

UMASS CLEAN ENERGY EXTENSION

Quarterly Progress Report to MA Department of Energy Resources

Period ending June 30, 2021

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This Progress Report provides a summary of work accomplished by the UMass Clean Energy Extension (CEE) during the period April 1, 2020 to June 30, 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 attract and compete for funds beyond our ISA with DOER. 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 continued contract negotiations, and have settled on a final Statement of Project Objectives after DOE management review, and final budget forms are prepared. We now anticipate a contract start date around October 1, but the DOE contracting process is not in our control.

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 77 requests for user support across 48 municipalities and other entities. Other key tasks for this quarter included:

- Worked closely with Eversource to address a long-standing issue surrounding the way solar production data is supplied to MEI.
- Loaded data for Middleborough MLP, and Hingham MLP.
- Worked with Optimiser, National Grid, and the City of Quincy on an automated approach to rectifying cases of double counting induced by correction bills.
- Published two online newsletters; topics included informing MEI users of improvements and additions to reports, introducing the new weather-normalized EUI report, and announcing upcoming trainings.
- Concluded outreach for the ~50 cases of the “Nested Nodes” issue across 20 municipalities.
- Began authoring an internal guidance document on MEI Support protocols, common support scenarios, etc., to facilitate the training of future support staff.
- Worked on upcoming training series.
- 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 includes building a “tool kit” for towns to assess scenarios of solar build-outs, conducting interviews and surveys to assess community preferences regarding solar, and evaluating financial opportunities to retain local economic benefits.

During this quarter, the financial analysis of alternative ownership factsheet and cash flow model were finalized and submitted for NREL review. Also, a survey of all town residents was conducted, and analysis begun. Final drafts of the guides, fact sheets, and other documents that comprise the tool kit were submitted to NREL for 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, drafted a report [*Leading the Charge: Accelerating the Massachusetts Battery Energy Storage Innovation Ecosystem*](#) that (1) summarized outcomes from the December 2021 day-long online symposium [*Creating Opportunity: Advancing the Massachusetts Battery Energy Storage Innovation Ecosystem*](#), and

(2) included 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 developed updated forms and agreements, and the research team received final approvals to commence work.

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 and host a monthly webinar series (running April-September 2021) for this ongoing initiative to promote and support energy efficiency and sustainability in the food and beverage sector. This quarter we also provided related guidance and analysis to MassDEP Clean Energy Results Program staff, who asked for our input on the potential expansion of their Gap energy grant program to include nonprofits and small businesses such as food banks, commercial kitchens, and food processors.

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

City or Town	Technical Assistance
Holyoke	Continued our Green Communities progress review. Completed virtual audit analysis for Dean Technical High School, which accounts for 10% of the city’s total annual energy consumption. Our Clean Energy Corps student team presented findings and recommendations to improve the building envelope in the short term and install a water-source heat pump system in the longer term. Our presentation was attended by staff of the city, school department, and Holyoke Gas & Electric, as well as the city’s acting mayor and state representative.
Longmeadow	Discussed financing options for solar projects with town Energy & Sustainability Committee. Began review of MEI data and discussions about selecting one of the town’s buildings for a Clean Energy Corps audit.
Medfield	Continued support of 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 student team delivered a presentation to several Energy Committee members, Development Committee members, and town employees about the site’s clean energy potential using heat pumps, district energy, and efficient restoration of the historic buildings. At the committee’s request, we posted a recording of our presentation on our website and YouTube channel for

City or Town	Technical Assistance
	viewing by potential developers and other stakeholders, and Medfield TV has broadcast it for viewing by other residents.
Natick	Continued working with the town to advance implementation of our recommendations to replace the failing chiller and cool thermal energy storage system in the town’s library 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. Assisted with preparation of the Green Communities grant application that the town submitted in April. Presented recommendations to town staff and the library board of trustees
Tewksbury	Continued our Green Communities progress review and study of Wynn Middle School, which accounts for 9% of the town’s total annual energy consumption after a significant increase in natural gas use several years ago. Presented to town and school staff, Green Communities Committee, state representative, and National Grid on findings and recommendations to improve overall energy management, substantially reduce middle school energy use in the short term, and transition it to heat pumps in the longer term.
Westhampton	Clean Energy Corps class completed analysis of elementary school and presented to school principal and Select Board member on recommendations to improve efficiency in the short term, and transition to heat pumps in the longer term.

Clean Energy Corps and Municipal Building Audits

This spring our Clean Energy Corps class worked with six communities (five listed above, as well as Bernardston, for which we completed our work in the previous quarter), 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 Tewksbury, as detailed in the table above. We met with DOER to discuss other Green Communities that have not achieved their energy reduction goal and identify several to which we may offer progress reviews in the future.

Sustainable Wastewater Infrastructure of the Future (SWIFT)

Met with U.S. DOE, MassDEP and DOER to launch our partnership to offer DOE’s Sustainable Wastewater Infrastructure of the Future (SWIFT) initiative to public wastewater treatment plants in Massachusetts.

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 revised dual-use pre-determination application and began revision of a second application.

Pollinator-Friendly Solar Certification Program

During this reporting period, we received four applications from proposed solar PV facilities for Pollinator-Friendly Certification and provided certification to six projects which completed the review process. 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 finished 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 secured industry guest instructors and speakers for the Summer 2021 program course (*ECO 612 Offshore Wind Energy: Project Economics, Deployment, and Business Logistics*), finalized the ECO 612 course syllabus structure, and began instruction for the course with another increase in enrollment to 24 students.

Marketing activities continued, including conducting a targeted e-mail campaign communicating the success of the program and sending a reminder for the summer course, posting announcements in various association newsletters, and putting out multiple social media posts about the program. CEE participated in a blog post by American Clean Power (ACP) (formerly AWEA) 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 and guest instructors to help fund student diversity scholarships. Additionally, CEE submitted a proposal to a MassCEC Offshore Wind Workforce solicitation to expand access to the certificate program to underrepresented and target populations.

UMass Campus – Carbon Mitigation Planning and Sustainability Strategies

CEE (Breger) has taken an active role in a set of university-wide committees that have been established by the administration to plan for the campus' own carbon mitigation and clean energy transition, and to design and establish an integrated "Living Lab" to bring widescale multidisciplinary learning, research, and engagement of the campus community as a vital part of this energy transition. CEE, representing all of the UMass Extension, was also selected to

participate in a Sustainability Strategies Working Group convened by the Deans, to offer recommendations on the creation, scope, and organizational structure of a campus wide sustainability focus for teaching, research, and outreach/extension. The working group will present its findings and recommendation to the Deans by the end of the summer.

Greenhouse Gas Inventory for Non-profit Connecticut River Conservancy

CEE coordinated, administered, and mentored two students under a public service internship to conduct a greenhouse gas inventory for the Connecticut River Conservancy. Students have worked directly with CRC staff as a client to understand their environmental objectives, data sources and quality, and scopes of emissions to include. With CEE staff, the students are completing a GHG inventory spreadsheet tool, an inventory for a baseline 2019 year, and a final report. The project is scheduled to wrap up with final deliverables to CRC in July.

Heat Pump Training

Organized free, online heat pump training through the Massachusetts Energy Efficiency Partnership. More than 70 people, including state and municipal staff and Mass Save program administrators and vendors, attended the live session, and many others have accessed the recording on YouTube.

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
MA Dept. of Environmental Protection	April 12, virtual	Breger, Mattison, Strong	Explore potential clean energy collaborations related to outreach, assistance, and applied research projects.
American Clean Power	April 12, virtual	Strong	Interview related to UMass Offshore Wind Professional Certificate Program.
Town of Andover, MA, with DOER Green Communities	April 14, virtual	Breger, Strong, Mattison	Reviewed NREL SAM solar modeling option as well as others for town project.
Nancy Hazard, Greening Greenfield	April 20, virtual	Breger, Strong	Reviewed work of CEE and current solar issues in Greenfield, MA.
Enterprise Community Partners, Drew Warshaw, COO	April 26, virtual	Breger	Discussed solar equity efforts, and challenges of bringing solar to low-income housing and communities.
Environment Massachusetts, Ben Hellerstein	April 30, virtual	Breger, Strong	Discussion of potential collaborations related to community solar siting support.
Community Solar Access, Kaitlin Kelly	May 5, virtual	Breger, Strong	Discussed potential collaboration on assessing state of CSS in MA.
Massachusetts Cooperative Extension, Climate Adaptation Convening	May 6, virtual	Strong	Multi-group discussion of state climate adaptation strategies.
Town of Shutesbury, MA public meeting	May 19, virtual	Dowling	Presentation and Q & A forum for Shutesbury residents and municipal board members regarding solar planning, solar permitting, and state policy

Entity and Attendees	Date and Format	Extension Staff	Purpose and Outcomes
PowerOptions	May 24, virtual	Breger, Strong	Meeting to discuss partnering on NREL SEIN Round 3 RFP
Connecticut River Conservancy	June 4, virtual	Breger, Strong	Attended CRC board meeting to support CEE students in presentation of GHG analysis project findings.
Regional Economic Modeling, Inc. (REMI)	June 15, virtual	Breger, Strong	Discussed potential research/policy collaboration to model local economic impacts of solar under various financing/ownership scenarios.
Rep. Dylan Fernandes, with UMass Wind Energy Center	June 23, virtual	Breger	Introduced rep to Offshore Wind Professional Certificate, WEC research, and discussed mechanisms for state support.
Massachusetts Department of Conservation and Recreation	June 24, virtual	Mattison	Met with DCR staff about advising on their plans for energy retrofits and heat pump installation at targeted facilities that currently use electric resistance heat.

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
MA Association of Conservation Commissions – Spring Conference	April 10, virtual	Dowling	Municipal planning and permitting for solar projects: Updates on MA solar policy, model by-laws, and community planning	Municipal board members and staff; wetlands consultants and professionals	75
U.S. DOE EERE, Strategic Analysis and Institutional Support Team	April 14, virtual	Breger, Bates	NREL SEIN project presentation on solar development in rural MA	DOE officials and staff	15
Cape Cod Technical Council	April 16, virtual	Strong	Dual-use Solar in Massachusetts	Council members	30
UMass Energy Forum (campus event)	May 4, virtual	Breger	Participant and panelist in forum, highlighting energy research and student projects over academic year	UMass students and faculty	45
Medway Battery Energy Storage Forum, Rep. Roy	May 5, virtual	Breger	Presentation work on BES innovation to stakeholder forum chaired by Rep. Roy, in context of proposed BES project in town.	Medway town officials and constituents, battery company, national BES safety experts.	30
Cornell Cooperative Extension Ag & Solar Summit	May 5, virtual	Dowling	Dual-use solar and agriculture: Lessons from Massachusetts	Extension educators from New York and New England	50

Event	Date and Location	Extension Presenter/ Attendee	Presentation Title/Topic	Audience	Estimated Attendance
Webinar Series: Green Your Bottom Line in Food and Beverage Businesses	April 16, May 21, June 25	Mattison	Sustainability in food and beverage businesses	Food and beverage businesses, government agencies, sustainability service providers	45

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.

U.S. Department of Energy, Industrial Assessment Center Program

CEE staff contributed to the UMass Center for Energy Efficiency and Renewable Energy’s successful proposal to continue in DOE’s Industrial Assessment Center program, through which we offer free, in-depth energy audits to manufacturers and water/wastewater treatment plants across Massachusetts and beyond, while training engineering students for careers in energy with employers including Mass Save program administrators.

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.

CEE plays an active role in the Steering Committee of the UMass Energy Transition Institute (ETI) 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.

Campus as Living Lab for Carbon Mitigation. CEE (Breger, Strong) plays a role on the steering committee established to vision, plan, and establish a Living Lab to integrate academics,

research, service, and campus operations as educational and applied learning opportunities associated with the campus goal of achieving carbon neutrality by 2032. The group received a \$10,000 Presidential Grant from the Davis Educational Foundation to support this planning during the fall 2021 semester, which CEE will manage with a graduate student.

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.
A.G., Graduate Student	Masters in Sustainability Sciences	Breger, Strong	Support and manage working group of faculty/staff to vision and plan for Living Lab is coordination with campus energy transition.
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 Student	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.
G.K., Undergraduate	Environmental Science	Mattison	Introduced student to our contact at Mass Interfaith Power & Light and assisted with her successful application for their MassCEC supported internship to inventory energy use and emissions for Massachusetts houses of worship