

UMASS CLEAN ENERGY EXTENSION

Quarterly Progress Report to MA Department of Energy Resources

Period ending March 31, 2017

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This Progress Report provides a summary of work accomplished by the UMass Clean Energy Extension (CEE) during the period January 1, 2017 to March 31, 2017.

During this reporting period, the Clean Energy Extension completed the drafting of its 2017-2019 Strategic Plan and 2017 Work Plan, has formally begun activities in support of the Mohawk Trail Woodlands Partnership, and has engaged a class of Clean Energy Corps students with work to support Green Communities and the MTWP activities.

Given the launch of the 2017 Work Plan and further maturity of CEE, this progress report is reformatted from prior reports to better reflect and report on the activities of CEE.

1. Extension Administration and Management

Strategic Planning

CEE focused significant effort during this reporting period to completing the drafting of its 3-year strategic plan, and an annual work plan for 2017. These draft documents have been reviewed with the Center for Agriculture, Food and the Environment, and was the subject a meeting with DOER scheduled in April. Following these reviews, CEE will provide a public version of the Strategic Plan on its website and utilize the document for guiding its work and recruitment of an Advisory Committee.

The 2017 Work Plan, included in the Strategic Plan, has been reviewed with CEE staff and project leads for each activity have been assigned to staff who have begun identifying tasks, resource needs, and deliverables and outcome for those activities starting in Q1 2017.

Project Management

As CEE embarks on its first annual work plan with its full staff, we have invested some effort to establish project management procedures to assure efficient and effective activity tracking and collaboration. A project management template has been established and a combination of MS OneNote and Excel spreadsheets are being utilized as management tools. CEE will continue to evolve and adapt these procedures to meet the needs of the staff and project load.

2. Public Events and Outreach Activities

During this reporting period, CEE staff and affiliates have engaged in the following public events.

Event	Date and Location	Extension Presenter	Presentation Title	Audience	Estimated Attendance
UMass Extension Board of Overseers Meeting	January 17, UMass Collaborative Service Center, Shrewsbury	Breger, Strong	<i>Supporting Clean Energy in Massachusetts: Clean Energy Extension</i>	Board of Overseers; CAFE leadership	20
Local film premier of <i>From Hurricane to Climate Change</i> and Panel Discussion	February 2, Hitchcock Center for the Environment, Amherst, MA	Breger	Event organizer and panel discussant, with film producer Doug Challenger (Sociology Professor, Franklin Pierce College, NH)	Local community, environmental advocates	75
New England Women in Energy and the Environment (NEWIEE) and UMass School of Earth and Sustainability – Career Panel (CEE Co-sponsor)	February 15, UMass Amherst	Breger	Welcome to students and NEWIEE panel, and short introduction to CEE	UMass undergraduate and graduate students	40
Amherst Media, Community TV – Panel discussion of <i>From Hurricane to Climate Change</i>	February 16, Amherst	Breger	Live filming of panel discussion, with film producer Doug Challenger and Representative Goldstein-Rose.	General public	To be broadcast on Amherst Media and distributed to MA community TV affiliates
Citizens Climate Lobby, Northeast Conference	February 19, UMass Amherst	Breger	Moderator: Plenary panel on <i>States' Role in Solving the Climate Crisis, 2017-2020</i>	CCL leadership and membership from northeast	120
<i>Bringing Renewable Thermal Solutions to New England: Stakeholder Convening</i>	February 23, Boston	Strong	Participated as CEE contributor to Carbon Neutral Cities Alliance project.	CNCA participant communities, state agencies, partners, consultants, stakeholders	28

Mohawk Trail Woodlands Partnership Advisory Committee Meeting	March 7, Charlemont, MA	Breger, Strong, Peltier	<i>Support Activities for the Mohawk Trail Woodlands Partnership</i> (Breger); <i>Up in the Air - Investigating Biomass Emissions in Western MA</i> (Peltier)	MTWP regional leadership and Advisory Committee, EEA, DOER, public stakeholders	35
Green Roundtable on Green Jobs	March 30, Greenfield, MA	Breger, Strong	Participated in Roundtable discussion	Representatives from western MA businesses, economic development agencies, and higher education	10

3. Green Communities and other State/Municipal Assistance

CEE continues to provide technical assistance to Massachusetts towns in support of Green Communities or for activities apart from this program. CEE has utilized its staff engineers, Chris Beebe and Lauren Mattison, for this purpose, along with the efforts directly by Principal Investigator Ben Weil and the student Clean Energy Corps. River Strong maintains management of the activities and interactions with the towns.

City or Town	Status	Technical Assistance
Boston	Support to Boston Planning and Development Agency to evaluate Lower Roxbury Microgrid opportunity.	Provided technical assistance in developing strategies for systems sizing and technology options.
Conway	Annual GC reporting support.	CEE supported Conway in answering technical questions arising from a GC review of the town's annual report.
Hilltown Cooperative Charter Public School	HCCPS is considering a solar PV installation that will provide some or all of the school's electric needs.	CEE's support included advising HCCPS on possible project ownership structures, financing mechanisms and arrangements, and potential designers/installers.
Huntington	Town is considering energy upgrades at its wastewater treatment facility using Green Communities funds.	CEE is providing energy efficiency analysis and recommendations to the water and sewer commissioner and town staff, as well as drawing outside expertise from CEE's partner network.
Montague	Consulting and support for project identification and implementation.	CEE met with a Montague energy committee member for an initial discussion related to supporting the committee as it seeks to identify, organize, prioritize, and implement clean energy projects across the town generally and specifically at the Montague industrial park and DPW facility.

Pioneer Valley Regional School District	Consulting and support for project identification and implementation.	CEE met with PVRSD and GC officials to discuss supporting them in establishing an MEI account for the District, entering and organizing data, and establishing a path for identifying and implementing clean energy projects across the district.
Pittsfield	Town has been approached by local champion Toryl Hanna regarding the development of a microgrid to support critical facilities. Town is contemplating a proposal submission to MassCEC for feasibility study.	CEE has provided support to Toryl Hanna and engaged in phone meeting with Mayor, and with MassCEC staff.
Southampton	GC designation application support.	CEE communicated with the town administrator to outline our 2016 work with Southampton and to outline a process for helping the town move toward a designation application in 2017.
Winchester	Further analysis of feasibility of geothermal system for town library.	Analysis included using additional billing information to update utility rates in our earlier analysis and estimating the potential impact of the Alternative Portfolio Standard on the project finances.
<i>Municipalities Engaged with Clean Energy Corps</i>		
Adams	Basic analysis of MEI data and reference to UMass Industrial Assessment Center.	By far the largest energy user in Adams is the waste water treatment plant. Clean Energy Corps flagged this site for a free consultation with the UMass Industrial Assessment Center.
Erving	CEE supported town's successful application for GC designation last year. CEE is currently providing guidance on how to spend their GC designation grant and continue working toward their energy reduction goal.	CEE support included investigating the high electric bills for the town's senior center, which is only five years old and has a geothermal heating and cooling system, and connecting them with Ben Weil who is helping them to identify opportunities for large reductions in energy use through envelope retrofits, controls, and mechanical system upgrades in the Senior Center, Administrative building, Elementary School, and Fire Stations.
Greenfield	Wood Pellet Boiler System in Fire Station	Dr. Weil and Clean Energy Corps diagnosed and solved a back-drafting problem that would have caused the fire department to abandon the pellet boiler system in which they had invested several years ago. The town plans on building a new fire station in the next several years. Clean Energy Corps provided a guidance document with strategies and recommendations to optimize the efficiency and performance of a new fire station while incorporating the existing pellet boilers and solar thermal system into the future building.
Orange	Consulting and support for upcoming GC designation application.	Dr. Weil and Clean Energy Corps identified strategies to enable the town to reduce total energy use by more than 20% at an annual savings. Some recommendations offer savings of about \$14k/year with a simple payback of less than two months.
Pelham	Consulting and guidance in support of an upcoming application for a Green Communities competitive grant to dramatically improve the	Dr. Weil and Clean Energy Corps provided comprehensive diagnosis and building energy modeling to recommend a package of upgrades that include exterior continuous insulation on walls, a heat

	performance of the Community Center.	exchanger that eliminates glycol from 95% of the hydronic system, eliminates short-cycling of chiller and boiler and reducing pumping electrical demand, and moisture control solutions that reduce the extensive dehumidification costs. Estimated savings \$7k/year with a 7 year simple payback period.
Rowe	Preliminary feasibility study for possible district energy system.	Clean Energy Corps analyzed heating demand and circulation energy requirements, as well as rough cost estimates for integrating the town hall and police and fire station into a district heating loop connected to the wood pellet boiler system at the DPW.

4. Business Outreach and Support

The Clean Energy Extension staff held substantive direct interactions with the following businesses, state entities, and other organizations.

Entity and Attendees	Date and Format	Extension Staff	Purpose and Outcomes
Stop & Shop	January 10, February 14, March 27; conference calls	Mattison	Arranged for Stop & Shop's distribution center in Assonet, MA to host a workshop and tour for the Green Your Bottom Line initiative for sustainability in food businesses.
The Nature Conservancy, Laura Marx	January 18 meeting	Breger, Strong	Explore common areas of interest, particularly pertaining to wood energy and forestry.
Little Leaf Farm and Devens Municipal Light Plant, Shirley MA, company CEO and other officials, Gerry Palano MDAR	February 2, site visit and meeting	Breger, Strong, Beebe, McDaniel	Reviewed opportunity for CHP at greenhouse site in coordination with Devens utility. CEERE CHP Application Center following up with CHP screening evaluation.
Gorton's Seafood, Gloucester, MA	February 2, site visit and meeting	Mattison	Arranged for Gorton's to host a workshop and tour for the Green Your Bottom Line initiative for sustainability in food businesses.
Roberts Energy Renewables, Ashfield MA	February 15; conference call	Strong	Reviewed progress and business plan development
Co-op Power, Lynn Benander	February 15	Breger, Strong	Drafted letter of support for Co-op Power's grant application for EERE innovative pathways grant.
MA Representative Solomon Goldstein-Rose	February 24	Breger	Introductory meeting with new local Representative and introduction to CEE
Fivefork Farms, Upton MA	March 6, conference call	Strong, Beebe, Breger	Reviewed farm energy needs and business growth plans. Follow up site visit planned in April. Target outcome is application to MA Ag Energy program.
Statewide Wood Energy Team – Berkshire Modern Wood Heating Event	March 15, wood heat site visits and presentation	Strong, Beebe	Attended tour of several modern wood heat facilities in Berkshire County, lunch presentation by DOER,

			networking with wood heat users and suppliers.
Leading By Example Council Meeting	March 23	Strong	Attended LBE council meeting to provide updates on CEE efforts, network, and stay apprised of LBE partner projects and initiatives.

5. UMass Clean Energy Corps and other Student Research Activities

The Clean Energy Corps was convened in a class of 12 students led by Ben Weil, and supported by Chris Beebe and Kevin Calantone (senior year student and student leader for the Clean Energy Corps). The class was exposed to building energy diagnostic methods and analytical procedures, and deployed to site visits in Pelham, Greenfield, and Erving to undertake deep energy evaluations on buildings and building systems to address energy challenges as reported in Section 3.

Other undergraduate student research projects underway during this reporting period include the following. Each of these projects will result in a technical paper.

Evaluation of wood energy policy and strategic economic development in Upper Austria and transferability to western MA (in support of 2017 Work Plan activity as reported in Section 6).

GIS heat demand mapping of MTWP region to assess potential wood heat demand and identify opportunities for community district heating systems (in support of 2017 Work Plan activity as reported in Section 6).

Evaluation and ChargePoint data analysis of the use of electric vehicle recharging stations at UMass Amherst and recommendations for expanded stations and EV adoption.

6. Progress on 2017 Work Plan Activities

As part of its Strategic Plan, CEE has established its 2017 Work Plan, which includes a set of priority activities across CEE’s activity areas. This report uses this work plan structure to report on its progress in each of these activities.

UMass Clean Energy Extension Work Plan 2017	2017 Q1 Progress Report
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Activities	Timeframe	Summary of Progress
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Market Analysis & Outreach		
<i>Clean Energy in Food/Beverage Industry</i>	Q1-Q4	<p>The following activities were completed to plan <i>Green Your Bottom Line</i> workshops for food and beverage businesses in Massachusetts.</p> <ul style="list-style-type: none"> • Made a connection with Stop & Shop sustainability staff and arranged for them to host the April 4 workshop at their New England distribution center and provide tours of their green energy facility (CHP system with anaerobic digester fueled by food waste from Stop & Shop stores). • Developed presentation for the April 4 workshop about energy efficiency opportunities in food/beverage businesses. • Met with UML Madeline Snow and Gorton’s Seafood staff to plan May 3 workshop at the Gorton’s headquarters in Gloucester. • Made a connection with Sustainable Business Network of Massachusetts and worked with them to plan a March 13 meeting to evaluate the organization and their members’ interest in participating in the initiative. • Helped to plan agendas, publicize workshops, and develop a handout listing resources for participating businesses. Created event registration pages.
<i>Community Scale Biomass District Heating: Role of Farmers/Foresters, Outreach Materials</i>	Q1-Q3	Two student interns working on comparative review of Upper Austria wood energy policy and economy. Met with Rob Rizzo and Paul Catanzaro (UMass extension professor) to discuss western MA forestry economy and recent woodlands cooperative business ventures.
<i>Packaged CHP and ASHP Evaluation for Hotel Industry</i>	Q1-Q3	Project task plan and outcomes has been prepared and reviewed with CEE staff.
<i>Biomass and other Renewable Thermal Heating for Greenhouses</i>	Q2-Q4	Project task plan and outcomes has been prepared and reviewed with CEE staff.

Energy Storage in Manufacturing Sector	Q2-Q4	Not yet started
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Collaborative Applied Research		
Mohawk Trail Woodlands Partnership	2017 and 2018	CEE worked with FRCOG and BRPC to strategically prepare for Advisory Committee meeting and to plan and manage the engagement of UMass CEE with member towns. CEE prepared Activity Summary handout and presentation for meeting. UMass efforts and team were well received and the membership was generally pleased to have this technical support.
Regional Inventory of Boilers / Wood Heating Demand	Q1-Q3	CEE prepared an Information Request for member towns to solicit information on municipal building heating loads and equipment. Information Request was distributed by FRCOG and BRPC to town officials and CEE is now engaged in data collection and follow up. Information Request is built upon MEI data for MTWP Green Communities, and CEE has offered to prepare MEI accounts for non-Green Communities. CEE will deliver to each partnership town a Municipal Energy Assessment Report, and a wood energy screening analysis for any town that is interested. To assess heating demand for non-municipal buildings, CEE has engaged a student intern using GIS to create parcel-level heat maps for the MTWP region. This approach is showing good signs for useful evaluations and replication.
Air Emissions Monitoring and Public Health Assessment	Q1-Q2 and 2018	With joint support from CEE, DOER and MassCEC, Professor Peltier has completed development of a mobile air emissions monitoring laboratory as of the end of March. The laboratory will be deployed to the Amherst College book depository bunker for its first monitoring assignment. Additional test sites have been identified, and will be subject to monitoring next heating season.
Pellet/Dry Chip Manufacturing - Alternative Business Models	Q2-Q4 and 2018	Not yet started
Regional Economic Analysis	Q2-Q3 and 2018	Professor Henry Renski (Regional Planning) has prepared a scope of work and budget for his work to lead an effort to analyze the regional economic impact of the MTWP wood energy activities. The work will be undertaken as a “seed grant” from CEE ISA funds. This modeling work will be started this summer, but will be interactively advanced as information from other sub-tasks (wood heating demand, pellet/chip manufacturing) become available through 2018.
Analysis of Monitoring Data from Renewable Thermal Systems	Q2	Not yet started / Opportunity to be reviewed with DOER
Analysis of Pellet Boiler Systems and Thermal Storage	Q1-Q3	A graduate student in CEERE continues to make progress on a TRNSYS model to simulate a boiler/storage/load system and analyze the benefits and optimization of storage under various scenarios.
Thermal Storage & Renewable Thermal to reduce UMass Campus Oil Use	Q2-Q4 and 2018	Not yet started
UMass Faculty Seed Grants	as needed	Manwell/McGowan, Offshore Wind and Energy Storage: Research has been completed on storage technologies and modeling is well advanced. A second interim report has been delivered. An abstract “Design and Analysis Tool for Power Systems with Large Scale Wind Power and Energy Storage” has been accepted for oral presentation at the on this research has been accepted for a presentation at the Offshore Energy and Storage 2017 Conference at Woods Hole, Cape Cod in July.

		Timmons, Massachusetts Biochar Economics Study: Research progress was reviewed at meeting at UMass Amherst on February 17, with other UMass colleagues engaged in biochar research.
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Technical Assistance & Advisory Services		
<i>Green Communities/Municipal Support</i>	Q3-Q4 and continuously	CEE has worked with 15 municipalities during this reporting period. A summary of these activities area provided in the main body of the Progress Report.
<i>UMass Physical Plant - Energy Storage Proposal</i>	Q1-Q2 and as needed	<p>CEE coordinated a follow-up meeting with Physical Plant on April 6 to support progress of campus in advancing a proposal to the state Energy Storage Demonstration grant opportunity. As part of this support, Beka Kosanovic and Ben McDaniel in CEERE provided a UMass campus electric load model with energy storage using NREL's System Advisor Model (SAM) to analyze to potential for energy storage on campus. Parametric simulations were conducted to determine the technical and economic potential of different battery technologies, dispatch strategies and system sizing (both kW and kWh). Preliminary results showed a simple payback of approximately 15 years (with no incentives) at system sizing of 3MWh & 1MW.</p> <p>On April 10, CEE staff and Beka Kosanovic (CEERE) participated in the interviews of energy storage vendor finalists – one of which to be selected by the University to partner in the energy storage project proposal to the state.</p>
<i>Technical Assistance to State, Businesses, Institutions, Associations, others</i>	as needed	CEE has worked with 9 businesses and other entities during this reporting period. A summary of these activities area provided in the main body of the Progress Report.