COMMONWEALTH OF MASSACHUSETTS

Executive Office of Housing and Economic Development

OFFICE OF PERFORMANCE MANAGEMENT & OVERSIGHT

Massachusetts Clean Energy Center

FISCAL 2015 ANNUAL REPORT

INTRODUCTION

The Massachusetts Clean Energy Center Fiscal 2015 Annual Plan complies with the requirements of the Office of Performance Management Oversight created by Chapter 240 of the Acts of 2010 – An Act Relative to Economic Development Reorganization. It includes goals set for the year and the performance measurements by which to evaluate goals, programs, and initiatives. This plan also demonstrates alignment where applicable with the Commonwealth's FY 15 economic development plan and policy.

AGENCY OVERVIEW

The Massachusetts Clean Energy Center (MassCEC) is dedicated to accelerating the success of clean energy technologies, companies and projects in Massachusetts—while creating high-quality jobs and long-term economic growth for the people of Massachusetts.

MassCEC provides early-stage and growth investments to startup companies, funds renewable energy rebates for residents and businesses and supports the development of a local clean energy workforce. Since its inception in 2009, MassCEC has helped clean energy companies grow, supported municipal clean energy projects and invested in residential and commercial renewable energy installations creating a robust marketplace for innovative clean technology companies and service providers.

FISCAL YEAR 2015 ANNUAL PLAN

GOALS	STRATEGY	MEASUREMENTS
Create clean energy jobs and increase workforce diversity [INV: please enter jobs supported by investment portfolio at end of FY15]	Increase the attractiveness of STEM careers to both students and teachers Ensure that STEM programs are designed in a way to increase STEM interest and achievement across all populations, especially those currently under-represented in STEM careers to help increase the secondary education pipeline. Increase by 20% annually over the next five years the number of internship placements made by multi-school, multi-employer internship program.	• Number employed in clean energy jobs in Massachusetts · **98,895** employees · **11.9%** growth since 2014 • Number of institutions and companies engaged in clean energy activities and change in level of activity over the previous year · **6,439** Establishments · **7.6%** growth since 2014 • Number graduating from sponsored clean energy training programs · **508** students graduated from a clean energy training program, representing a 39% increase over FY14. · **421** college students and recent graduates participated in the paid internship program

	Support programs to train low-income populations to work in clean energy. Provide workforce development support and workforce tools to the Marine Commerce Terminal in New Bedford. Grow the MassCEC internship program to reach a diverse population of students across the Commonwealth. Expand the role of Massachusetts companies and institutions in clean energy research, product development, manufacturing, deployment and services. Support the growth of the full spectrum of the Massachusetts clean energy industry, from manufacturing to installation, through deployment programs. Supplement this support with industry training and assistance. Provide equity and debt capital to clean energy startups, diversified across stage of growth and sector, to support hiring and retention of employees.	· **87** high school students participated in and completed a hands-on academic/paid work experience (*Learn and Earn*). · **13** *Pathways Out of Poverty* participants were accepted into the pilot program *Successful Women in Clean Energy*. The program trains low-income women in sales in clean energy and places them in a six month paid fellowship at the end of training. • Number of trainee graduates offered employment · **95** students who participated in the internship program and *Learn and Earn* were offered full or part-time employment upon completing training activities. • Number of STEM majors or graduates participating in the Internship Program · **203** internship program participants were STEM majors • Diversity profile of trainees, STEM graduates, sector workforce <u>Internship Program</u> Male: **256** Female: **165** Asian: **57** Black: **12** Caucasian: **301** Hispanic/Latino: **21** Multi-Racial/Other: **21** Unspecified: **9** <u>Learn and Earn</u> Male: **52** Female: **35** Asian: **15** Black: **35** Caucasian: **9**

		Hispanic/Latino: **5** Multi-Racial/Other: **2** Unspecified but identify as Minority: **21** <u>SWICE</u> Male: **0** Female: **13** Asian: 0 Black: **2** Caucasian: **11** Hispanic/Latino: **0** Multi-Racial/Other: **0** Unspecified: **0** <u>STEM Graduates</u> Male: **123** Female: **80** Asian: **34** Black: **6** Caucasian: **134** Hispanic/Latino: **15** Multi-Racial/Other: **9** Unspecified: **5** • Total jobs supported by MassCEC's investment portfolio ○ **415** jobs at **18** companies • Please refer to next section for details on number and amount of equity and debt investments, convertible grants and grants to clean energy companies and clean energy network partners.
Economic Development Plan Alignment: Above goal aligns with Category for Action 1 – Advance Education & Workforce Development for Middle Skills Jobs		
Accelerate clean energy technology commercialization	Provide consistent support for collaborative research and development among universities and businesses.	• Number of university partnership agreements and joint research and development projects. ○ MassCEC partnered with **6** universities and colleges on research, workforce

	Sustain our program that provides operational and event support to incubator and/or accelerator programs. Support the development of shared facilities for the making and testing of product prototypes, to support the growth of small and mid-sized businesses. Launch a program that facilitates the adoption of new, home-grown clean energy technologies by state and municipal agencies. Sustain our grant funding for universities and early stage startups to complete early proof-of-concept projects, to validate innovative clean energy technologies and prepare them for additional financing. Launch a federal grant-matching funding program for universities and early stage startups, to promote company creation and growth and accelerate technology and product development and commercialization. Provide equity and debt capital to clean energy startups, diversified across stage of growth and sector, to accelerate technology development, commercialization and scale-up.	training and program development in FY15 • Number of clean energy companies in Massachusetts ○ **6,439** establishments • Number and dollar volume of investments raised by clean energy companies in Massachusetts ○ **52** deals ○ **$550 million** in public and private investment • Number of patents filed by supported clean energy companies in Massachusetts ○ Investments portfolio: **471** filed or awarded to current MassCEC portfolio companies ○ Catalyst winners: **26** new inventions disclosed or patents filed/awarded in FY15 ○ InnovateMass winners: **40** patents • Number and dollar amount of equity and debt investments, convertible grants and grants awarded by MassCEC to clean energy companies and universities in FY15 ○ Catalyst grants: **$320K** to **8** companies and **$160K** to **4** university projects ○ InnovateMass grants: **$981,140** to **8** company projects ○ AmplifyMass: **$750K** in convertible grants to **3** companies and **$200K** in grants to **4** university projects ○ Equity and debt investments: **$1,429,502** to **4** companies • Funding to clean energy network partners ○ IncubateMass: **$305,000** to **4** incubators, supporting a total of **163** jobs in **32** companies ○ Fraunhofer: **$1.62 million** ○ Cleantech Open Northeast: **$75K**, supporting a total of **32** companies

		○ MassChallenge: **$60,000**, supporting a total of **10** companies • Dollar volume of follow-on investment raised by supported clean energy companies in FY15 ○ Investments portfolio: **$121,260,063** ○ Catalyst winners: **$10,372,717** ○ InnovateMass winners: **$3,079,736 (committed)** • Leverage on MassCEC investments in FY15 ○ AmplifyMass: **$13,855,551 ($14.6 for every $1** invested by MassCEC) ○ Investments portfolio: **$6,740,053 ($4.7 for every $1** invested by MassCEC) • Number of state and municipal agencies that are "first customers" of home-grown clean energy technologies. ○ **17** commercially ready technologies have been approved for program support ○ **3** deals with municipalities are currently in the pipeline with MassCEC funding committed, pending the execution of a contract
Economic Development Plan Alignment: Above goal aligns with Category for Action 2 – Support Innovation and Entrepreneurship.		
Increase clean energy generation	Increase adoption of commercialized clean energy technologies in Massachusetts homes, businesses, and institutions through deployment programs. Support local governments to plan for and adopt clean energy technologies that support community needs	• Installed renewable energy capacity in Massachusetts, by technology type[1] ○ Solar: **36.8 MW** ○ Wind (land-based): **3.4 MW** ○ Wind (offshore): **0 MW** ○ Small Hydro:[2] **295 kW** ○ Organics to Energy: **100 kW** ○ Clean Heating and Cooling: **5.3 MW-thermal**

[1] These represent only a portion of total renewable energy capacity installed in MA during FY 15, and do not include capacity installed for projects not funded by MassCEC.
[2] Many funded hydro projects increase output without increasing in capacity.

	Sponsor research to enhance the performance and commercialization of clean energy technologies Evaluate the performance, benefits and impacts of operating clean energy systems to refine deployment strategies Increase clean energy awareness for residents, businesses, and institutions through outreach, education, and marketing.	○ Solar Hot Water:[3] **0.6 MW-thermal** • Annual renewable energy generation in Massachusetts, by technology type (as applicable) • Solar: **101,545,562 kWh** • Wind: **198,000,000 kWh** • Small Hydro: **18,893,173 kWh** • Of those, 1 was a municipal project • Organics to Energy: **6,740,920 kWh** • Clean Heating and Cooling: **7,373,208 kWh (thermal)** • Solar Hot Water: **3,519,657 kWh (thermal)** • Installed number of renewable energy projects in Massachusetts, by technology type • Solar: **5,491** projects completed during FY 15 • Wind: **1** project completed during FY 15 • Small Hydro: **2** projects completed during FY 15 • Organics to Energy: **1** pilot project completed during FY 15 • Clean Heating and Cooling: **1,481** projects completed during FY15 (including 1 municipal project) • Solar Hot Water: **92** projects completed during FY15 (including 1 municipal project) • Annual number and value of grants awarded by MassCEC by type (i.e., site assessment, feasibility study, construction/design grant, technical services, other) ○ Solar: **5,491** rebates (**$10,468,164**) ○ Wind (land-based): ▪ **1** project development grant (**$400,000**) ▪ **7** analysis and information grants (**$146,625**) ▪ **3** research support grant (**$167,500**)

[3] Solar Hot Water Capacity is not typically reported. This value is estimated using a 13% capacity factor.

		▪ **1** sector development grant (**$10,000**) o <u>Wind (offshore) – please refer to Offshore Wind Sector Development below</u> o Small Hydro: ▪ **2** Construction grants (**$546,831**) ▪ **2** Feasibility study grants (**$64,142**) o Organics to Energy: ▪ **3** Construction/Pilot grants (**$1,109,716**) ▪ **1** Feasibility Study grant (**$40,000**) ▪ **1** Technical Services grant (**$49,500**) ▪ **1** Agreement for Services to a Municipality o Clean Heating and Cooling: ▪ Residential Air-Source Heat Pumps: **505** construction rebates (**$644,125**) ▪ Residential Central Biomass Heating Systems: **24** construction rebates (**$280,685**) ▪ Residential Ground-Source Heat Pumps: **92** construction rebates (**$672,597**) ▪ Residential Wood Stove Change-Outs: **366** rebates (**$475,000**) ▪ Commercial-Scale Biomass Boilers: • Feasibility Study Grants: **1** (**$2,500**) • Construction Grants: **4** (**$703,353**)

		▪ Commercial-Scale District Energy Systems: • Feasibility Study Grants: **2** (**$5,000**) • Construction Grants: **2** (**$138,270**) ▪ Commercial-Scale Ground-Source Heat Pumps: • Feasibility Study Grants: **4** (**$16,107**) • Construction Grants: **4** (**$491,100**) ○ Solar Hot Water: ▪ **76** residential construction grants (**$258,740**) ▪ **6** commercial construction grants (**$220,120**) ▪ **2** commercial feasibility studies (**$10,000**) • Annual number of community meetings held for Solarize Mass estimated number of people attending meetings above ▪ Number of Meetings: **12** ▪ Number of Communities: **5** ▪ Total estimated number of attendees: **340** • Annual number and value of awards for sponsored research; number of research projects completed • **$1,282,494** committed to **5** clean technology development research projects in FY15 through the Strategic Analysis, Leveraging Federal Opportunities and University Research Support programs

		• Annual number and value of contracts awarded to evaluate systems; number of studies completed
		  • Cadmus was the sole awardee of a **$154,000** budget to audit PV systems registered as reporting for SRECs in the Production Tracking System (PTS). **122** systems were audited for FY15. The examination focused on verifying installed systems components, program compliance, and system generation.
		  • The Clean Heating & Cooling Program launched a **$200,000** study to measure and monitor the performance of **42** residential central biomass heating and ground-source heat pump systems.
		  • The Commonwealth Solar Hot Water Program completed a **$100,000** performance monitoring study of **40** residential solar hot water systems.
		  • The Commonwealth Solar Hot Water Program completed a **$40,000** study to evaluate emerging solar thermal technologies.
		• For change-out programs, the estimated reduction in the annual emissions of air pollutants.
		  • The FY15 Wood Stove Change-Out program resulted in the replacement of **366** polluting wood stoves with clean-burning models. This results in an approximate reduction in particulate matter (PM2.5) of **36,000** pounds per

		year, or **360** tons over the lifetime of the project.
Economic Development Plan Alignment: Above goal does not have direct alignment with one specific Category for Action or Action Item, but supports initiatives within the plan, and it is core to MassCEC's mission.		

Eliminate market/industry barriers:
 	
1. Facilitate demonstrations and testing of new technology
 	
2. Increase access to international markets
 	
3. Increase public acceptance of Renewable Energy
 	
4. Support Water Innovation Cluster
	1. Continue the InnovateMass program to support clean energy and water innovation technology demonstrations.
	
	2. Establish connections and cooperative agreements with international clean energy governmental partners.
	
	3. Develop and launch educational campaign to help increase public acceptance.
	
	4A.Launch the New England Water Innovation Network (NEWIN), which is the formalized water innovation cluster group supported by MassCEC.
	
	4B. Continue to refine and support the Massachusetts Israeli Innovation Partnership (MIIP) grants, resulting strategic international partnerships.
	
	4C. Stakeholder engagement and strategic planning for growing the water innovation cluster through NEWIN.
		Metrics associated with each barrier necessarily differ. The critical measures of success for MassCEC's market barrier priorities are:
		
		• Number of technology patents, financing rounds, and sales by InnovateMass grantees : **40** patents, **$1.78M** in sales, and **$3.05M** raised in funding after securing Innovate grant.
		• Number of MA companies abroad & sales volume; Number of international companies in MA & related jobs.
		  ○ Due to changes in the new Administration's priorities MassCEC has not been actively pursuing international opportunities and does not track metrics of companies abroad or international companies located in Massachusetts.
		• Increased number of supporters at public meetings and in letters to the editors and op-eds regarding renewable energy issues and projects.
		  ○ MassCEC did not end up launching the educational campaign to help increase public acceptance in FY15
		• Establishment of at least one strategic partnership through the Massachusetts Israeli Innovation Partnership (MIIP).
		  · **1** strategic partnership established between Triton Systems of Chelmsford, MA and Advanced Cavitation Technologies (ACT) of Israel. Technology Demonstration underway.
		• Number of members of NEWIN.

		· **42** • Number of applicants and awards for Water Innovation demonstration projects under InnovateMass or Catalyst. · **9** applicants in FY15 · **4** awards granted in FY15 • Completion of Water Innovation Industry Report and Survey. · Completed and released on May 20, 2015
Economic Development Plan Alignment: Above goal aligns with Category for Action 2 – Support Innovation and Entrepreneurship.		
Offshore Wind Sector Development	Lead construction of Marine Commerce Terminal in New Bedford (MCT). Promote and support offshore wind sector development. Ensure that an adequately trained work force is available for construction, operations, and maintenance by identifying and providing funding programs for pre-apprentice and apprentice training programs Ensure an adequate and diverse supply chain for construction, operations, and maintenance of the Offshore Wind Sector Sponsor and support stakeholder engagement activities to increase understanding of offshore wind benefits and impacts and inform program activities. Sponsor technical and environmental studies to establish baseline conditions in wind energy areas and speed environmental reviews. Sponsor assessments and planning exercises to identify optimal approaches to offshore wind development and build-out.	• Complete construction of Marine Commerce Terminal (MCT) by the end of CY 2014. ○ Substantial completion was achieved by January 5, 2015 • Provide early developers with critical port facilities for deployment, operation and maintenance. ○ MassCEC entered into a lease agreement with the Cape Wind offshore wind project in July 2014. MassCEC terminated the Cape Wind lease in February 2015 after Cape Wind's power sales agreements to utilities were cancelled. • Number of people graduating from sponsored pre-apprentice and apprentice programs. ○ Responding to the indefinite delay of Cape Wind, MassCEC temporarily suspended its job training efforts associated with the near-term deployment of offshore wind • Number of regional vendor forums hosted to identify Massachusetts Companies who can provide materials and equipment in support of the offshore wind sector. ○ One regional forum held on October 1, 2014; **25** companies attended

	Sponsor economic and electric system studies to increase understanding of the benefits and impacts of large-scale offshore wind development.	• Number of stakeholder groups consulted and meeting held; quality of input received.
		  ○ MassCEC sponsored a total of 16 meetings, including **2** meetings of the offshore Wind Habitat Working Group, **2** meetings of the Offshore Wind Fisheries Working Group, and **12** public information forums for the Marine Commerce Terminal at New Bedford.
		• Number of baseline studies completed.
		  ○ MassCEC completed survey work for two baseline studies: the third years of large whale/turtle and avifauna wildlife surveys
		• Number of development planning exercises (or modules) completed.
		  ○ MassCEC contracted for preparation of a Scoping Study for Meteorological and Ocean Data, with the study to be completed in FY16
		• Number of economic and electric system studies (or modules) completed.
		  ○ MassCEC conducted a consultant selection process but deferred completion of a benefit/cost study based upon consultation with EOEEA
		  ○ MassCEC prepared and submitted a proposal to ISO-NE for an Economic Study to Evaluate the Impact of Offshore Wind Deployment on New England's Wholesale Electricity Markets and Operations; ISO-NE accepted the proposal and will complete the study in FY16

Economic Development Plan Alignment: Above goal does not have direct alignment with one specific Category for Action or Action Item, but supports initiatives within the plan, and it is core to MassCEC's mission.		

World Class Wind Technology Testing Center	Maintain world class wind turbine large blade (structural) testing facility to provide timely and cost effective testing services to the wind industry. This will support increased reliability of utility scale wind turbines and promote new technologies to be commercialized and move the blades & turbines to larger offshore wind turbines.
	
	Generate revenue to help support WTTC operations.
		• Number blades being tested at WTTC
		  ○ **Seven (7)** blades
		• $1.5 to $2 million testing revenues from customers
		  ○ **$2.6 million** in testing revenues
		• Become revenue neutral (or self-sustaining) in FY 2015, as done in FY 2014
		  ○ Successfully was self-sustaining

Economic Development Plan Alignment: Above goal does not have direct alignment with one specific Category for Action or Action Item, but supports initiatives within the plan, and it is core to MassCEC's mission.		

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