

UMASS CLEAN ENERGY EXTENSION

Quarterly Progress Report to MA Department of Energy Resources

Period ending September 30, 2019

Contacts: Dwayne Breger, Director, dbreger@umass.edu 413-545-8512
Prashant Shenoy, shenoy@cs.umass.edu, 413-577-0850

This Progress Report provides a summary of work accomplished by the UMass Clean Energy Extension (CEE) during the period July 1, 2019 to September 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, disseminated 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:

- Began development of three new tools to support the Green Communities program: Municipal Energy Profile, Energy Efficiency Checklist for Municipal Buildings, and Decision Guide for Energy Retrofits in Massachusetts Schools.
- Broadly disseminated 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
- Continued to develop the Offshore Wind Energy Professional Graduate Certificate Program in coordination with the University College of Natural Sciences (CNS) and University Without Walls. CEE was awarded a MassCEC Massachusetts 2018 Offshore Wind Workforce Grant for \$105,500 and secured an additional \$32,000 from the university to develop the program. A soft launch of the program with one course module is planned for Spring 2020.
- Continued to provide user support services to Green Communities MassEnergyInsight users in partnership with DOER, Peregrine Energy, and OptiMiser, LLC. This quarter we refined the project team by adding Dugan Becker to the support team and continued to conduct transition support with Peregrine, Optimizer, and DOER. During this period,

CEE successfully addressed 114 requests for user support across 65 communities, published its first MEI user newsletter, and attended team planning meetings.

- 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, providing reviews of five new dual-use applications, and one revised application. We also participated in two dual-use site 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 seven communities with building-energy site assessments, clean energy project evaluation and implementation, and general technical assistance.
- Initiated and mentoring four-student team Makerspace project to experiment on winter ice production through enhanced icicle formation to evaluate feasibility of seasonal ice storage for campus building cooling.
- In coordination with the Clean Cities Program, we took next steps to launch our joint telematics pilot project, to support municipalities in identifying opportunities to reduce municipal fuel consumption. We reviewed the finalized PON and advertised its posting on CommBuys to interested communities. We reviewed two applications from rural municipalities in Berkshire and Franklin counties, and identified appropriate vehicles to trial the equipment. We held phone meetings with Clean Cities and GPS Insights staff to better understand the telematics program, and opportunities for data collection and analysis.
- 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. The 17 member Task Force held issued an RFP in July for a consultant to support technical tasks and received 13 proposals. The Task Force screened the responses to 5 finalists which will be interviewed on campus in October.
- Completed the development of a Clean Energy Corps greenhouse gas inventory and clean energy plan for the newly acquired UMass Amherst Mount Ida campus during the spring and summer of 2019. The Corps presented project findings and results in a final report and presentation to the campus leadership team and other project stakeholders on July 11. This public service learning initiative was conducted in coordination with the UMass Amherst Sustainability Manager, and will be integrated with DOER Leading by Example. The final project report and presentation can be found [here](#).

- During this reporting period, we took significant steps in development of our pollinator-friendly certification program for solar PV facilities. We finalized application forms, certification procedures, application fees, and annual reporting requirements, to help guide developers and consultants through the application process. We discussed pollinator-friendly certification criteria and participation in the program with six developers and two consultants. We disseminated information about the Massachusetts pollinator-friendly program through discussions with Clean Energy States Alliance and the Leading by Example Interagency Working Group. We also completed a financial analysis estimating the costs for pollinator-friendly solar PV development for DOER.

1. Extension Administration and Management

CEE has brought on a new part-time employee, Dugan Becker, Municipal Technical Support Coordinator, to assist with our efforts in providing MassEnergyInsight user-support and other projects.

CEE has modified Lauren Mattison’s staff title to Municipal Services Program Director to reflect her lead role in outreach and assistance to MA municipalities.

CEE said goodbye to Chris Beebe, Research Engineer, as he completed his final work day on August 29.

CEE Director served on the Search Committee for an Assistant Director for the Center for Agriculture, Food and the Environment (CAFE) which resulted in an offer and hiring of a new senior staff for CAFE.

CEE Associate Director served and chaired a Search Committee for a Web Designer/Online Strategist for the Center for Agriculture, Food and the Environment (CAFE). The search remains in process.

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
American Society of Agricultural and Biological Engineers (ASABE) Annual International Conference	July 9, Boston Marriott Copley Place	Breger	Issue in Renewable Energy & Agriculture in Massachusetts Solar on Agricultural Land Biomass,	National agricultural engineering firms and federal/state agencies	25

			Forestry, and Carbon		
Mt. Ida Greenhouse Gas and Clean Energy Plan – Final Project Presentation	July 11, UMass Amherst Mt. Ida Campus	Strong, Breger, Clean Energy Corps	Mt. Ida Greenhouse Gas and Clean Energy Plan – Final Project Presentation	UMass faculty, staff, students, Newton officials	30
Variable Refrigerant Flow stakeholder meeting	July 16, Eversource	Mattison	N/A	Eversource and MassCEC staff, HVAC industry	40
Eureka/Girls Inc. Workshop	July 17 & 18, UMass Amherst	Dowling, Strong	Clean energy workshop and field trip with Girls Inc. of Holyoke	Eureka/Girls Inc.	25
UMass Summer Engineering Institute	July 18, UMass Amherst	Mattison	Advancing Energy Efficiency in Massachusetts Cities & Towns	High school and undergraduate students	30
Energy Efficiency Advisory Council meeting	July 24, DOER	Mattison	N/A	Massachusetts energy efficiency stakeholders	50
Green Your Bottom Line in Food/Beverage Processing workshop	July 31, UMass Lowell	Mattison	Energy efficiency in food and beverage processors	Massachusetts food and beverage businesses	30
Energy Transition Institute	August 8, UMass Amherst	Breger, Strong	Initial planning meeting to build concept of a campus-wide, interdisciplinary Energy Transition Institute	UMass faculty, staff, researchers	70
Twilight Meeting	August 20, UMass S. Deerfield Research Farm	Strong	Dual-use research at S. Deerfield	UMass faculty, staff, general public	50
PVPC Solar Siting Working Group	September 3, Springfield, MA	Dowling	Solar siting in MA: The SMART program and local bylaws	Municipal officials, PVPC staff	15
SMART 400-MW Review meeting	September 5, UMass Amherst	Breger, Strong, Dowling	N/A	SMART stakeholders, UMass	100

				community, general public	
Western Mass Economic Development Council meeting	September 5, Springfield	Mattison, Kosanovic	Reduce Operating Costs with Energy Efficiency	Western Mass business and community leaders	60
WMAcce Informational Potluck	September 10, Amherst	Strong	N/A	WMAcce volunteers, CCA consultant Paul Fenn, general public	30
CAFE Summer Scholars Poster Session	September 11, UMass Amherst	Dowling, Strong, Jessica Mooring (student intern)	Municipal Planning For Carbon Neutrality	UMass faculty, students, staff, general public	100
Board of Public Overseers Meeting	September 17, Shrewsbury, MA	Strong	N/A	UMass Extension staff, faculty, BOPO officials	25
Mohawk Trail Woodlands Partnership, Advisory Committee Meeting	September 17, Charlemont, Berkshire East	Breger, Peltier	Peltier provided presentation on biomass emissions testing results and findings	MTWP advisory committee, EEA, and public	40
Interagency Pollinator Working Group meeting	September 20, Purgatory Chasm, Sutton, MA	Dowling	Pollinator-Friendly Solar PV Certification Program	State employees and planners working across the state to develop pollinator habitat	30
New England ENERGY STAR Best Practices Meeting	September 18, Waltham	Mattison	N/A	Manufacturers, colleges/universities, utility staff	30
Pioneer Valley Planning Commission, Clean Energy and Climate Action Group	September 26, Springfield	Dowling, Strong, Devon Lukas (student intern)	Pioneer Valley Planning Commission GHG Inventory Project Presentation	Regional planners, representatives, and organizations.	40

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, work continued on the consulting project scope of analyzing the feasibility and specifics of further developing and implementing the WMCCE.

MassCEC EV Marketing Campaign

In coordination and at the request of MassCEC, CEE provided local support to the MassCEC campaign to enhance Electric Vehicle recharging awareness in local towns. CEE committed a student intern to campaign the local businesses in Amherst town to display MassCEC provided decals denoting the business as EV-friendly and within proximity of a public EV recharging station.

Green Communities & MassEnergyInsight

CEE continues to provide technical assistance to Massachusetts towns in support of the Green Communities program. During this reporting period, CEE engaged directly with seven communities and began development of new tools to support communities across Massachusetts:

- Municipal Energy Profile – a report that can be generated for a community using MEI data, which provides an overview of the community’s energy use and helps to prioritize steps for energy reduction
- Energy Efficiency Checklist for Municipal Buildings – explains prescriptive and other relatively simple measures that are often cost-effective and eligible for Mass Save incentives but we have found are often missed in audits
- Decision Guide for Energy Retrofits in Massachusetts Schools – a decision tree to help communities narrow down the appropriate options for their school buildings in advanced retrofits of heating and ventilation systems, building envelope, and installation of clean heating and cooling technologies

These tools are all being developed to help fill common information gaps that we have observed in our work with communities, and they address some of the recommendations made in our Green Communities program review for DOER this spring. We reviewed drafts with Joanne Bissetta and will seek feedback from other stakeholders before finalizing.

Continued to provide user support services to Green Communities MassEnergyInsight users in partnership with DOER, Peregrine Energy, and OptiMiser, LLC. This quarter we refined the project team by adding Dugan Becker to the support team and continued to conduct transition support with Peregrine, Optimizer, and DOER. During this period, CEE successfully addressed 114 requests for user support across 65 communities, published its first MEI user newsletter, and attended team planning meetings.

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	Technical Assistance
Chicopee	Center for Energy Efficiency and Renewable Energy conducted an audit of the city’s wastewater treatment facility through its Industrial Assessment Center program, led by Beka Kosanovic, coordinated by Lauren Mattison and with Ben Weil participating

Cohasset	Ben Weil consulted on moving forward with renovation plans for Town Hall
Northampton	Ben Weil consulted on solar thermal design for Northampton High School, air-source heat pump and condensing boiler to eliminate steam system at Jackson Street School
Northfield	CEE (Mattison, Strong, Weil) fielded technical questions from a Northfield Energy Committee member regarding options for a failing boiler at the Northfield Elementary School, and the Eversource SBEA program
Orange	Ben Weil made a site visit and consulted on plans for a retrofit of Town Hall
Whately	Ben Weil consulted on moving forward with retrofit plans for elementary school
Worcester	Lauren Mattison and Ben Weil began discussions with Worcester Public Schools about analyzing energy use in their schools and including one of their buildings in the spring Clean Energy Corps audits

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
US EPA	July 2 and September 17, Boston EPA office	Mattison	Discuss potential areas of collaboration, including programs with manufacturers and food/beverage processors
Georgena Terry, Clean Energy Group	July 3, phone	Dowling	Provided update on MA pollinator-friendly program for white paper she is compiling on pollinator-friendly solar PV
MDAR Energy Grant Application Review Meeting	July 12, UMass Amherst	Strong	Met with Gerry Palano and MDAR staff to review of 37 MDAR energy grant applications.
Daikin	August 1, September 4 and 20, phone	Mattison	Consider collaboration with Daikin and UMass Center for Energy Efficiency and Renewable Energy on a heat pump metering study
PVPC Solar Siting Working Group	August 6, Springfield, MA	Dowling	Met to discuss solar siting in the Pioneer Valley from a municipal perspective, opportunities to better support towns
Hyperion Solar Meeting	August 9, UMass S. Deerfield Research Farm	Breger, Dowling, Strong	Meeting to discuss ongoing dual-use PV research collaboration between UMass and Hyperion.
Rep. Sabadosa	August 9, Northampton, MA	Breger, Strong	Meeting to brief Rep. Sabadosa on CEE's activities, seek input on her legislative priorities, and explore points of collaboration.

Carter Wall, Government Affairs and Community Relations Manager, FirstLight	August 12, Amherst, MA	Breger	Discussed pumped hydro station and assistance to Carter's effort to convene Woman in science/engineering symposium
Emily Cole, American Farmland Trust	August 13, UMass Amherst	Dowling	Discussed MA's experience with dual-use, and CEE's involvement in the program
Pioneer Valley Planning Commission – GHG Inventory Project	August 20, phone	Strong, Dowling	Meeting to discuss scope of proposed project to refine the 2014 PVPC Climate Action Plan GHG inventory with UMass Clean Energy Corps assistance.
Eric Wilkinson, General Counsel, Environmental League of MA	August 23, Amherst	Breger	Discussed priorities of ELM, and potential areas of collaboration. Invited Eric to speak to the UMass Wind Energy Center steering committee.
John Snell	September 5, CEE offices	Breger, Strong	Met with John (formerly of Peregrine Energy Group) to discuss details surrounding a consulting agreement related to MEI support and other potential points of collaboration.
Eversource and UMass Lowell Center for Sustainable Production	September 6 and 18, Westwood and Waltham	Mattison	Discuss collaboration on next phase of food/beverage sustainability initiative
Offshore Wind Energy Professional Graduate Certificate Program – course design meeting	September 9, University Without Walls	Breger, Strong, Kraus	Met with UWW staff to discuss course design and details around creating an online content.
John Rogers, Union of Concerned Scientists	September 12, UMass Amherst	Breger, Dowling	Met to discuss CEE and UCS projects, and areas of mutual research interest
DOER	September 19, phone	Mattison	Call with Joanne Bissetta to review new educational tools we have been developing to support Green Communities.
InSPIRE Advisory/Working Group, Agriculture & Solar Together: Research and Outreach	September 30, phone	Strong	Meeting to discuss state, regional, and national efforts related to dual-use PV research and outreach.

5. Research Activities and UMass Clean Energy Corps

Research Activities and Funding Opportunities

Continued to develop the Offshore Wind Energy Professional Graduate Certificate Program in coordination with the University College of Natural Sciences (CNS) and University Without Walls. CEE was awarded a MassCEC Massachusetts 2018 Offshore Wind Workforce Grant for \$105,500 and secured an additional \$32,000 from the university to develop the program. A soft launch of the program with one course module is planned for Spring 2020.

Continued to provide user support services to Green Communities MassEnergyInsight users in partnership with DOER, Peregrine Energy, and OptiMiser, LLC. This quarter we refined the project team by adding Dugan Becker to the support team and continued to conduct transition support with Peregrine, Optimizer, and DOER. During this period, CEE successfully addressed

114 requests for user support across 65 communities, published its first MEI user newsletter, and attended team planning meetings.

CEE in collaboration with colleagues in Resource Economics and industry partner Sustainable Energy Advantage, LLC, is working on its Seed Grant from the UMass Institute for Social Science Research. The project is evaluating and quantifying the magnitude and recipients of the economic rents from Massachusetts solar SREC II program, and will examine the distributional impacts of the benefits across geography and income sectors. CEE hired a summer student intern to begin the cash flow modeling for the project, and is continuing with a student working for credit under an independent study to analyze the solar market and track the economic rents.

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. This proposal was not funded.

CEE Research Fellow submitted an application to the James A. Walker Future of Wind and Wildlife Postdoctoral Fellowship sponsored by the American Wind Wildlife Institute, and received the award. This fellowship will be administered through UMass, and will fund research related to reconciling relative risks to wildlife from wind development and climate change, while still allowing time for her to continue work on other CEE projects.

CEE, with associated stakeholders and partners (Environmental Conservation department faculty, UMassFive Federal Credit Union, regional planning organizations, local solar development companies, and municipalities), submitted a concept proposal for community-driven solar siting and financing in rural communities to the National Renewable Energy Laboratory’s Solar Energy Innovations Network.

CEE completed 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. Final project results were presented in a Summer Scholar poster session at UMass Amherst in September.

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 provided a progress report to RTA in August, and is working with a student working for credit under an independent study to reach out to industry for input on assumptions, and to prepare a case study analysis for the town of Amherst.

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) finalized 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 battery system was commissioned in July and CEE participated in a campus kick-off meeting. Physical Plant is now providing interval data for the battery system to be used in the research efforts.

Clean Energy Corps

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

- Corps member Jessica Mooring conducted 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.
- Clean Energy Corps member Pranav Heryani is working with Professor Crago in Resource Economics and Professor Breger in Environmental Conservation and Clean Energy Extension to evaluate the equity impacts of the Massachusetts RPS Solar Carve-Out programs.
- Corps members are working with Professor Breger to develop a system dynamic model that simulates the energy, capacity, and economic implications of adding large-scale energy storage to offshore wind projects. Students are exploring the connections between the annual performance of offshore wind and wholesale energy markets to demonstrate and optimize the value added by storage to wind developers and ratepayers in the context of the anticipated offshore wind development off the coast of Massachusetts.

- Corps member Devon Lukas is working with CEE staff to develop an update of Pioneer Valley Planning Commission's 2014 regional GHG Inventory. Results of this first phase of work were presented at PVPC in September. Findings from the update will help inform a subsequent phase of work in which the inventory is re-cast with a more robust methodology and data sources.
- First-year students in *NRC 100: Environment and Society* are working with CEE Research Fellow Zara Dowling on a project to raise awareness about songbird mortality, and the relative risks posed by cats as opposed to wind energy development.