

UMASS CLEAN ENERGY EXTENSION

Quarterly Progress Report to MA Department of Energy Resources

Period ending September 30, 2018

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This Progress Report provides a summary of work accomplished by the UMass Clean Energy Extension (CEE) during the period July 1, 2018 to September 30, 2018.

During this reporting period, the Clean Energy Extension continued its support of the Mohawk Trail Woodlands Partnership (MTWP), advanced efforts in support of clean heating and cooling markets, made significant progress in support of the SMART solar-agriculture dual-use program, and continued working with Clean Energy Corps students engaged with Clean Energy Site Assessments (CESAs) and a range of research and outreach activities. Some key highlights, further discussed below for this reporting period include:

- Advanced collaborations with farmers, developers, UMass Agricultural Extension, DOER, and Massachusetts Department of Agricultural Resource (MDAR) to develop tools, guidance, and a pre-determination form for those considering dual-use PV systems under the forthcoming SMART program.
- Advanced research initiative to explore the early-stage battery innovation ecosystem in Massachusetts and facilitate interactions across industry and the universities – in collaboration with DOER and MassCEC. Supported a technical consultant and two Clean Energy Corps students, conducted industry and academic outreach, drafted findings and a database of findings.
- Supported 15 communities in the Green Communities designation application process - and clean energy project evaluation and implementation.
- Worked with MassCEC to organize a training session on heat pump and variable refrigerant flow technology, which reached capacity several days ahead of the planned close of registration and was attended by 75 people.
- Part of team led by UMass Lowell that was awarded a second EPA pollution prevention grant for work on sustainability in the food and beverage industry
- Supervised, mentored, and coordinated one graduate and five undergraduate Summer 2018 Clean Energy Corps students assisting Community Choice Aggregation business

planning, municipal technical assistance services, energy storage research, rural transportation efficiency research, and independent research projects.

- Hired four undergraduate Fall 2018 Clean Energy Corps students to assist with municipal technical assistance services, rural transportation efficiency research, Community Choice Aggregation project mapping, and transportation policy research.
- Conducted a two-day clean energy workshop and field trip with Girls Inc. of Holyoke – a youth program dedicated to introducing empowering and educating middle-school girls by introducing them to STEM topics at the UMass Amherst campus.
- Supported the Western Massachusetts Community Choice Energy (WMAcce) effort (comprised of Amherst, Northampton, and Pelham) by participating in Task Force activities, including project planning, developing funding proposals, and supporting research efforts.

1. Extension Administration and Management

Post-Doctorate Position

Zara Dowling served as a graduate Research Assistant to CEE during the 2017-2018 academic year. Upon completion of her Ph.D., Zara and CEE have agreed to maintain her position with CEE as a post-doc position. Zara is leading our efforts on dual-use solar and agriculture and with solar and pollinator/wildlife friendly habitat, along with other research activities. Her post-doc position covers 60% of her time (3 days per week).

2. Public Events and Outreach Activities

During this reporting period, CEE staff and affiliates have engaged in the following public events.

| Event | Date and Location | Extension Presenter/Attendee | Presentation Title | Audience | Estimated Attendance |
|---------------------------------|-------------------------|------------------------------|--|-------------------------|----------------------|
| MTWP Advisory Committee Meeting | July 17, Charlemont, MA | Breger, Strong | Update on the UMass CEE Regional Heat Demand & Air Quality and Public Health Study | MTWP Advisory Committee | 40 |
| Eureka/Girls Inc. Workshop | July 18 & 19 | Dowling, Strong | Clean energy workshop and field trip with Girls Inc. of Holyoke | Eureka/Girls Inc. | 25 |

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| UMass Student Engineering Institute | July 20, Amherst | Mattison | Reducing Energy Use in Manufacturing and Food Processing | High school summer program | 50 |
| Twilight Meeting | July 26, Rogers Farm, Warren, MA | Dowling | State Incentives for Solar Photovoltaic Arrays on Farms | Dairy farmers and agricultural service providers | 100 |
| WGBY Interview | August 2, Springfield, MA | Strong | Energy costs in rural Massachusetts | WGBY viewers | |
| NOFA conference presentation | August 10, Hampshire College | Dowling, Strong | Solar Energy for Your Farm: Navigating the MA SMART Program | Conference attendees | 12 |
| Twilight Meeting | August 16, UMass Research Farm, South Deerfield, MA | Dowling | State Incentives for Solar Photovoltaic Arrays on Farms | Farmers, agronomy researchers, and agricultural service providers | 30 |
| CAFE Summer Scholars Poster Session | September 12, UMass, Amherst | Breger, Strong, Dowling, CAFE Summer Scholar | Best Practices to Reduce Fuel Use and GHG emission in Rural Municipal Fleets | UMass community, and external funders of Scholars program | 150 |
| Training on Heat Pump and Variable Refrigerant Flow Technology | September 20, Boston Society of Architects | Mattison | Heat Pump and VRF Technology | Architects, engineers, end users, government and utility staff | 75 |

CEE co-Principal Investigator Beka Kosanovic collaborated with National Grid to evaluate potential for combined heat and power at Specialty Minerals in Adams, MA and Equinix in Billerica, MA. Even though both facilities qualify as a potential candidate for CHP based on their thermal and electrical demand, management at both facilities is leaning towards not implementing CHP at this time. Also worked with Unitil on an analysis for CHP at the Health Alliance hospital in Fitchburg. Discussions still underway.

CEE Principal Investigator Prashant Shenoy continues his work with Holyoke Gas and Electric holding discussions this reporting period on a transformer energy storage study and on data analytics with the Mt. Tom energy storage project.

We continue to update and add resources to our website for businesses, institutions, municipalities, and residents. In this reporting period, we completed and published 3 fact sheets regarding residential solar PV systems. We also completed and published 2 fact sheets for municipalities regarding methods to reduce municipal vehicle fuel usage (idle reduction systems

and telematics). We completed and published 2 fact sheets explaining the SMART incentive program as it pertains to solar arrays on farms, and demonstrating how to estimate incentives using the SMART compensation calculator.

3. Green Communities and other State/Municipal Assistance

Mohawk Trail Woodlands Partnership

CEE, in collaboration with Professor Rick Peltier and his staff, continued to prepare a draft report addressing air emissions monitoring mobile lab through the end of April. The draft report is being prepared to deliver to MTWP and DOER.

Community Choice Energy (Northampton, Amherst, Pelham)

CEE has engaged 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.

Division of Capital Asset Management and Maintenance

CEE met with Kaitlyn Menyo of DCAMM to discuss wood heat projects at state facilities, technical assistance available from CEE staff, and a CEE clean heating and cooling technology screening tool and its applicability to current and anticipated DCAMM projects.

Green Communities

CEE continues to provide technical assistance to Massachusetts towns in support of Green Communities. During this reporting period, CEE engaged with 15 communities to support their Green Communities reporting processes and general clean energy activities. As part of Green Communities (or outside this program), CEE staff and affiliates have engaged with the following communities:

| City or Town | Status | Technical Assistance |
|------------------------------------|---|---|
| Amherst, Pelham, Northampton | Western Massachusetts Community Choice Energy | CEE supported WMACCE by participating in Task Force activities, including project planning, developing funding proposals, and supporting research efforts. |
| Charlemont | Green Communities designation application support | CEE and the Clean Energy Corps assisted Charlemont with energy data gathering and MassEnergyInsight set-up in preparation for a GC designation application, as requested by Franklin Regional Council of Governments. |
| Chicopee | HVAC retrofit savings estimates | CEE has coordinated with the City of Chicopee to begin reviewing proposed scope for a \$14 million upgrade at the City Hall, in an effort to prioritize the GC designation funds. |
| Colrain | Green Communities designation application support | CEE and the Clean Energy Corps assisted Colrain with energy conservation measures savings |

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| | | estimates in preparation for a GC designation application, as requested by Franklin Regional Council of Governments. |
| Conway | Clean Energy Site Assessment | CEE conducted a Clean Energy Site Assessment of the Conway Grammar School as provided by Prof. Ben Weil and the Clean Energy Corps. |
| Easthampton | Municipal Energy Assessment and Clean Energy Site Assessment | CEE delivered a Municipal Energy Assessment and conducted a Clean Energy Site Assessment of municipal energy usage as provided by CEE staff, Prof. Ben Weil, and the Clean Energy Corps. |
| Gill | Clean Energy Site Assessment | CEE delivered a Clean Energy Site Assessment report based on an analysis and walk-thru of Gill Elementary School by Prof. Ben Weil and the Clean Energy Corps. |
| Hawley | Clean energy technical assistance | Hawley requested support from CEE in determining savings and system efficiency estimates for a proposed wood heat boiler in the town garage. |
| Lanesborough | Clean energy technical assistance | Calculated the expected energy savings from the reglazing of 98 windows within the elementary school |
| Montague | Clean energy technical assistance | Montague's energy committee request technical assistance as it designs a new DPW facility and considers green roofing options. |
| New Salem | Municipal Energy Assessment and MEI support | CEE and the Clean Energy Corps supported New Salem with MassEnergyInsight data input for the Swift River School and drafted a Municipal Energy Assessment for the town. |
| Shelburne | Clean energy technical assistance | Shelburne requested support from CEE in determining clean energy project prioritization. |
| Westhampton | Green Communities designation application support | CEE and the Clean Energy Corps assisted Westhampton with energy data gathering and MassEnergyInsight set-up in preparation for a GC designation application, as requested by Pioneer Valley Planning Commission. |
| Worthington | Green Communities designation application support | CEE and the Clean Energy Corps assisted Worthington with energy data gathering and MassEnergyInsight set-up in preparation for a GC designation application, as requested by Pioneer Valley Planning Commission. |

4. Business 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 |
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| Greentown Labs | July 12, Greentown Labs | Breger, Strong, Fabel (CEE Contractor), | Discussed collaborative efforts and strategy around MA battery storage ecosystem research project. |

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| | | Clean Energy Corps | |
| Massachusetts Institute of Technology | July 12, MIT | Breger, Strong, Fabel (CEE Contractor), Clean Energy Corps | Discussed collaborative efforts and strategy around MA battery storage ecosystem research project. |
| Pittsfield microgrid project | July 18, conference call | Strong | Presented CEE overview and role in supporting project during the Pittsfield microgrid feasibility study kick-off meeting. |
| RE Endowed Chair introduction to DOER, MassCEC | July 19, Boston | Breger, with Prof. Thiagarajan Sharman and Dean Anderson | Introduce DOER-supported UMass Endowed Chair in Renewable Energy. Seminar to DOER/state, meeting with Commissioner and Senior Staff, and meeting with MassCEC offshore wind team. |
| DCAMM clean heating & cooling screening meeting | July 24, CEE office | Beebe, Strong | Presented CEE CH&C screening tool and discussed applicability to DCAMM projects. |
| Smith College, Prof. Alex Barron | July 30, in town | Breger | Discussed common backgrounds and potential research/teaching collaborations. |
| Roberts Renewables | July 31, conference call | Beebe, Breger, Strong | Discussed progress and support needs for the Roberts Renewables biogas project. |
| MBTA | August 1 memo | Mattison, Weil | Provided memo about energy efficiency opportunities in the MBTA Riverside maintenance facility |
| Boston University, Institute for Sustainable Energy, Jacqueline Ashmore | August 6, phone call | Breger, Strong, Fabel (CE Contractor) | Discussed battery storage project and general areas of common work and interest. |
| Cypress Creek Solar | August 16, CEE office | Dowling, Strong | Discussed pollinator-friendly solar development under SMART and collaborative research opportunities. |
| PV Squared | August 22, Amherst | Breger | Discussed solar market and SMART, and concerns in western MA capacity availability for small commercial projects. |
| NREL, Hyperion Solar, MDAR (Palano) | August 28, UMass Research Farm, South Deerfield | Breger, Dowling | Hosted NREL photo-shoot of UMass dual-use project, discussed project development, and national work and funding opportunities. |
| Pioneer Valley Planning Association - Climate Action and Clean Energy Advisory Group Meeting | September 6, Springfield | Strong | Met with PVPC staff and partners to discuss updates and CEE's role in supporting the Pioneer Valley Climate Action and Clean Energy Plan. |
| DOER and Western MA Community Choice Energy Task Force | September 6, DOER, Boston | Breger, with Amherst, Pelham, Northampton task force members | Discussed innovative Community Choice Aggregation under study jointly by the three towns, and funding needs for scope of work for consultant. |
| Leading by Example Council Meeting | September 11, Hampshire College | Strong | Attended LBE Council Meeting to discuss CEE support for state facilities pursuing clean energy initiatives. |

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| KC Blue Energy | September 18, CEE office | Breger, Strong | Discussed KC Blue’s water-sourced heat pump technology and potential MA pilot sites, including the UMass campus and the Amherst WWTF. |
| Cape Light Compact, Maggie Downey | September 21, Amherst Town Hall | Breger, Strong | Hosted Maggie Downing with Western MA Community Choice Energy Task Force to discuss Cape Light Compact formation and current operations. |
| Clean Energy States Alliance, Val Stori | September 27, conference call | Breger, Strong | Discussed project ideas and a collaborative proposal to a Renewable Thermal Alliance funding solicitation. |
| DOER | September 28, conference call | Breger, Strong, Peltier | Call to discuss progress and preliminary results of MTWP air emissions monitoring project. |

5. UMass Clean Energy Corps and other Research Activities

CEE submitted a proposal in response to MassCEC’s 2019 HeatSmart Program Request for Proposal for Clean Heating & Cooling Technical Consultants.

CEE is partnered with UMass colleagues in the engineering-led Wind Energy Center on two substantial federal grants – 1) an NSF/DOE Engineering Research Center grant (led by Tufts University) to establish an offshore wind engineering center, and 2) an NSF Research Traineeship program grant to establish a graduate student research and training on the clean energy transition.

CEE (Strong, Breger) held a kick-off meeting on September 11 for the project on Greenhouse Gas Life Cycle Analysis for Cross Laminated Timber (CLT) sourcing, milling, and use in Massachusetts. Under an ISA with the MA Executive Office of Energy and Environmental Affairs, CEE is partnered with the New England Forestry Foundation and other consultants to carry out this work.

CEE completed a research survey initiated by Clean Energy Corps member Varsha Suresh to evaluate the efficacy of existing municipal aggregations in meeting stated goals of aggregation, including energy cost savings, price stability, and higher renewable energy content. The final report was made available on our website, and distributed to western Massachusetts town representatives currently considering municipal aggregation as part of a Franklin Regional Council of Governments (FRCOG) initiative. The results were also presented to members of the WMACCE Task Force.

CEE (Mattison) worked with MassCEC to plan a 2018 Q3 (September 20) heat pump and variable refrigerant flow training to architects, building owners and managers, energy professionals, and HVAC contractors. The training was attended by 75 people, and additional sessions are under consideration for the future.

CEE (Mattison) collaborated with John Ballam of DOER to compile and analyze data on combined heat and power systems participating in the Alternative Portfolio Standard. Analysis of 2017 data is underway, with plans to present initial results in November.

CEE has convened its Fall 2018 Clean Energy Corps consisting of four undergraduate students working on the following projects:

- GIS mapping support for the Western MA Community Choice Energy aggregation Task Force.
- Support of Green Communities program providing western MA towns with Mass Energy Insights support, preparation of Municipal Energy Assessment and Clean Energy Assessment reports, and support in the development of Green Communities designation applications.
- Evaluation and data analysis of the challenges, opportunities and best practices to reduce fuel use and greenhouse gas emission in rural municipal fleets, in coordination with DOER Clean Cities program.
- Transportation policy research regarding opportunities and barriers to increasing access to public transportation and electric vehicles for underserved populations.