

3-YEAR STRATEGIC PLAN: 2017 – 2019

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1 Introductory Statement

UMass Clean Energy Extension (CEE) was established in 2014 with support from the Massachusetts Department of Energy Resources and the purpose of mobilizing University of Massachusetts resources to accelerate the adoption of clean energy in the Commonwealth. Beginning in October 2015, CEE has developed its core staff, served dozens of stakeholders, convened a statewide clean energy conference and several workshops, developed outreach and educational materials, seeded UMass faculty research efforts and collaboration across disciplines and UMass campuses, and leveraged staff, faculty, and students to support wider deployment of energy efficiency and renewable energy technologies across the Commonwealth.

Building on these early successes, the Strategic Plan provides an opportunity for CEE to re-vision and re-articulate its purpose, focus its strategies, and develop an organizational roadmap that guides key decisions and future directions as we embark on our next stage of development and potential growth. The Plan will help us to communicate effectively to our stakeholders, design and implement our programs for greatest impact, deploy our resources thoughtfully and efficiently, penetrate underserved markets, and measure and report our progress and contributions to a strong clean energy ecosystem for current and future generations of our Commonwealth.

2 The Need for UMass Clean Energy Extension

The creation and usage of energy sourced from fossil fuels has led to global climate change, extreme weather events, and the degradation of sensitive environments around the globe. There is now an opportunity to re-vision, manifest, and create an energy future based on efficient, renewable, and regenerative energy sources accessible to all. As such, the Commonwealth has adopted a range of national leading policies, most notably the Global Warming Solutions Act (GWSA), a framework for reducing heat-trapping emissions from all sectors of the economy to reach legally binding commitments of a 25% reduction of Greenhouse Gas (GHG) emissions by 2020 and an 80% reduction by 2050. These goals include a focus on reducing Massachusetts' dependence on fossil-based energy sources derived from other regions, protecting Massachusetts consumers from energy price volatility, and taking advantage of an economic opportunity for growth of the Massachusetts clean energy industry while reducing the local economic drain of energy import spending.

As a public-serving, non-profit entity with research and extension partnerships across the disciplines of the university, CEE is in a unique position to help the Commonwealth achieve these larger goals. We provide expertise, legitimacy, impartiality, academic rigor, and local responsiveness to the task of building the Massachusetts clean energy economy. At the same time, we avoid competing with private-sector technology and service providers. Instead, we are able to support and collaborate with these entities by demonstrating clean energy market opportunities, which can then be served most effectively by the private sector.

Building on the Extension model that is at the founding of the University of Massachusetts and the organizational home of CEE, we assist market and project development for emerging clean energy opportunities that face barriers that the private sector cannot readily serve at this time. CEE serves as a unifying and value-adding force between public agencies, academia, and the for-profit and non-profit sectors. As such, we are able to leverage the strengths of each sector in service of building a resilient, equitable, and flourishing clean energy economy for the Commonwealth.



3 Guiding Principles

CEE joins the University's historic mission as a Land Grant College to provide research, outreach and extension to the Commonwealth. No longer strictly limited to agriculture, the mission of UMass Extension extends to human health, social equity, and environmental well-being. In keeping with this mission, CEE serves as a resource to reduce market barriers and accelerate the adoption of clean energy into the Massachusetts economy. The timely transition to a clean energy economy is critical for Massachusetts for two reasons: (1) it is an essential factor in meeting the state's legislated greenhouse gas reduction commitments, and (2) it provides an opportunity to foster new areas of economic development in the Commonwealth. Following are the guiding principles by which CEE contributes to this transition.

3.1 Our Commitment

CEE is committed to the following operating principles in all of its activities:

1. **Collaboration:** Working collaboratively with the UMass community and Massachusetts state officials, agencies, institutions, and businesses to help meet our shared climate-related, energy, and education goals.
2. **Service:** Providing professional clean energy services, education, outreach, research, and workforce development for the public good of the Commonwealth.
3. **Integrity:** Conducting our work and relationships with honesty, academic rigor, objectivity, passion, continuous learning, fiscal responsibility, and inclusiveness.

3.2 Our Vision

With CEE serving as a primary clean energy market-building catalyst, we envision a healthy and thriving Commonwealth with a flourishing clean energy economy in which energy efficiency opportunities are maximized and the Commonwealth's energy needs are met with affordable, accessible, low-impact, secure, and locally generated clean energy.

3.3 Our Mission

To proactively and collaboratively accelerate the Massachusetts clean energy economy by identifying, developing, and serving markets for energy efficiency and renewable energy across the state. We achieve our mission by leveraging the resources of our staff, our partners, and the UMass community to foster market opportunities, address market barriers, and unleash private sector activities.

3.4 Our Unique Value in the Marketplace

We are uniquely equipped to achieve our mission due to the following assets:

1. **Our Positions:** Our position within the UMass community and alignment with the university Extension model affords us a distinctive perspective and specialized toolset with which to identify, understand, and develop underserved clean energy markets as a public service to the citizens of the Commonwealth. Our position under a service agreement with the state Department of Energy Resources allows us to be



available and responsive to the state’s needs and directly assist the Commonwealth in meeting its clean energy policy and programmatic goals.

2. **Our Structure:** Our small, public-sector structure and public-good mandate allow us to minimize transactional costs to our clients, streamline services to our clients and stakeholders, and to be locally responsive to opportunities while strategically and proactively addressing larger market needs.
3. **Our Staff and Stakeholders:** Our experienced staff, accomplished faculty investigators, professional advisors, state partners, and stakeholders within the UMass Center for Agriculture, Food and the Environment all serve to catalyze research opportunities and amplify our impact in the Massachusetts clean energy market.
4. **Our Relationships:** Our interdisciplinary relationships and experience working with state agencies, business organizations, municipalities, and non-profit and for-profit organizations enable us to collaborate across sector boundaries, respond to a diversity of needs, and innovate clean energy solutions for the benefit of the citizens of the Commonwealth.
5. **Our Brand:** Our alignment with the trusted and respected UMass brand allows us to provide legitimacy, objectivity, and authority in evaluating and implementing clean energy market opportunities.



4 Strategy Formation & Implementation

Operating under the umbrella of the UMass Center for Agriculture, Food and the Environment, CEE is in a unique position to create, share and utilize knowledge for the benefit of the Commonwealth and its citizens, and to advance academic scholarship and the mission of UMass Amherst. Catalyzing and leveraging resources across the University system, we partner with a wide range of agencies, organizations, institutions, communities, and businesses, to identify, develop, and deploy clean energy solutions throughout the Commonwealth and foster a thriving Massachusetts clean energy economy.

CEE provides a resource dedicated to reducing market barriers and accelerating the adoption of clean energy by engaging with two primary audiences:

- **Outward facing** support to Massachusetts cities and towns, businesses, institutions, farms, low-income and multiunit housing, and others.
- **Inward facing** research, education, and workforce development within the UMass community of students, researchers, and educators.

4.1 Serving the Commonwealth

CEE provides technical support and proactively seeks opportunities to promote clean energy markets and projects. We work with businesses eager to enter or diversify into the clean energy markets. We provide assistance to municipalities, institutions, and businesses in navigating through state programs that offer incentives for energy efficiency and renewable energy projects. CEE serves the citizens of Massachusetts by acting as a value-adding interface between the UMass Community and the Commonwealth.

In accordance with our public-good mandate and non-profit mission, we aim to avoid competing with private sector technology and service providers. Instead, our goal is to support and collaborate with these entities by identifying and “proving out” clean energy market and specific project opportunities, which can then be capitalized upon by the private sector.

For greatest impact in advancing the Massachusetts clean energy economy, we directly serve:

- Municipal staff and officials
- State agencies and policymakers
- UMass staff, faculty, and students
- Business owners and business organizations

It’s important to note that to avoid creating unfair advantage in the for-profit business sector, we strive to make our services equally accessible to these entities throughout the Commonwealth.

In addition to the audiences listed above, we provide clean energy outreach and information to the Commonwealth in its entirety – including the residential market – through our website, social media, fact sheets, white papers, conferences, and other outreach materials and means.



CEE supports and contributes to applied research activities across UMass departments, interdisciplinary research centers, and campuses that advance technical, economic, and policy solutions that support clean energy advancement in Massachusetts.

Similar to the role of UMass Extension in agriculture, CEE provides the legitimacy, impartiality, and local responsiveness to:

- Assist entities in evaluating and implementing clean energy opportunities
- Help businesses offer clean energy technologies into the marketplace
- Foster and support applied research that advances technical, financial, and policy opportunities for the clean energy economy

4.2 CEE Impacts

We advance clean energy in Massachusetts to accomplish two distinct but related economic outcomes:

- (1) **Market Development:** We proactively identify, evaluate, and develop targeted sectors of the Massachusetts clean energy economy to elucidate and accelerate new market niches and enable private sector interest and activities. We do this by identifying market opportunities where clean energy technologies are applicable but not well penetrated. For these market opportunities, we perform market and technology analysis, applied research, policy analysis and support, and market outreach and education to the applicable clean energy adopters and providers.
- (2) **Project Development:** We help move appropriate and specific clean energy projects from conception to completion as a means of demonstrating the viability and benefits of clean energy projects. We do this by offering outreach, education, and technical services to two general audiences: (a) entities that may not be sufficiently aware of their clean energy opportunities, and (b) under-resourced and underserved entities (e.g., non-profits, municipalities, state agencies, academia, human service agencies). Our primary project development tools include client clean energy strategy consulting, pre-feasibility and scoping studies, technical assistance, funding identification (e.g., grants, incentives, loans), vendor solicitation, and owner agency services. As clients approach project design and implementation stage, we help them to access private-sector services and resources as needed.

4.3 Activity Areas

To most efficiently and effectively meet our mission and achieve our desired outcomes, we organize our efforts into five activity areas.

1. **Market Analysis & Outreach:** This activity area is focused on conducting strategic research, analysis, and reporting related to determining the characteristics, extents, and dynamics of potential Massachusetts clean energy markets. In addition, we conduct outreach and education in promising markets with the

goal of developing and identifying clean energy project and strategic opportunities within those markets. Examples of current and recent market analysis and outreach projects include:

- a. Annual Clean Energy Conference
 - b. Food & Beverage Industry Initiative
 - c. Biomass Heating for Greenhouses
 - d. Case Studies on Green Communities Program Successes and Renewable Thermal Projects
2. **Collaborative Applied Research:** This activity area is focused on supporting the UMass research mission and expanding the public knowledgebase that supports the advancement and adoption of energy efficiency and renewable energy in Massachusetts and society at-large. To that end, we actively foster applied clean energy research and development activities in three key areas: UMass faculty seed grants, university research partnerships, and industry research partnerships. Examples of current collaborative applied research projects include:
- a. Mohawk Trail Woodlands Partnership – Air Emissions, Regional Economic Impact
 - b. Biochar Technology and Market Research
 - c. GIS Database of MassDEP Permitted Boilers
3. **Technical Assistance & Advisory Services:** This activity area is focused on providing direct assistance to our client-base as provided by CEE faculty and staff specialists. Assistance generally takes the form of information sharing, pre-feasibility and scoping studies, proposal development, funding guidance, project support services, and general consulting services. The aim of technical assistance is to maximize the quality of project conception, implementation, and impact by supporting decision-making, vendor selection, policy and financial support navigation, etc. Examples of current technical assistance projects include:
- a. Green Communities – Prospective Communities Application Support
 - b. Green Communities – Participant Communities Project Support
 - c. UMass Physical Plant Energy Storage support
4. **Education & Workforce Development:** This activity area is focused on supporting the UMass educational mission, the mission of Center for Agriculture, Food and the Environment (CAFE), and the state's economic prosperity by providing workforce development and skills training opportunities to UMass students and other potential clean energy workers in the clean energy sector. The aim of this activity area is to maximize clean energy educational opportunities and expand the volume and quality of the Commonwealth's clean energy workforce to meet current and anticipated demand. Examples of current educational and workforce development projects include:
- a. UMass Clean Energy Corps
 - b. Community-Benefiting Business Model Competition
 - c. Student Internships



5. **Administrative & Strategic Planning:** Continuously ensuring that we operate effectively, efficiently, sustainably, and with greatest impact are all critical to our mission, growth, and long-term viability. Maintaining solid business functions, measuring and communicating our successes, responding to changes and opportunities, ensuring that our staff is happy and professionally fulfilled, and planning for the future are essential aspects of what we do. To be most proactive and effective in advancing the Massachusetts clean energy economy, we regularly seek guidance from our stakeholders, develop long-range strategic and short-term action plans, conduct fiscal planning and budget reviews, develop proposals for future opportunities, support and develop our staff, refine our operational systems, and provide regular reports to our funders, stakeholders, and the broader community. Examples of administrative and strategic planning projects include:
- a. 2017 – 2020 Strategic Plan
 - b. CEE Project Management System
 - c. CEE Advisory Committee development

4.4 Clean Energy Technologies and Target Markets

While CEE will remain open to all areas of clean energy where our services can be helpful, we generally apply our program tools to those technologies and markets that are commercially viable but have barriers that limit business activities and market maturity. Our focus is generally on the technologies and markets shown in the table below.

| Target Clean Energy Technologies | Target Clean Energy Markets |
|---|-----------------------------------|
| Packaged Combined Heat and Power | Public facilities |
| Distributed generation | Healthcare |
| Thermal heating and cooling | Manufacturing |
| Energy storage – thermal and electrical | Agriculture |
| District thermal energy systems | Multi-unit and low-income housing |
| Microgrids | Hospitality |
| Electric transportation | Cooperative and community groups |
| Energy efficiency | Institutional campuses |
| | Office and industrial parks |
| | Others as needed |

4.5 Prioritizing Our Activities

Advancing the Massachusetts clean energy market is a broad mission with a wide range of drivers, dynamics and players. As we seek to influence the market, there is a potential risk of losing focus and diluting our impact by attempting to be “everything to everybody.” To mitigate this risk, we are committed to focusing our efforts and resources on activities that leverage our core strengths, best meet our mission, complement the educational and research mission of UMass, and have the greatest potential for market impact. As such, we regularly consider, develop, test, prioritize, and pursue new ideas and concepts according a three-stage prioritization process:

1. **Activity Ideation.** New ideas, concepts, and activities generally come to CEE via four basic avenues:



- Conceived internally by CEE’s staff, Principal Investigators, and other key stakeholders including DOER and other state agencies;
- Proposed to CEE by UMass research faculty, staff, and students; and
- Requested as assistance from strategic partners and collaborators, municipalities, businesses, etc.; and
- Research and outreach opportunities offered through requests for proposals from external funders.

In creative collaboration with the above audiences, we continually invite, develop, and synthesize clean energy ideas and concepts that have the potential to contribute to our mission to advance the clean energy within the Commonwealth.

2. **Strategic Plan Screening Analysis.** In this step, we quickly filter and score new ideas by casting them against a set of commonly agreed-upon criteria. These criteria relate to our organizational performance metrics discussed in Section 4.7 but may vary depending on scope, timing, and nature of each new idea. Example criteria include:
 - a. **Mission Alignment:** Is the activity aligned with (1) CEE’s mission and strategic direction, and (2) UMass’s educational and/or research goals?
 - b. **Competency Alignment:** Does the activity align with CEE’s core skillset and staff experience, or with accessible competencies within CEE’s network of collaborators?
 - c. **Activity Plan Alignment:** Does the proposed activity fit within (1) our stated 2017 – 2020 activity areas of *Market Analysis & Outreach, Collaborative Applied Research, Technical Assistance & Advisory Services, Education & Workforce Development* (discussed in Section 4.3), and (2) our target clean energy technologies and target markets (discussed in Section 4.4)?
 - d. **Resource Alignment:** Can the activity be supported by CEE’s resources – human and financial? Does the activity align our annual action plan, staff availability, collaborative interests, and organizational and programmatic budgets? Do we have the administrative capacity to support the activity?
 - e. **Impact Alignment:** What is the potential impact of the activity on the Massachusetts clean energy economy and ecosystem? Does the activity demonstrate a technology that is potentially scalable – technologically, economically, and politically? On what timeline might the activity lead to broader implementation?
 - f. **Goals Alignment:** To what extent will the activity contribute to the Commonwealth meeting its greenhouse gas and clean energy goals?
 - g. **Audience Alignment:** Does the activity serve our target entities, i.e. those that (a) may not be sufficiently aware of their clean energy opportunities nor sufficiently served by existing clean energy markets, or (b) are under-resourced and underserved entities (e.g., non-profits, municipalities, state agencies, academia, human service agencies)?
 - h. **Definable Parameters:** Does the nature of the activity lend itself to a definable and achievable scope of work, timeline, deliverable(s), and outcome(s)?



The results of the Strategic Plan Screening analysis give an initial indication of whether to pursue an activity or not. In selected cases, ideas that score highly in the Strategic Plan Screening Analysis but require relatively low investment may still be selected for pursuit. However, for most high-scoring ideas, to gain a fuller understanding of (1) the potential impact of a given activity, (2) the required investment to pursue the activity, and (3) the likelihood of success of that activity, we engage in a deeper Market Analysis Screening, as described below.

- 3. Market Analysis Screening.** In this stage, we conduct a deeper evaluation of the proposed activity and its alignment with our organizational goals and the Massachusetts clean energy market. Specifically, we evaluate additional factors such as market trends, opportunities, and barriers, and conduct strategic market research and analysis related characteristics, extents, and dynamics of potential Massachusetts clean energy markets. Additionally, we also seek additional guidance from CEE stakeholders, industry experts, state agencies, clients (and potential clients) and UMass faculty through surveys, meetings, and one-on-one conversations. We may also conduct a SWOT (Strengths, Weaknesses, Opportunities, Threats) around the proposed activity. The typical outcome of this step is a “go-now, go-later, no-go” determination.

Following this prioritization progression (and in continuous consultation with our Advisory Committee and other stakeholders) we are well positioned to determine which activities we should pursue in the short-term, which can be deferred until a later time, and which should not be considered at all. As such, we are able to focus our efforts on the highest impact activities that are well matched to our strengths. That said, activity prioritization is a dynamic, fluid, and ongoing process and each potential activity has a unique set of factors and considerations. Even as we test and prioritize new ideas, we are committed to remaining responsive and strategic as circumstances shift, opportunities arise, and the clean energy needs of the Commonwealth evolve.

4.6 Project Management

CEE is committed to providing high quality services for our clients, stakeholders, and partners – and conducting all of our activities with professionalism and integrity. To this end, we are actively developing, workflow-, project-, and client-management systems and processes to ensure that all inquiries, leads, programs, projects, and activities are managed with a focus on achieving high-quality outcomes, continuous learning, and stakeholder satisfaction. It is a stated goal of CEE’s 2017 work plan (presented in Appendix A) to develop and refine robust processes and systems for defining, conducting, tracking, closing, and evaluating each of our activities.

4.7 Measuring Performance

Metrics enable CEE to measure, track and evaluate the effectiveness of CEE in meeting our mission and achieving our desired outcomes. Metrics also help us to communicate our impact to stakeholders; develop and refine our strategies, activity areas and program offerings; assess our fiscal sustainability; and form the foundation for strategic decision-making.



CEE currently tracks several metrics, including:

- CEE's program spending levels
- Individual consultations and site visits conducted by CEE
- Number of CEE-supported municipal applications submitted to the state's Green Communities Program
- Number of CEE-supported municipal officials engaged in meeting energy reduction goals
- Number of CEE-engaged stakeholders seeking state energy incentives
- Number of attendees at public events and presentations in which CEE is involved

These are valuable indicators of various aspects of our impact but do not fully reflect the breadth of our current and anticipated activities or the extent of our desired outcomes. It is a stated goal of CEE's 2017 work plan (presented in Appendix A) to develop a robust and manageable set of meaningful metrics based on the three-year strategic plan and individual annual action plans. Following are a general approach and set of assumptions that will guide metrics development over the coming year:

General Approach

1. Develop metrics in consultation with CEE's key stakeholders.
2. Include a mix of quantitative and qualitative metrics.
3. Include a mix of CEE-wide (crosscutting) metrics and activity-specific indicators.
4. Organize metrics around specific goals, activities, and priorities.
5. Make metrics flexible and adaptable to be useful across as many activities as possible.
6. Minimize the amount of staff time needed to track and document metrics.
7. Use existing sources of data and information as much as possible.

Assumptions

1. Metrics should reflect the various perspectives and values of CEE's key stakeholders.
2. No set of quantitative or qualitative metrics or indicators will be sufficient to fully measure our success, but some combinations of metrics will be better for tracking our progress than others – or than having none.
3. Metrics can help to promote progress and improvement by holding us accountable for working toward goals and objectives, but they also can do harm if action is focused on meeting particular numbers or indicators rather than the larger purposes for which they are created.
4. Any set of metrics will have unintended consequences that are important to analyze and anticipate.
5. Any set of metrics should be viewed as a whole and be part of an overall qualitative assessment of CEE's success.

4.8 Sustained Organizational Development

The development of this Plan is an important step for CEE to review and articulate its mission and goals, and to confidently allocate our resources to appropriate activities. The Plan provides our guide for moving forward, but allows us to efficiently adapt to changing market needs and funding opportunities.



Strategic planning is not a static outcome, but an evolving process. CEE is committed to sustain its efforts to develop its internal organizational functions and effectiveness over the next three years, particularly in the following areas:

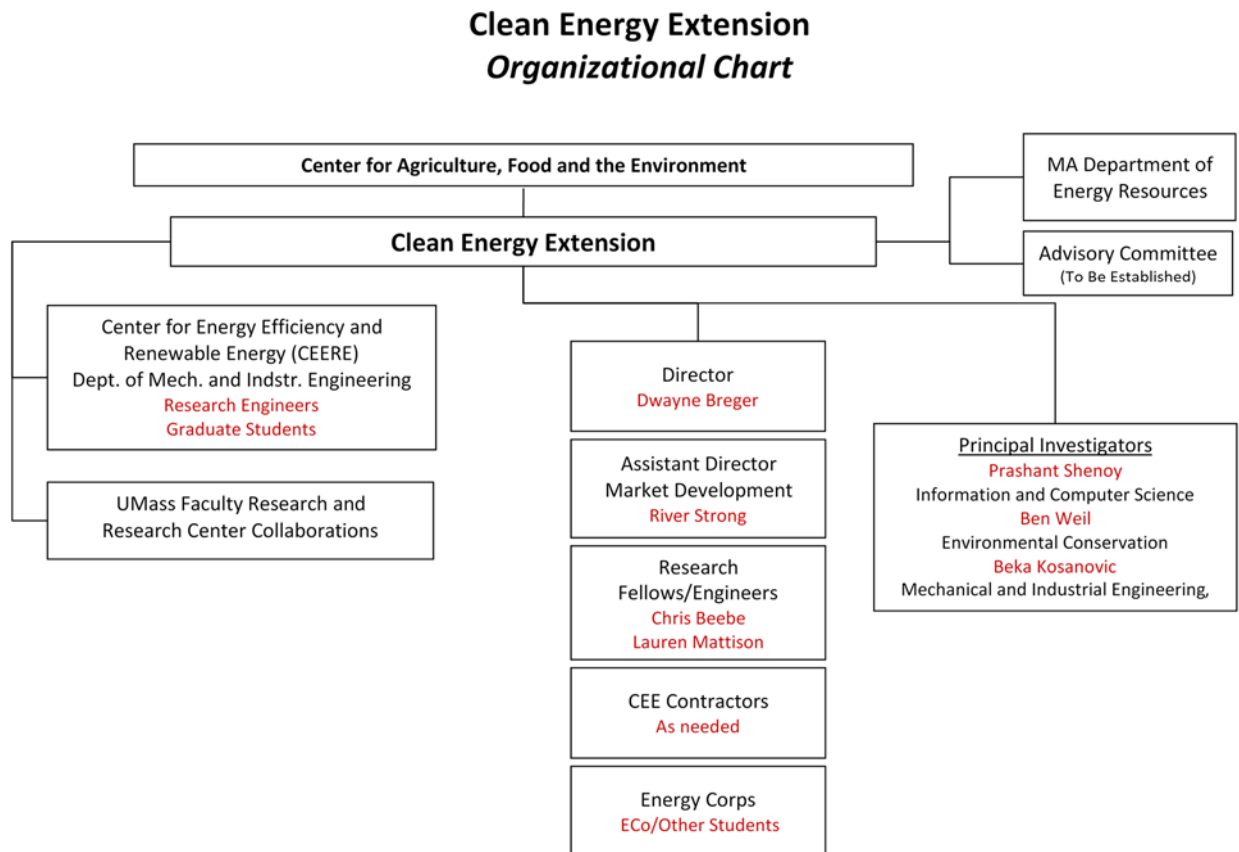
- **Annual Action Plans:** CEE will develop and offer annual action plans each calendar year to lay out a set of activities and resource allocations that will guide its staff and inform its funders and the public. CEE will use the action plan to reflect on its accomplishments and deficiencies at the end of each year to inform future planning cycles. The 2017 CEE Action Plan is presented in Appendix A.
- **Advisory Committee:** CEE will recruit and convene an Advisory Committee during the first half of 2017. As discussed in Section 5.6, CEE will meet with the committee twice per year and provide regular updates on programs, projects, and strategic directions. CEE will utilize the advisory committee to help align its annual action plans with overall strategic direction, and to identify new opportunities and address challenges.
- **Monitoring and Evaluating the Strategic Plan:** CEE Director, staff, and Principal Investigators will monitor and evaluate the Plan on a semi-annual basis. The review will evaluate: 1) our accomplishments with respect to our mission and goals; 2) the balance between our staff resources, skill sets, and work needs; 3) topic areas and collaborations for faculty seed grants; and 4) our fiscal situation and funding needs and opportunities.
- **Progress Metrics and Reporting:** CEE will establish a set of progress metrics and semi-annually measure our progress using these metrics, along with other means, and provide reports as appropriate to funders, the University, the advisory committee, and others.
- **Project Management System:** As the activities and staff of CEE grow, it has become increasingly important to develop and implement a project management system to intake, assign staff, track, and closeout projects and ad-hoc support services for clients. CEE has researched potential platforms, and will implement a system during the first quarter of 2017.
- **Communications Plan:** As CEE emerges from its start-up, a meaningful communications plan is essential to make our services visible and promote outcomes in the clean energy market. CEE has launched a social media presence with a website, Facebook page, and Twitter account, and we will use these platforms prudently and more strategically during 2017 and beyond.
- **Staff Management and Support:** CEE Director will enhance staff management practices with explicit efforts to set goals and to evaluate progress on a regular basis. Staff meetings to set weekly work assignments in accordance with the work plan and project management will be continued and enhanced. Opportunities for staff professional development through campus offerings, and attendance at workshops, conferences, and trainings are important and will be encouraged.
- **Resource Planning:** CEE has a small staff and an aggressive work plan, and needs to be adaptable to new research and outreach opportunities. The Director will annually assess staffing needs and available budget, as well as the alignment of the staff interests and capabilities with current and planned work activities, and provide recommendations to the Principal Investigators.



5 Capacity & Resources

5.1 Organizational Structure

CEE has attracted an experienced and passionate staff of professionals. Following the completion of the state funding agreement, the Principal Investigators initiated a few strategic research activities, and completed the hiring of a Director in October 2015. Through 2016, the Director has completed hiring of a core staff and together have established a number of pilot programs, research and outreach initiatives, affiliations with University faculty and research centers, and collaborations with state agencies. These capacities will continue to mature as reflected in this section.



5.1.1 Center for Agriculture, Food and the Environment

CEE is a program of the Center for Agriculture, Food and the Environment (CAFE) at UMass Amherst. CAFE integrates research and outreach education in agriculture, food systems and the environment. The Center is the contemporary standard-bearer of the university's land-grant origins. It provides linkages from the University with vibrant business, policy and public interest sectors in the state, including agriculture, the horticultural 'green industries,' environmental decision-makers and food system interests. UMass Extension,

the Massachusetts Agricultural Experiment Station and the Water Resources Research Center are all units of CAFE. The Center is based in the College of Natural Sciences at UMass and also works with the School of Public Health and Health Sciences, the School of Social and Behavioral Sciences and the College of Engineering.

5.1.2 Center for Energy Efficiency and Renewable Energy

The Center for Energy Efficiency and Renewable Energy (CEERE) conducts research and provides technical assistance for a range of clean energy technologies and applications. With support from state and federal partners, CEERE provides services at no cost to industrial, commercial and municipal clients, helping them to identify and implement cost-effective measures that reduce their operating costs, environmental impacts and greenhouse gas emissions. Based in the Mechanical and Industrial Engineering Department at UMass, CEERE offers valuable training and research experience for graduate and undergraduate engineering students.

In the past 30 years, CEERE has conducted audits and feasibility studies at more than 800 facilities around the northeast, helping them to save millions of dollars in energy costs and billions of tons of carbon dioxide emissions. Their research has informed energy policy and program development, and their graduates have gone on to found energy consulting companies and work for top energy efficiency programs.

5.2 CEE Core Staff

The core staff people serving CEE are introduced below. As described below, CEE recognizes the need for one additional staff person to provide additional research project management and technical writing capabilities.

Dwayne Breger, Director. Dwayne was hired as the Director of CEE in 2015. Dwayne comes to UMass after 13 years as the Director of the Renewable Energy Division at the Massachusetts Department of Energy Resources (DOER). At DOER, he was responsible for the state Renewable Portfolio Standard (RPS), the development of the RPS solar carve-out and solar loan program, the advance of biomass energy policy, and served on the staff working group that designed the Regional Greenhouse Gas Initiative. Prior to DOER, he was an Assistant Professor in engineering at Lafayette College. Dwayne returns to the UMass campus where he received his Ph.D. in Resource Economics and served as a Senior Research Associate in Mechanical Engineering between 1988 and 1994. Dwayne received his B.S. degree in engineering from Swarthmore College, and an M.S. in technology and policy from MIT. At UMass, Dwayne also holds an Extension Professor position in the Department of Environmental Conservation.

Key Skill Set: Energy and climate policy analysis, resource economic analysis, renewable energy technologies, thermal energy storage, district energy systems, systems modeling and analysis, program management, faculty research collaboration.

River Strong, Assistant Director of Market Development. River brings more than 20 years of experience in the renewable energy, energy efficiency, climate change, and sustainability consulting fields to CEE. Before coming to UMass, served as founder and president of Spring Hill Solutions, LLC, a clean energy and carbon management consulting firm based in Burlington, Vermont. He holds a B.S. degree in Mechanical Engineering



from Colorado State University and an MFA in creative writing from University of Arizona. River is a Senior Fellow with the Environmental Leadership Program and an instructor for the National Outdoor Leadership School and the Appalachian Mountain Club.

Key Skill Set: Communications, strategic planning, market research and development, business management and innovation, business development, project management, sustainability and climate action planning, energy engineering, client management, group facilitation.

Chris Beebe, PE, Research Engineer/Fellow. Before joining CEE, Chris was the Principal of BEAM Engineering, a Boston-based consulting firm specializing in delivering renewable energy technologies to market through project design, policy, and project implementation support. Having been active in the Massachusetts, California, and New York energy markets, Chris brings an extensive and diverse knowledge base to the energy markets in general, but clean energy technologies specifically. Chris is a licensed Professional Engineer (PE), a LEED Accredited Professional, and an Association of Energy Engineers Certified Energy Manager (CEM). He received his Master's degree in Mechanical Engineering from the University of Massachusetts Amherst.

Key Skill Set: Renewable thermal technologies and project design, energy efficiency, energy engineering, modeling, data analysis, anaerobic digestion, policy support, project development, and wholesale electric power market operations.

Lauren Mattison, Research Engineer/Fellow. Lauren holds a joint position with CEE and the Mechanical and Industrial Engineering Department's Center for Energy Efficiency and Renewable Energy. Her professional experience includes assisting commercial and industrial customers with identifying, analyzing and implementing energy efficiency projects at Efficiency Vermont; supporting ENERGY STAR specification development, creating marketing and technical training materials, and developing widely used energy savings calculators for more than 30 types of residential and commercial products as a consultant to the U.S. EPA; working on several potential studies for energy efficiency, demand response and combined heat and power; and managing and contributing to program evaluations and technical reference manual development for demand-side management programs across North America. Lauren holds a B.S. and M.S. in Mechanical Engineering from UMass Amherst. Her master's thesis on the potential for combined heat and power in Massachusetts has been used by utility companies and government agencies for policy analysis and program planning. She is a Certified Energy Manager through the Association of Energy Engineers.

Key Skill Set: Energy engineering, energy efficiency, industrial processes, combined heat and power, data analysis, analytical tool development, market research, program evaluation and design, potential studies, project management, customer relationship management, outreach, technical communications and training.

CEE Contractors. As additional resources and expertise are needed to address specific research or extension services, CEE contracts with specialized employees. Currently, one contract employee with unique biomass technology and policy experience is working with CEE to contribute to the Mohawk Trail Woodlands Partnership activities.

UMass Clean Energy Corps. The UMass Clean Energy Corps is a student-centered initiative focused on helping communities and others across the Commonwealth to develop and meet their clean energy goals



while providing clean energy training opportunities for UMass students. The Corps is trained, coordinated and managed by Professor Weil and CEE staff. The Corps provides energy analysis and consulting services to Massachusetts cities and towns, trains students in advanced energy analysis and auditing techniques, draws high caliber students to the sustainability undergraduate and graduate programs, and helps UMass and CEE demonstrate the value of its integrated teaching, extension, and research programs to the public. Most recently, the Corps assisted several Massachusetts municipalities in their clean energy-related efforts under DOER's Green Communities program. Going forward, the Corps is slated to support CEE's activities under the Mohawk Trail Woodlands Partnership and will assist a 2017 cohort of Green Communities municipalities.

Additional Staffing Needs: CEE's 2017 Work Plan (presented in Appendix A) suggests that its core and affiliated staff can meet CEE activities. However, our resource allocation leaves us with limited ability to develop new initiatives, manage the projects and collaborations, and deal with unforeseen challenges. To accommodate our needs and ensure success, CEE anticipates hiring one additional staff position in early 2017. As CEE begins to engage in an expanded set of activities and research collaborations, and production of more written deliverables such as white papers, case studies, web materials, and presentations, a staff member focused on project management and technical writing is needed to support and enhance the efficiency of the team.

5.3 UMass Faculty Principal Investigators

Prashant Shenoy, Professor, College of Information and Computer Sciences (CICS). Professor Shenoy serves as the lead Principal Investigator for CEE. Professor Shenoy's research focuses on systems issues for distributed systems ranging from large server clusters to networks of small sensors. Current research projects in his lab include (i) distributed and mobile clouds, (ii) green data centers, and (iii) smart buildings and smart energy systems.

Dragoljub (Beka) Kosanovic, Director of Center for Energy Efficiency and Renewable Energy (CEERE), Research Assistant Professor of Mechanical Engineering. Under the leadership of Professor Kosanovic, CEERE houses the U.S. Department of Energy's Industrial Assessment Center and Northeast Combined Heat and Power Technical Assistance Partnership programs. Professor Kosanovic's research interests include combined heat and power, distributed generation, unit commitment modeling for dispatch of power plants in the grid, gas turbine combustion, mixing, and steam cycle analysis.

Benjamin S. Weil, Extension Assistant Professor, Department of Environmental Conservation. Professor Weil teaches courses in energy efficient buildings in the Building Construction Technology program. With primary responsibility for the Extension program in building energy, his research program is responsive to the needs of various stakeholders in the Commonwealth of Massachusetts, including homebuilders, architects, weatherization companies, energy utilities, state government agencies, town governments, environmental and community organizations, and homeowners. He is particularly interested in the social and behavioral dimensions of energy efficiency. He is a building analyst certified with the Building Performance Institute, and continues to enjoy building diagnostics. Along with CEE's staff, Professor Weil provides academic oversight, recruitment, and training for the UMass Clean Energy Corps.

5.4 University Academic Resources

CEE operates within the University of Massachusetts Amherst and serves the five-campus University of Massachusetts public university system. UMass Amherst, the flagship campus of the five-campus system, was founded in 1863 as the Massachusetts Agricultural College under the Morrill Land-Grant Act. As a land-grant university, UMass Amherst's mission is to provide teaching, research and public service to benefit people in Massachusetts, the nation and the world. CEE's mission reflects and reinforces the UMass Amherst mission of teaching, research and public service.

A critical aspect of our mission is to identify, focus, and mobilize resources throughout the UMass system to advance the clean energy economy and benefit the citizens of the Commonwealth. To that end, current strategies for interfacing with UMass resources include supporting targeted research by funding faculty seed grants, supporting student development through UMass Clean Energy Corps and student internships, and developing opportunities for collaborative research.

The following is a selected list of UMass entities with whom we are currently collaborating or developing collaborations. As our footprint grows, we are regularly encountering new project ideas and exploring potential partnerships. As our work evolves, new opportunities and collaborations are expected to arise.

- **College of Natural Sciences:** The College of Natural Sciences (CNS) – the home of both CAFE and CEE – excels in world-class research, award-winning teaching, and distinguished outreach and service. CNS offers interdisciplinary research in the life, environmental, computational, and physical sciences that touches lives—reducing energy costs, transforming medicine and health care, sustaining our natural resources, creating new materials, and improving the food we eat and the world we live in. The college's 400 faculty members, who work across 13 departments and one school, are awarded half of the total academic research grants on campus, and are routinely listed among the world's leading scientific minds in Thomson Reuters surveys. CNS faculty are equally dedicated to effective teaching and committed to mentoring its 7,000 undergraduate and 1,000 graduate students. From innovations in knowledge and education, the development of new materials, systems, and tools, to partnering with the community, CNS engages in scientific discoveries and education that make a difference.
- **School of Earth and Sustainability:** The School of Earth and Sustainability (SES) provides students, faculty, the campus community, and the Commonwealth with a central hub for innovation, research, education, and outreach related to earth, sustainability, and environmental sciences. SES is a partnership led by the College of Natural Sciences between the Department of Environmental Conservation (ECo), Department of Geosciences (GEO), and the Stockbridge School of Agriculture (SSA) and the Department of Landscape Architecture and Regional Planning (LARP). SES presents many collaborative opportunities for CEE, including clean energy applications in building and construction technology, sustainable food and farming, and our Green Communities work.
- **College of Engineering:** Ranked the best public engineering school in New England, the College of Engineering hosts thousands of graduate and undergraduate students, award-winning research



centers, and faculty recognized as world-renowned researchers in their fields. Beka Kosanovic, Research Assistant Professor in the Department of Mechanical and Industrial Engineering, directs CEERE and serves as a Principal Investigator for CEE. In addition, CEE is currently working with the UMass Wind Energy Center through our Seed Grant program, and developing collaborations with the UMass Transportation Center and the Water Innovation Network for Sustainable Small Systems (WINSSS).

- **School of Public Health and Health Sciences:** is a national leader in finding ways to maximize public health and quality of life. The school addresses complex health issues by integrating traditional core areas of public health with related health science disciplines, fostering a unique environment in which transdisciplinary research collaborations can flourish. CEE is currently developing a research partnership with School of Public Health and Health Sciences faculty to examine emissions related to wood heating facilities as part of the Mohawk Trail Woodlands Partnership project.
- **Isenberg School of Management:** The Isenberg School of Management is the business school at UMass, and includes the Berthiaume Center for Entrepreneurship, whose mission is to promote entrepreneurship and innovation across the UMass Amherst campus and throughout the region and state. CEE may work with Isenberg and Berthiaume to support clean energy initiatives, assess promising clean energy markets, and to develop businesses planning expertise across clean energy technologies.
- **College of Information and Computer Sciences:** CICS offers a world-class curriculum in support of BA, BS, MS, and PhD degrees. CICS is internationally recognized for its research activities and has one of the highest ranked and most competitive graduate programs in the nation. The College is distinguished by its culture of collaboration and leadership in multi-disciplinary research. As described above, Professor Prashant Shenoy serves as the lead Principal Investigator for CEE. Professor Shenoy's research focuses on systems issues for distributed systems ranging from large server clusters to networks of small sensors.
- **Department of Environmental Conservation:** The focus of the Environmental Conservation (ECo), within the College of Natural Resources, extends from the ecology and management of fish and wildlife populations, trees, forests, watersheds and landscapes to the physical, social, and policy aspects of conservation involving urban forests, human habitat, and sustainable building. The study of biology, sociology, policy, engineering, building science, and resource management encompasses rural, suburban, and urban environments. The unifying focus of all these activities is on the stewardship of healthy and sustainable ecosystems that provide important human and community benefits. Benjamin Weil teaches courses in energy efficient buildings within ECo and serves as a Principal Investigator for CEE. Dwayne Breger, Director of CEE, holds an extension professor position in ECo. Through the UMass Clean Energy Corps and independent projects, CEE draws many students from ECo's programs in environmental and sustainability sciences.
- **Department of Landscape Architecture and Regional Planning:** LARP provides sustainable solutions to complex problems focused on educating outstanding students, serving diverse communities, and



undertaking influential scholarship. CEE will work with LARP to develop regional economic impact assessments and other collaborative opportunities.

- **Department of Resource Economics:** Resource Economics tackles complex questions about how to use environmental, natural and human resources. By researching important societal problems, and gathering and analyzing data, Resource Economics offers policy solutions that move the needle on today's most pressing issues. CEE is developing a research collaboration with Resource Economics faculty to examine the regional economic impact of a three-year project that will integrate sustainable forestry and energy practices to support the rural economy in the 22 towns in the Mohawk Trail Woodlands Partnership region.
- **Institute for Social Science Research:** Based in the College of Social and Behavioral Sciences at UMass, the mission of ISSR is to promote excellence in social science research. CEE may work with ISSR on understanding human behavior, attitudes, and perceptions as they relate to clean energy. For example, ISSR's research may support CEE's work in developing rural biomass economies and examine public attitudes surrounding local development ownership of clean energy generation.

5.5 Affiliate State Agencies

CEE is strategically aligned with the several state agencies. The following briefly describes the role of each agency and how CEE is affiliated with it. This CEE affiliate list is expected to evolve over time based on the needs of CEE, our affiliates, and the Massachusetts clean energy market.

- **Executive Office of Energy and Environmental Affairs.** The Executive Office of Energy and Environmental Affairs (EEA) is the only state Cabinet-level office in the country that oversees both environmental and energy agencies. In putting energy and environment under one roof, a course was set toward a clean energy future, and the six agencies under EEA are following that direction with vigor, in close collaboration with the Legislature and many outside partners. CEE may affiliate directly with the secretariat programs on forest policy, energy equity, and climate policy.
- **Massachusetts Department of Energy Resources.** CEE was established under an agreement with and funds from the Massachusetts Department of Energy Resources. DOER develops and implements policies and programs aimed at ensuring the adequacy, security, diversity, and cost-effectiveness of the Commonwealth's energy supply to create a clean, affordable and resilient energy future. CEE will work in partnership with DOER to help it fulfill its mission and programmatic activities to promote clean energy for the Commonwealth. CEE will support DOER in, for example, its Green Communities Program, Leading by Example, energy storage initiative, renewable thermal market development.
- **Massachusetts Department of Environmental Protection.** The Department of Environmental Protection - MassDEP - is the state agency responsible for ensuring clean air and water, the safe management of toxics and hazards, the recycling of solid and hazardous wastes, the timely cleanup of hazardous waste sites and spills, and the preservation of wetlands and coastal resources. CEE may work with MassDEP through its Clean Energy Results Program to support clean energy initiatives in the water/wastewater sector, landfill/brownfields, anaerobic digesters, and biomass emissions.



- **Massachusetts Clean Energy Center.** The Massachusetts Clean Energy Center (MassCEC) is a ratepayer funded quasi-public agency dedicated to accelerating the success of clean energy technologies, companies and projects in the Commonwealth, while creating high-quality jobs and long-term economic growth for the people of Massachusetts. Since it began operating in 2009, MassCEC has helped clean energy companies grow, supported municipal clean energy projects and invested in residential and commercial renewable energy installations, creating a robust marketplace for innovative clean technology companies and service providers. CEE may work in affiliation with MassCEC to help it successfully meet its program goals and to evaluate market opportunities. CEE expects to stimulate and prepare new applicants to MassCEC grant programs to support renewable and energy storage projects, and help new clean energy companies find demonstration and commercial market opportunities.
- **Massachusetts Department of Agricultural Resources.** The Massachusetts Department of Agricultural Resources' (MDAR) mission is to ensure the long-term viability of agriculture in Massachusetts. MDAR strives to support, regulate and enhance the rich diversity of the Commonwealth's agricultural community to promote economically and environmentally sound food safety and animal health measures, and fulfill agriculture's role in energy conservation and production. CEE will work with MDAR and UMass Extension partners to stimulate clean energy projects in the agricultural sector and assess opportunities for farmers to engage in clean energy business activities.
- **Massachusetts Department of Conservation and Recreation.** DCR's mission is to promote and enhance our common wealth of natural, cultural and recreational resources for the well-being of all. This includes management and policy of the state's forestlands and promoting the marketing and utilization of forest products. CEE will work with DCR to evaluate advanced, low emissions wood heating systems using fuels derived from sustainable forestry and leading to rural economic development.

5.6 CEE Advisory Committee

CEE will recruit and assemble an advisory committee in 2017 to provide strategic advice and programmatic guidance to CEE management, staff, and Principal Investigators. The proposed committee will be presented to the Deans of CNS and the College of Engineering and Director of CAFE for input and approval.

Representatives of these university units will sit on the committee.

The committee will be informal and volunteer-based, which will afford it flexibility in structure and management. The advisory committee will not vote on business matters or bear any legal fiduciary responsibilities. The committee as a whole will provide:

- **Input** on CEE mission and strategic plan;
- **Review** of research initiatives;
- **Identification** of clean energy market opportunities and needs;
- **Outreach** and networking to market participants, decision makers, and potential funders; and



- **Guidance** on other initiative efforts and operations.

The committee will meet on a periodic basis, envisioned to be twice per year, to review past progress and develop future goals in the context of the larger CEE strategic plan.

The committee will be recruited by CEE's director and Principal Investigators and will be comprised of members from UMass, state and local government, non-profits, and industry.

5.7 Funding Sources

With the support of DOER, CEE is currently on steady financial ground for 2017 and 2018. This enables CEE to focus on developing its Extension services and research activities, without pressing need to find additional sources of funds.

CEE anticipates that it will further demonstrate and remain a valued resource for the Commonwealth and that opportunities to sustain additional support from the state will remain open. CEE, however, is eager to diversify its funding sources to enhance its own sustainability, expand its reach, and to amplify our value to DOER and the Commonwealth.

Notwithstanding the goal to become more financially independent, and consistent with the goals of the DOER support and the mission of the University to public benefits to the Commonwealth, CEE seeks to reduce barriers, including small financial transactional barriers that often restrict projects from being envisioned or advanced. For this reason, CEE plans to continue offering a range of its project development services without recovering its full costs from the targeted client – particularly those in important market sectors and those most impeded by these transactional barriers.

In 2016, CEE has participated as a lead or collaborator on a number of grant applications including to U.S. DOE, U.S. EPA and MassCEC. CEE will continue to look at opportunities and find appropriate academic and industry/non-profit partners to prepare competitive responses to grant opportunities that advance our strategic plan and mission. More broadly, CEE will consider and appropriately target a range of funding sources in the following ways:

- CEE will seek continuation of state funds from DOER to cover core staff and expenditures to sustain our service as a resource to Department and the Commonwealth.
- CEE will respond to solicitations from federal and other grant sources that are consistent with CEE's mission and capabilities. These funding opportunities may alleviate funds drawn from DOER, or expand CEE's work beyond its established work plan, and used to bring additional resources into CEE to perform the funded scope of work.
- CEE will work with the University to solicit substantial foundation funding if research or industry support opportunities arise with significant capital investment.
- CEE will investigate a fee-for-service program for appropriate, replicable consulting services for appropriate client sectors.
- CEE will investigate business or entrepreneurial activities that take some investment but then can generate revenues through fee structures.



- CEE will investigate project support services for some client sectors in exchange for limited shared savings once a project begins operations.



6 Budget & Financial Planning

CEE was established with funding from the Massachusetts Department of Energy Resources. DOER funding for CEE comes from Alternative Compliance Payment funds that DOER receives in some years due to shortages of available certificates to meet the renewable and alternative energy portfolio programs. These ACP funds are used at the discretion of the DOER Commissioner to foster continued growth of renewable and alternative energy in the Commonwealth.

Budget and financial details are not included in the public version of the Plan.

7 Approving and Communicating the Strategic Plan

Effectively communicating the Plan is as important as creating it. CEE staff, Principal Investigators, funders and key University affiliates should be familiar with our long-term strategic goals and short-term action plans so that they (1) understand the critical and valued role they play in meeting our mission, (2) communicate effectively to those we serve, and (3) feel supported in making day-to-day decisions that advance CEE towards its goals. The stakeholders served by CEE and the public should also be informed of our mission, work plan, and how we decide on and engage in new activities. This section addresses:

1. Intended audiences and respective sharing levels for the Plan
2. A process for finalizing and approving the Plan

7.1 Plan Audiences & Sharing Levels

For reasons described above, there are several CEE audiences that should have a working familiarity with the Plan. However, because it contains sensitive strategic and financial information, it is not appropriate for all audiences to have access to the entire Plan. The following table outlines various Plan audiences and respective Plan sharing levels.

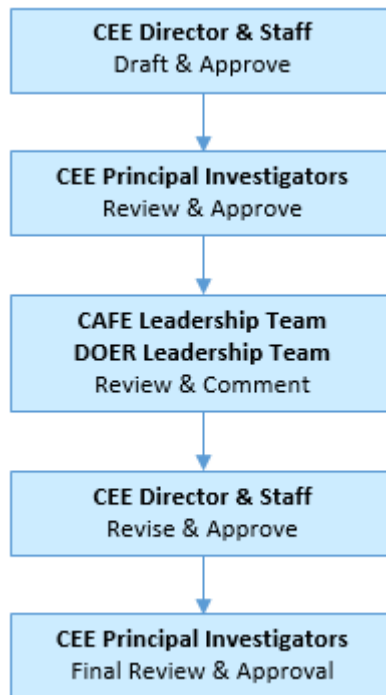
| Audience | Full Plan | Public Plan* |
|-------------------------------------|-----------|--------------|
| CEE Staff | Y | Y |
| Principal Investigators | Y | Y |
| Advisory Committee | Y | Y |
| CAFE Leadership Team | Y | Y |
| CEE Funders (DOER) | Y | Y |
| CEERE Staff | | Y |
| Affiliated UMass Units and Programs | | Y |
| Student Affiliates | | Y |
| Partners, Clients & General Public | | Y |

*Public Plan refers to the Full Plan with an abridged Section 6 (*Budget & Financial Planning*) and abridged 2017 Work Plan

The Full Plan will be distributed directly to the audiences indicated above and the Public Plan will be made available on the CEE website.

7.2 Plan Approval, Finalization, and Publication

To strengthen the Plan and ensure that CEE is on a sure path to meeting its mission, it is essential that we seek input and guidance on the Plan from our broad diversity of stakeholders. The following flow chart outlines a drafting, approval and finalization process for the Plan:



Upon approval and finalization, various versions of the Plan will be posted to the CEE website, shared directly with CEE's affiliates and stakeholder audiences, and announced to the general public. An important next function of the finalized plan will be to recruit and inform advisory committee members, as described in Section 5.6.

As additional CEE stakeholders emerge, the Plan will be shared as appropriate. For example, as new staff and advisors are added, the full plan will be provided and reviewed as part of an orientation process.

Appendix A – Detailed 2017 Work Plan

The Detailed 2017 Work Plan is not included in the public version of the Plan.



Appendix B – Abridged 2017 Work Plan

An Abridged 2017 Work Plan is provided below. This abridged, “public” version is limited to CEE activity areas, intended outcomes, timeframes, and the CEE lead staff member for each activity.

**UMass Clean Energy Extension
Work Plan 2017**

| Activities | Description | Outcomes | | Timeframe | CEE Lead Staff |
|------------|-------------|--------------------|---------------------|-----------|----------------|
| | | Market Development | Project Development | | |

Market Analysis & Outreach

| | | | | | |
|--|--|---|---|-------|---------------|
| <i>Clean Energy in Food/Beverage Industry</i> | Sub-award from UM-Lowell to EPA Pollution Prevention funded program. Plan and coordinate outreach events, and provide follow-up technical assistance to companies. | X | X | Q1-Q4 | Mattison |
| <i>Community Scale Biomass District Heating: Role of Farmers/Foresters, Outreach Materials</i> | Evaluate role of farmers/foresters in Austrian wood energy economy, and assess lesson learned and translation to MA and MTWP. Prepare case studies and outreach materials. | X | | Q1-Q3 | Breger |
| <i>Packaged CHP and ASHP Evaluation for Hotel Industry</i> | Model performance and economics, and prepare of white paper for industry outreach. | X | | Q1-Q3 | Mattison |
| <i>Biomass and other Renewable Thermal Heating for Greenhouses</i> | Model performance and economics, and prepare white paper. Target outreach to sector with MDAR, in coordination with EE measures. | X | | Q2-Q4 | Beebe, Strong |
| <i>Energy Storage in Manufacturing Sector</i> | Utilize IAC database and assess energy storage across electric rates, load profiles, and scale. Provide energy storage assessments to complement EE assessments for | X | X | Q2-Q4 | Mattison |

Collaborative Applied Research

| | | | | | |
|---|---|---|---|----------------|---------------|
| <i>Mohawk Trail Woodlands Partnership</i> | Support DOER/EEA with assistance to FRCOG, BRPC, and MTWP communities | | | 2017 and 2018 | Breger |
| Regional Inventory of Boilers / Wood Heating Demand | Collect and analyze data on current boilers and fuel usage in municipal, state, multi-unit housing, C&I sectors; estimate residential sector. | X | X | Q1-Q3 | |
| Air Emissions Monitoring and Public Health Assessment | Monitor air emissions and assess public health impacts for 3-5 wood heat systems and 2-3 oil heat systems, over 2016/17 and 2017/18 heating seasons. | X | | Q1-Q2 and 2018 | |
| Pellet/Dry Chip Manufacturing - Alternative Business Models | Characterize siting issues for a community-scale wood pellet manufacturing facility, and evaluate financial viability across a range of ownership and business models. | X | | Q2-Q4 and 2018 | |
| Regional Economic Analysis | Evaluate economic impact (GDP, jobs, income, etc.) of wood energy economy for MTWP region. | X | | Q2-Q3 and 2018 | |
| <i>Analysis of Monitoring Data from Renewable Thermal Systems</i> | Support DOER/MassCEC in analyzing monitoring data and provide report on results. Offer recommendations for continued monitoring needs and specifications. | | | Q2 | Beebe |
| <i>Analysis of Pellet Boiler Systems and Thermal Storage</i> | Model wood pellet heating systems to elucidate role of thermal storage and other option to optimize operations in support APS regulatory provisions. | X | | Q1-Q3 | Beebe, Breger |
| <i>Thermal Storage & Renewable Thermal to reduce UMass Campus Oil Use</i> | Evaluate large scale thermal storage and distributed renewable thermal systems as a means to reduce fuel oil use by UMass CHP plant, in coordination with Physical Plant | | X | Q2-Q4 and 2018 | Breger |
| <i>UMass Faculty Seed Grants</i> | Manage and report on results of three on-going Seed Grants (offshore wind - energy storage, biochar, and advanced inverters). Offer 3rd round to support Work Plan or other | | | as needed | Breger |

(Continued on next page)



(Continued from previous page)

| Technical Assistance & Advisory Services | | | | | |
|---|---|--|---|------------------------|---------------|
| <i>Green Communities/Municipal Support</i> | Provide energy analysis and MEI support to municipalities for designation applications, competitive grants, annual reporting, and strategies for reaching energy reduction goals. | | | Q3-Q4 and continuously | <i>Strong</i> |
| <i>UMass Physical Plant - Energy Storage Proposal</i> | Support campus application for energy storage demonstration project with HOMER modeling and technical review for award and implementation. | | X | Q1-Q2 and as needed | <i>Breger</i> |
| <i>Ad Hoc Assistance to State, Businesses, Institutions, Associations, others</i> | Assist entities on goal setting, technology scoping, pre-feasibility analysis, navigating incentive programs and vendors, implementation support, and business plan review. | | X | as needed | <i>Strong</i> |

| Education & Workforce Development | | | | | |
|--|--|---|--|--------------|---------------|
| <i>Recruit, Educate, and Manage UMass CEE Energy Corps</i> | Sustain 5 to 10 students in Energy Corps through academic credit and internships. | X | | per semester | <i>Strong</i> |
| <i>Curriculum and Course Development</i> | Support RE curriculum development for new School of Earth and Sustainability. Develop materials for grad level course (anticipated to be offered in Spring 2018 term). | | | Q3-Q4 | <i>Breger</i> |

| Administrative & Strategic Planning | | | | | |
|---|--|--|--|--------------|---------------|
| <i>Staff Development and Management</i> | | | | continuous | <i>Breger</i> |
| <i>Budget, ISA Management, Progress Reports</i> | | | | continuous | <i>Breger</i> |
| <i>CEE Strategic Planning and Development</i> | | | | continuous | <i>Strong</i> |
| <i>Website, Social Media Maintenance</i> | | | | continuously | <i>Strong</i> |
| <i>Recruit/Convene Advisory Committee</i> | | | | Q1-Q2 | <i>Breger</i> |
| <i>Respond to RFPs and other External Funding Opportunities</i> | | | | as needed | <i>Breger</i> |
| <i>Overhead Work/Office Management and Communications</i> | | | | continuous | |

Appendix C – 2018 - 2019 Work Plan Outline

A 2018 - 2019 Work Plan Outline is provided below. Efforts are organized by CEE activity areas, anticipated activities within those areas, and an estimate of staff-time allocation. Because this work lies farther in the future and unforeseen needs, changes, and opportunities will likely arise between now and then, this framework is intended to provide an overview of our anticipated activities and general sense of direction during the years of 2018 and 2019.

| 2018-2019 Work Plan Outline | | |
|--|---|------------------|
| Activity Area Description | Anticipated Activities | Staff Allocation |
| Market Analysis & Outreach | | |
| Broad-based market-building activities, including market research, analysis, and reporting to determine the characteristics, extents, and dynamics of potential Massachusetts clean energy markets. Outreach into promising markets through case studies, surveys, workshops, and direct meetings with market clean energy suppliers and adopters. | <ul style="list-style-type: none"> Market assessments; 3-5 white papers per year Market outreach; 2-4 markets engaged per year Policy analysis and guidance; as needed Public presentations at conferences and public forums; 10-20 per year | 20% |
| Collaborative Applied Research | | |
| Supporting the UMass research mission and applying research needs to address clean market barriers in Massachusetts and society at-large. Fostering applied clean energy research in three key areas: UMass faculty seed grants, university research partnerships, and industry research partnerships. | <ul style="list-style-type: none"> Mohawk Trail Woodlands Partnership, 2018 (year 2) Faculty Seed Grants; 3 per year Clean energy technology testing and validation (e.g., air source heat pumps, energy storage technologies); 2 per year | 25% |
| Technical Assistance & Advisory Services | | |
| Providing proactive and reactive assistance to CEE client-base by CEE faculty, staff, and the UMass Clean Energy Corps. Information sharing, pre-feasibility and scoping studies, proposal development, funding guidance, project support services, and general consulting services. The aim of technical assistance is to maximize the quality of project conception, implementation, and impact by supporting decision-making, vendor selection, policy and financial support navigation, etc. | <ul style="list-style-type: none"> Green Communities, Application Support; 7-10 communities served per year Green Communities, Project Support; 7-10 communities served per year Ad hoc support to State, Businesses, Institutions, Associations, Other; 15-20 per year | 25% |
| Education & Workforce Development | | |
| Supporting both the UMass educational mission and the state's economic prosperity by providing workforce development and skills training opportunities to UMass students and other potential clean energy workers in the clean energy sector. The aim of this activity area is to maximize clean energy educational opportunities, enhance the clean energy curriculum of the University, and expand the volume and quality of the Commonwealth's clean energy workforce to meet current and anticipated demand. | <ul style="list-style-type: none"> UMass Clean Energy Corps development and management; 20 students engaged per year Campus entrepreneurial initiatives; 1 per year Student internships and research projects; 3-5 per year Curriculum development and course instruction; 2 courses per year | 10% |
| Administrative & Strategic Planning | | |



| 2018-2019 Work Plan Outline | | |
|---|--|------------------|
| Activity Area Description | Anticipated Activities | Staff Allocation |
| Maintaining solid business functions, measuring and communicating our successes, responding to changes and opportunities, ensuring that CEE staff is supported, and planning for business sustainability. | <ul style="list-style-type: none"> • Long-range strategic and short-term action planning • Fiscal planning and budget reviews • Proposal development • Communication planning and execution (e.g., website and social media) • Staff support and development • Operational system development and refinement | 20% |

