

UMASS CLEAN ENERGY EXTENSION

Quarterly Progress Report to MA Department of Energy Resources

Period ending December 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 October 1, 2021 to December 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 our staff and office needs generally.

Note on External Funds and CEE: An important strategic objective of CEE is to attract funds beyond our ISA with DOER. These external funds are tied to specific scopes of work and displace a 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 and the project team reached out to the solar developers for each site to get an update on the status of each solar project. Site trial protocols were developed, and a first round of soil samples was performed. Six site trial locations were identified to conduct pre-site trial interviews to assess farm economics, and work was begun to obtain restricted USDA federal data. Literature reviews were begun on economic theoretical models for solar renewable energy production on agricultural land, and on existing social acceptance of renewable energy projects. A candidate list for a Project Advisory Committee was developed.

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 161 requests for user support across 106 municipalities and other entities. Other key tasks for this quarter included:

- Continued adding to an internal guidance document on MEI Support protocols, common support scenarios, etc.
- Initiated and completed improvements to MEI site and support procedures.
- Offered an office hours session to assist users in preparation for the Annual Report.
- Published online newsletter, informing users of helpful resources for the Annual Report, as well as reminding them of support resources on the MEI website.
- 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 remaining five of the twelve documents comprising the tool kit were revised based on NREL review, formatted into a final layout, and returned to NREL for DOE review.

Creating Equity in the Offshore Wind Professional Workforce

CEE received a grant from MassCEC to expand access to our Offshore Wind Professional Certificate Program to underrepresented and target populations, starting with BIPOC/ethnic minorities, followed by Veterans, individuals in Gateway Cities/EJCs, and indigenous populations, and women. Through its Offshore Wind Career Access Program, CEE will build capacity and a sustainable program for STEM-oriented near-term and recent graduates from 4-year college degree programs from these Priority Groups, providing tuition scholarships and non-curriculum student support, a comprehensive professional development program, development of a robust recruitment pipeline, and solutions to potential barriers for the Priority Group students. We anticipate supporting 8 participants over this two-year pilot and developing recruitment pipelines with UMass campuses, MIT, and the City University of New York (CUNY). We will also establish a framework to expand our program across other higher education institutions and Priority Groups, and leverage foundation and industry support for a sustained scholarship fund.

During this reporting period, CEE, in collaboration with contractor and workforce diversity specialist Libby DeLucia, successfully established a scholarship fund and established a

scholarship selection committee, with representation from industry, certificate alumni, CEE staff, and a university DEIJ specialist. We publicized the scholarship program through industry publications and social media, received 15 applications, and conducted interviews with qualified applicants.

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, the NEFF research team continued its analysis and UMass and NEFF continued planning to engage a project advisory committee.

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 provided direct support to 13 communities, including support for project implementation, conducting Green Communities program reviews, and arranging projects for next semester’s Clean Energy Corps class.

City or Town	Technical Assistance
Brookline	Continued Green Communities progress review with ongoing data analysis and collection
Deerfield	Reviewed data and had initial phone discussions and zoom meeting to arrange a study by Clean Energy Corps class next semester, and scheduled a February 2022 site visit
Easthampton	Reviewed data and had phone discussions to discuss a potential Clean Energy Corps study
Gill	Met with highway superintendent, police chief, fire chief, and energy and finance committee representatives to plan a Clean Energy Corps study of Public Safety Complex, and scheduled a February 2022 site visit
Holyoke	Continued to help the city pursue Clean Energy Corps recommendation for a water-source heat pump in Dean Technical High School, and planned a January 2022 meeting to brief the newly elected mayor on municipal clean energy projects
Hopkinton	Held kickoff meeting and analyzed data for Green Communities progress review
Longmeadow	Reviewed data and held zoom meeting with assistant town manager and facilities director to identify a high priority facility and arrange a Clean Energy Corps study, and scheduled a February 2022 site visit
Natick	Met with sustainability director and facilities director to arrange a Clean Energy Corps study
Westhampton	Met with school principal, select board member, and HVAC contractor about implementation of Clean Energy Corps recommendations for elementary school
Weston	Reviewed data and met with sustainability director and facilities director to arrange a Clean Energy Corps study
Westwood	Held kickoff meeting and analyzed data for Green Communities progress review
Worcester	Planned meeting and data review to assist with planning of City Hall retrofits

Green Communities Progress Reviews

This quarter, we continued progress reviews for the Towns of Brookline, Hopkinton and Westwood, as detailed in the table above.

Water and Wastewater Treatment Facilities

CEE and CEERE staff presented about energy efficiency opportunities and the free assessments offered through the Industrial Assessment Center program in an online workshop held by U.S. EPA for Massachusetts water and wastewater treatment facilities, and we met with MassDEP and MWRA staff to arrange assessments of MWRA facilities.

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.

Floating Offshore Wind Technology Research and Development

CEE is collaborating with the Professor Krish Sharman of the UMass Amherst College of Engineering in the research and development of a new technology designed to support enhanced performance of floating offshore wind installations. During this reporting period, technology design and testing advanced, and the research team was supported by the UMass Institute for Advanced Life Sciences Venture Development program to establish an intellectual property plan and commercialization pathway.

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 and began review on three additional dual-use pre-determination applications (including one revised application that was previously submitted).

Pollinator-Friendly Solar Certification Program

During this reporting period, we received seven applications from proposed solar PV facilities for Pollinator-Friendly Certification and provided certification to fourteen 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 provided the Fall 2021 program course (ECO 610 *Offshore Wind Energy: Technology, Resources, Grid Integration, and Trends*), with enrollment of 29 students (4 UMass graduate students and 25 professional continuing education students). This registration sustains the substantial growth of the program, which had 8 registered students last fall, 18 in the spring 2021 course, and 24 in the summer 2021 course.

Marketing activities continued, including conducting a targeted e-mail campaign communicating the success of the program and sending a reminder for the spring course, posting announcements in various association newsletters, and putting out multiple social media posts about the program. The program success is already reflected in multiple students and alumnae securing positions in offshore wind and related fields, as well as awareness of the program spreading directly from alumni and current students.

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 began work on the MassCEC-funded Offshore Wind Career Access Program designed to expand access to the certificate program to underrepresented and target populations (see details in *Externally Funded Project Activities* section above).

UMass Campus – Carbon Mitigation Planning and Sustainability Strategies

CEE 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 presented its report to the Deans in September and expect to have follow up discussions later this spring.

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
Solstice Initiative; Eli Goldman and Winslow Lewis	October 4, virtual	Breger, Strong	Met with Solstice staff to discuss CEE’s solar finance and community ownership planning tools.
DOER Leading by Example	October 5, virtual	Breger, Ezra Small	Participated in LBE’s Campus Decarbonization Discussion and provided update on UMass Amherst carbon mitigation planning
Jen Fuller, Arizona State University	October 6, virtual	Dowling	Discussed pollinator-friendly solar and agrivoltaics as part of EPRI-funded research study
Mass Audubon staff	October 15	Breger, Mattison, Strong, Weil	Discussed Mass Audubon’s interest in achieving carbon neutrality through renewable energy, building efficiency, and electrification.

Entity and Attendees	Date and Format	Extension Staff	Purpose and Outcomes
Vernon County (Wisconsin) Energy District	October 21, virtual	Breger	Reviewed CEE solar financial ownership and modeling tools and outcomes from NREL project.
NYSERDA; Diane Bertok	November 1	Breger, Strong	Discussed CEE's dual-use solar research and NYSERDA's interest in establishing agrivoltaics demonstration sites.
UConn Team TERRA graduate students	November 8	Dowling	Discussed current status and research gaps regarding solar siting, policy, and planning
Bee Better Electric – EPRI and Xerces Society initiative	November 10	Dowling	Discussed development of pollinator-friendly criteria for multiple types of electric installations
MassCEC Offshore Wind Workforce, Community of Practice	November 12	Breger	Participated in Community of Practice discussion forum on charting a course to revitalize the COP.
RWSE Bird & Bat Subcommittee	November 15	Dowling	Participated in introductory discussion of offshore bird and bat research priorities
MA DEP	November 19	Breger	Reviewed current issues/policies/program regarding use of waste arboriculture wood in MA
UMaine, Co-op Power, Mt. Desert Island	November 30; and December 17	Breger, Strong	Discussed research and business efforts and opportunities to support community solar ownership.
MassCEC	December 2	Mattison	Served as a judge for MassCEC Catalyst program.
UMass Lowell; engineering students	December 2	Breger, Strong	General discussion regarding student research and development of a solar PV technology related to fertilizer production.
MassCEC Offshore Wind Workforce, Community of Practice	December 3	Breger, Strong	Participated in discussion focused on Veteran recruitment in to OSW workforce. Follow up connected MassCEC with Dan Leary to learn from veterans in solar sector.
Heliac, Denmark solar thermal company	December 7	Breger	Introduction to company and US affiliates seeking first US project opportunities for low cost concentrating solar thermal technology. Introduced to campus carbon mitigation team and consultants.
Hyperion Solar; Jake Marley	December 8	Breger, Strong	Meeting to discuss status of proposed dual-use project.
Pioneer Valley Planning Commission	December 15	Breger, Dowling, Mattison, Strong	Discussion regarding CEE's support of PVPC's effort to provide GHG and net zero planning to selected Green Communities.

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 Office Hours	October 14, virtual	Mattison	Training session to answer participants' questions as they prepare to file their Annual Reports as part of Green Communities program	Massachusetts municipalities and others assisting them with Green Communities program	14
Senator Comerford and staff	October 19	Strong	Presentation regarding dual-use solar research at UMass research farm and CEE's DOE-funded dual-use research.	Senator Comerford, staff, and extension professionals	20
Massachusetts Association of Conservation Commissions conference	October 21	Dowling	Presentation regarding CEE <i>Community Planning for Solar</i> toolkit	Municipal staff and volunteers, wetland consultants	50
Energy Transition Institute, UMass	November 9	Breger, Dowling	Networking and idea brainstorming event	UMass staff, faculty, and students	50
Solstice, Community Solar Forum	November 15	Breger	Presented CEE solar toolkit and financial case study to community solar forum	Solstice and other community solar experts	10
Northeast Agribusiness and Certified Crop Adviser Conference	November 23, virtual	Dowling	Presented Massachusetts experience with agrivoltaics to date	Certified crop advisors, agronomists, extension staff	93
EPA and MA Water and Energy Utility Resilience Workshop	November 30, virtual	Mattison	Presented on energy efficiency in water and wastewater treatment facilities	Massachusetts water/ wastewater treatment plants	100
AWWI Solar Power & Natural Resources Symposium	December 1-3, (virtual, content on-demand)	Dowling	Development of a pollinator-friendly solar certification for Massachusetts	Solar developers, state/federal agency staff, wildlife biologists, consultants	Conference attendance – 500, no info re: on-demand content views
Four Rivers Charter School	December 9	Dowling, Strong	Presentation and interview related CEE's clean energy and climate change research, outreach, and education.	Four Rivers Charter School students and staff	30

Event	Date and Location	Extension Presenter/ Attendee	Presentation Title/Topic	Audience	Estimated Attendance
UMass Extension, Legislative Briefing	December 14	Breger	Participated in CAFE briefing to local delegation on extension activities and needs (focus on agricultural activities).	CAFE leadership and local MA delegation	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, and planning 2022 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 (DEF) to support this planning during the fall 2021 semester, which CEE will manage with a graduate student. Using this planning grant, CEE co-led an effort to submit a more substantial grant (\$300,000) to DEF in September to fund a 3-year carbon and clean energy curricular project focused on campus carbon literacy and experiential learning with public service. This proposal was well reviewed but was not awarded due to its departure from the foundation’s primary areas and scopes of interest. Nonetheless, the proposal effort has served to solidify a part of the Living Lab priority areas and work to find other funding opportunities.

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
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.
M.D., Graduate Student	Environmental Conservation	Breger, Strong	Support on-line preparation and instruction of OSW Certificate program courses.
D.B., Graduate Student	Sustainability Science and Regional Planning	Strong, Kraus	Technical support for MEI users. Support for new MEI staff during staff transition.
L.R., Undergraduate	Business Administration in Finance, Environmental Science	Breger, Strong	Support for community solar planning financial tools and floating offshore wind technology commercialization pathway.
B.S., Undergraduate	Environmental Science	Breger, Strong	Committee members mentoring student's Honors Thesis on low carbon microgrids for remote Alaskan villages.
S.N., Undergraduate	Environmental Science	Breger, Strong, Dowling	Compilation of CEE metrics over our years of operation as part of its Strategic Plan development.
N.M., Undergraduate	Environmental Science	Dowling	Support for development of greenhouse gas inventory and carbon neutral planning tools