

UMASS CLEAN ENERGY EXTENSION

Quarterly Progress Report to MA Department of Energy Resources

Period ending June 30, 2019

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This Progress Report provides a summary of work accomplished by the UMass Clean Energy Extension (CEE) during the period April 1, 2019 to June 30, 2019.

During this reporting period, the Clean Energy Extension continued its support of the Green Communities and SMART solar-agriculture dual-use programs, advanced efforts in support of clean heating and cooling markets, completed its study and report on the early-stage battery innovation ecosystem in Massachusetts, and facilitated interactions across industry, the university, and a range of research and outreach activities. Some key highlights, further discussed below for this reporting period include:

- Completed a pilot project for DOER in collaboration with the Metropolitan Area Planning Council to review the progress of and offer support to Green Communities that have been in the program for more than five years and not yet achieved the 20% energy reduction goal. Developed Green Communities Building Energy Analysis Tool for use in this pilot and beyond.
- Finalized the CEE project report [*Creating Opportunity: Building a Massachusetts Battery Energy Storage Innovation Ecosystem*](#). This study explores the early-stage battery innovation ecosystem in Massachusetts and offers recommendations to facilitate interactions across industry and the universities – in collaboration with DOER and MassCEC. Supported a technical consultant, finalized a database of findings, and drafted the final report.
- CEE was awarded a MassCEC Massachusetts 2018 Offshore Wind Workforce Grant for \$105,500 to develop an offshore wind professional graduate certificate program in coordination with the University College of Natural Sciences and the Office of Online / Continuing & Professional Education.
- Commenced providing user support services to MassEnergyInsight Green Communities users in partnership with DOER, Peregrine Energy, and OptiMiser, LLC. Conducted team trainings and transition support.

- Advanced collaborations with farmers, developers, UMass Agricultural Extension, DOER, and Massachusetts Department of Agricultural Resource (MDAR) to develop tools, guidance, and a pre-determination form for those considering dual-use PV systems under the recently launched SMART program. Over this reporting period, CEE has continued its review of Pre-Determination applications for dual-use agricultural STGUs, conducting reviews of two applications, with comments provided to the applicant. We also participated in three dual-use sites visits to provide further recommendations and clarifications at proposed sites. In addition, we continue to update our fact sheets, add resources to our website, and provide one-on-one guidance to farmers, developers, and communities, as new information becomes available.
- CEE supported 16 communities and non-profit organizations with UMass Clean Energy Corps building-energy site assessments and presentations, clean energy project evaluation and implementation, and general technical assistance.
- In coordination with DOER and Clean Cities Program, continued to develop fact sheets, reports, and other outreach materials to support municipalities in addressing rural transportation challenges and identifying opportunities to reduce municipal fuel consumption. Finalized the project report, [*Reducing Municipal Vehicle Fuel Consumption in Rural Massachusetts Communities*](#).
- CEE worked with MassCEC to plan and host April training sessions on heat pump and variable refrigerant flow technology in Boston and Westborough.
- CEE Director and the campus Sustainability Manager are co-chairing the Chancellor's Carbon Mitigation Task Force charged with charting a plan for the University to rely on renewable energy and eliminate greenhouse gas emissions. Co-chairs have convened a 17-member taskforce including faculty, administration, and students. Task Force held two additional meetings during this reporting period along with a meeting with the Chancellor. The Task Force finalized an RFP for a consultant to support technical tasks for release in July.
- Completed the training of six Clean Energy Corps students to support the development of a greenhouse gas inventory and clean energy plan for the newly acquired UMass Amherst Mount Ida campus during the spring and summer of 2019. Deployed five of the six Corps members to the Mount Ida campus to conduct analyses, with plans to complete the project in July 2019. This public service learning initiative is being in coordination with the UMass Amherst Sustainability Manager, and will be integrated with DOER Leading by Example.
- Finalized a spreadsheet of recommended plant species to accompany pollinator-friendly designation criteria and Best Management Practices for establishing and maintaining pollinator-friendly vegetation under and around solar PV arrays. Initiated discussions with DOER on the potential for an incentive adder in the SMART program revisions to

support pollinator-friendly solar PV installations. Discussed potential for development of pilot pollinator-friendly sites with Massachusetts solar developers.

1. Extension Administration and Management

CEE has brought on a part-time contractor, Mary Kraus, to assist with our new efforts in providing MassEnergyInsight user-support and other projects.

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/Attendee	Presentation Title	Audience	Estimated Attendance
UMass Wind Energy Fellow Seminar	April 4, UMass	Shenoy (CEE PI); Attendees: Breger, Strong, Dowling	Smart Control of Grid-friendly Solar Arrays	Faculty, students	30
MassCEC Heat Pump and Variable Refrigerant Flow training	April 9, Boston	Mattison	N/A (helped to plan event and develop training materials)	HVAC industry, government and utility staff	50
UMass School of Earth and Sustainability – Earth Day Celebration	April 17, Olver Design Building, UMass	Breger, Strong, Clean Energy Corps	Poster presentation on Mt. Ida GHG Inventory project	University community, local organizations and representatives	200
IGERT/UMass Wind Energy Poster Session	April 23, UMass Campus Center	Dowling; Attendees: Breger, Strong	N/A	Faculty, grad students, companies, organizations, representatives	60
WMAcce Task Force Meeting	April 24, Amherst Town Hall	Breger, Dowling, Strong	Survey of Municipal Aggregations in MA	Members of WMAcce task force (municipal officials and NGO staff)	15
MassCEC Heat Pump and Variable Refrigerant Flow training	April 25, Westborough	Mattison	N/A, helped to organize event and develop training materials	HVAC industry, government and utility staff	50
Offshore Wind Workforce Collaboration Meeting	May 1, New Bedford	Strong, Khalsa (student)	N/A	State, local officials, industry participants, citizens	100
UMass Clean Energy Corps –	May 2, UMass Amherst	Weil & Clean Energy Corps	Clean Energy Site	Municipal officials and	50

Project Presentations			Assessment Project Presentations	citizens, UMass community members	
MA Forestry Forum, EEA/Bob O'Connor	May 2, Harvard Forest, Petersham	Breger	N/A	State officials, MA forestry stakeholders	50
MassCEC Offshore Wind Workforce Awards Announcement	May 10, Marine Commerce Terminal, New Bedford	Breger, Manwell (Mechanical Engineering)	N/A	Wind industry, state officials, grant awardees	120
Hosted DOER - Public Hearing at UMass - RPS regulations	May 16, UMass Amherst	Breger, Strong	N/A	Municipal officials, general public, UMass community members	150
Pioneer Valley Planning Commission, Clean Energy and Climate Action Group	May 23, Springfield	Breger, Strong	N/A	Regional planners, representatives, and organizations.	40
ASME Offshore Wind Forum	June 12, Copley Plaza, Boston	Breger, Manwell (Mechanical Engineering)	Lunch Keynote remarks by UMass Chancellor Subbaswamy	Offshore wind industry, engineers, professionals	200

3. Green Communities and other State/Municipal Assistance

Community Choice Energy (Northampton, Amherst, Pelham)

CEE continues its engagement with the Western Massachusetts Community Choice Energy organizers to support the towns of Northampton, Amherst and Pelham, which have all approved the exploration of a municipal aggregation for electricity with innovative efforts to enhance strategic investments in local energy efficiency, demand reductions, and renewable generation. CEE is providing analytical support, and is participating in Task Force activities, including project planning, developing funding proposals, and supporting research efforts. During this quarter, the Task Force received a grant award from the Northampton to the Urban Sustainability Directors Network to support the services of two consultants. Work commenced on the consulting project scope of analyzing the feasibility and specifics of further developing and implementing the WMCCE.

Green Communities

In this quarter, CEE completed the Green Communities program review pilot for DOER, in collaboration with the Metropolitan Area Planning Council. We worked closely with staff from four communities (Monson, Northampton, Mashpee, and Westford) and did extensive data

analysis to understand their energy efficiency efforts to date and the challenges they have faced. We completed development of the Excel-based Green Communities Building Energy Analysis Tool to help municipalities better understand their energy use and identify areas for improvement. We held final meetings in each community, attended by DOER representatives, to present and discuss our findings and recommendations, and presented final written reports to each community. With MAPC, we provided a report to DOER compiling results from all eight pilot communities, along with program recommendations, and we held a final meeting with DOER (Joanne Bissetta, Neal Duffy, Kelly Brown).

In coordination with DOER and Clean Cities Program, CEE continued to develop fact sheets, reports, and other outreach materials to support municipalities in addressing rural transportation challenges and identifying opportunities to reduce municipal fuel consumption. We finalized the project report, [Reducing Municipal Vehicle Fuel Consumption in Rural Massachusetts Communities](#).

CEE continues to provide technical assistance to Massachusetts towns in support of the Green Communities program. During this reporting period, CEE engaged with 16 communities and non-profit organizations with UMass Clean Energy Corps building-energy site assessments, clean energy project evaluation and implementation, and general technical assistance.

As part of Green Communities, and for towns and non-profit organizations outside this program, CEE staff and affiliates have engaged with the following communities:

City or Town	Status	Technical Assistance
Arcadia Wildlife Sanctuary – MA Audubon	Non-profit technical assistance	CEE (Strong, Weil) conducted a Clean Energy Site Assessment and provided a series of recommendations related to building performance and energy efficiency for this non-profit’s facility located in Easthampton, MA.
Chicopee	Municipal technical assistance	Mattison and Kosanovic met with Mayor Richard Kos and municipal staff members to plan an assessment of Chicopee’s wastewater treatment plant through CEERE’s Industrial Assessment Center program.
Cohasset	Green Communities/Municipal technical assistance	CEE (Weil, Clean Energy Corps) presented results of the Clean Energy Site Assessment and analyses for the town’s historic town hall.
Colrain	Green Communities/Municipal technical assistance	CEE (Weil, Clean Energy Corps) presented results of the Clean Energy Site Assessment and analyses for the Colrain Central School.
Drama Studio	Non-profit technical assistance	CEE (Weil, Clean Energy Corps) presented results of the Clean Energy Site Assessment and analyses for this non-profit’s newly acquired facility located in Springfield, MA.
Mashpee	Green Communities	Completed Green Communities program review. CEE (Mattison) met with two members of town staff, Cape Light Compact representative and Joanne Bissetta to discuss findings and recommendations, then sent final report to town.

Monson	Green Communities	Completed Green Communities program review. CEE (Mattison, Dowling) met with several members of town staff and Jim Barry to discuss findings and recommendations, then sent final report to town.
Montague	Green Communities/Municipal technical assistance	CEE (Weil, Clean Energy Corps) conducted a Clean Energy Site Assessment and analyses for Montague's Hillcrest School and Sheffield Administration Building. In addition, the Corps presented results of the site assessment and subsequent analyses.
Northampton	Green Communities/Municipal technical assistance	CEE (Weil, Clean Energy Corps) presented results of the Clean Energy Site Assessment and analyses for Northampton's Leeds Elementary School. Completed Green Communities program review. CEE (Mattison, Dowling) met with several members of city staff and Jim Barry to discuss findings and recommendations, then sent final report to city.
North Quabbin Harvest Co-op	Non-profit technical assistance	CEE (Weil, Clean Energy Corps) presented results of the Clean Energy Site Assessment and analyses for this community co-op located in Orange, MA.
Orange	Green Communities/Municipal technical assistance	CEE (Strong, Weil) advised Orange regarding ventilation strategies for the town hall and related use of Green Communities funding.
Pittsfield	Green Communities/Municipal technical assistance	CEE (Strong) advised Pittsfield regarding engaging a UMass summer intern to assist in the updating of its municipal Climate Action Plan.
South Hadley	Green Communities/Municipal technical assistance	CEE (Weil, Clean Energy Corps) presented results of the Clean Energy Site Assessment and analyses for South Hadley's high school building.
Westford	Green Communities	Completed Green Communities program review. CEE (Mattison) met with several members of town staff, Joanne Bissetta and Neal Duffy to discuss findings and recommendations, then sent final report to town.
Westhampton	Green Communities	CEE assisted with correction of MEI GC baseline year data, for solar electricity account on library building
Whately	Green Communities/Municipal technical assistance	CEE (Weil, Clean Energy Corps) presented results of the Clean Energy Site Assessment and analyses for the Whately Elementary School.

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
Garlock Printing & Converting Corp.	April 2, site visit	Kosanovic, McDaniel	Conducted site visit and analysis for a combined heat and power system for the Garlock Printing in Gardner, MA

Senator Jo Comerford	April 8, UMass Amherst	Breger, Strong	Introduced the Senator to CEE's history, structure, role in the MA clean energy landscape, specific projects, and areas of potential collaboration.
Mary Kraus	April 9, CEE offices	Breger, Strong	Met to discuss contracting with Mary to assist with the MEI user support efforts.
UFP Technologies	April 9, site visit	McDaniel, Kosanovic	Conducted site visit and analysis for a combined heat and power system for the UFP Technologies in Newburyport, MA
Vermont Energy Investment Corp./Biomass Energy Resources Center meeting	April 11, conference call	Breger, Strong	Meeting with Adam Sherman of VEIC and BERC to discuss respective projects, collaborations, and strategies for identifying wood energy funding opportunities.
Western Mass Economic Development Council mayors meeting	April 17, Westfield, MA	Mattison, Kosanovic	Spoke at a meeting with most of the Western Mass mayors about energy efficiency and the assistance available for water/wastewater treatment plants and local manufacturers through CEERE's Industrial Assessment Center.
Cobi Frongillo, UMass School of Public Policy	April 26, CEE Offices	Breger, Dowling	Met to discuss municipal aggregation for research project on MA aggregations
Peregrine Energy Consulting	April 26, conference call	Breger, Strong	Discussed subcontracting details related to the MassEnergyInsight energy management platform.
Dual-use Solar Site Visit – Knowlton Farms	April 30, Grafton, MA	Dowling	Site-visit to review and discuss dual-use solar-ag project application.
DFE Corporation	May 2, site visit	McDaniel, Kosanovic	Conducted site visit and analysis for a combined heat and power system for the DFE Corporation in Agawam, MA
Representatives Mindy Domb and Natalie Blais, intro/CEE	May 3, UMass Amherst	Breger, Strong	Introduced the Representatives to CEE's history, structure, role in the MA clean energy landscape, specific projects, and areas of potential collaboration.
NYPRO Healthcare	May 9, site visit	Kosanovic, McDaniel	Conducted site visit and analysis for a combined heat and power system for the NYPRO Healthcare in Clinton, MA
Dr. Rick Peltier	May 15, UMass Amherst	Breger, Strong	Meeting with Rick to discuss air quality emissions monitoring analysis progress and reporting, and strategies for identifying additional emissions monitoring funding opportunities.
UMass Amherst Sustainability Tour with Center for EcoTechnology	May 21, UMass Amherst	Strong	Tour and meeting with UMass sustainability coordinator and CET with focus on campus sustainable energy and green buildings.
Pioneer Valley Planning Association - Climate Action and Clean Energy Advisory Group Meeting	May 23, Springfield	Strong	Met with PVPC staff and partners to discuss updates and CEE's role in supporting the Pioneer Valley Climate Action and Clean Energy Plan.
EnerGSave/Grinspoon Foundation	May 30, Conference Call	Dowling, Strong	Met with EnerGSave staff to discuss Clean Energy Corps research project examining opportunities for and barriers to delivering community energy efficiency analysis and retrofit services to the existing residential building sector.

CAFE Summer Scholars Research & Extension Program meeting	May 30, UMass Amherst	Dowling, Strong	Attended CAFE Summer Scholars meeting for networking and presentations related to CEE's award for a Summer Scholar to support an undergraduate intern for a project on Municipal Planning for Carbon Neutrality.
Mt. Ida GHG and Clean Energy Planning mtg.	June 5, Mt. Ida campus	Breger, Strong	Convened project planning meeting and campus tour with campus officials and project student group.
Paul Fenn, Local Power	June 6, CEE offices	Breger, Strong	Discussed collaborative efforts, funding sources, and potential partnerships related to a Community Choice Energy UMass incubator proposal.
Offshore Wind Professional Certificate Planning Meeting	June 13, UMass Amherst	Breger, Strong	Met with John Lopes, Associate Dean for Operations & Graduate and Postdoctoral Programs to plan approval process for CEE's OSW certificate program.
MDAR Energy Grant Application Review Meeting	June 25, UMass Amherst	Strong	Met with Gerry Palano to kickoff the review of 37 MDAR energy grant applications. Final review meeting scheduled for July.

5. Research Activities and UMass Clean Energy Corps

Research Activities and Funding Opportunities

CEE advanced a program design for an offshore wind professional graduate certificate program in coordination with the University College of Natural Sciences and the Office of Online / Continuing & Professional Education. In May, CEE was awarded a MassCEC Massachusetts 2018 Offshore Wind Workforce Grant for \$105,500 to develop this effort.

In partnership with DOER, Peregrine Energy, and Optimizer LLC, CEE commenced transition meetings and providing user support services to Green Communities MassEnergyInsight users. CEE's primary role in this effort is to provide user/customer support and training, which is well aligned with our current role in supporting MA municipalities.

CEE in collaboration with colleagues in Resource Economics and industry partner Sustainable Energy Advantage, LLC, was awarded a Seed Grant from the UMass Institute for Social Science Research. Seed Grants are intended to support proposals that are not likely to be funded by traditional granting organizations because they are early in development and interdisciplinary in nature. The project will analyze the magnitude and beneficiaries of the economic rents from Massachusetts solar programs (SREC and SREC II), and examine the distributional impacts of the benefits across geography and income sectors. CEE hired a summer student to assist with the project which was started in June.

CEE, with colleagues in the Department of Environmental Conservation, submitted a \$375,000 grant proposal for "Designing Efficient Wildlife Monitoring Protocols to Guide Mitigation and Address Knowledge Gaps" to NYSERDA in response to their PON 4082. Staff member Zara Dowling also collaborated with faculty in the Department of Mechanical Engineering on a grant

proposal to the American Wind Wildlife Institute regarding development of a system for sensing wildlife collisions with wind turbine blades.

CEE continued work on a Municipal Planning for Carbon Neutrality research project, utilizing funds provided through the Center for Agriculture, Food and the Environment (CAFE) Summer Scholar Program to support an undergraduate intern to work on the project

CEE continued work on the Renewable Thermal Alliance (Yale U.) Seed Innovation Grant award project: *Understanding Renewable Thermal Market Penetration Outcomes – Comparative Evaluation Tool*.

CEE continued providing technical input to support the selection and design of a clean heating and cooling system calculator tool, in partnership with the Clean Energy States Alliance and northeast regional state energy offices. These efforts are in service of the Renewable Thermal Alliance (Yale U.) Seed Innovation Grant project: *Consumer-Facing Cost-Carbon Calculator for RH&C Technologies*.

CEE and its project partners (the Center for Energy Efficiency and Renewable Energy and the Water Innovation Network for Sustainable Small Systems, the Town of Amherst Wastewater Treatment Plant, Blue Thermo) continued to finalize the funding contract from MassCEC's Wastewater Treatment Innovative Technology Program. The project will pilot an innovative wastewater-source heat pump at the town WWTP and deliver heat to the building facility.

CEE continued to provide technical support to the communities of Northampton, Amherst, and Pelham under the Urban Sustainability Directors Network (USDN)-funded project to advance the western MA towns intent to establish a progressive Community Choice Energy Aggregation 3.0. The consulting team of Paul Gromer, Peregrine Energy and Paul Fenn, Local Power commenced work in January and are providing regular progress updates.

CEE is participating on the organizing committee for a campus-wide visioning process of an Energy Transition Initiative to bring forward convergence research across University colleges and departments to contribute to the energy transition essential to resolve our climate and social challenges.

CEE in collaboration with Benjamin McDaniel, Dr. Beka Kosanovic and graduate researchers (CEERE) and Prashant Shenoy (CICS) continue to support the University Physical Plant as part of the ACES battery storage grant and installation. The 4 MWh / 1 MW battery was installed on campus in June and is completing commissioning in July. Research focuses on deep learning models to forecast energy loads for optimal distributed energy resource dispatch. CEE is also working with CEERE to evaluate and design a large scale, long duration thermal storage in campus clay deposit to reduce fossil fuel use by the UMass CHP Plant. A mechanical engineering graduate student has begun to learn the simulation tools, and will focus on this research project for his thesis.

Clean Energy Corps

CEE staff, in collaboration with CEE co-PI Ben Weil, has been engaged with local Green Communities and other organizations in identifying energy problematic town/school/non-profit buildings for Prof. Weil's spring 2019 Clean Energy Corps class. During this quarter, the Corps provided building walkthroughs, energy diagnostics, and energy efficiency and renewable thermal recommendations at two facilities: Montague's Hillcrest School and Sheffield Administration Building. In addition, the Corps presented findings and final reports for eight community/non-profit eight site assessments and subsequent analyses (Cohasset, Colrain, Drama Studio, Montague, Northampton, North Quabbin Harvest Co-op, South Hadley, Whately).

During this reporting period, Clean Energy Corps interns have worked on the following projects with CEE staff mentors:

- Support of Green Communities program providing western MA towns with Mass Energy Insight support, preparation of Municipal Energy Assessment and Clean Energy Assessment reports.
- Evaluation and data analysis of the challenges, opportunities and best practices to reduce fuel use and greenhouse gas emission in rural municipal fleets, in coordination with DOER Clean Cities program.
- Transportation policy research regarding opportunities and barriers to increasing access to public transportation and electric vehicles for underserved populations.
- Research on offshore wind professional education programs around the U.S. and world, and development of industry contact database.