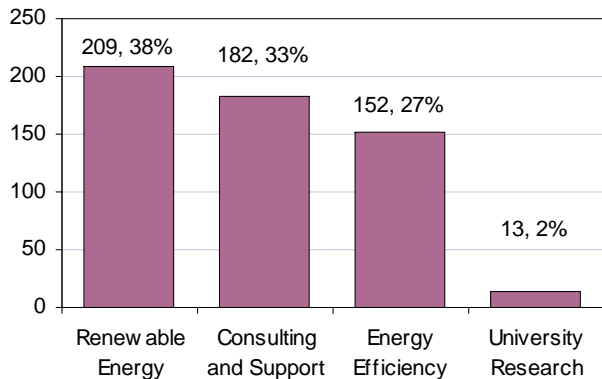
14,400 Clean Energy Jobs In Massachusetts (Jobs)



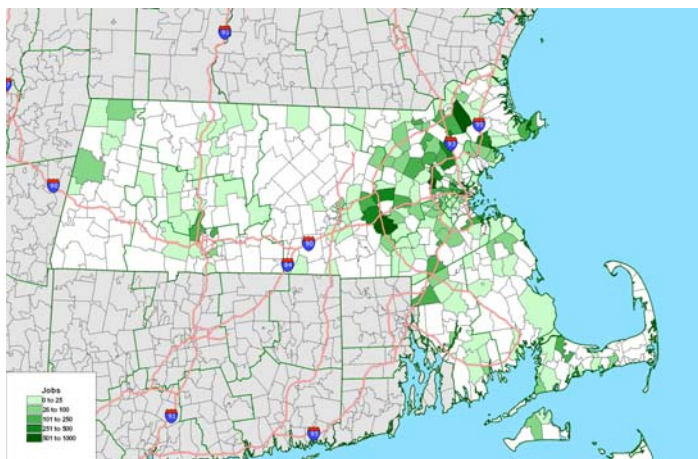
- **Renewable Energy.** There are two categories of renewable energy entities: 1) companies that develop new renewable energy technologies, such as more efficient solar panels, and 2) companies that design, engineer, finance, and/or construct renewable energy systems. Renewable energy technologies include solar photovoltaic systems, solar-assisted fuel cells, bio-energy fuels, wind power, and wave systems. (This report includes all fuel companies in the renewable energy part of the cluster, even though fuel cells may be powered by sources like natural gas that are not renewable.)
- **Energy Efficiency / Demand Response.** Energy efficiency companies develop, manufacture, or install systems that cut energy waste, such as light-emitting diode (LED) lighting, building controls, and energy-efficient appliances and machinery. Companies in this category include Color Kinetics and Ember. Demand response companies develop and/or install controls to help consumers cut peak power demand. Companies include EnerNOC and Ambient Corporation.
- **Consulting and Support.** Support companies provide services across all industries. This survey includes only firms and jobs with identified clean energy staff. Support companies provide legal, financial, and consulting services. Financial services include angel investors and venture capital firms.
- **University Research Centers.** Universities and private laboratories drive innovation, fueling the next generation of new companies. This survey includes only staff identified with clean energy research and development. In Massachusetts, research centers include such specialties as fuel cell, wind power, solar, and wave power research.

556 Companies Identified In MA Cluster

(Companies, Agencies, and University Research Centers)



Clean Energy Jobs by Municipality



Note: A full-sized map is available in the Appendix.

The Massachusetts Clean Energy Sector Is Booming

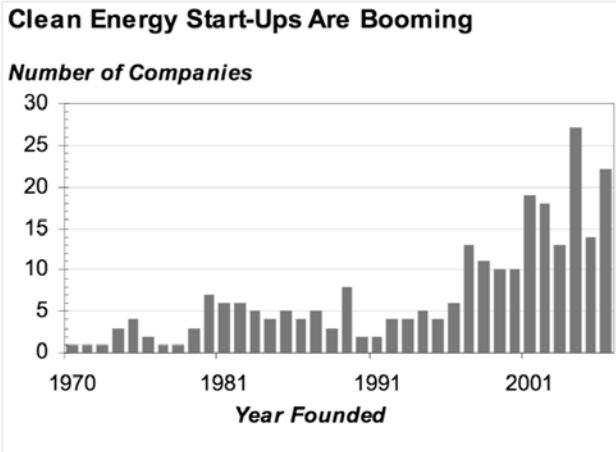
With a 15% compound annual growth rate in new company formations since 1995, the clean energy sector has been booming. The boom is leading company executives to forecast hiring more employees, with a predicted average annual employee growth rate ranging from 11% for universities to 30% for renewable energy companies. This growth rate is a function of the high weighting of very small start-up companies—comprising 1 to 5 employees—that normally have high growth rates. Weighted by existing employees, the growth rate is still a robust 20%.

In Massachusetts, start-up ventures are created or assisted by:

- Company spin-outs from universities, such as the University of Massachusetts, MIT, Worcester Polytechnic Institute, and Boston University, as well as private laboratories, such as TIAX and Draper Labs. Such spin-out companies include Konarka, Solasta, MTPV, and Lilliputian Systems.
- The Renewable Portfolio Standard, which provides a market and revenue stream for renewable energy project developers. Projects built in recent years have included landfill gas, biomass, and wind developments.
- Talented people who started new companies after their employers, such as Polaroid and Schott Solar, implemented involuntary staff reductions. Nanoptek is one such start-up company.
- Market solicitations for demand response offered by New England’s electricity grid operator, ISO New England. In addition, ISO New England’s new forward capacity market will encourage capacity investments in renewable energy projects and demand response.
- Programs offered by the Massachusetts Technology Collaborative such as the Green Schools Initiative, the SEED Initiative, the Large Onsite Renewables Initiative, and the Massachusetts Green Power Partnership. Companies that have benefited from these programs include Nuvera Fuel Cells, Acumentrics, Konarka, Zapotec Energy, Commonwealth Resource Management, Agrivida, and Ze-gen. Early investments by MTC helped Evergreen Solar to thrive, leading to the recently announced plan for their \$150 million expansion in Massachusetts, also partially funded by MTC.

Massachusetts Clean Energy Industry Census

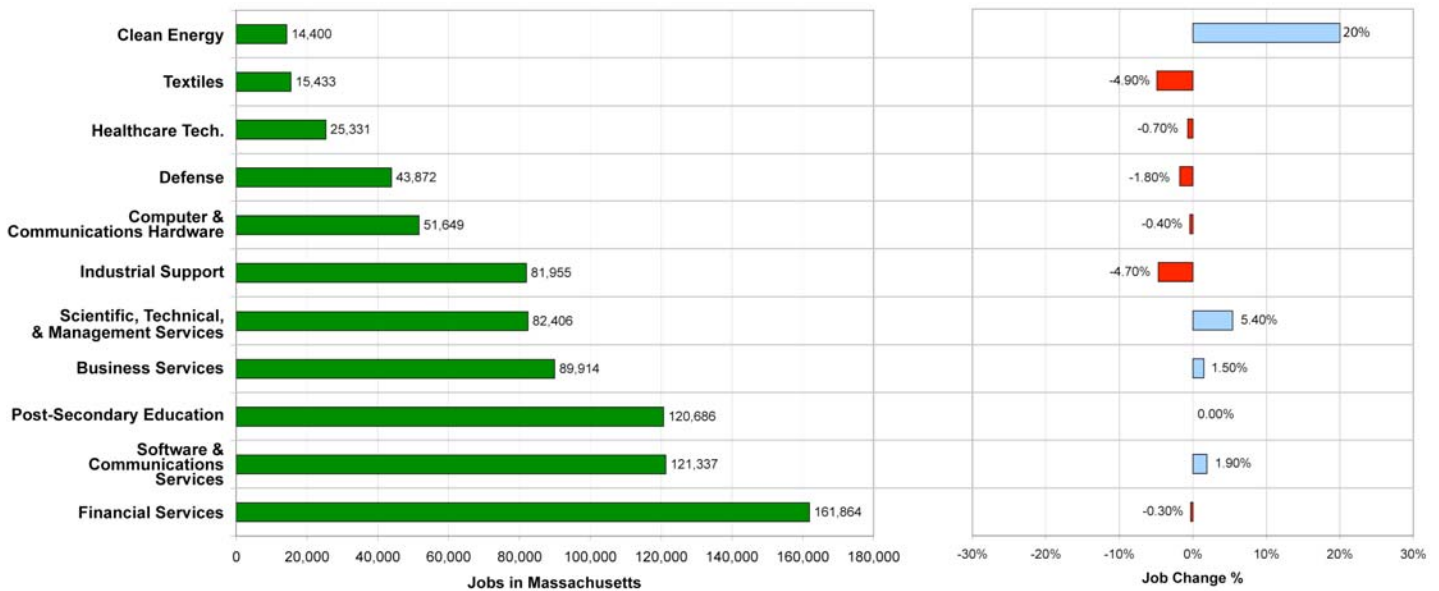
- Entrepreneur training and programs offered by the MIT Enterprise Forum and the Massachusetts Technology Transfer Center, such as the Ignite Clean Energy Business Presentation Competition and the Conference on Clean Energy. Companies helped by these programs include Solasta, Stellaris, and PowerHouse Enterprises.
- Monthly events and networking from industry and college groups such as the Massachusetts Hydrogen Coalition, the Solar Energy Business Association of New England, the Northeast Sustainable Energy Association, the MIT Energy Club, the New England Energy Innovation Collaborative, and the Northeast Energy and Commerce Association.
- Clean energy services and technology programs offered at community colleges across the state. Cape Cod, Berkshire, and other community colleges offer programs and curriculum to support the development of the clean energy workforce.
- A vibrant venture capital and legal services industry. For instance, companies that have benefited include Evergreen Solar, Lilliputian Systems, and Advanced Electron Beams, which received funding from Rockport Capital.
- Collaboration and networking services offered by Raab Associates, which brings stakeholders together each month to discuss critical issues affecting electricity markets.



Poised to be in Top 10 Industries in Massachusetts

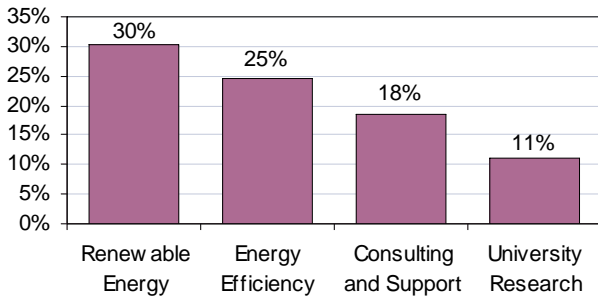
Benchmarking the jobs and growth against the John Adams Innovation Institute’s 2006 *Index of the Massachusetts Innovation Economy*, Clean Energy is due to overtake “Textiles and Apparel” as the 10th largest industry cluster in the state. With an expected average growth rate of 20%, Clean Energy is poised to grow more than three times faster than any other large sector grew over the past year.

Clean Energy Will Be a Top 10 Industry in Massachusetts



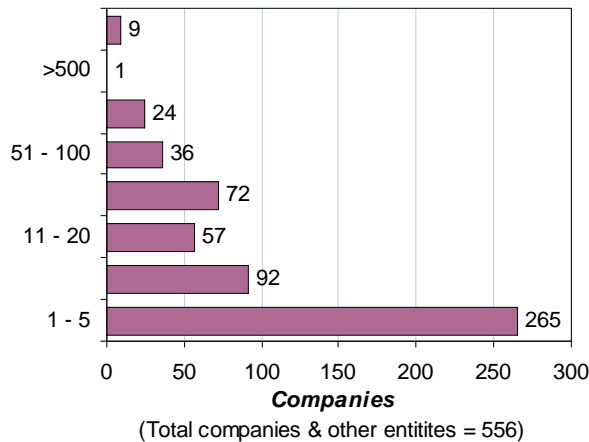
High Employee Growth Expected

(Projected average growth rates)



One-Half of Firms Have Less Than 5 Employees

Employees



116 Companies Founded since 2001

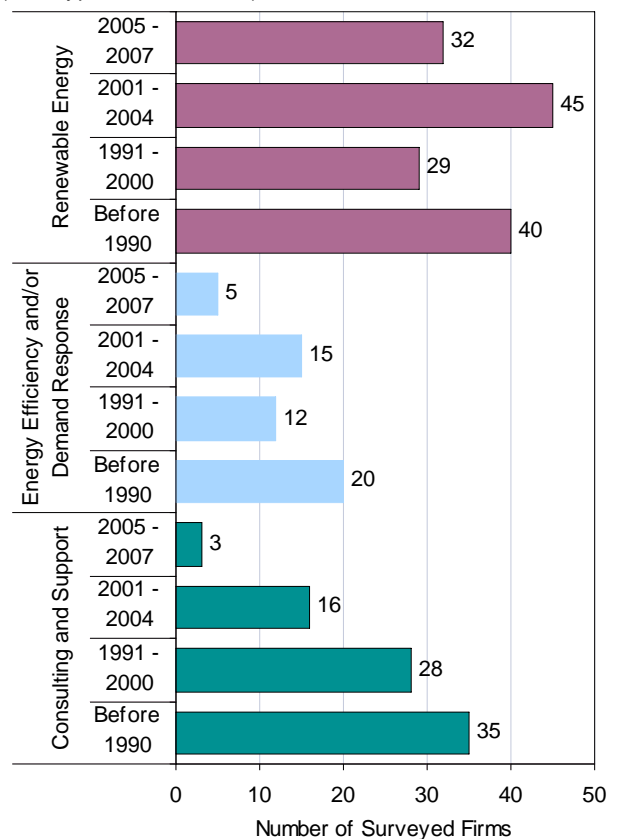
Within the survey group, 77 renewable energy companies were formed between January 2001 and March 2007. This high rate of company formation compares to 20 and 19 companies for the energy efficiency and consulting sectors, respectively.

These new companies are able to grow quickly, using the rich base of experienced people in the Commonwealth, who entered the industry following the energy crisis of the late 1970s and early 1980s. This earlier period saw the rise of a cohort of Massachusetts-based energy efficiency firms, such as XENERGY, Conservation Services Group, DMC, and NORESCO.

While these companies have evolved through mergers and acquisitions, they still provide jobs and a skilled, knowledgeable workforce to the region. In addition, alumni of these companies have formed other energy start-ups such as AMERESCO and Nexus Energy Software.

Renewable Energy Firms Are The Youngest

(Firm Type, Year Founded)



Massachusetts Clean Energy Industry Census

Today, the established energy efficiency and consulting firms are joined by new renewable energy companies, such as Mascoma, UPC, Verenium Corp. (formerly Celunol), Second Wind, World Energy Alternatives, Cape Wind, and Northeast Biodiesel.

Energy efficiency and renewable energy are leading the growth of start-ups as state and federal policy makers promote research funding and new regulations to foster energy independence, natural gas and electricity price stability, and lower carbon dioxide (CO₂) emissions.

Small Firms Comprise Two-Thirds of the Cluster

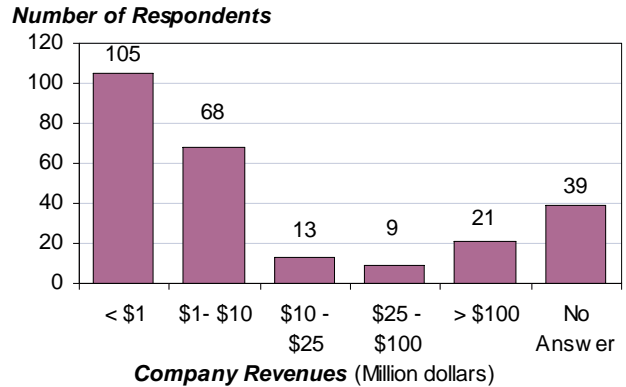
Confirming Massachusetts’ strong incubation infrastructure, the survey revealed that 173 companies out of 255 respondents, or 68%, reported annual revenues under \$10 million, with 41%, or 105 companies, under \$1 million. This result implies that most Massachusetts companies are still in the product and market development phase, and are not yet ready to fund the hiring of sales and marketing staff to acquire customers. Some of these companies could substantially contribute to future job growth as they go to market.

CEOs Focus Efforts on Revenues and Funding

Among executives surveyed, the top concern for creating a profitable, sustainable company is money. Executives’ top money issues are: increasing customer sales revenues, raising capital, and obtaining government funding. Priorities for the use of funds include: completing product development, educating potential buyers about their company’s new product, and finding and hiring skilled people.

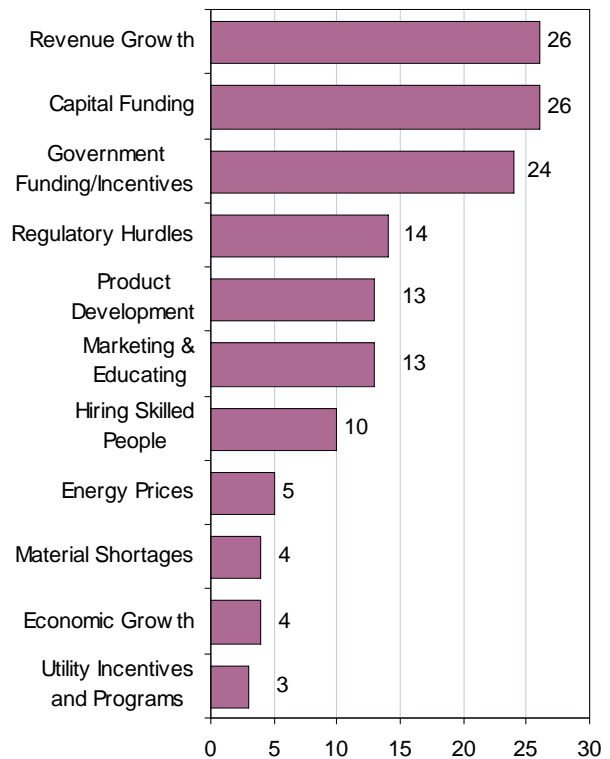
Also high on the list of concerns is overcoming market barriers that limit customer sales and profits, principally regulatory hurdles. Among the specific hurdles listed by respondents were: project-related permitting restrictions, regulatory uncertainty and risk, and net metering rules.

68% of Firms Are Under \$10 Million in Revenues



CEOs Mostly Worry About Money

(Responses)



Massachusetts Clean Energy Industry Census

Early-Stage Funding Is in High Demand

Respondents were asked to select all the financing sources they have used in their company's development. Self-funding by company employees ranked at the top of the list, followed by private equity, government grants, and angel investors. These financing sources are especially important to the early-stage companies and start-ups, reflecting the incubation nature of the Massachusetts clean energy industry.

Middle-stage financing from venture capital firms accounted for only 9% of the respondents' funding sources.

Company founders, who sought exit-stage financing, looked first to strategic investors (7%) and then to public stock offerings (3%).

Local Customers Are Crucial to Companies

Finding, selling to, and serving customers is expensive, requiring dedicated sales and service staff. The more innovative and complex the new product, the more effort is required to educate customers through one-on-one meetings. Worse, these meetings may stretch out for periods up to and even exceeding one year, as complex sales typically require long selling cycles. Not surprisingly, the survey respondents focus their sales efforts on Massachusetts, New England, and the Northeast—easily accessible markets offering a lower cost of sales.

Massachusetts Companies May Miss Growth

By focusing sales efforts on local customers, Massachusetts firms may limit their growth opportunities, as they may miss entering faster growing and larger markets. These other markets provide companies the opportunity to come up against more competitors, improving their firms' skills and capabilities. In addition, selling to other markets outside of Massachusetts brings revenues to Massachusetts employees and the economy.

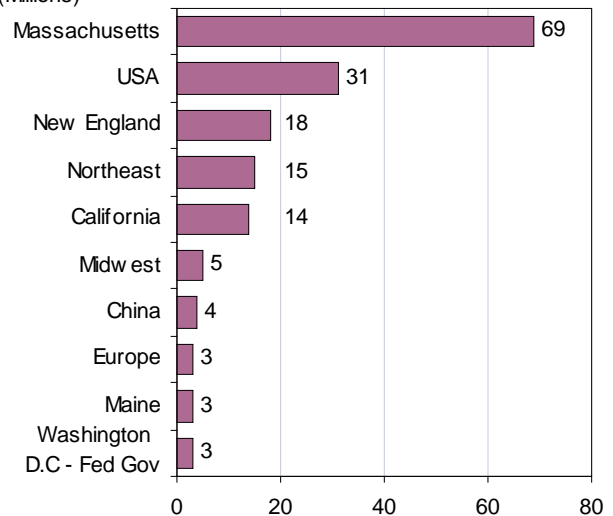
Financing Used By Companies

(Number of companies)

Financing Type	Companies	Percent
Employee-Financed	77	26%
Private Equity	42	14%
Grants	41	14%
Angels	32	11%
Venture Capital	28	9%
Other	23	8%
Strategic Investors	22	7%
Public Stock	9	3%
Cooperative	3	1%
Refused To Answer	20	7%
Total	297	100%

Most Revenues Are From Local Customers In Massachusetts And The Northeast

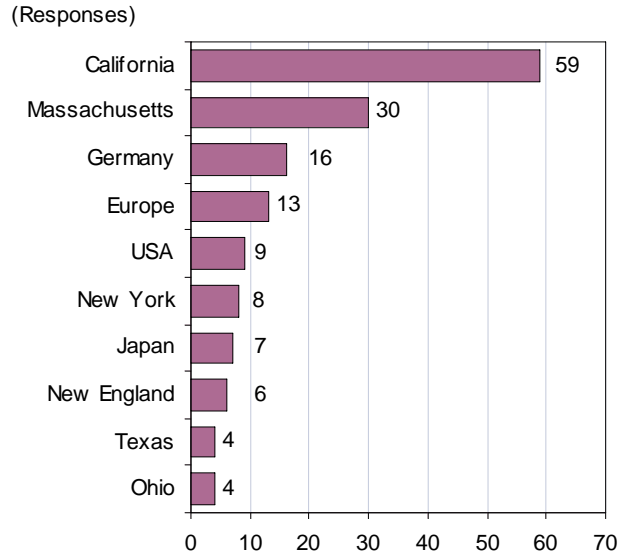
(Millions)



California Is Massachusetts' Top Competitor

Overwhelmingly, the survey respondents viewed California as the most supportive region for building a clean energy cluster. Many of the California programs are geared to driving demand for energy conservation, demand-response and smart metering, fuel efficiency, and renewable energy such as solar. These demand-related programs create regionally concentrated markets for start-up firms—speeding the firm's brand development, staff capabilities, and customer references. Time-to-market is critical as increasing clean energy federal and state regulatory mandates spur a rush of new competitors.

California Is Viewed As The Most Supportive Of Building A Clean Energy Cluster



II. Analysis: Keeping Massachusetts Competitive

Massachusetts has a proven ability to start new companies. The survey results point to strong entrepreneurial activity in the Commonwealth for innovative clean energy companies. The question that arises in this census, and that ought to inform future research, is how to help these companies evolve into a thriving Massachusetts-based industry? Responses to this census suggest three things to examine:

- **Barriers to Expansion:** What barriers threaten the prospects of nascent clean energy companies growing from start-up to the mature/profitable phase?

Based on the census, money-related issues top the list of concerns for clean energy CEOs generally. These included “revenue growth,” “capital funding,” and “government funding/incentives.” With 116 companies founded since 2001, early-stage capital is clearly an issue for these young companies. But another challenge for many of these companies is converting new technologies into reliable revenue streams. Wind energy companies, for example, face siting barriers that make it difficult for them to bring projects to completion. Similarly, the solar industry faces a number of barriers that impact the economics of photovoltaic panels. Policies and incentives that make solar power more economical to buy and install would greatly increase sales volume.

- **Regulation and Incentives:** How can the regulatory landscape in the Commonwealth better support the growth of clean energy companies?

The executives surveyed indicated that California was the place they considered most supportive of building a clean energy cluster.

The Golden State has in place state policies, regulatory structures, and financial incentives geared to driving demand for energy conservation, demand-response (smart metering, etc.), and renewable energy. These policies and programs spur market demand for and encourage innovation in clean energy companies. Ambitious energy efficiency policies that align the incentives of energy distribution companies with energy efficiency efforts, and additional state incentives for renewable energy and distributed generation could make

Massachusetts even more of a hotbed of clean energy entrepreneurship than it is.

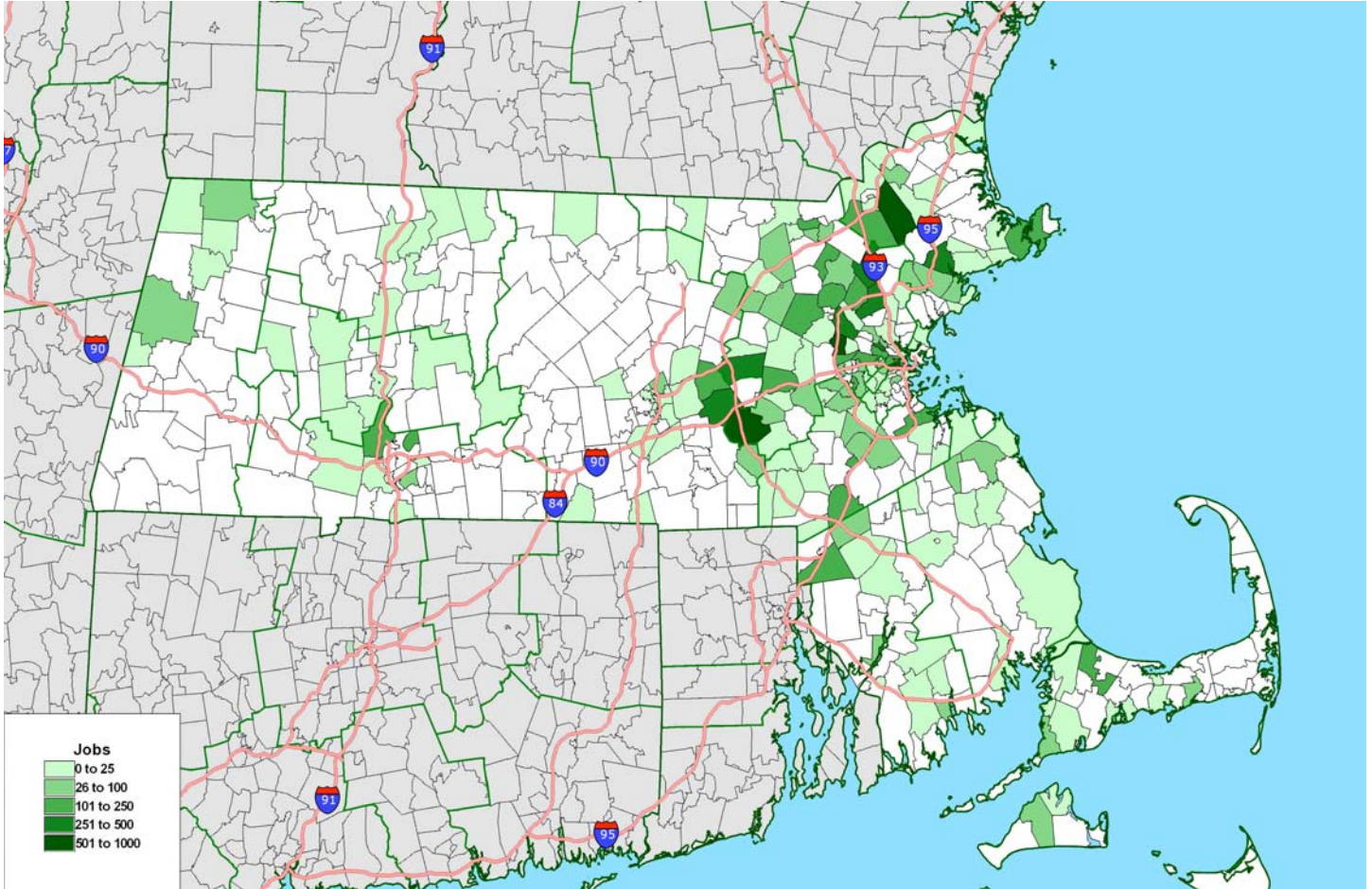
- **Creating a Regional Market:** How can Massachusetts become the hub of a regional market that supports Massachusetts-based clean energy companies?

Besides being seen as more supportive of clean energy, California has a significantly larger economy (\$1.7 trillion GSP 2006) than Massachusetts (\$338 billion GSP 2006). A market of equivalent scale here would have to be regional in nature. Although CEOs here report that their largest source of revenue currently is Massachusetts/New England/Northeast, growth will require greater demand for clean energy products and services. Some of this growth in regional demand could come from state energy policies and regional efforts to control greenhouse gas emissions. By limiting and putting a price on carbon dioxide emissions from large power plants and creating a market for “offsets” in 10 Northeastern states, the Regional Greenhouse Gas Initiative (RGGI) should create additional demand for energy efficiency and renewable energy products.

In addition, adopting more state policies and regulatory structures favoring energy efficiency and renewable energy are adopted by states across New England and throughout the Northeast should lead to continued growth of the Massachusetts-based clean energy cluster. Policies and regulatory schemes that could be considered include Renewable Portfolio Standards, decoupling of electricity distribution rates from sales volume to encourage utility promotion of efficiency improvements, energy efficiency mandates (energy efficiency portfolio standards, procurement requirements, etc.). In Massachusetts, the public utility commission has begun an inquiry into decoupling, while the Governor, House Speaker, and Senate President have agreed on a goal of meeting all electricity load growth through efficiency rather than additional power generation within three years. Rhode Island, Connecticut, and Maine have each passed legislation within the last year to promote efficiency and renewable energy. These developments bode well for growth of the clean energy sector in Massachusetts and throughout the region.

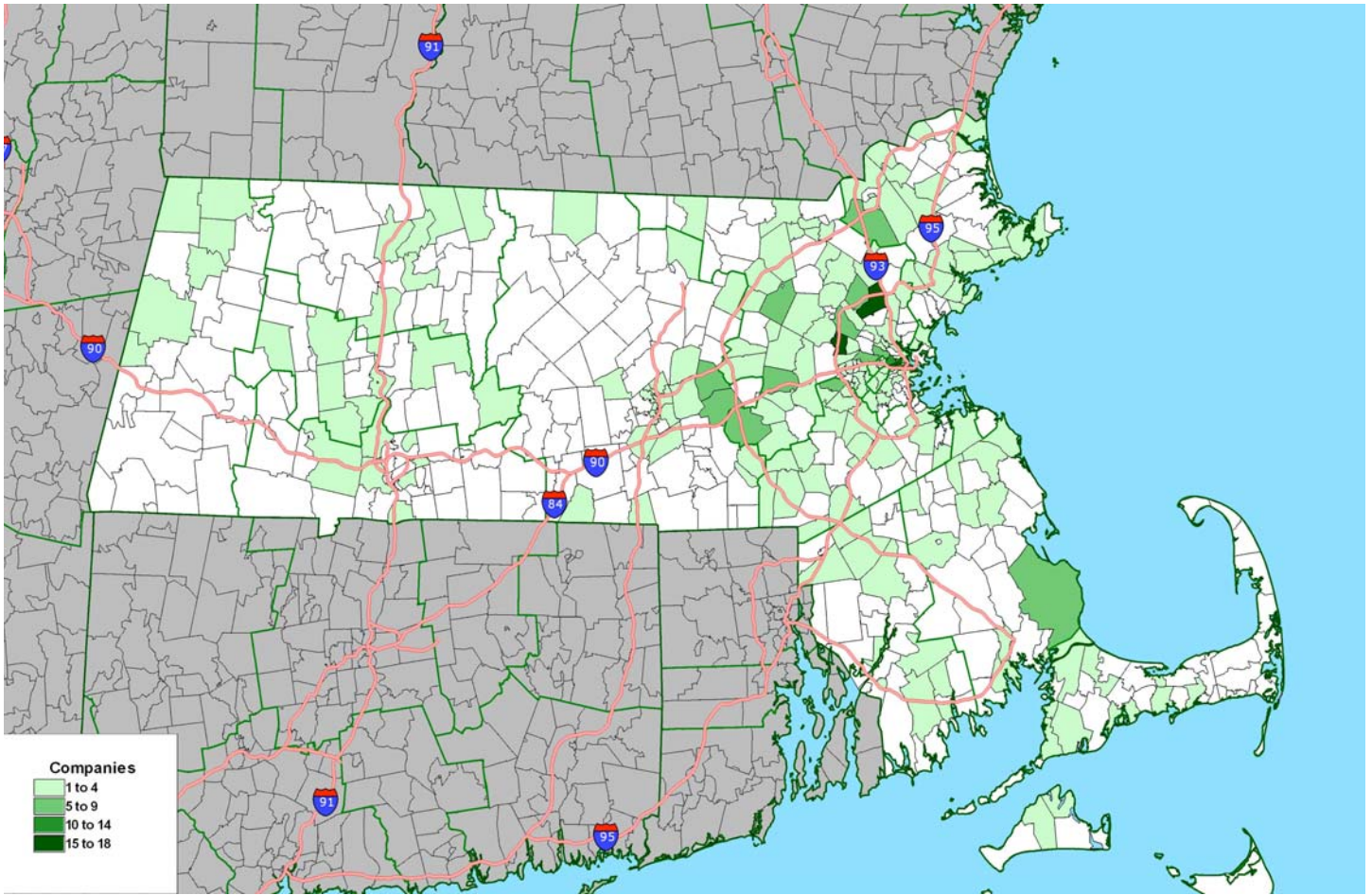
III. Additional Census Charts and Tables

Map: Clean Energy Jobs in Massachusetts



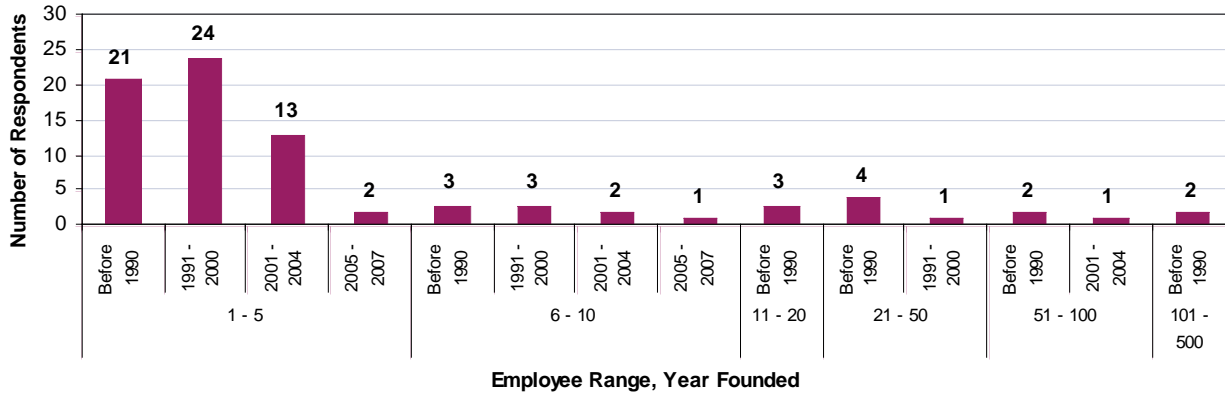
Massachusetts Clean Energy Industry Census

Map: Clean Energy Companies in Massachusetts

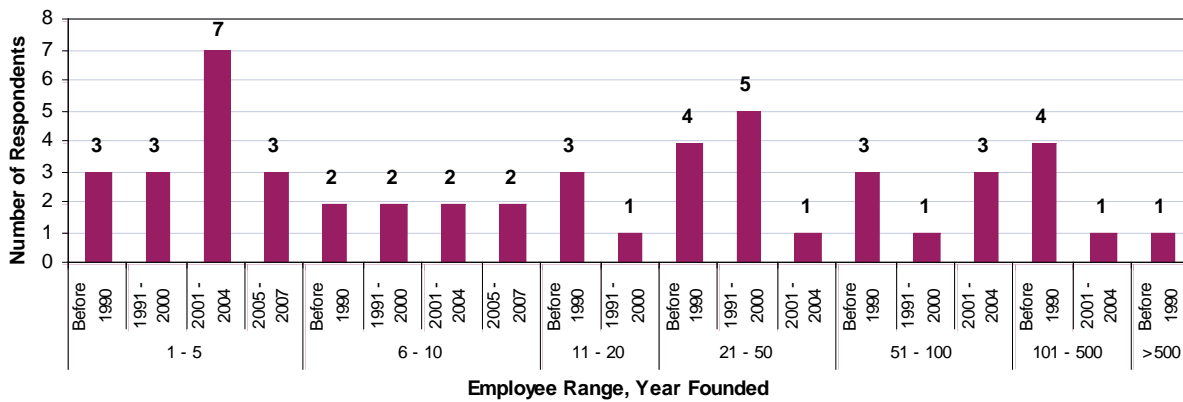


Employees by Sub-Industry and Year of Company Formation

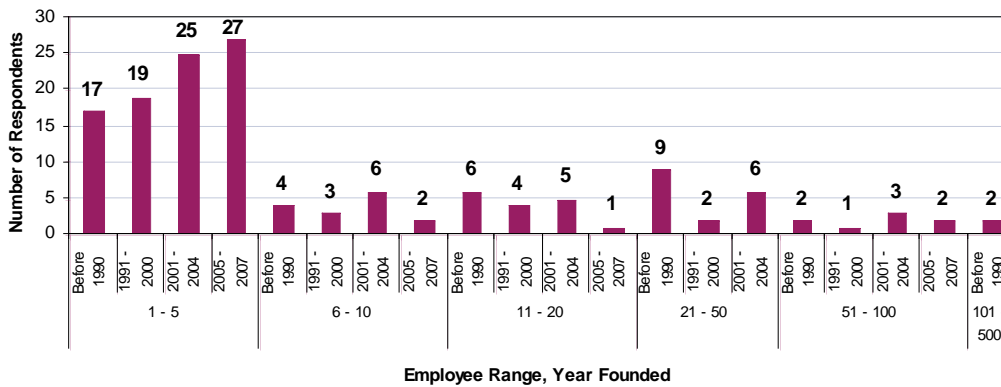
Consulting and Support Firms' Founding Years by MA Employee Range



Energy Efficiency Firms' Founding Years by MA Employee Range



Renewable Energy Firms' Founding Years by MA Employee Range



Massachusetts Clean Energy Industry Census

Massachusetts Employees by Sub-Industry

Entity Type	MA Employment Range	Number of Respondents
Consulting and Support	1 - 5	101
	6 - 10	27
	11 - 20	18
	21 - 50	17
	51 - 100	10
	101 - 500	7
	Missing	2
Energy Efficiency/Demand Response	1 - 5	40
	6 - 10	36
	11 - 20	15
	21 - 50	31
	51 - 100	17
	101 - 500	9
	>500	1
Missing	3	
Renewable Energy	1 - 5	119
	6 - 10	26
	11 - 20	22
	21 - 50	23
	51 - 100	9
	101 - 500	8
Missing	2	
University Research Center	1 - 5	5
	6 - 10	3
	11 - 20	2
	21 - 50	1
	Missing	2

Massachusetts Clean Energy Industry Census

Employment Growth Rate by Sub-Industry

Entity Type	Employment Growth Rate in the Clean Energy Sector	Number of Respondents
Consulting and Support	0% but less than 10%	35
	10% but less than 25%	6
	25% but less than 50%	2
	50% but less than 100%	2
	100% or more	4
	Other	2
	Refuse to answer / Do not know	6
Energy Efficiency / Demand Response	0% but less than 10%	18
	10% but less than 25%	14
	25% but less than 50%	4
	50% but less than 100%	2
	100% or more	4
	Other	3
	Refuse to answer / Do not know	10
Renewable Energy	0% but less than 10%	61
	10% but less than 25%	21
	25% but less than 50%	13
	50% but less than 100%	13
	100% or more	16
	Other	2
	Refuse to answer / Do not know	19
University Research Center	0% but less than 10%	2
	10% but less than 25%	2
	Employment decreased	1
	Refuse to answer / Do not know	2

Massachusetts Clean Energy Industry Census

Company Total Revenues by Sub-Industry

Entity Type	Revenue Range	Number of Respondents
Consulting and Support	> \$1 million	20
	\$1 - \$10 million	11
	\$10 - \$25 million	4
	\$25 - \$100 million	5
	> \$100 million	10
	Refuse / Unknown	6
Energy Efficiency / Demand Response	> \$1 million	14
	\$1 - \$10 million	18
	\$10 - \$25 million	4
	\$25 - \$100 million	1
	> \$100 million	6
	Refuse / Unknown	10
Renewable Energy	> \$1 million	71
	\$1 - \$10 million	38
	\$10 - \$25 million	5
	\$25 - \$100 million	3
	> \$100 million	5
	Refuse / Unknown	23
University Research Center	\$1 - \$10 million	1

Massachusetts Clean Energy Industry Census

Company Revenues Attributable to Clean Energy by Sub-Industry

Entity Type	Percent of Revenue from Clean Energy	Number of Respondents
Consulting and Support	0% but less than 10%	22
	10% but less than 25%	8
	25% but less than 50%	5
	50% but less than 100%	4
	100% or more	10
	Refuse / Unknown	3
Energy Efficiency / Demand Response	0% but less than 10%	10
	10% but less than 25%	4
	25% but less than 50%	1
	50% but less than 100%	11
	100% or more	23
	Refuse / Unknown	7
Renewable Energy	0% but less than 10%	27
	10% but less than 25%	11
	25% but less than 50%	5
	50% but less than 100%	14
	100% or more	68
	Refuse / Unknown	18
University Research Center	0% but less than 10%	1

Massachusetts Clean Energy Industry Census

Expected Revenue Growth Rates by Company Size

Revenue Range	Revenue Growth Rate	Total
Less than \$1 million	0% but less than 10%	54
	10% but less than 25%	7
	25% but less than 50%	6
	50% but less than 100%	7
	100% or more	14
	Refuse to answer / Do not know	13
\$1 million but less than \$10 million	0% but less than 10%	14
	10% but less than 25%	12
	25% but less than 50%	8
	50% but less than 100%	8
	100% or more	14
	Refuse to answer / Do not know	9
\$10 million but less than \$25 million	0% but less than 10%	3
	10% but less than 25%	3
	25% but less than 50%	1
	50% but less than 100%	1
	100% or more	1
	Refuse to answer / Do not know	4
\$25 million but less than \$100 million	0% but less than 10%	2
	10% but less than 25%	3
	25% but less than 50%	2
	Refuse to answer / Do not know	1
Greater than \$100 million	0% but less than 10%	8
	10% but less than 25%	1
	25% but less than 50%	1
	50% but less than 100%	2
	100% or more	1
	Refuse to answer / Do not know	7

IV. Entities Included in Census

374's Electric Power Corporation
A123 Systems
Acela Energy Group
ACFox, Inc.
Active Surface Technologies Incorporated
Acumentrics Corporation
AD&G
Adv. Technology Products
Advanced AMR Technologies
Advanced Conductors
Advanced Diamond Solutions
Advanced Electron Beams
Advanced Energy Systems
Advanced Mechanical Technology, Inc.
Advanced Technology Ventures
Aegis Energy Services, Inc.
Aerodyne Research, Inc.
Aerotek, Inc.
AES-Advanced Energy Systems
AEW Engineering & Design
Agrivida
AIR Worldwide
Aircuity
AirRECON
Airtricity, Inc.
Alfa Aesar
Allegro Strategy, Inc.
Alternate Energy, LLC
Alternative Energy Store
Alyra Renewable Energy Finance, LLC
Ambient Corporation
Amec Earth Environmental
Ameresco
American Solar Technologies
American Superconductor
Analysis Group/Economics
Analytic Power LLC
Anomet Product
Appleton Electric Inc
Applied Marketing Science
Applied Proactive Technologies
AquaEnergy Group, Ltd.
ARC Advisory Group
Arcadis
Arkion Systems
Aspen Technology, Inc.
Atlantic Battery Company, Inc.
Atlantic Heating & Air Conditioning, Inc.
Atlas Venture
Atmospheric & Environmental Research, Inc.
ATS Lighting Inc.
Axsess Group
B9 Energy
Babcock Power Inc.
Bales Energy Associates
Ballard Material Products
Batteries Unlimited
Battic Door Energy Conservation Products
Beacon Integrated Solutions
Beacon Power Corp.
Berkshire Biodiesel
Berkshire Photovoltaic Services
Berkshire Renewable Energy Collab.
Berkshire Wind Power
Bernstein, Cushner & Kimmell, P.C.
Beta Dyne Inc.
BioEnergy International, LLC
BioEnergy Partners, LLC
Biological Energy Corp. (BEC)
Biomass Combustion Systems
Black & Veatch
Blue Sky Environment
Bluestone Energy Services
Bluewave Strategies, LLC
Boreal Renewable Energy Development (BRED)
Boston AIC Inc.
Boston College
Boston-Power, Inc.
Boston Area Solar Energy Association (BASEA)
Boston Technology Venture Center

Massachusetts Clean Energy Industry Census

Boston University
Brandeis University
Birch Tree Capital
Brower CO
Brown, Rudnick, Berlack Israels LLP
BSC Group
BTU International, Inc.
Buchanan & Associates
C&D Technologies (DATEL), Inc.
Cabot Corporation
Cadmus Group, Inc.
Cambridge Energy Research Associates
Cape & Island Self-Reliance
Cape Cod Research
Cape Light Compact
Cape Wind
Catalyzed Combustion Technologies, Inc.
Catamount Pellet Fuel Corporation
CCI Energy
Cell Expert North America
CellTech Power LLC
Center for Ecological Technology
Center for Industrial Competitiveness, UMass Lowell
Central New England Solar Store
CeraMem Corporation
CertaLogic
Charles River Associates
Charles River Ventures
The Charles Stark Draper Laboratory, Inc.
Cimetrics
Citizens Energy Corporation
CLE Engineering, Inc.
Clean Energy Design
Clean Energy Group
Clean Power Now
Clear Methods
Cleaves & Company
CMR Fuel Cell
Coalition for Buzzards Bay
Coalition for Environmentally Responsible Economies
CoalTek, Inc.
Color Kinetics (now Philips)
Commons Capital
Commonwealth Resource Management Corporation
Community Energy, Inc.
Community Wind Power, LLC
Competitive Power Adventures
Competitive Power Ventures, Inc.
Concentric Energy Advisors
The Conservation Consortium Foundation, Inc.
Conservation Law Foundation (CLF)
Conservation Resource Solutions
Conservation Services Group
Consolidated Edison Energy Solutions
Consortium for Energy Efficiency
Constellation New Energy
Consulting Engineers Group
Continuum Control Corp.
ControlPoint Technologies, Inc.
Coonamessett Farm
Co-op Power
Coppus Steam Turbine (Dresser Rand)
Cost Containment, Inc.
Cotuit Solar
Covalent Associates
Cronin-Stone Solar & Wind Power Company
Crystal Systems, Inc.
CTP Hydrogen
Current to Current Corporation
Delenova Energy, LLC
DE's Cambridge Clean Energy Incubator
Diversified Technologies
Division of Capital Asset Management (DCAM), Office of
Facilities Maintenance
DMI, Inc.
Donald Campbell Associates
Earth Tech
EarthSource Energy Solutions, Inc.
EBI Consulting
ECO Energy Conversion (d/b/a Tracer Technologies)
Eco Power
Ecos/Sustainable Strategies Ecological Engineering and
Design
EIC Laboratories
Eikos Inc.
ElectraStor

Massachusetts Clean Energy Industry Census

Electric Vehicle Systems
Electrochem Commercial Power
ElectroChem, Inc.
Electron Power Systems
Element Ventures
Ember Corporation
Emerging Tech APC
Endless Energy Corporation
Enel North America, Inc.
Energy Enhanced
Energy Federation Incorporated
Energy Insights, an IDC Company
Energy Management Group
Energy Management Inc.
Energy Market Decisions
Energy New England
Energy Program Consulting
Energy Rebate, Inc.
Energy Security and Analysis
Energy Services Group
EnerNOC, Inc.
Enersol Associates
Engineered Materials Solutions
EnOcean
ENS International
Ensource, Inc.
ENTECH
EnvaPower, Inc.
Environmental Construction Technologies
Environmental Resources Management
Environmental Solar Systems
Envision ALR
Epsilon Associates LLC
ERG
ESS Group
Essex Hydro Associates, LLC
Ethec Industries Associates
Evdeals
Evergreen Solar, Inc.
Excelergy
Exergy, Inc.
FA Technology Ventures
Fat Spaniel Technologies, Inc.
Feed Resource Recovery
Ferro Solutions Inc.
Financial Management Group
Five Colleges Energy Inc.
Flagship Ventures
FMC Technologies
Foley Hoag LLP
Forum Technologies, Inc.
Foster-Miller, Inc.
Fuel Cell Scientific Inc.
Future Wave Technologies
GE Infrastructure Sensing Corp.
General Catalyst Partners
General Compression Corporation
Genpower Holdings LP
Geo Drilling of New England
GEO2 Technologies
Geothermal Drilling of New England
Gibbard Research & Development Corp.
The Gillette Company (P&G)
Gilway Technical Lamp
Giner, Inc. & Giner Electrochemical Systems, LLC
Global Insight
Global Petroleum
Global Resource Options (groSolar)
Global Technology Systems, Inc.
Global Transition Consulting
GMS Home Automation
Go Solar Massachusetts!
Goldman Clean Energy Partners
Greasecar Vegetable Fuel Systems
Green Roundtable
GreenFuel Technologies Corporation
Greylock Partners
Groom Energy Solutions LLC
GVD Corp
GZAceo Environmental
H.C. Starck
Haley & Aldrich
Hamilton Ferris Co - Power Products
Harris Miller Miller & Hanson Inc.
Harvard Electricity Policy Group
Harvard University

Massachusetts Clean Energy Industry Census

HealthLink
HearthNet
Heliotronics, Inc.
Highland Capital Partners
Hitachi America
Hollingsworth & Vose Company
Honda Research Institute
Honeywell Batteries / Global Technology Systems
Honeywell Utility Solutions
Hossein Pakravan
Hull Wind
Hy9 Corporation
Hybricon Corp.
Hyerexcell
Hyperion Catalyst
ICET, Inc.
Independence Energy Homes
Industrial Economics
Industrial Power Services Corp.
Infoscitex Corporation
Integrated Illumination
International Paper Products Corporation
International Parallel Machines Inc.
International Power
Interval Data Systems
Intronics, Inc.
Invensys Process Systems
Ionics, Inc.
Ion Optics Inc.
iProton, Inc.
Irradiance, Inc.
Iwaki Walchem Corporation
James R. Geschwindt & Associates
Jattra Ventures, LLC
JET Energy, Inc.
Johnson Controls
KaZaK Composites, Inc.
Keegan, Werlin & Pabian LLP
Kema
Kendall Foundation
Kesco International Corp.
KeySpan Energy Delivery
Kokhala Energy, Inc.
Konarka Technologies, Inc.
Kosmo Solar
Kraft Power Corp.
Krofta Technologies, LLC
Kurkoski Solar Electric
La Capra Associates
Lanes End Design, Inc.
LeBoeuf, Lamb Greene & MacRale LLP
Levitan & Associates
Lexecon
LiftPort Energy/Tethered Turbines
Lighthouse Electrical Contracting, Inc.
Lilliputian Systems
Lion Spring Sun Star
LiquidPiston, Inc.
Lithium Energy Associates
Lockheed Martin
Lodestar Corporation
London Economics International LLC
Lorax Energy Systems
Loria Emerging Energy Consulting, LLC
The Louis Berger Group, Inc.
Lowe Energy Design
Luminus Devices, Inc.
Lumus Construction
M.I.T., Center for Energy and Environmental Research (Cambridge)
M.I.T., Laboratory for Energy and the Environment
Magnolia Optical Technologies, Inc.
Mascoma Corp.
MasonLEDs.com
Mass Audubon
Mass Biofuel
Mass Megawatts Wind Power, Inc.
Massachusetts Division of Energy Resources
Massachusetts Energy Efficiency Partnership
Massachusetts Green Energy Fund
Massachusetts Hydrogen Coalition
Massachusetts Renewable Energy Trust
Massachusetts Technology Transfer Center
Massachusetts Energy Consumers Alliance
Matrix Partners
McCauley Lyman LLC

Massachusetts Clean Energy Industry Census

Mechanology LLC
Meridian Investments, Inc.: Meridian Clean Fuels
Merjanian Enterprises
Metabolix
Micro Tech Mfg. Inc.
Microbia
MicroCell Technologies LLC
Millennial Net
Milton Cat
Mimetex
Mintz Levin
Mirant Corporation
MKS Instruments
Morrison Berkshire
Moss Hollow, LLC
Mt. Wachusett Community College
MTechnology, Inc.
MTPV Corporation
Murtha Cullina LLP
Nano-C, Inc.
Nanocatalysis and Energy Laboratory
NanoLab
Nanoptek
Natel Energy
National Coating Corporation
Natural Fuel & Energy Inc.
NeuCo, Inc.
New Ecology
New Energy Capital
New Energy Opportunities, Inc.
New Energy Options, Inc.
New Energy Solutions, Inc.
New England Solar Electric, Inc.
New England Solar Homes
New England Window Systems, Inc.
NexGen Energy Solutions, LLC
Nexus Energy Software
NiSource Retail Services
Nixon Peabody LLP
Noble & Wickersham
NORESO
North Point Resources
North Shore Solar & Windpower Company
Northeast Biodiesel Company, LLC
Northeast Sustainable Energy Association
Northeastern University
Northern Energy Services Inc.
NorthWinds Renewables
Novotech, Inc.
Nuvera Fuel Cells
Oak Point Energy Associates
Ocean Power Delivery
Ocean Wave Energy Company, Inc.
OceanWind Technology LLC
Optodot Corporation
Orca Energy SL
Orion Wholesale Lighting
Ortronics, Inc.
Osram Sylvania Products
Owens Collers Partners
Oxford Bioscience Partners
Palmer Renewable Energy
Parker-Hannifin Corporation
PB Power Inc.
Peregrine Energy Group, Inc.
PEU Enterprises
Phoenix Innovations Inc.
Photofabrication Engineering, Inc.
Physical Sciences Inc.
Pioneer Valley PhotoVoltaics Cooperative
Plastecs Company
Plexus Research, Inc.
PolarisVenture Partners
PolySun
PoroGen Corporation
Power Options
Powercell Corporation
PowerHouse Enterprises, Inc.
PPM Energy
Practical Solar, Inc.
Precix, Inc.
Premium Power Corporation
Prism Solar Technologies, Inc.
Progressive Asset Management
Protonex
R. W. Beck, Inc.

Massachusetts Clean Energy Industry Census

Raab Associates
Ragan Technologies, Inc.
Raytheon
Re-Ergo Group
Renewable Resources Unlimited
Renewable Strategies, Inc.
RFK Associates
Rich May Law
Richard C Gross P.E., Inc.
Riverstone
Robinson & Cole LLP
Rockport Capital Partners
Rockwell Automations
Rolls Battery Engineering
Russell Biomass LLC
Safe Hydrogen LLC
Saint-Gobain High-Performance Materials
Sarnafil
SatCon Technology Corporation
Schaefer Inc.
Schlumberger-Doll Research
SCHOTT Fiber Optics
Scuderi Group LLC
Seahorse Power Co.
Second Wind Inc.
Semlux Technologies
Sensicast Systems, Inc.
Sensata Technologies
Setra Pressure Measurement Division
Shaw Environmental
Shooshanian Engineers
Silva Energy
SiOnyx Inc
SJH and Co.
Sky WindPower Corp.
Solar & Environmental Workshop
Solar Design Associates, Inc.
Solar Innovations
Solar Marketing Inc.
Solar Systems
Solar Wave Energy
Solar Works, Inc.
SolarOne Solutions
Solectria Renewable
Solo Automotive
Soluz, Inc.
Somerset Power LLC
Sorensen Systems
SourceOne, Inc.
South End Technology Center
South Mountain Company
SouthCoast Development Partner
Spire Corporation
Sprague Energy
Stellaris Corporation
Stevens Roofing Systems
Stiebel Eltron
Stone & Webster Management Consultants, Inc.
Strategic Energy Systems
SUEZ Energy Resources
Sullivan & Worcester LLP
Sun Energy
Sun Tech Solar Service
SunEthanol C-Corp
SunPower Corporation
Sustainable Energy Advantage, LLC
Sustainable Energy Solutions, Inc.
Sustainable New Energy
Sustainable Resources Group
Sustainable Step New England
Swanson Energy Group, Inc.
Sweetbriar Wind Energy Connection
Swift River Company
Synapse Energy
Synthetic Genomics, Inc.
TAC
Tamarack Energy, Inc.
TEAM Energy Appliance
Tech Environmental, Inc.
Tecogen, Inc.
Tetra Tech EC, Inc.
ThermalSource, LLC
Thermal Form & Function LLC
TIAX LLC
Tractebel Energy Services
TransÉnergie U.S., Ltd.

Massachusetts Clean Energy Industry Census

TRC Environmental Corporation	Waiteco Machine, Inc.
TSP Inc.	Water, Energy, Ecology Information Services
Tungstone Power Inc.	Webb Research Corp
TurboCare	WebGen Systems
Turbosteam Corporation	Weissman & Associates
Twin River Technologies	West End Associates
Under the Sun	Weston & Sampson
Underground Engineering LLC	Whitmor Company
Uniross Batteries Corp	William Gallagher Associates
UniversityWafer.com	Wilmer Cutler Pickering Hale and Dorr LLP
UPC Wind Management, LLC	Wilson TurboPower, Inc.
URS Corporation	Wind Management LLC
USD Renewables/American Biomass	Wind Works
Vanasse Hangen Brustlin, Inc.	Windrush, Inc.
Vanderweil Engineers	WindTechCo
Varian Semiconductor	The Writing Company
Vaughn Manufacturing	Woods Hole Research Center
Venture Development Corporation	Worcester Polytechnic Institute, Fuel Cell Center
Verenium Corporation	World Energy Alternatives, LLC
Viatronix	Yellow Biodiesel
Vicor Corporation	Yusen Associates, Inc.
Village Power Design Associates	Zapotec Energy Incorporated
The Vineyard Energy Project	Ze-gen Inc.
W.A. Vachon & Associates	Ztek

V. *Census Methodology*

Our methodology consisted of the following elements:

1. **Build the initial survey database.** The initial survey contact list was developed in Microsoft Excel using contact lists from MTC, the MIT Enterprise Forum of Cambridge, the Ignite Clean Energy Business Plan Competition (ICE), the Massachusetts Technology Transfer Center, the Solar Energy Business Association of New England (SEBANE), the Northeast Energy and Commerce Association (NECA), ISO New England, Cape Wind, and the New England Energy Efficiency Council (NEEC), as well as additional companies known to the study authors. These additional companies included law firms, public relations firms, consultants, and university research centers.
2. **Research primary contact information.** Missing email addresses and telephone numbers were researched thorough online sources and phone calls.
3. **Create, test, and revise the survey questions.** The survey question set was refined several times to improve the flow and clarity of the questions for the participants and the call-center staff. Also, after consultation with the call-center managers, additional questions were included to ask executives their views about the economic development climate in Massachusetts for building a clean energy industry cluster. The final survey consisted of 34 questions.
4. **Upload the initial dataset into the WebSurveyor online survey tool.** WebSurveyor is an online survey tool that enables surveyed participants to correct and add information directly to their unique, pre-filled data record, saving time for the participants. In addition, WebSurveyor is also the tool used by Global Insight's call center subcontractor, Luth Research. All data was continuously available for quality control checking and analysis.
5. **Invite participants to fill in the online survey.** Participants received a cover letter and an email request to participate in the MTC census. An HTML link was provided to direct them to their customized, pre-filled census record.
6. **Call targeted individuals to increase the survey participation.** Using a survey script, Luth Research's call center staff phoned company executives who did not complete the online survey, or who did not have an email address in our contact database.
7. **Ask surveyed participants to list their top three vendors.** To grow the participant list, the survey asked participants to name their three most important vendors. Global Insight then added these companies to the survey, if appropriate.
8. **Review and clean the dataset.** Global Insight and MTC extensively reviewed and checked the survey results for accuracy and completeness, following up to verify and correct information as needed.
9. **Estimate Massachusetts clean energy jobs, where needed.** Global Insight and MTC estimated Massachusetts job levels on a company-by-company basis for companies that refused to participate in the survey. This review was conducted in three phases to ensure accuracy, and included confirming employee size through public filings and documents.

VI. Survey Questions

Massachusetts Clean Energy Industry Census

The **Massachusetts Technology Collaborative** (MTC) seeks to identify the companies and institutions that are critical to the growth of a viable clean energy cluster in Massachusetts. This survey is part of our effort to provide Massachusetts policy makers with accurate and comprehensive information on companies in the state, and provide a baseline for program development. As an important first step, we want to make sure your company is included in this important census.

Notes:

- 1) If company data has been pre-loaded, please correct the information as necessary.
- 2) This census contains conditional questions. Depending on the answers you select to some questions, you will automatically skip ahead to the next question that applies to you.
- 3) All individual company data will be kept private in accordance with MTC's privacy policies (<http://www.masstech.org/AgencyOverview/privacy.htm>). Only aggregate statistics will be included in public reports.

1) What is your entity's name and website?

Entity refers to the company, association, government agency, or university research institution.

Entity Name: _____
Entity Website: _____
Format: <http://www.name.domain>

2) Where is your primary Massachusetts location?

Primary refers to the headquarters location, or if the headquarters is not located in Massachusetts, then provide the facility location with the Massachusetts-based management team.

Street Address: _____
Format: 201 Any Street, Building 2
City: _____
Zip Code: _____
USA Format: 99999-9999

Massachusetts Clean Energy Industry Census

3) What is your contact information?

Salutation: _____
Format: Ms., Mr., Dr.
First Name: _____
Nick Name: _____
Last Name: _____
Job Title: _____
Telephone Number and Extension: _____
USA format with extension: 999-999-9999 x9999
If outside of North America, add the country code
Email Address: _____

4) Who is the highest-level executive located in Massachusetts?

If that executive is completing this census, then provide the contact information for the next highest-level executive.

Salutation: _____
Format: Ms., Mr., and Dr.
First Name: _____
Last Name: _____
Job Title: _____
Telephone Number and Extension: _____
USA Format with extension: 999-999-9999 x9999
If outside of North America, add the country code.
Email Address: _____

5) Where is your headquarters located?

City: _____
State: _____
Format: Use the two letter state code if US
or Canada. For example, use "MA"
for Massachusetts.
Zip Code: _____
USA Format: 99999-9999
Country: _____
Format:
USA for United States
CA for Canada
UK for United Kingdom
All others spell country name

6) How many Massachusetts locations does your entity occupy?

Answer of "1" refers to a single office address, a single manufacturing facility, a manufacturing campus located on the same property, or a university campus located on the same property.

Massachusetts Clean Energy Industry Census

7) If your company is a subsidiary of a larger parent corporation, what is the legal corporate name of the ultimate parent?

For example, OSRAM SYLVANIA, located in Massachusetts, is a subsidiary of OSRAM GmbH, which is the subsidiary of the ultimate parent, Siemens AG.

8) What year was your entity founded?

Format: 9999

9) Which entity type best describes your firm's activities?

Check only one.

- Renewable Energy
- Energy Efficiency and/or Demand Response
- University Research Center
- Consulting and Support (Examples include government agency, energy consultant, industry association, law firm, public relations firm, and investor or financial services)

10) If you selected Renewable Energy, which industry segment is your primary focus?

Check only one.

- BioEnergy
- Fuel cells and Hydrogen
- GeoThermal
- HydroPower
- Solar
- Wave and Ocean Thermal
- Wind
- Commodity Broker/Marketer
- Other (please specify)

If you selected other please specify:

11) If you selected Energy Efficiency and/or Demand Response, which industry segment is your primary focus?

Check only one.

- Building Systems
- Energy Storage and/or Power Electronics
- Lighting
- Transportation Systems
- Other (please specify)

If you selected other please specify:

Massachusetts Clean Energy Industry Census

12) If you selected University Research Center, which industry segments are funded and staffed with professors and graduate students?

Check all that apply.

- BioEnergy
- Fuel cells and Hydrogen
- GeoThermal
- HydroPower
- Solar
- Wave and Ocean Thermal
- Wind
- Building systems energy efficiency (such as building shell and HVAC controls)
- Energy Storage and/or Power Electronics
- Lighting
- Transportation Systems

13) What is your Research Center(s)' annual budget?

If you do not know the exact budget number, please make your best estimate.

14) What is your Research Center(s) staff level?

Please estimate the full-time equivalent (FTE) staff number for each category, below.

Paid FTE professors: _____
Paid FTE graduate students: _____
Enrolled undergraduate students: _____
Paid FTE administrative staff: _____

15) What is the most recent year-over-year staff growth trend within the University Research Center?

- Employment decreased
- 0% but less than 10%
- 10% but less than 25%
- 25% but less than 50%
- 50% but less than 100%
- 100% or more
- Refuse to answer / Do not know

16) If you selected Consulting and Support, which industry segment is your primary focus?

Check only one.

- Government Agency
- Industry Association
- Energy Consultant
- Investor or Financial Services
- Law Firm
- Public Relations Firm
- Other (please specify)

If you selected other please specify:

17) If you selected Government Agency or Industry Association what is your organization's current size?

Please provide your best estimate of full time equivalent (FTE) staff, where applicable.

Paid FTE Staff: _____
Interns: _____
Dues-Paying Members: _____
Volunteers: _____

18) What are your Agency or Association's current activities?

Check all that apply.

- Organizing and running educational and/or networking events
- Creating industry awareness through public relations activities
- Government policy advocacy
- Providing funds to clean energy entrepreneurs or projects
- Assisting universities to commercialize technology inventions
- Other (please specify)

If you selected other please specify:

19) What is the source of funding for your Agency or Association?

Check all that apply.

- Cooperative profit sharing
- Event ticket/registration sales
- Grant funded
- Legislative or government budget authorization
- Member dues

20) What is the most recent year-over-year staff and volunteer growth trend?

- 0% but less than 10%
- 10% but less than 25%
- 25% but less than 50%
- 50% but less than 100%
- 100% or more
- Refuse to answer / Do not know
- Other (please specify)

If you selected other please specify:

Massachusetts Clean Energy Industry Census

21) Which value chain segments apply to your company?

Check all that apply.

- Product Research and Development
- Manufacturing
- Project developer for renewable energy generation plants
- Renewable energy producer, plant operator, or facility owner
- Distribution and sales
- Engineering, design, and/or construction services
- Energy services (turn-key design, build, own, and operate projects, which may also include commodity sales)
- Software and IT
- Other (please specify)

If you selected other please specify:

22) If you selected Project Developer For Renewable Energy Generation, then:

How many projects are in currently the _____
planning, financing, or construction stages?
How many of your firm's current projects are _____
located in Massachusetts?

23) What financing/ownership structures has your company ever utilized?

Check all that apply.

- Management/Employee funded
- Angel funds
- Venture capital funds
- Private equity funds
- Strategic investors, such as major corporations
- Public stock
- Grants
- Cooperative
- Refuse to answer / Do not know
- Other (please specify)

If you selected other please specify:

24) Which annual revenue range applies to your company's most recent fiscal year?

- Less than \$1 million
- \$1 million but less than \$10 million
- \$10 million but less than \$25 million
- \$25 million but less than \$100 million
- Greater than \$100 million
- Refuse to answer / Do not know

25) What percent of your firm's revenue is attributable to selling:

- a) Renewable Energy,**
- b) Energy Efficiency/Demand Response Services, or**

Massachusetts Clean Energy Industry Census

c) Consulting and Support Services to clean energy companies?

Select the range that applies.

- 0% but less than 10%
- 10% but less than 25%
- 25% but less than 50%
- 50% but less than 100%
- 100% or more
- Refuse to answer / Do not know

26) What was your firm's most recent year-over-year, revenue growth rate in the clean energy sector?

- 0% but less than 10%
- 10% but less than 25%
- 25% but less than 50%
- 50% but less than 100%
- 100% or more
- Refuse to answer / Do not know

27) What is your company's current total employment?

Please estimate if you do not know the exact number.

28) What is your company's current Massachusetts employment?

Please estimate if you do not know the exact number.

29) What was your firm's most recent year-over-year, employment growth rate in the clean energy sector?

- 0% but less than 10%
- 10% but less than 25%
- 25% but less than 50%
- 50% but less than 100%
- 100% or more
- Refuse to answer / Do not know
- Other (please specify)

If you selected other please specify:

30) If applicable, what are your firm's three most important strategic vendors located in Massachusetts?

- A. _____
- B. _____
- C. _____

Massachusetts Clean Energy Industry Census

31) If applicable, what are the top regions (states or countries) where you expect to receive most of your customer revenues in 2007?

List in order of region with the highest revenue to the lowest, among the top three.

First: _____
Second: _____
Third: _____

32) What are your CEO/Managing Director's top three concerns to achieve profit growth of sustainability in 2007?

A. _____
B. _____
C. _____

33) If applicable, what are the top three regions (states or countries) that are most supportive of growing a clean energy industry cluster, and why?

Please rank order the list with the best region shown in the First box.

First: _____
Second: _____
Third: _____
Why? _____

34) The MTC greatly appreciates your time and effort in assisting us with this important undertaking. As a token of our appreciation, we can notify you when the summary report of this effort is finalized.

- Yes, send me a copy of the summary report
- Yes, notify me when summary is posted on the MTC website
- No thank you

Thank you for completing the MTC census. Now your company is recorded as part of the Clean Energy Industry Cluster in Massachusetts.