

## UMASS CLEAN ENERGY EXTENSION

### Quarterly Progress Report to MA Department of Energy Resources

Period ending September 30, 2020

*Contacts:* Dwayne Breger, Director, [dbreger@umass.edu](mailto:dbreger@umass.edu) 413-545-8512  
River Strong, Associate Director, [gcstrong@umass.edu](mailto:gcstrong@umass.edu) 413-545-8513  
Prashant Shenoy, PI, [shenoy@cs.umass.edu](mailto: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, 2020 to September 30, 2020.

### Externally Funded Project Activities

*In this section, we provide updates and progress on projects for which CEE has received substantial funding support from outside the DOER Interagency Service Agreement (ISA). We recognize that these activities still rely critically on the ISA for enabling CEE to pursue external funds and to sustain and stabilize our staff and office needs generally.*

Note on External Funds and CEE: An important strategic objective of CEE is to demonstrate its ability to attract and compete for funds beyond our ISA with DOER. At this point in CEE's development, we have begun to find some success in this area as demonstrated below. These external funds are tied to specific scopes of work and do displace some portion of CEE core staff salaries from DOER funds, however, the bulk of these funds are typically used to extend CEE's capacities with other faculty, graduate students, consultants, and expenses tied to the project scope.

### MassEnergyInsight Technical Support

*Prime Funding: Peregrine Energy, as subcontract with DOER Green Communities*

CEE continued to provide user support services to Green Communities MassEnergyInsight (MEI) users in partnership with DOER, Peregrine Energy, and OptiMiser, LLC. During this quarter, CEE successfully addressed over 200 requests for user support across 85 municipalities and other entities. Other key tasks for this quarter included:

- Coordinated with Eversource to address a long standing data population issue with streetlight accounts; coordinated with several smaller utilities on data quality and sharing.
- Ran five online trainings and prepared materials for additional trainings; designed and distributed survey for feedback on first three trainings; met with representatives from Pioneer Valley Planning Commission to train their new employees on MEI basics.
- Published online newsletter on the topics of the training series and how to prepare for Designation.

- Collaborated with Optimiser to make various improvements to MEI functionality and interface
- Participated in weekly team planning meetings with DOER and Optimiser.

### **Offshore Wind Energy Professional Graduate Certificate Program**

#### ***Prime Funding: MassCEC Offshore Wind Workforce Development***

CEE continued to develop the Offshore Wind Energy Professional Graduate Certificate Program in coordination with the Department of Environmental Conservation, the College of Natural Sciences (CNS), and University Without Walls (UWW). During this quarter, CEE launched the first program course (*ECO 610 Offshore Wind Energy: Technology, Resources, Grid Integration, and Trends*) on August 24 with instructors Dwayne Breger and Joshua Watson and 8 students (5 UMass graduate students and 3 professional continuing education students). The design for online course delivery was refined through collaboration with the online education team at UWW. A list of industry guest speakers was developed, a first speaker was secured, and plans were made for a continuing speaker series in all three program courses.

A certificate marketing plan was deployed, including finalizing a program [web page and brochure](#), conducting a targeted e-mail campaign announcing the program launch, organizing and distributing a targeted social media blast, and publishing a program-related [post](#) for MassCEC's *Clean Power Blog*. CEE joined the Business Network for Offshore Wind (BNOW) and the Northeast Clean Energy Council (NECEC), and promoted the certificate program to their membership. Development of strategic industry partnerships was continued, including industry guest speaker roles and investigation of industry funding of scholarships for underrepresented populations.

CEE expanded industry and academic networks in the offshore wind space and continued forging relationships with industry and other workforce training programs. Staff attended the second "Community of Practice" with MassCEC, MassHire Greater New Bedford Workforce Board, and OSW workforce training providers and partners in Massachusetts. Staff also participated in WindU collaboration meetings to begin planning for the integration of the OSW Professional Certificate program into the course offerings of this multi-university (Northern Arizona University, Texas Tech University, and UMass Amherst) consortium model focused on providing a multi-disciplinary wind energy graduate curricula.

CEE staff participated in several project coordination meetings with UMass faculty and administrators, University Without Walls, etc. Equitable program revenue sharing arrangements were finalized with UMass Department of Environmental Conservation, University Without Walls, and College of Natural Sciences.

### **Community-Informed Proactive Solar Siting and Financing**

#### ***Prime Funding: NREL Solar Energy Innovation Network – Solar in Rural Communities Program***

CEE and its project partners continued work under a grant with the National Renewable Energy Laboratory's (NREL) Solar Energy Innovation Network program in the category of *Solar in*

*Rural Communities.* The project will demonstrate “bottom-up” solar siting processes and actionable protocols driven by community residents and municipal officials and evaluate financing mechanisms that can keep solar benefits within the community.

During this quarter, CEE collaborated with project partners to revise a technical solar resource assessment for the three pilot towns of Blandford, Westhampton, and Wendell. Alternative scenarios of solar capacity build-out were developed, with alternative mixes of different solar development types associated with each. The team outlined a financial analysis of alternative ownership options and advanced a protocol for stakeholder engagement, including identifying community leaders for focus groups and progressing on survey content and methodology. A cross-team meeting with another grant awardee from Rhode Island included discussions of energy storage as a strategy for managing interconnection costs and town-utility collaboration for solar deployment.

### **Battery Energy Storage Innovation Ecosystem Development Support**

*Prime Funding: DOER/MassCEC ACES, UMass Physical Plant*

CEE has received approval from DOER, MassCEC, and UMass Physical Plant to direct a portion of awarded UMass ACES funding toward supporting key recommendations from CEE’s June 2019 report [\*Building a Massachusetts Battery Energy Storage Innovation Ecosystem\*](#). Over this reporting period, CEE, with its contractor John Fabel, expanded the formerly 10-person steering committee to 13 members with representation from industry, academia, entrepreneurship, and state government. CEE also convened a third steering committee meeting and developed a draft symposium agenda in preparation for planning a 2020 BES symposium anticipated to occur in November or early December.

### **Life-Cycle GHG Analysis of Cross-Laminated Timber (CLT) for Buildings**

*Prime Funding: MA EEA, subcontractor New England Forestry Foundation*

Over this reporting period, CEE and the New England Forestry Foundation and (NEFF) advanced discussions related to unexpected project cost overruns due to modeling complexities and interface with data from third-party CORIM. The NEFF/CEE team subsequently developed and submitted to EEA a project contract proposal for additional funds to complete the work.

### **Framework for Evaluating Trade-Offs Between Wind Energy and Environmental Impacts**

*Prime Funding: American Wind Wildlife Institute, provided as James A. Walker Future of Wind and Wildlife Fellowship for CEE Zara Dowling*

CEE Research Fellow Zara Dowling continues with her James A. Walker Future of Wind and Wildlife Postdoctoral Fellowship sponsored by the American Wind Wildlife Institute. This fellowship research is exploring stakeholder concerns regarding wind energy impacts on wildlife, and development of an evaluation framework for considering cumulative impacts to wildlife and wildlife habitat from wind development and climate change.

## **Green Communities and Municipal Support**

*In this section, we provide updates and progress on our activities directly serving Massachusetts municipalities in coordination with the Green Communities program. These activities are funded by DOER under the scope of our ISA.*

CEE and our Clean Energy Corps class provided direct support to 9 communities, including completing energy audits, supporting project implementation, and generating municipal energy profiles.

<b>City or Town</b>	<b>Technical Assistance</b>
Amherst	Completed and delivered audit report for 1200 North Pleasant Street, a town preschool/office building.
Buckland and Shelburne	Completed and delivered audit report for Shelburne Falls Wastewater Treatment Plant. Generated municipal energy profile for the Town of Buckland. Helped Buckland connect with Mass Save representative to begin the process of getting information on incentives toward implementation of our recommendations.
Holyoke	Began to work with DOER and the City of Holyoke on a progress review of the City’s Green Communities and energy management efforts.
Monson	Had follow-up discussions with the Town about the audit report we delivered for Monson’s water pumping stations in June.
Natick	Collaborated with the Town of Natick and DOER on a concept paper for a study of the ice storage system in the Town’s library. Connected Town with contacts at Trane to help with questions about the system controls.
Plainfield	Began to generate municipal energy profile for the Town of Plainfield.
Shelburne	Had follow-up discussions about our 2018 audit of Cowell Gym.
Winchester	Generated municipal energy profile for the Town of Winchester. Held zoom meeting to review findings and recommendations, and discuss specific concerns with selected buildings.
Worcester	Completed and delivered audit report for Columbus Park Elementary School, with several recommendations to address indoor air quality and temperature control issues, as well as energy efficiency. Generated municipal energy profile for the City. Held zoom meeting to review findings and recommendations.

**Clean Energy Corps – Spring 2020 Municipal Building Audits**

This quarter, we continued the analysis and reporting for the audits conducted by Ben Weil and his Clean Energy Corps class in January-March, as detailed in the table above. This work is ongoing after being slowed down by the challenges of transitioning to online learning. We delivered three audit reports this quarter, had follow-up discussions about past audits, and began to identify facilities for future audits.

Reports for Worcester’s Columbus Park Elementary School, Shelburne/Buckland Wastewater Treatment Facility, and Amherst’s pre-school and administrative building were all delivered in July. Work is being finalized on reports for Leverett’s elementary school and Northampton’s Smith Vocational High School, with delivery expected in December. Additional substantial consultation, critical to the implementation of major projects was provided to Royalston, Warwick, Greenfield and Northfield.

**Green Communities Progress Reviews**

This quarter we provided continuing support to regional planning agencies that are conducting progress reviews for selected Green Communities.

We also began to conduct a review for the City of Holyoke. Initial findings include potential errors in MEI baseline data, and a need to engage the school department in energy efficiency efforts, as school buildings account for 45% of the City’s energy use. We are working with the



City and DOER to address these issues and beginning to get into more detailed analysis of energy use in targeted facilities and specific areas of opportunity. We plan to identify one or two buildings for our Clean Energy Corps to audit next semester.

**Community Choice Aggregation – Technical Support to Amherst, Northampton, 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 has begun drafting a municipal aggregation plan and Joint Powers Agreement document that will be the subject of review by town officials and legal counsel.

## Other Project Activities and Initiatives

*In this section, we provide updates and progress on projects and initiatives that CEE pursues using funding primarily supported under the scope of our ISA.*

### **ASTGU (Dual-Use Solar) Pre-determination Application Review for DOER SMART**

CEE continues to advance discussions relating to dual-use research needs and opportunities with industry, state policymakers, and UMass stakeholders. During this quarter, CEE and Extension staff reviewed one dual-use pre-determination application, conducted a dual-use farm applicant site visit, and met with Penn State Extension staff concerning dual-use information sharing and to explore a potential collaboration.

### **Pollinator Friendly Solar Certification Program**

During this reporting period, we received five applications from proposed solar PV facilities for Pollinator-Friendly Certification, and provided review and certification. Establishment Plans for all seven sites certified this year were finalized, with seeding to be conducted later this fall at most sites. We continue to field questions and offer technical support to solar developers considering pollinator-friendly development, clarify our criteria, and discuss potential pollinator-friendly solar projects with municipal board members.

### **UMass Campus – Carbon Mitigation Task Force**

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. Over this reporting period, the co-chairs have organized two full Task Force meetings during which the consultants reviewed modeling assumptions and methods, and more frequent working group meeting providing a deeper dive into the modeling with the consultant. The Chairs have worked together to prepare for community engagement efforts planned for the fall, including a series of webinars to update students, faculty and staff on the carbon mitigation plan and gain feedback, and a campus-wide survey to solicit baseline information on community awareness, perspectives and preferences.

## Business and Community 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
American Farmland Trust	July 2, virtual	Breger, Dowling	Provided review of AFT solar siting draft documents they have been developing with other collaborators.
University of Rhode Island/CEE solar information sharing meeting	July 13, virtual	Breger, Dowling, Strong	Discussed solar siting project synergies and potential points of collaboration between CEE and URI faculty and staff.
MassCEC OSW grant recipient Community of Practice meeting	July 14, virtual	Breger, Dowling, Strong	Grant recipient updates, presentation, and planning for how best to work together to support each other's workforce development programs.
NREL InSPIRE Advisory Working Group	July 14, virtual	Breger, Dowling, Strong	Updates and presentations on national dual-use and pollinator-friendly solar activities.
Connecticut River Conservancy meeting	July 15, virtual	Breger, Strong	Discussed potential for CEE to support CRC's goals for measuring and mitigating operational GHG emissions with Clean Energy Corps student assistance.
Prathamesh Raghunath Patil, Fraunhofer ISE	July 15, virtual	Breger, Dowling	Addressed inquiry about dual-use solar in SMART program from Fraunhofer Institute in Europe.
MassCEC OSW business plan presentation	July 17, virtual	Breger, Strong	CEE presented and discussed the finalized OSW certificate program business plan with MassCEC staff and consultant.
Relay Power	July 17, virtual	Breger, Strong	Discussed strategies and potential collaborations related to Relay Power's efforts to promote their community shared solar offering.
PVPC DLTA process	July 17, virtual	Dowling	Met with PVPC staff to discuss input on model solar bylaw
Czajkowski Farm, Amherst	July 20, site visit	Breger, Strong, Hashemi	Site visit to prospective dual-use solar application with Ag Extension, solar developer, and MDAR.
Northeast Clean Energy Council	July 23, virtual	Breger, Strong	Met with Alistair Pim from NECEC to discuss the Battery Energy Storage innovation ecosystem symposium steering committee make-up, goals, and his potential participation.
PVPC Solar Working Group	July 28, virtual	Dowling	Discussed development of solar model bylaw by PVPC
NREL Virtual Offshore Wind Workforce Summit	July 28 & 30, virtual	Strong	National summit to discuss OSW workforce development needs, roles, and strategies. Highlighted the launching of CEE's OSW professional certificate program.
The Nature Conservancy, Competitive Energy Solutions, UMass Sustainability Director	August 3, virtual	Breger	Discussion regarding TNCs habitat protection criteria in RE procurement as it may relate to the University's carbon mitigation plan.
MDAR energy grant review meeting	August 5, virtual	Strong	Met with Gerry Palano and MDAR staff to review of MDAR energy grant applications.

<b>Entity and Attendees</b>	<b>Date and Format</b>	<b>Extension Staff</b>	<b>Purpose and Outcomes</b>
EEA energy meeting	August 5, virtual	Breger, Strong	Met with Andrew Smith of MA EEA to discuss energy project funding strategies for state buildings.
TrackerSled meeting	August 11, virtual	Breger, Strong	CEE and MDAR officials met with TrackerSled founder to discuss their solar PV and agricultural technology and potential collaborative opportunities.
Prof. David Timmons, UMass Boston	August 11, virtual	Breger	Discussed and compared carbon mitigation activities across two campuses.
UMass Carbon Mitigation Task Force + Consultants meeting	August 12, virtual	Breger, Small	Fifth meeting of CMTF, consultants, and others to review progress of carbon mitigation plan.
Utah Clean Energy	August 17, virtual	Breger, Strong	Introduction and discussion of programs and activities between two organizations.
DOER LBE Campus Decarbonization Discussion	August 26, virtual	Breger, Small	LBE organized meeting of UMass campuses engaged in carbon mitigation planning to share ideas and strategies.
Ener-G-Save & MakeIt Springfield meeting	September 11, virtual	Strong	CEE introduced Ener-G-Save and MakeIt Springfield staff and facilitated a discussion of collaborative opportunities in preparation for Energy Efficiency Month activities in Springfield.
MassEnergize training meeting	September 15, virtual	Strong	CEE attended this training session for using MassEnergize's community engagement and carbon tracker platform as part of our collaboration with the Cooler Communities & MassEnergize.
EEA/CSIS Mass-Tamil Nadu Partnership – The Future of Transportation Electrification	September 16 and 17, virtual	Breger	Participated, with other UMass representatives, in virtual conference/meeting on research topics for partnership.
Lautec meeting	September 21, virtual	Breger, Strong	CEE met with Nick Zenkin from Lautec to discuss their offshore wind energy management technologies and explore collaborative opportunities.
PVPC Solar Working Group	September 24, virtual	Dowling	Discussed issues surrounding solar development and wetlands with MassDEP, considered options to be included in bylaw, BMPs
UMass Carbon Mitigation Task Force + Consultants meeting	September 25, virtual	Breger, Small	Sixth meeting of CMTF, consultants, and others to review progress of carbon mitigation plan.
NREL InSPIRE Advisory Working Group	September 29, virtual	Breger, Strong	Updates and presentations on national dual-use and pollinator-friendly solar activities.

## Public Events and Outreach Activities

*In this section, we itemize significant public-facing events and outreach activities in which CEE participated.*

Event	Date and Location	Extension Presenter/ Attendee	Presentation Title/Topic	Audience	Estimated Attendance
Mass Energy Insight Trainings	July 16 & 30, August 20, Sept 3 & 17, virtual	Becker, Kraus	Trainings on platform used to help municipalities track energy data for Green Communities program.	Massachusetts municipalities and others assisting them with Green Communities program	60 (35 +/- each training)
NREL SEIN Cross-Team Meeting	August 24, virtual	Breger, Strong, Dowling, Kraus	Energy storage to manage interconnection costs, town-utility collaboration for solar deployment	CEE and additional recipient of NREL SEIN grants	15
Western Mass Green Consortium	August 9, virtual	Breger	Keynote speaker on biomass energy in MA	Western MA community energy leaders and engaged public	20
CAFE Board of Public Overseers (BOPO)	September 17, virtual	Breger	Provided update on CEE activities and work adjustments under COVID-19.	Board overseeing UMass Extension	12
Battery Energy Storage Innovation Ecosystem Symposium	September 17, virtual	Breger, Fabel, Strong	Hosted and facilitated third Steering Committee meeting; set planning for fall symposium.	BES Innovation Ecosystem Steering Committee	14

## Prospective Activities and Proposals

*In this section, we provide updates and progress on proposals and collaborations that CEE pursues for prospective funded work to support CEE directly or in collaboration with activities led by other units on campus.*

### Cooler Communities, with Ener-G-Save and MassEnergize

CEE is collaborating at the invitation of Ener-G-Save in the expansion of the [Cooler Communities Program](#) – a statewide initiative dedicated to providing community-based climate, clean energy, and science education via K-12 educational curriculum in conjunction with school- and community-based events and engagements. CEE has supported the work in helping to develop a program budget, researching potential foundations and other financial supporters, and engaging with MassEnergize in a potential collaboration. During this reporting period, CEE participated with Ener-G-Save in conversations with MassEnergize regarding developing a strategic partnership, identifying funding sources, and program budget development.



## **U.S. DOE Proposal - Impacts of Dual-Use Solar on Crop Productivity and the Agricultural Economy in Massachusetts and Beyond**

In collaboration with state solar industry partners, state agencies, a non-profit organization, and UMass collaborators, CEE submitted (last quarter) a full/final project proposal entitled *Impacts of Dual-Use Solar on Crop Productivity and the Agricultural Economy in Massachusetts and Beyond* in response to a U.S. Department of Energy solicitation. The submission of a full proposal was “encouraged” by DOE upon review of our concept proposal. If awarded, this \$2.5 million research effort will provide outcomes to fill the significant knowledge gap regarding the impact of dual-use solar on farm productivity and economics. This knowledge is critical for solar and agricultural sectors, and policymakers, to confidently set a forward path for successful and implementable dual-use policy and development guidelines in Massachusetts and the U.S. This quarter, CEE and collaborators were called back by DOE reviewers for a “pre-selection” interview, which was held on September 3<sup>rd</sup>. DOE’s timetable for award determination was discussed and remains in flux. We expect to hear some news by the end of 2020.

## **U.S. DOE Proposal - Validation and Optimization of an Ice Thermal Energy Storage System to Provide Demand Flexibility**

Members of the CEE team worked with DOER’s Green Communities Division and the Town of Natick to submit a concept paper for funding to measure, evaluate and optimize operation of the cool thermal energy storage system in the Natick Library. DOE stated in the funding opportunity announcement that preference would be given to states with above average energy consumption per capita, so we were at a disadvantage and we were not selected to submit a full proposal. However, the discussions we had while developing this proposal have been beneficial to the Town in bringing up opportunities to optimize their current system and to improve the system design when current equipment needs replacement, and we are discussing with the Town working together on portions of this project next year with our Clean Energy Corps class.

## **Solar Equity: Analysis of DOER SREC II Solar Program**

CEE completed its research work supported by a Seed Grant from the UMass Institute for Social Science Research. A Ph.D. candidate in Resource Economics is currently pursuing further work on this project, and CEE continues to review this progress.

## **University-based Proposals and Initiatives**

CEE is engaged with university colleagues as participants in the following proposals and initiatives.

*Enhancing Resiliency and Increasing Equity in the Transition to a Sustainable Energy Future*, National Science Foundation Research Traineeship (NRT) Program. Lead: Matt Lackner, Mechanical Engineering. NSF awarded this proposal to UMass, and CEE is participating as affiliated researchers, and in the current planning process to launch this interdisciplinary graduate education program.

*Foundational Research on Marine Moorings: Applications to Hydrokinetics and Blue Economy*, Concept Proposal submitted to U.S. DOE Office of Energy Efficiency and Renewable Energy (EERE) DOE-FOA-0002234. Lead: Krish Sharman, Mechanical Engineering.

Planning Team for response to U.S. DOE Building Technologies Office’s Connected Communities Funding Opportunity. Lead: Golbon Zakeri, Industrial Engineering (with University of Maryland and Ohio State University).

CEE (Breger) plays an active role in the Steering Committee of the UMass Energy Transition Initiative led by the Colleges of Engineering, Natural Sciences, and Behavior Science, and the School of Earth and Sustainability. ETI is a broad campus initiative to bring faculty across diverse disciplines to collaborate on cutting-edge research focused on encouraging a clean energy transition that increases social equity. ETI has gained interest across the university administration and is preparing to reach out to state government.

## Student Engagement

*In this section, in keeping with our mission to support students and workforce development, we list graduate and undergraduate students who have engaged with CEE during reporting period. Given confidentiality concerns, we provide only the students’ initials in this publicly accessible report.*

<b>Student Initials, Status</b>	<b>Department</b>	<b>Extension Staff Mentor</b>	<b>Project Description</b>
D.L., Undergraduate	Physics, iCONS	Strong	Municipal GHG Assessment for Pioneer Valley Planning Commission; GHG analytics for MassEnergize; MassEnergyInsight user training support; Offshore Wind Professional Certificate marketing support.
I.W, Undergraduate	Environmental Science and Political Science	Breger, Strong	Non-profit organizational GHG and Clean Energy Planning for the Connecticut River Conservancy; various other CEE projects.
M.B., Undergraduate	Natural Resources Conservation	Breger, Strong	Non-profit organizational GHG and Clean Energy Planning for the Connecticut River Conservancy; various other CEE projects.
M.D., Graduate	Environmental Conservation	Breger, Strong	Support On-line preparation of OSW Certificate program courses.
J.W., Graduate	Mechanical Engineering	Breger, Strong	Support curriculum development for OSW Certificate program courses.
D.B., Graduate	Sustainability Science and Regional Planning	Strong, Kraus	Technical support for MEI users.
D.S., Graduate Student	Masters in Sustainability Sciences	Breger, Strong	Support on financial modeling of solar ownership options as part of NREL grant.
H.P., Graduate Student	Masters in Sustainability Sciences	Mattison	Green Communities progress review for the City of Holyoke