

NECA Conference on Energy Efficiency & Demand Response

October 21, 2010

Peter Rothstein, President New England Clean Energy Council

Council mission:



 To accelerate New England's clean energy economy to global leadership by building an active community of stakeholders and a world-class cluster of clean energy companies.



New England Clean Energy Growth





Source: ACORE

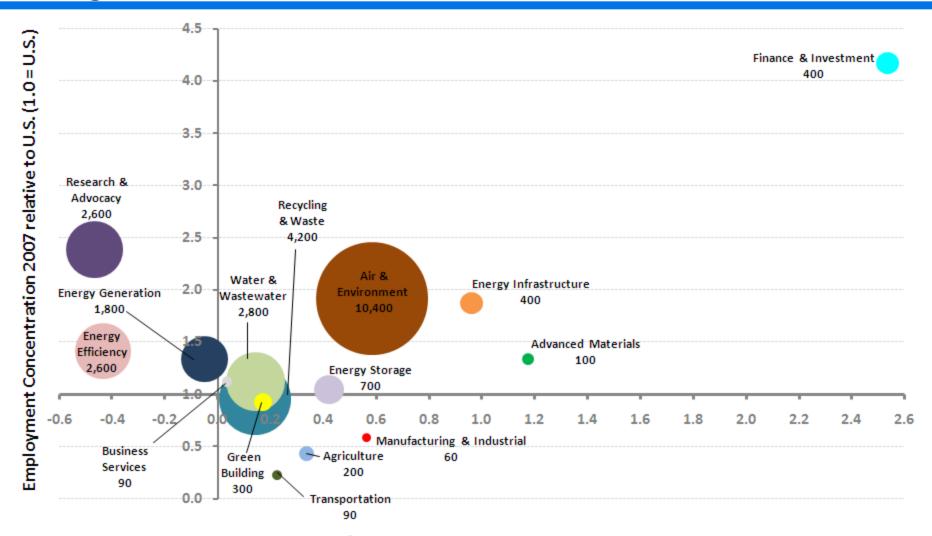
Mass. Clean Energy Jobs Growth



- Massachusetts clean energy sector businesses and jobs at an all-time high
- According to MassCEC survey, clean energy jobs increased approx. 65% from 2007 to 2010 – 14,400 to 23,000 jobs
- Using different green jobs definitions, last year Pew Charitable Trusts counted 1,912 green businesses in Massachusetts with a total of 26,678 green jobs

Mass. Employment by Green Segment, 1995-2007

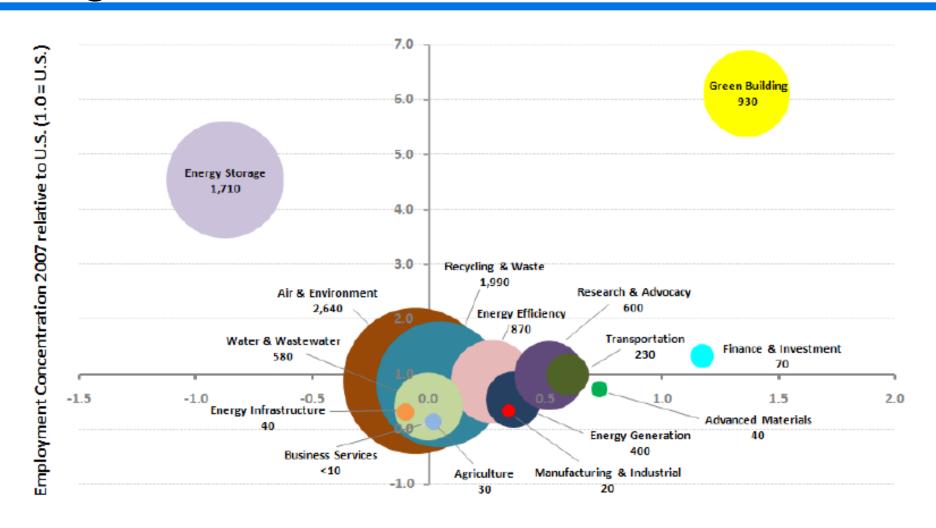




Change in Concentration 1995 - 2007

CT Employment by Green Segment, 1995-2007





Clean Energy State Leadership Scorecard



State	Total Marks Earned (out of 56 possible)	Percent of Total Marks Possible
California	48	86%
Massachusetts	45	80%
Oregon	43	77%
Colorado	35	63%
New Jersey	35	63%
Connecticut	34	61%
New York	34	61%
Maryland	32	57%
Washington	32	57%
Minnesota	30	54%
Arizona	28	50%
Illinois	28	50%
Florida	24	43%
Pennsylvania	24	43%
Texas	20	36%

Source: Clean Edge, Inc., 2010

Mass. Winning DOE ARPA-E Awards clean ene



- In four rounds of ARPA-E grants awarded, Massachusetts entities received:
 - 13 percent of total awards and 17 percent of dollars
 - Of 123 awards, 16 Mass. Awardees received total of \$62.8 million
- Mass. Companies funded by ARPA-E:
 - 1366 Direct Wafer: Enabling Terawatt Photovoltaics
 - Sun Catalytix: Affordable Energy from Water and Sunlight
 - FloDesign: Breakthrough High Efficiency Shrouded Wind Turbine
 - Agrivida: Conditionally Activated Enzymes Expressed in Cellulosic Energy Crops
 - Beacon Power: Development of a 100 kWh/100 kW Flywheel Energy Storage Module
 - Ginkgo Bioworks: Engineering E. Coli as an Electrofuels Chassis for Isooctane Production
 - General Compression: Fuel-Free, Ubiquitous, Compressed Air Energy Storage and Power Conditioning
 - FastCap: Low Cost, High Energy and Power Density, Nanotube-Enhanced Ultracapacitors
 - 24M: Semi-Solid Rechargeable Power Sources- Flexible, High Performance Storage for Vehicles
- Mass. University Lab projects funded by ARPA-E
 - MIT: Advanced Technologies for Integrated Power Electronics
 - MIT: Bioprocess and Microbe Engineering for Total Carbon Utilization in Biofuel Production
 - MIT: Electrochemically Mediated Separation for Carbon Capture and Mitigation
 - UMass: Electrofuels via Direct Electron Transfer from Electrodes to Microbes
 - MIT: Electroville: High-Amperage Energy Storage Device-Energy Storage for the Neighborhood
 - MIT: Engineering Ralstonia eutropha for Production of Isobutanol, Motor Fuel from CO2, H2, Oxygen
 - Harvard Med: Engineering a Bacterial Reverse Fuel Cell

Clean Energy VC Investments in US Companies as % of Total VC

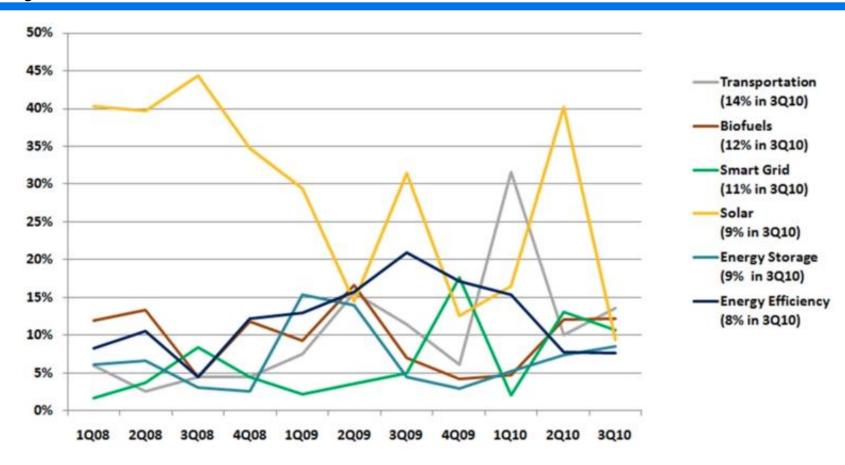


Year	Total Venture Investments (US\$ Billions)	Energy Technology Investments (US\$ Millions)	Energy Technology Percentage of Venture Total		
2001	\$40.6	\$351	0.9%		
2002	\$22.0	\$271	1.2%		
2003	\$19.7	\$424	2.2%		
2004	\$22.5	\$650	2.9%		
2005	\$23.0	\$797	3.5%		
2006	\$26.5	\$1,308	4.9%		
2007	\$29.4	\$2,867	9.8%		
2008	\$28.3	\$3,213	11.4%		
2009	\$17.7	\$2,216	12.5%		

Source: Bloomberg New Energy Finance with supporting data from Clean Edge and Nth Power, 2010. NOTE: New Energy Finance's energy-tech VC numbers include investment in renewable energy, biofuels, low-carbon technologies, and the carbon markets. VC figures are for development and initial commercialization of technologies, products, and services, and do not include private investments in public equity (PIPE) or expansion capital deals.

Top Cleantech VC Sectors by Amount Invested





Small number of large deals from qtr-to-qtr causes extreme volatility











Developing the New England Cleantech Cluster

Clusters & Innovation



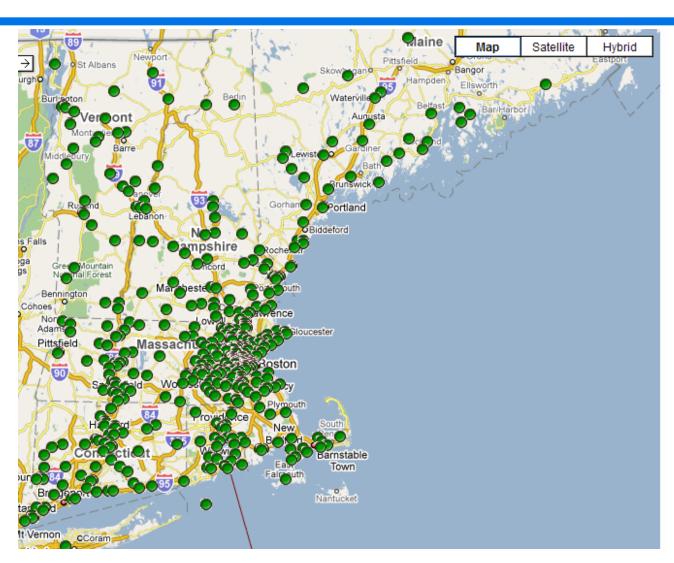
"The vitality of the U.S. economy... depends on creating innovation and competitiveness at the regional level."

Professor Michael Porter Harvard University & Monitor Group Council on Competitiveness, 2002

New England Clean Energy Cluster Driving Venture Growth

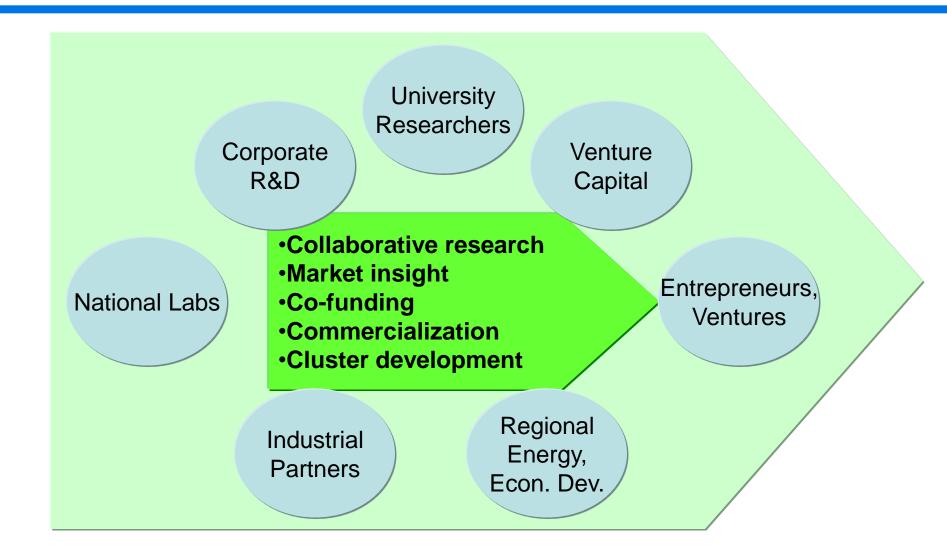


- Over 500 companies
- Diverse array of emerging technologies
- Supported by:
 - Research universities
 - VC firms
 - Entrepreneurs
 - Public sector economic development



Cluster Stakeholders





New England Energy Innovation Consortium









- New England Energy Innovation Consortium in planning
- NEEIC is being established to support:
 - Increased clean energy research and development
 - Accelerate technology commercialization and clean energy ventures, and
 - Build the clean energy cluster network in New England
- Goal is to form a consortium with industry, universities, government, non-profits, finance, others in New England energy innovation community
- Analysis of regional strengths:
 - EE & DR; Offshore renewables; Smart grid; Storage, etc.

Partners Included in Recent New England Federal Building EE & Cluster Proposal



(partial list)

E-RIC Partner	Public Works	Workforce		Commercial- ization		SBDC	MEP
EnerNOC		Χ	X	X	X		
Connecticut Clean Energy Fund		Х	Х	X	Χ		
Mass Dept of Energy Resources ¹	X		Х		Х		
New England Clean Energy Council		Х	Х		Х		
City of Boston	X						
Millennium Partners	X						Ш
Conservation Services Group		Х			X		
Carabetta Organization			Х		Χ		
Next Step Living							
Mass. Exec. Off. Housing & Eco. Dev. ²			Х		X	X	
CH2M HILL	X				X		
Connecticut Business and Industry		х	х				
Association		^	^				
Institute for Energy & Sustainability			Х				
UMass Center for Sustainable Enterprise & Regional Competitiveness		X	X				
Environment Northeast			Х		X		
Ameresco		Χ	Х		X		
Mass. Utility EE Programs (excluding							
National Grid) ³							
National Grid							
Connecticut Energy Efficiency Fund							
(including Connecticut Light & Power,			X	X	X		
United Illuminating)							

Aligning Research with Markets, Commercialization clean er Models, Partners, Demonstration Sites



	CABS Project	Business Models	Potential Sites and Partners
New Residential	 Nano-engineered surfaces for HVAC & dehumidification Advanced OLEDs Energy Harvesting Windows Switchable Thermal Mass Displays & Controls 	 Advanced building codes under adoption by Massachusetts and New England (IECC 2012 code when it is available) MA communities' option of adopting a "stretch" energy code that is 20% more stringent than the energy requirements in the base building code over 100 communities have done so or are considering Development of design tools for architects and builders 	 US Green Building Council and NE state Green Building Councils Architects engineers, trades MA Zero Net Energy Buildings Task Force with more than 70 public/private sector experts to: Establish minimum performance standards based on energy per sq/ft Benchmark, report and track energy use data for all buildings Incentives to help address regulatory and financial barriers Workforce development and public education initiatives
Multi-Family Residential	•Low-lift cooling •Nano-engineered surfaces for HVAC and dehumidifying •Advanced OLEDs •Thin-insulation •Non-intrusive load monitoring •Consumer feedback interfaces •Thermographic sensing •Building modeling, simulation, continuous	 Financing models Consumer education, behavior change and support Models for shared savings 	Castle Square Tenants Organization, a 500 unit low-income apartment complex in Boston Boston Boston Housing Authority's plan for major energy efficiency retrofits to public housing units across the City Lawrence CommunityWorks a High Performance Buildings Grant winner, including Deep Energy Retrofit demonstration of an old mill into a multi- family residential unit Homeowner's Rehab, Inc. projects underway in Cambridge that include

Aligning Research with Markets, Commercialization Models, Partners, Demonstration Sites



	CABS Project	Business Models	Potential Sites and Partners
Existing Commercial/Public	 Low-lift cooling Advanced insulating materials Energy harvesting windows Nano-engineered surfaces for HVAC and dehumidification Advanced OLEDs Proximity sensing Continuous commissions Design tools for architects and engineers Building modeling and simulation systems Building systems integration 	Models for community, user involvement and feedback Shared savings and financing models	 Leading By Example – Clean Energy and Efficient Buildings program for audits and retrofits Major renovations at state facilities of more than 20,000 sq. ft. to perform 20% better than the Mass Energy Code Mass DOER Enterprise Energy Management System deployment to provide detailed, real time energy data for more than 17 million sq ft of state buildings DOER Green Communities Division for energy efficiency or renewable energy initiatives on municipallyowned buildings Northeast Energy Efficiency Partnership's (NEEP) Commercial Buildings and Technologies Initiative

Building the New England Clean Energy Cluster: Innovation, Growth, Adoption



- New England innovation economy being replicated from high tech and life sciences into cleantech
- The capital intensity of cleantech has made scale-up funding difficult
- Most challenging, the lack of a U.S. federal energy policy has left uncertainty on how to develop cleantech companies in U.S.
- Clean energy is one of few growth sectors with new jobs
- Long-term market opportunity remains strong:
 - Energy is forecasted to be a \$6 Trillion market
 - Global climate and energy policies having impact
- Massachusetts and New England has one of the strongest cleantech clusters, with strong public-private collaboration:
 - Human capital, intellectual capital, financial capital, cluster network
- Many opportunities to grow new businesses in clean energy economy



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