

UMASS CLEAN ENERGY EXTENSION

Quarterly Progress Report to MA Department of Energy Resources

Period ending June 30, 2020

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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, 2020.

Starting this quarter, you will note some modification to the structure of our Progress Report. Our new structure provides an itemized account of our various projects and initiatives, and we expect it to be more informative and efficient to read. We continue to document metrics of our significant public-facing meetings and events, and interactions with Massachusetts municipalities.

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. Base funding to sustain CEE staff remains essential and concerning, and will be separately addressed with DOER.

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 90 requests for user support across 50 municipalities and other entities. Other key tasks for this quarter included:

- Coordinated with National Grid and Eversource to address data population issues in problem accounts; coordinated with two smaller utilities on data sharing.
- Designed improvements to the landing page for reports on the MEI platform, creating a logical organization by category and writing detailed descriptions of each of the 25 reports.
- Developed a framework and outline for a series of online trainings, designed a draft of the first two of eight trainings, and held a test run of the first training.
- Produced two online newsletters, highlighting results of the user survey, introducing the online trainings, and giving pointers to communities seeking designation as Green Communities.
- 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. During this quarter, CEE concluded the pilot course offered during the Spring 2020 semester (*Offshore Wind Energy: Environmental Impacts, Siting, Permitting and Stakeholder Engagement*) taught by Dr. Alison Bates. The course had 20 students and shifted to remote learning in response to Covid-19. Dr. Bates and graduate student Max Dilthey concurrently adapted the course material to an online platform and format. Curriculum development for the other two course modules is also underway, as led by graduate student Josh Watson with the assistance Max Dilthey and CEE staff.

The Certificate program and three associated courses were approved by the Faculty Senate during this reporting period and processed through the registrar's office.

A business plan was finalized and a marketing plan developed, including the design of marketing materials and posting of a program web page. CEE performed targeted follow-up interviews with industry professionals, gaining additional feedback and forging the basis for possible collaboration, including guest speaker engagements, scholarships, and in-house offering of the program. A survey of students enrolled in the pilot course was conducted to further assess interest in the certificate program and courses.

CEE staff participated in virtual meetings with MassCEC staff, professional facilitators, and other workforce grant recipients as a "community of practice" in which recipients work together to support each other's workforce development programs.

Community-Informed Proactive Solar Siting and Financing

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

CEE and its project partners kicked off its new grant with the National Renewable Energy Laboratory's (NREL) Solar Energy Innovation Network program in the category of *Solar in Rural Communities*. The project will demonstrate "bottom-up" solar siting processes and

actionable protocols driven by community residents and municipal officials and evaluate financing mechanisms that can keep solar benefits within the community.

The NREL-facilitated kickoff included a series of three virtual workshops with key national program facilitators, and representation from the other seven grant awardees. This quarter, CEE in collaboration with project partners, completed a GIS-based mapping analysis and report of solar resource and infrastructure assessment for each of the three pilot towns.

Battery Energy Storage Innovation Ecosystem Development Support

Prime Funding: DOER/MassCEC ACES, UMass Physical Plant

CEE received approval from DOER, MassCEC, and UMass Physical Plant to direct a portion of awarded UMass ACES funding toward supporting key recommendations from CEE's June 2019 report [Building a Massachusetts Battery Energy Storage Innovation Ecosystem](#). Over this reporting period, CEE, with its contractor John Fabel, has convened a 10-person steering committee with representation from industry, academia, entrepreneurship, and state government. CEE held two steering committee meetings in preparation for planning a fall 2020 BES symposium.

Green Your Bottom Line in Food and Beverage Businesses

Prime Funding: UMass Lowell, as subcontract with U.S. EPA Pollution Prevention Program, (cost shared with DOER ISA funds)

CEE continues our collaboration with UMass Lowell and other partners to promote sustainability in food and beverage processing. During this period, we began to plan a webinar series. We drafted an information sheet to serve as a central source of information on the variety of free support and assistance available to support energy and sustainability efforts in Massachusetts food and beverage businesses, which will be completed and published pending review by partner organizations.

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

Prime Funding: MA EEA, subcontractor New England Forestry Foundation

Over this reporting period, the New England Forestry Foundation delivered a draft progress report and reviewed unexpected cost overruns due to modeling complexities and interface with data from third-party CORIM. CEE is in the process of discussing with EEA the budget and potential for additional funds to complete the work. CEE has identified potential members of a report review committee.

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

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

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

Green Communities and Municipal Support

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

CEE and our Clean Energy Corps class provided direct support to 12 communities, including conducting energy audits, evaluating clean energy projects, and supporting project implementation. We also provided training to representatives from 50 communities in our heat pump workshop.

City or Town	Technical Assistance
Amherst	Continued work on the analysis and report for audit of 1200 North Pleasant Street, a town preschool/office building.
Buckland/Shelburne	Continued work on the analysis and report for audit of the Shelburne Falls Wastewater Treatment Facility, which is located in Buckland and serves both towns.
Holyoke	UMass Energy Transition Initiative, discussion with Marcos Marrero, city sustainability manager, on energy equity perspectives and challenges in Holyoke.
Leverett	Continued work on the analysis and report for audit of Leverett Elementary School.
Monson	Completed and submitted the report for audit of Monson water pumping stations.
Newton	Engagement with Anne Berwick and Newton’s sustainability team on potential collaboration in city’s Green Leaders Collaborative and campus/town engagement with UMass Amherst Mt. Ida campus. Spoke with Newton Co-Director of Sustainability, Bill Ferguson, about plans to upgrade a library to heat pumps, and assisted with review of contractor proposals.
Northampton	Continued work on the analysis and report for audit of Smith Vocational and Agricultural High School.
Northfield	Analyzed and submitted a memo on HVAC upgrade options for Library and Elementary School, and helped town connect with Eversource for information on incentives.
Rowley	Provided guidance to consultant working on municipal energy reduction planning.
Royalston	Provided guidance on efficient renovation of historic school building.
Worcester	Continued work on the analysis and report for audit of Columbus Park Elementary School.

Clean Energy Corps – Spring 2020 Municipal Building Audits

This quarter, we worked on analysis and reporting for the audits conducted by Ben Weil and his Clean Energy Corps class in January-March, as detailed in the table above. This work is ongoing after being slowed down by the challenges of transitioning to online learning. We delivered the first report, on Monson’s water pumping stations, in June.

Heat Pump Training

CEE, in collaboration with DOER, held a highly-attended, free, online heat pump workshop targeted toward municipal staff and volunteers. CEE planned, recruited presenters for, publicized, and led content development for this training, based on a need identified by Green Communities staff. Due to the public health crisis, the training was redesigned to be held online. The workshop was held in two parts, totaling three hours, held on May 27 and 28. More than 200 people participated in the live workshop, and the recording on YouTube has more than 40

views. Participants included representatives from 50 cities/towns/regional school districts across the state (staff, elected officials or energy committee members), 40 state employees (DOER, OTA, DCAMM, state colleges/universities), staff from four regional planning agencies, and staff from utilities and Mass Save program administrators. Many reported that the workshop was very helpful, with feedback including:

- *That was a really useful workshop, at least for a heat pump rookie like me.*
- *Thank you for organizing the Heat Pump Workshop. It was a valuable refresher in this technology.*
- *That was the best heat pump session that we have seen (and there are lots of them)*
- *I have two comments. Wow and thank you.*

Some participants have reported already using the information they learned in the workshop to advance or advocate for heat pump projects in their communities.

Green Communities Progress Reviews

This quarter we began to provide training and support for the Green Community review process for which DOER awarded grants to several RPAs. These reviews will be based on the program review that we conducted with MAPC for DOER in 2019. As a first step, we made several updates and enhancements to the Excel-based Green Communities Energy Analysis Tool we developed last year (including reducing the tool's focus on the most recent year because recent operations have been atypical due to the pandemic). On June 25, we held an online meeting to provide detailing training to RPAs on how to use the process and tools we developed to assist selected communities in evaluating their approach to energy management, understanding their energy use and effectiveness of measures implemented to date, and planning to achieve their savings goal. About 25 people participated in the training, including Green Communities staff and RPA staff from across the state. We are now supporting RPAs as they get started with the review process.

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 established an RFP for legal support to prepare its aggregation proposal for DOER review and submission to DPU, and for the organization of a Joint Powers Agreement to enable the towns to work together.

PVPC Greenhouse Gas Inventory Update and Analytical Upgrade; Carbon Neutral Planning

In its role as regional planning body for the Pioneer Valley region, the Pioneer Valley Planning Commission (PVPC) provides clean energy and climate change mitigation and adaptation support and resources to the 43 cities and towns in Hampden and Hampshire counties of Western Massachusetts. In the summer of 2019, PVPC requested that CEE support the update of their 2014 Pioneer Valley GHG inventory with three primary goals in mind:

1. Provide an update of the 2010 inventory using (a) the most recent regional GHG-related data available; and (b) analytical methods identical (or comparable) to those used in the inventory portion of the 2014 Pioneer Valley Climate Action and Clean Energy Plan;
2. Compare sector-by-sector GHG inventory results and methodology between the current update and the 2010 inventory; and
3. Provide recommendations for future PVGHG inventory efforts

Two CEE staff and two interns have supported this effort since 2019. During this quarter, CEE submitted to PVPC the final project report entitled *Pioneer Valley Greenhouse Gas Inventory – Update of 2014 Inventory*.

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

Over this reporting period, CEE provided reviews of three Pre-Determination applications for dual-use agricultural STGUs, including one new one and two revised applications for projects occurring on the same farm. On a fourth insufficiently complete application, advice was provided for revision and next steps. In addition, CEE helped advance discussions relating to dual-use research needs and opportunities with industry, state policymakers, and UMass stakeholders.

Pollinator Friendly Solar Certification Program

During this reporting period, we received updated versions of our first two Pollinator-Friendly Certification applications. We continue to field questions and offer technical support to solar developers considering pollinator-friendly development, clarify our criteria, and discuss potential pollinator-friendly solar projects with municipal board members.

UMass Campus – Carbon Mitigation Task Force

CEE Director and the campus Sustainability Manager are co-chairing the Chancellor’s Carbon Mitigation Task Force charged with charting a plan for the University to rely on renewable energy and eliminate greenhouse gas emissions. Over this reporting period, the co-chairs have organized two full Task Force meetings during which the consultants reviewed modeling assumptions and methods, and a working group meeting providing a deeper dive into the modeling with the consultant.

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
NREL InSPIRE Advisory Working Group	April 2, virtual	Breger, Strong, Dowling	Updates and presentations on national dual-use and pollinator-friendly solar activities. CEE provided update on MA efforts.
DOER Green Communities	April 10, virtual	Breger, Strong	Reviewed efforts to expand Cooler Communities program and coordination with DOER.
Appalachian Mountain Club	April 21, phone	Dowling	Reviewed changes to SMART program as related to land use.
Kassandra McQuillen, Texas Tech University	April 27, virtual	Breger, Strong	Review graduate wind courses (legal, financial aspects) and potential coordination with OSW Certificate program and WindU.
NREL Offshore Wind Work Force, Advisory Group Meeting	April 27, virtual; follow-up June 1	Breger	Kick-off meeting of advisory group, provided summary of OSW Certificate program, and networking. One-on-one follow-up with NREL officer.
PVPC Solar Working Group Meeting	April 28, virtual	Dowling	Continuing development of guidance and template municipal solar zoning bylaw for towns in rural MA.
Center for EcoTechnology, Lorenzo Macaluso, Paulina Alenkina	April 28, and May 19 (follow-up) virtual	Mattison, Weil	Discuss CET's role in supporting certain Mass Save PAs and opportunities to collaborate in supporting implementation of the energy efficiency projects identified in our audits.
Courtney Feeley Karp, Klavens Law Group	April 29, virtual	Breger	Reviewed role of CEE in dual-use ASTGU pre-determination applications, and firm's projects.
Cinda Jones, Cows	April 30, phone	Breger	Reviewed objectives of NREL solar siting project and role of stakeholders in informing project development.
Tina Clarke, consultant	May 6 and 12, virtual	Breger, Strong	Discussed collaboration between Pioneer Valley, UMass and Tina's northern Europe collaborators on regional planning and sustainability.
Ernst Pollinator Services	May 6, phone	Dowling	Discussed pollinator-friendly solar program and criteria.
Rebecca Blathras, Clean Power, Inc.	May 12, virtual	Breger, Strong	Discussed commercialization support for Clean Power's electromagnetic energy-flux generator technology in the U.S., including federal and state resources (e.g., MassCEC).
PVPC Affordable Access Regional Coordination Mtg	May 14, Virtual	Strong	DOER funded program to support low income and affordable housing access to clean energy.
MassEnergize analytics and software support	May 15, Virtual	Strong	Discussed a project scope and timeline associated with CEE providing an intern to support MassEnergize's software tools with GHG algorithm analysis and recommendations.
Mike Zimmerer, Soltage	May 20, phone	Dowling	Discussed pollinator-friendly solar program and criteria.
U.S. DOE National Community Solar Partnership	May 20 and June 18, virtual	Strong, Breger	1) Kickoff discussion of NCSP reviewing areas of interest, challenges and opportunities for community solar markets across U.S. 2) Solar Financing for Community Ownership presentation and discussion by Co-op Power and Peoples Solar Energy Fund.
Lawrence Cook, AMP	May 28, phone	Dowling	Discussed pollinator-friendly solar program and criteria.

Entity and Attendees	Date and Format	Extension Staff	Purpose and Outcomes
Massachusetts Municipal Wholesale Electric Company, Joe Coles	June 3, phone	Mattison, Weil	Share information on CEE and WVEC programs and discuss potential opportunities for collaboration
MassCEC OSW Certificate Program – Business Planning	June 4, virtual	Strong, Breger	Detailed review of business plan for OSW Certificate program with MassCEC consultant.
Center for EcoTechnology, Paulina Alenkina & Susan Olshuff, Ener-G-Save	June 4, phone	Mattison	Discussion on temporary increase in Columbia Gas incentives and outreach opportunities to encourage participation.
PVPC Solar Working Group Meeting	June 9, virtual	Dowling	Continuing development of guidance and template municipal solar zoning bylaw for towns in rural MA.
Sierra Club	June 10, virtual	Dowling	Discussed changes to SMART and CEE solar siting projects.
DOER, Joanne Bissetta	June 10, virtual	Mattison	Plan for support of Green Communities review process.
DOER Green Communities & RPAs	June 15	Mattison	Train RPAs to conduct Green Communities progress reviews for selected 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
NREL SEIN Kick-off Workshops	April 8, 9, virtual	Breger, Strong, Dowling, Kraus	Presented summary of CEE project and participated in networking activities.	Co-recipients (8) of NREL SEIN grants	35
Environmental Interest Group, UMass Department of Economics	April 24, virtual webinar	Breger	Equity in Policy-Driven Solar Markets: Distribution of Economic Returns, Rents, and Expenditures in the Massachusetts RPS Solar Carve-Out II Program	Faculty, graduate students in Economics	15
Battery Energy Storage Innovation Ecosystem Steering Committee	April 28, virtual	Breger, Strong, Fabel, Kraus	Hosted and facilitated first Steering Committee meeting; discussed agenda for fall symposium.	BES Innovation Ecosystem Steering Committee	14
UMass Carbon Mitigation Task Force	May 15 and June 26	Breger	Facilitated meeting with Task Force members and consultants.	Carbon Mitigation Task Force	20
Scandinavian Models for Local Sustainability & Economic Transition	May 22	Breger, Strong	Co-facilitator with Tina Clarke, and participated in presentation by Fredrik	PVPC, and UMass regional	10

Event	Date and Location	Extension Presenter/ Attendee	Presentation Title/Topic	Audience	Estimated Attendance
			Björk, Malmö University, Sweden.	planning faculty	
Heat Pump Workshop	May 27-28	Mattison	In-depth introduction to heat pump technology, with a focus on municipal applications.	Massachusetts municipalities, state employees, others	200
NREL SEIN Program – Peer Exchange Working Sessions	May 27-29, virtual	Breger, Strong,	Presented summary of CEE project and facilitated peer exchange on full scope of granted projects.	Co-recipients (8) of NREL SEIN grants	35
Solar Development in MA webinar	May 27, virtual	Dowling	Presented current information on SMART program and local solar zoning/bylaws appropriate for municipal board members, in collaboration with Hilltown Land Trust and Appalachian Mountain Club.	Primarily municipal board members from MA towns	150
Battery Energy Storage Innovation Ecosystem Steering Committee	June 30, virtual	Breger, Strong, Fabel	Hosted and facilitated second Steering Committee meeting; set planning for fall symposium.	BES Innovation Ecosystem Steering Committee	14

Prospective Activities and Proposals

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

Cooler Communities, with Ener-G-Save and MassEnergize

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

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

In collaboration with state solar industry partners, state agencies, a non-profit organization, and UMass collaborators, CEE submitted a full/final project proposal entitled *Impacts of Dual-Use Solar on Crop Productivity and the Agricultural Economy in Massachusetts and Beyond* in response to a U.S. Department of Energy solicitation. The submission of a full proposal was “encouraged” by DOE upon review of our concept proposal. If awarded, this \$2.5 million research effort will provide outcomes to fill the significant knowledge gap regarding the impact of dual-use solar on farm productivity and economics. This knowledge is critical for solar and agricultural sectors, and policymakers, to confidently set a forward path for successful and implementable dual-use policy and development guidelines in Massachusetts and the U.S.

Solar Equity: Analysis of DOER SREC II Solar Program

CEE in collaboration with colleagues in Resource Economics and industry partner Sustainable Energy Advantage, LLC (SEA), completed its research work supported by a Seed Grant from the UMass Institute for Social Science Research. The project evaluates the magnitude and recipients of the economic expenditures and returns from Massachusetts solar SREC II program. The project results were presented to the Environmental Interest Group in the UMass Department of Economics. The project documentation still needs to be completed and funding for an expansion of this area of work will be considered in collaboration with colleagues in Resource Economics.

University-based Proposals and Initiatives

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

Enhancing Resiliency and Increasing Equity in the Transition to a Sustainable Energy Future, full proposal submitted to National Science Foundation Research Traineeship (NRT) Program. Lead: Matt Lackner, Mechanical Engineering.

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

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

CEE (Breger) plays an active role in the steering committee of the UMass Energy Transition Initiative led by the Colleges of Engineering, Natural Sciences, and Behavior Science. 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.

CEE (Breger) participated in Strategic Planning exercise for the UMass Wind Energy Center, with consultant Fara Courtney.

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
D.L., Undergraduate	Physics, iCONS	Strong	Municipal GHG Assessment for Pioneer Valley Planning Commission; GHG analytics for MassEnergize; MassEnergyInsight user training support; Offshore Wind Professional Certificate marketing support.
A.P., Graduate	Sustainability Science	Breger	Solar Equity - Modeling and analysis of cash flows across project types.
M.D., Graduate	Environmental Conservation	Breger, Strong	Support On-line preparation of OSW Certificate program courses.
J.W., Graduate	Mechanical Engineering	Breger, Strong	Support curriculum development for OSW Certificate program courses.
D.B., Graduate	Sustainability Science and Regional Planning	Strong, Kraus	Technical support for MEI users.