

UMASS CLEAN ENERGY EXTENSION

Quarterly Progress Report to MA Department of Energy Resources

Period ending March 31, 2021

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This Progress Report provides a summary of work accomplished by the UMass Clean Energy Extension (CEE) during the period January 1, 2021 to March 31, 2021.

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 has completed the *Statement of Project Objectives* and the NEPA EQ-1 form submission to DOE which are now under their review for approval. The focus of our remaining negotiation is on the budget forms for UMass and the third-party cost share contributors. We now anticipate a contract start date around July 1, 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 140 requests for user support across 70 municipalities and other entities. Other key tasks for this quarter included:

- Collaborated with Eversource and National Grid to improve the quality and/or frequency of energy data being entered into MEI.
- Set up Mansfield MLP and Wakefield MLP with MEI accounts, and educated them on site navigation and upload protocol. Loaded MLP data for both MLPs and worked with Wakefield MLP to get them oriented to the MEI platform.
- Identified approximately 50 cases of an organizational formatting issue across 20 municipalities in MEI; worked closely with the municipalities experiencing this issue.
- Published on online newsletter; topics included updates to the weather normalization process and greenhouse gas emission factors.
- Worked on additions to the FAQ section of the MEI website, including PDFs of slide decks from trainings.
- Participated in weekly team planning meetings with DOER and Optimiser.

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 presented at and participated in the Solar Energy Innovation Symposium with other organizations awarded grants under this program, with a range of solar energy practitioners in attendance. The financial analysis of alternative ownership factsheet and cash flow model were further refined and shared with external stakeholders for review. Focus groups were conducted 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. A first draft of the survey was created, subject to review by the towns before conducting.

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, drafted a report of the December 2021

day-long online symposium [Creating Opportunity: Advancing the Massachusetts Battery Energy Storage Innovation Ecosystem](#). CEE also drafted a concept proposal aimed at attracting funding to further advance the Massachusetts BES innovation ecosystem.

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

Prime Funding: MA EEA, subcontractor New England Forestry Foundation

CEE and the New England Forestry Foundation and (NEFF) finalized an ISA amendment to extend the project timeframe and budget necessary to address unexpected project cost overruns due to modeling complexities and interface with data from third-party CORIM. Over this reporting period, UMass and NEFF contract offices have been updated forms and agreements, and we remain awaiting final approvals.

Green Your Bottom Line in Food and Beverage Businesses

Prime Funding: US EPA Pollution Prevention grant

CEE worked with the UMass Lowell Center for Sustainable Production to plan a webinar series for this ongoing initiative to promote and support energy efficiency and sustainability in the food and beverage sector. Monthly webinars will be held from April through September.

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 and conducting energy audits, supporting project implementation, and conducting Green Communities program reviews.

City or Town	Technical Assistance
Abington	Answered questions to support Municipal Vulnerability Preparedness grant application.
Barnardston	Conducted virtual audit of Highway Garage with our Clean Energy Corps class. Analyzed and presented recommendations to reduce or eliminate oil use and improve temperature control, comfort, and air quality. Gave final presentation in March, rather than typical end of semester timing, to allow for town to apply for a Green Communities grant in April.
Bridgewater	Continued the Green Communities progress review, which the town then had to put on hold due to staffing changes.
Holyoke	Continued the Green Communities progress review. Helped to engage school department in Green Communities efforts by meeting with school finance and facilities staff, presenting municipal energy profile we had created, and discussing opportunities and assistance available to improve energy efficiency in the schools. Together we selected the Dean Technical High School, the city's highest energy user, for our Clean Energy Corps class to study. Conducted virtual audit of Dean School and began analysis.
Longmeadow	Reviewed NREL-project solar financing tools with Longmeadow Energy & Sustainability Committee, in regard to solar proposal town has received.
Medfield	Provided extensive support to the Medfield Energy Committee's efforts to include a district energy system in the redevelopment of the Medfield State Hospital site. Our Clean Energy Corps class studied the site and began to develop a presentation to educate stakeholders on district energy, heat pumps, and restoration of historic buildings. We also connected the town with related organizations that can provide additional guidance or potential funding, including

City or Town	Technical Assistance
	hosting introductory meetings with the International District Energy Association and the Danish Embassy’s District Energy Advisory.
Natick	Our Clean Energy Corps class studied the town library and developed recommendations to replace the failing chiller and cool thermal energy storage system with an innovative heat pump and thermal battery storage system that will electrify space heating, improve system efficiency with heat recovery, and take advantage of existing storage tanks to provide thermal storage throughout the year. We worked with the town and an engineering firm to refine the system design and prepare a Green Communities grant application that the town submitted in April.
Tewksbury	Continued the Green Communities progress review. Held kickoff meeting and selected facility for our Clean Energy Corps class to study. Held virtual audit with Clean Energy Corps. Did thorough data review and found some data missing from baseline, then worked with community to retrieve that data and update MEI, which showed annual savings is actually higher than previously reported.
Westhampton	Advised on energy efficiency opportunities in Town Hall. Held virtual audit of elementary school with our Clean Energy Corps class. Ben Weil and student visited elementary school and Town Hall.

Clean Energy Corps and Municipal Building Audits

This spring our Clean Energy Corps class worked with six communities, with a modified approach due to the pandemic. We conducted virtual audits of several buildings, supplemented by some site visits by Ben Weil, and found this allowed us to safely continue providing in-depth technical assistance to communities and valuable experience to our students. This approach allowed us to work with communities across the state without concern about travel time, which supports our ongoing efforts to diversify the communities we serve.

Green Communities Progress Reviews

This quarter, we continued our progress reviews for the City of Holyoke and Town of Bridgewater and began a review with the Town of Tewksbury, as detailed in the table above. We also analyzed MEI data for the communities in which we did 2019 progress reviews, and we met with DOER to review those findings and discuss opportunities to strengthen the review process.

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 three dual-use pre-determination applications and presented at a webinar to farmers, researchers, and local/state officials at the Rutgers EcoComplex Clean Energy Innovation Center.

Pollinator-Friendly Solar Certification Program

During this reporting period, we received eight applications from proposed solar PV facilities for Pollinator-Friendly Certification and provided certification to seven of the applicants (one

project is still in review). This quarter, we finalized design of our pollinator-friendly program logo and signage, and participated in the Leading by Example Pollinator Summit. We continue to field questions and offer technical support to solar developers considering pollinator-friendly development, as well as discuss potential pollinator-friendly solar projects with environmental consultants and municipal board members.

Offshore Wind Energy Professional Graduate Certificate Program

With the MassCEC Offshore Wind Workforce Development grant formally concluded in December 2020, CEE continued to develop the program in coordination with the UMass Department of Environmental Conservation, the College of Natural Sciences (CNS), and University Without Walls (UWW). During this quarter, CEE commenced instruction of the second program course (*ECO 611 Offshore Wind Energy: Environmental Impacts, Siting, Permitting, and Stakeholder Engagement*) with instructors Dwayne Breger and Max Dilthey and 18 students (7 UMass graduate students and 11 professional continuing education students), more than twice the enrollment of the Fall 2020 course. We also conducted outreach to potential industry guest instructors and speakers in preparation for the Summer 2021 program course (*ECO 612 Offshore Wind Energy: Project Economics, Deployment, and Business Logistics*), and further refined the ECO 612 course syllabus structure.

Marketing activities continued, including conducting a targeted e-mail campaign communicating the success of the program and sending a reminder for the spring course, a post on the Northeast Clean Energy Council (NECEC) blog on the importance of professional training in the Offshore Wind Industry, and multiple social media posts about the program. CEE followed up on previously explored promotional opportunities with American Clean Power (ACP) (formerly AWEA), including setting up our participation in a blog post on workforce training in offshore wind.

CEE expanded industry and academic networks in the offshore wind space and continued forging relationships with industry and other workforce training programs. In addition, we continued development of strategic industry partnerships this quarter, including industry guest speaker roles and investigation of industry funding of scholarships for underrepresented populations. An internal effort was continued to establish structures for industry companies to invest in scholarships.

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 delivered its final report and the official work of the Task Force was completed. CEE and the Sustainability Manager have provided numerous presentations of the Carbon Mitigation Plan to campus committees, administration leadership, and classes. CEE has also taken a lead role in organizing collaboration with the School of Earth and Sustainability, the Energy Transition Institute, and the Integrated Concentration in Science program to develop a “living lab” proposal

and initiative to use the campus energy transition as a robust and broad learning and research opportunity for the campus.

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
Long Road Energy	January 4, virtual	Breger, Strong	Discussion of collaborations related to the CEE dual-use solar PV research and SMART program support.
Solstice Community Solar	January 4, virtual	Breger, Strong	Discussion of collaborations related to the CEE rural community-driven solar siting and financing research.
Swan Holt, ASTGU site visit, with MDAR	January 15, Carver, MA	Breger, Giverson, Clay (virtual)	Review ASTGU site and discuss ASTGU application with cranberry bog owner and solar developer.
Medfield State Hospital Redevelopment	January 19, virtual	Breger, Mattison, Strong, Weil	Meeting to explore CEE's role in supporting an effort to implement district energy in the Medfield State Hospital redevelopment process.
NYSERDA "State of the Science" Offshore Wind Bat Working Group	January 20, virtual	Dowling	Meeting to discuss priorities for ecological research on bats to understand/address potential cumulative impacts from offshore wind development
Sustainable Energy Advantage, LLC	January 21, virtual	Breger	Discussed CEE OSW Professional Certificate and SEA's new work in OSW market analysis
Environment Massachusetts	January 22, virtual	Breger, Strong,	Discussion exploring potential collaboration on mutual efforts around community solar implementation.
CAFE Board of Public Overseers	January 25, virtual	Breger	Provided update on CEE activity highlights that pertain to agricultural extension
Long Road Energy	January 25, virtual	Dowling	Discussion of CEE's pollinator-friendly certification program
UMass President's Office: Sustainability & Climate Resilience	January 29, virtual	Breger	Invited participant in UMass system review and coordination of clean energy and climate activities
Chancellor's Sustainability Advisory Committee	February 8, virtual	Breger	Presentation and discussion of campus Carbon Mitigation Plan
UMass Lowell	February 12, virtual	Breger, Strong,	Exploration of potential collaboration on offshore wind workforce education programs.
Clean Energy States Alliance	March 4, virtual	Strong	Meeting to discuss beta version feedback of clean heating and cooling calculator.
Klinkman Solar Design	March 12, virtual	Strong	Proposal collaboration discussion regarding DOE ARPA-E open energy funding solicitation.
EPRI	March 17, virtual	Dowling	Discussion of CEE's pollinator-friendly certification program
Co-op Power and NAACP energy group	March 18, virtual	Breger	Presented NREL solar financial tools and discussed equity aspects.
Energy Extension Agriculture and Solar working group	March 18, virtual	Dowling	Discussion among extension staff and faculty from multiple states (inc. PA, NY, MA, MI) regarding opportunities for collaboration and tool sharing across projects and programs, focused on large, ground-mounted solar development, and with emphasis on agriculture

Entity and Attendees	Date and Format	Extension Staff	Purpose and Outcomes
Town of Longmeadow Sustainability Committee	March 18, virtual	Breger, Dowling	Discussion of CEE’s NREL SEIN project financial tools, “piloting” use of tools for several solar projects on municipal property in Longmeadow
Rep. Paul Mark and others	March 19, virtual	Breger, Strong, Fabel	Discussed BES Innovation Ecosystem work and concept proposal.
Cape & Islands Self Reliance	March 22, virtual	Breger, Strong Kraus	Proposal collaboration discussion regarding offshore wind workforce accessibility RFP.
NREL Wind Energy Technologies Office (WETO)	March 23, virtual	Strong	Discussion on the role of workforce in accelerating and maximizing offshore wind deployment.
Interagency Pollinator Meeting – Leading by Example	March 26, virtual	Dowling	Discussion of pollinator habitat development and potential pollinator-friendly seed mixes with state agency staff
PVPC Climate Action Working Group	March 30, virtual	Strong	Multi-stakeholder networking, information sharing, and collaboration related to clean energy and climate-related initiatives.
NYSERDA “State of the Science” Offshore Wind Bat Working Group	March 30, virtual	Dowling	Meeting to discuss draft priorities for ecological research on bats to understand/address potential cumulative impacts from offshore wind development
CivilEats, Publication	March 30, virtual	Breger	Responded to new media interview request regarding US DOE dual use research award.

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
Leading by Example Council	January 12, virtual	Breger	UMass Amherst Carbon Mitigation Plan	LBE Council; state agencies	30
NREL InSPIRE Winter 2021 meeting	January 12, virtual	Breger	DOE grant award for dual-use research	U.S.-based stakeholders in dual-use and pollinator solar	60
Joint USDA-DOE Workshop on the Co-location of Agriculture and Solar Energy	January 22, virtual	Breger	Summary of US DOE research grant award “Impacts of Dual-Use Solar on Crop Productivity and the Agricultural Economy in Massachusetts and Beyond”	US DOE and USDA program directors and managers	50
Mass Save Three Year Plan 2022-2024 Municipal Engagement Session	February 25, virtual	Mattison	N/A	MAPC, municipal representatives	30
Rutgers University - NJ Vegetable	February 25, virtual	Strong	Dual-use solar in Massachusetts	Rutgers U staff and faculty, agricultural	50

Event	Date and Location	Extension Presenter/ Attendee	Presentation Title/Topic	Audience	Estimated Attendance
Grower's Convention Presentation				professionals, diverse solar energy practitioners	
NREL SEIN Symposium	March 8 – 10, virtual	Breger, Strong, Dowling	Solar Energy Innovation Symposium	NREL and RMI staff, additional recipients of NREL SEIN grants,	200
UMass ECo Graduate Student Symposium	March 19, virtual	Breger	Panelist, campus Carbon Mitigation Plan and applied building energy efficiency research	Graduate students and faculty	30
EBC Energy Resources Webinar: Massachusetts DOER Commissioner Patrick Woodcock and DOER Leadership	March 24, virtual	Mattison	N/A	DOER, variety of environmental professionals and advocates	40
Agrivoltaics – Combined Solar Power and Farming in NJ	March 24, virtual	Breger	Presentation on Dual Use and Pollinator Friendly solar activities at UMass	Farmers, researchers, state/local officials	70
CEE and UMass Energy Transition Institute presentation and discussion with W. MA legislative delegation	March 26, virtual	Breger, Strong	Review and discussion regarding CEE and ETI activities and collaborations	W. MA legislative delegation	10

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, and planning 2021 community engagements.

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.

UNIversiTy-Community Energy Engagement (UNITEE) to Foster Improved Building Efficiency and Demand Flexibility, proposal was submitted to the U.S. DOE Building Technologies Office's Connected Communities Funding Opportunity. UMass Lead: Golbon Zakeri, Industrial Engineering (with University of Maryland and Ohio State University).

CEE 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.
C.B., Undergraduate	Environmental Conservation	Dowling	Support on NREL project; review of state solar policies and GIS data layers for solar resource assessments (CT, ME, NH, NY, RI, VT).
M.D., Graduate	Environmental Conservation	Breger, Strong	Support on-line preparation and instruction of OSW Certificate program courses.
J.L., Undergraduate	Isenberg School of Management	Breger	Drafting paper on SREC II cash flow analysis across market participants
D.B., Graduate	Sustainability Science and Regional Planning	Strong, Kraus	Technical support for MEI users.
H.P., Graduate Student	Masters in Sustainability Sciences	Mattison	Green Communities progress review for Holyoke, Bridgewater and Tewksbury.