

UMASS CLEAN ENERGY EXTENSION

Quarterly Progress Report to MA Department of Energy Resources

Period ending December 31, 2020

Contacts: Dwayne Breger, Director, dbreger@umass.edu 413-545-8512
River Strong, Associate Director, gcstrong@umass.edu 413-545-8513
Prashant Shenoy, PI, 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 October 1, 2020 to December 31, 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.

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

CEE, in collaboration with state solar industry partners, state agencies (DOER and MDAR), a non-profit organization, and UMass collaborators, was selected for a \$1.8M research award for *Impacts of Dual-Use Solar on Crop Productivity and the Agricultural Economy in Massachusetts and Beyond*, by the U.S. Department of Energy, Solar Energy Technology Office. The research 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 the solar and agricultural sectors, and policymakers, to confidently move forward with dual-use solar deployment. This quarter, CEE is engaged with DOE on a contract negotiation which is expected to be completed in March 2021.

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 270 requests for user support across 130 municipalities and other entities. Other key tasks for this quarter included:

- Collaborated with Energy New England (ENE), Eversource, Berkshire Gas, Holyoke Gas and Electric (HGED), Chester Municipal Electric Light Department (CMELD), and Norwood Electric Light Department to improve the quality and/or frequency of energy data being entered into MEI.
- Met with the City of Cambridge to brainstorm solutions to an ongoing proration issue they have experienced for a number of years.
- Ran two online trainings; conducted survey for feedback on last four trainings in series; edited training videos to be posted on online platform for ongoing user support.
- Published two online newsletters; topics included a timely issue regarding National Grid electric account number changes and information on an upgraded weather normalization routine.
- 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 completed the first program course (*ECO 610 Offshore Wind Energy: Technology, Resources, Grid Integration, and Trends*) with instructors Dwayne Breger and Joshua Watson and 8 students (5 UMass graduate students and 3 professional continuing education students). An instructor was secured for the second program course (*ECO 611 Offshore Wind Energy: Environmental Impacts, Siting, Permitting, and Stakeholder Engagement*). Three industry guest speakers were secured for the fall semester course, and creation of the speaker roster for the spring course was begun.

Marketing activities continued, including conducting targeted e-mail campaigns communicating the success of the first course and announcing the spring course, organizing and distributing a targeted social media blast, and posting announcements in related organizations' newsletters – including Offshore Wind Weekly (ACP / American Clean Power) and Northeast Clean Energy Update (NECEC / Northeast Clean Energy Council). CEE forged a relationship with American Clean Power (ACP) (formerly AWEA), exploring opportunities for promotion and membership. In addition, development of strategic industry partnerships was continued this quarter, including industry guest speaker roles and investigation of industry funding of scholarships for underrepresented populations. An internal effort was begun to establish structures for industry companies to invest in scholarships.

CEE expanded industry and academic networks in the offshore wind space and continued forging relationships with industry and other workforce training programs. Staff participated in a

third “Community of Practice” meeting with MassCEC, MassHire Greater New Bedford Workforce Board, and OSW workforce training providers and partners in Massachusetts. CEE participated in WindU collaboration meetings to continue advancing 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 multi-disciplinary wind energy graduate curricula.

In December, CEE submitted to MassCEC the final report for the Offshore Wind Workforce Development grant awarded in August 2019. While this completes our work under this grant, CEE will continue to work to sustain and build the OSW Professional Certificate and contribute to OSW workforce development in MA.

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 build a “tool-kit” for towns to assess scenarios of solar build-outs, conduct interviews and surveys to assess community preferences regarding solar, and evaluate financial opportunities to retain local economic benefits.

During this quarter, CEE engaged in a peer exchange working session with other organizations awarded grants under this program. The financial analysis of alternative ownership models was further refined. More work progressed on structuring and identifying participants for the focus groups for each pilot town to assess citizens’ perspectives on solar development and to aid in the preparation of the more detailed survey of all town residents. Working with human subjects in the focus group is subject to approval by the University Institutional Review Board, and expected approval has been delayed due to Covid-19 related slowdown in the IRB review.

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*](#). During this reporting period, CEE, with its contractor John Fabel, held a day-long online symposium [*Creating Opportunity: Advancing the Massachusetts Battery Energy Storage Innovation Ecosystem*](#), attended by approximately 30 leaders from industry, academia, entrepreneurship, and state government.

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) received an ISA amendment to extend the timeframe and budget to address unexpected project cost overruns due to modeling complexities and interface with data from third-party CORIM. We await subcontractor NEFF to complete the necessary forms to complete the amendment process.

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

This quarter, CEE Research Fellow Zara Dowling completed the James A. Walker Future of Wind and Wildlife Postdoctoral Fellowship sponsored by the American Wind Wildlife Institute. Her fellowship research explored stakeholder concerns regarding wind energy impacts on wildlife, and focused on development of an evaluation framework for considering cumulative impacts to wildlife and wildlife habitat from wind development and climate change. The research is expected to result in a several technical reports and a peer-reviewed publication.

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 nine communities, including planning energy audits, supporting project implementation, and generating municipal energy profiles.

City or Town	Technical Assistance
Bernardston`	Planned for a virtual building audit by our spring Clean Energy Corps class. Did initial review of MEI data, advised the town on issues found in account setup, and then checked to confirm that issues had been addressed.
Bridgewater	Began a Green Communities progress review. Conducted initial data analysis and held kickoff meeting with town and DOER. Began discussion of potential facilities for Clean Energy Corps study.
Holyoke	Continued the Green Communities progress review. Created a municipal energy profile to help city staff and elected officials understand the areas that use the most energy, prioritize energy efficiency efforts, and see the importance of engaging the school department to work towards the city’s energy reduction goals. Discussed potential facilities for Clean Energy Corps study.
Monson	Held a meeting with the town to follow up on our audit of their water pumping system. Provided updated analysis and guidance based on clarifying information provided by town.
Natick	Planned for our Clean Energy Corps class to study and provide recommendations to optimize the cool thermal energy storage system in the town library.
Plainfield	Began to generate a municipal energy profile and discussed potentially providing a building audit in the future.
Tewksbury	Began a Green Communities progress review. Conducted initial data analysis and scheduled kickoff meeting.
Westhampton	Planned for our Clean Energy Corps class to study options for replacement of the elementary school’s aging boiler.
Worcester	Responded to request (in response to the municipal energy profile we provided earlier in the year) for more guidance on water/sewer energy and changes in building energy by providing an expanded profile with additional analysis of those topics.

Clean Energy Corps and Municipal Building Audits

In the past, our spring Clean Energy Corps class has traveled together to site visits for our audits of municipal facilities, which is not possible during the pandemic. We have been working to

develop a new online approach that will allow us to safely continue providing in-depth technical assistance to communities and valuable training and experience to our students. This quarter, we established relationships with most of the communities we will work with during the spring semester, began to identify the targeted facilities, began data collection and review, and planned initial zoom meetings with the class and community representatives. An additional benefit of this approach is that it allows us to work with communities across the state without concern about travel time, which supports our ongoing efforts to diversify the communities we serve.

We also continued discussions to support communities we have completed audits for, including follow up discussions to our water system audit in Monson and development of an expanded municipal energy profile for Worcester, as described in the table above.

Green Communities Progress Reviews

This quarter, we continued our progress review for the City of Holyoke. We discussed with DOER additional Green Communities that may need assistance in making progress toward their energy reduction goals, and then began progress reviews with the Towns of Bridgewater and Tewksbury.

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 completed its drafting a municipal aggregation plan and Joint Powers Agreement document, which are under review by town 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 two dual-use pre-determination applications (including revisions to an application reviewed the previous quarter), conducted one dual-use farm site visit, participated in a dual-use webinar organized by Penn State Extension, and participated in a multi-stakeholder dual-use meeting organized by the New Jersey Agricultural Experiment Station (NJAES) at Rutgers University.

Pollinator Friendly Solar Certification Program

During this reporting period, we received xx 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 published an article in the Association of Massachusetts Wetland Scientists newsletter describing the program and summarizing the projects certified to date. 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 environmental consultants and 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 consultant team have drafted its final report and two Task Force meetings have focused on the review, feedback, and contributions to the report. The Chairs have provided presentations of the carbon mitigation plan that has emerged from the report to student groups, faculty committees, and senior administration, along with state officials through the Leading by Example program.

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
MassCEC OSW grant recipient Community of Practice meeting	October 1, virtual	Breger, Strong	Grant recipient updates, presentation, and planning for how best to work together to support each other’s workforce development programs.
PVPC Climate Action Working Group	October 6, virtual	Strong	Multi-stakeholder networking, information sharing, and collaboration related to clean energy and climate-related initiatives.
Mayflower Wind	October 9, virtual	Breger, Strong	Discussion of collaborations related to the CEE Offshore Wind Professional Certificate.
MA Interagency Pollinator Habitat Working Group Summit	October 9, virtual	Dowling	Met with agency staff from around the state regarding development of pollinator habitats within Massachusetts
Cape Cod Commission	October 28, virtual	Breger, Strong, Dowling	Discussed, reviewed Cape Cod Commission’s GIS solar siting tool.
Lautec meeting	November 4, 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 Meeting	November 5, virtual	Dowling	Continued discussion and development of updated model bylaw and BMPs with PVPC and Pioneer Valley municipalities
Prof. Dawen Li, University of Alabama	November 11, virtual	Breger	Introduction and discussion on common interests around community solar.
USFWS National Energy & Infrastructure Call	November 12, virtual	Dowling	Joined monthly USFWS staff call to discuss wind energy permitting questions as part of AWWI fellowship
NYSERDA State of the Science Offshore Wind & Wildlife Conference	November 16-20, virtual	Dowling	Joined NYSERDA and national and international researchers for in-depth conference exploring

Entity and Attendees	Date and Format	Extension Staff	Purpose and Outcomes
			potential cumulative impacts of offshore wind development on wildlife
Town of Leverett	November 17, virtual	Breger, Strong	Discussion with town officials regarding increasing municipal solar PV capacity.
Clean Cities Coalition, DOER	November 23, virtual	Breger, Dowling, Strong	Meeting with new Clean Cities Coordinator and DOER staff to discuss existing collaborations and potential new projects of mutual interest
MassCEC & Greentown Labs	November 30, virtual	Breger, Strong	Discussion of submitting response to DOE EPIC FOA regarding development of battery energy storage innovation clusters in MA.
EBC offshore wind conference	December 2, virtual	Strong	Discussion of OSW permits, procurements, and port development.
Eversource Hosting Map Demonstration	December 15, virtual	Breger, Dowling, Strong	Meeting to review the status and operation of the Eversource grid-hosting map.
Brite Solar	December 18, virtual	Breger	Discussion Brite Solar design for dual-use solar and potential applications.
Clean Energy States Alliance – Clean Heating & Cooling online tool review	December 21, virtual	Strong	Meeting to review the status and operation of the Clean Heating & Cooling online calculator tool development.

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	October 1 & 15, 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	27 (18 each training)
Dual-Use Webinar – Penn State	October 6, virtual	Strong	Dual-Use Solar and Agriculture in Massachusetts	Penn State Extension and general public	50
NREL SEIN Peer Exchange Meeting	October 13 – 15, virtual	Breger, Strong	Community-Driven Solar Siting & Financing	NREL and RMI staff, and additional recipients of NREL SEIN grants	40
Dual-Use Presentation - New Jersey Agricultural Experiment Station (NJAES), Rutgers University	October 20	Strong	Dual-Use Solar and Agriculture in Massachusetts	NJAES staff and stakeholders	20

Event	Date and Location	Extension Presenter/ Attendee	Presentation Title/Topic	Audience	Estimated Attendance
American Council of Engineering Companies – Massachusetts Chapter	October 21, virtual	Dowling	Presented a summary of the UMass pollinator-friendly solar PV certification program	Environmental and engineering professionals	20
U.S. DOE Solar Energy Technology Office, Award Info Webinar	November 11	Breger	Webinar introducing 2020 SETO awards for solar dual-use topic area.	DOE and fellow awardees	20
Fraunhofer Institute Research Meeting	November 19, virtual	Dowling, Strong	Presented a summary of UMass experience with dual-use solar and agriculture project review and research	International group of dual-use researchers	25
Wind Wildlife Research Meeting	December 1-4, virtual	Dowling	Presented on new framework to address cumulative impacts of wind energy development on wildlife	Ecological researchers, wind energy developers, environmental and engineering professionals	300
Lights Up, Sustainable Solar in New England, Soil and Water Conservation Society	December 4, virtual	Breger, Dowling	Conference presentations on dual-use solar (Breger) and Pollinator Friendly Solar Certification	Environmental, ecological, and energy professionals	40
Battery Energy Storage Innovation Ecosystem Symposium	December 9, virtual	Breger, Fabel, Strong	Hosted and facilitated symposium.	Industry leaders	30
Large Scale Solar - Best Practices Guide Presentation	December 9, virtual	Dowling	Provided context and background information regarding solar development, regulations, and bylaws in Massachusetts, assisting main presenters from PVPC	Municipal officials, regional planning agency staff, local NGO representatives	40
Leading by Example, DOER	December 10, virtual	Breger	Presented UMass carbon mitigation plan and process	State agencies	20

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 advanced conversations with Ener-G-Save and MassEnergize identifying funding sources, planning 2021 community engagements, and responding to a Green Communities program Request for Information.

University-based Proposals and Initiatives

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

Elevating Equity Values in the Transition of the Energy system (ELEVATE), National Science Foundation Research Traineeship (NRT) Program. Lead: Matt Lackner, Mechanical Engineering. NSF awarded \$6.3 million to UMass to launch this interdisciplinary graduate education program, and CEE is participating as affiliated researchers.

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.

Student Initials, Status	Department	Extension Staff Mentor	Project Description
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.

Student Initials, Status	Department	Extension Staff Mentor	Project Description
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 Holyoke, Bridgewater and Tewksbury.