

## **Project: Building Energy**

**Project Leader: Ben Weil**

### **Project Overview**

The Building Energy Extension Program conveys current energy efficiency, renewable energy, and building science information to stakeholders including those in the building trades, design professionals, state government agencies, and building owners and occupants through workshops, web publication, and consulting. Applied research in building energy systems and is conducted to respond to perceived stakeholder need.

### **Activity Summary - 2018**

- Consulting and facilitation for Utility energy efficiency programs (26)
- Consulting for major energy savings in state institution buildings (2)
- Consulting for various builders and other building energy clients (14)
- Grant development (1)
- Needs assessments for municipalities – municipal technical assistance (26)
- Research on tree impact on energy usage for DCR – Greening Gateway Cities Program (1)
- Development of tools for utility bill analysis – Wathome (1)
- Workshops and lectures for the general public and for building and HVAC contractors (10)

### ***Total educational contacts***

	Adult Contacts
In Person	725
Indirect Contacts (Print, Web, etc...)	100

### **Narrative Summary and Impact 2018**

The focus of the building energy extension program is to use the Clean Energy Corps to capitalize on the administrative resources of the Clean Energy Extension and maximize capacity to provide service to Massachusetts municipalities. The Clean Energy Corps students gain sufficient training to provide energy analysis, engineering solutions, and professionally written reports to municipalities and other large entities with support and supervision from me. The number of comprehensive assessments produced for municipalities and school districts has tripled two years in a row.

Energy Corps uses several rapid energy assessment tools I developed to provide much more detailed and predictive analysis than has been previously available without site visits and deployment of specialized data logging sensors. I brought the insights and algorithms developed through experimenting with smaller municipal data sets to colleagues in Computer Science. We then translated and refined these ideas using Bayesian inference in an application that can provide fault detection to identify the underlying causes of energy inefficiency of any building in a large data set, such as that those by electric or gas utilities. The attendant research and demonstration case study were published and presented at the preeminent computer science conference.

Massachusetts DCR funded a program for planting street trees in urban areas based largely on research I had done using a natural experiment in Worcester indicating that neighborhood trees were providing a large energy saving benefit. With colleagues at Clark University we are providing analysis of the effects on microclimate of tree plantings of the Greening the Gateway Cities organized as a randomized controlled experiment.

Much of the consulting work for municipalities may not pay off in investments in projects for a year or more. However, another way to indicate the value of the service is through the opinions of the town officials with the most direct interactions. Here are some samples:

- "Ben, we really can't thank you enough for everything you have done to help us with this effort! Your advice is and direction is invaluable!" -- Lynn Hansell, Northfield Select Board Member
- Thanks so much for attending our meeting Tuesday night. Many members of the committee have mentioned to me how very helpful your information was to identifying priorities, while recognizing that we need to get these foundational pieces done, but find a way to do a more comprehensive study that leads to a more holistic plan, with a focus on renewables." - Susan O'Connor, Northfield Energy Committee.
- "I think this will be extremely useful! It lays out clear, practical fuel-saving actions that can be implemented in whole or incrementally." - Mary Quigley, Ashfield Select Board Member
- "This is a GREAT report! I enjoyed reading it and learned a lot. The initial measures you recommend seem fairly simple to implement, not that expensive, and provide good energy savings payoffs. I most appreciated understanding that with a thermal barrier separating the basement from the upstairs, we can essentially treat these spaces as two separate buildings...This makes it much simpler to proceed...That's a big relief and will make it much easier to make a plan we can start in on right away..."- Andrew Baker, Shelburne Select Board Member.
- Clean Energy Corps (BCT597R) has been an experimental course, but is now a regular course (BCT511) due to it's broad success so far. Some student comments from SRTI open-ended:
- "This is the best class that I have taken in my four years at UMass. I have learned more than any other class, and due to the nature of the class being real world oriented, everything that I have learned I am able to use in my everyday life."
- "I really enjoyed the hands on site visits and the opportunity to apply my knowledge I have gained over the last few years as a BCT student."
- "Ben is very helpful, and has been really great in making sure everyone can absorb what we are learning in the field. He has made me feel more confident in my ability to pick up things in the field, and to do reports and presentations surrounding energy analysis."

## **Collaborating Organizations**

- **Ma. Dept. of Energy Resources**
- **Ma. Dept. of Conservation and Recreation**
- **Pioneer Valley Habitat for Humanity**
- **Town of Goshen**
- **Town of Rowe**
- **Town of Ashfield**
- **Town of Erving**
- **Town of Orange**
- **Town of Northfield**
- **Town of Shelburne**