



# Demand Management Case Study

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## University of Massachusetts, Amherst

### Background

The University of Massachusetts Amherst is a sustainability leader. The university is actively studying potential pathways to carbon neutrality by 2030, and through a multi-year energy-efficiency partnership with Eversource, the university has cut millions in annual energy costs by completing projects throughout the campus. Looking ahead, UMass Amherst continues to set aggressive goals and adopt initiatives that not only reduce greenhouse gas emissions, but also improve the resiliency of the 150-year-old campus.

### The Challenge

UMass Amherst had already achieved significant energy savings through energy efficiency, but the university found that meeting its carbon reduction goals required more than just using less. They also needed to look at how they were generating energy on the campus, and also find ways to reduce peak demand.

As part of its Comprehensive Campus Energy plan, UMass Amherst replaced an 80-year-old coal-burning power plant with a Central Heating Plant in 2009. The new plant included a 10 MW gas turbine generator, a 2 MW high pressure steam generator, a 4 MW low pressure steam turbine, and four natural gas boilers and effectively delivered 70 percent of the electricity and 100 percent of the steam for heating and cooling more than 300 buildings. Eight years later, the team significantly expanded the on-campus solar footprint. While the addition of large-scale solar generation and the enhanced generation capacity of the Central Heating Plant greatly reduced greenhouse gas emissions, it also created an imperative challenge: How could power be stored when generation exceeded campus demand?

At the same time, the university also saw the value of reducing its peak demand, both because times of high demand often require use of electricity generated with the dirtiest fuels, and because lowering peak demand could help them lower transmission and capacity costs – the main factors leading to rising energy costs for UMass Amherst. Thus, reducing peak demand could help the university lower its carbon emissions associated with electricity not generated on-campus and lower its energy costs even further.

“As operators we play a big part in the sustainability. But it’s a whole culture on doing it and we’re always looking to improve. Key to our success is the strategic partnerships we’ve established with Eversource and DOER to take on projects. They’ve been instrumental in helping us optimize what we have, and think about what’s next.”

**- Ray Jackson,  
Director of Physical  
Plant, University  
of Massachusetts  
Amherst**

### About Mass Save:

Together, we make good happen for Massachusetts: Berkshire Gas, Cape Light Compact, Eversource, Liberty Utilities, National Grid and Unitil. As one, we form Mass Save®, with the common goal of helping residents and businesses across Massachusetts save money and energy, leading our state to a clean and energy efficient future.

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## The Solution

To solve the problem of how to store energy generated on campus, UMass Amherst decided it wanted to invest in battery storage, and in December 2017, UMass Amherst was awarded a \$1.1 million grant from the Advancing Commonwealth Energy Storage (ACES) program to construct a 1 MW/4 MWh lithium ion battery system at the Central Heating Plant.

Energy management experts from Eversource partnered with CPower, a Curtailment Service Provider that manages UMass Amherst's demand response participation, and Competitive Energy Services (CES), a strategic energy advisor with expertise helping companies leverage battery storage to meet sustainability goals.

The team helped UMass Amherst evaluate the impact of the new battery storage system and establish a comprehensive action plan to meet the dual goals of increasing reliability and reducing peak demand. The final recommended approach included utilizing multiple incentive streams offered through the Eversource ConnectedSolutions program, which offers businesses of all sizes access to expertise and incentives for reducing peak energy demand.

Through Eversource ConnectedSolutions, UMass Amherst was able to earn incentives for using its battery system and building management systems to curtail load when called on by Eversource during targeted times of peak demand. And in 2020 UMass Amherst is increasing their incentives by allowing the battery system to be dispatched daily by Eversource. By stacking incentives from ConnectedSolutions on its current participation with the ISO-NE Demand Response program and adding state incentives to the project, the university is recouping its investment and generating ROI on the battery system.

## Highlights

- Eversource issues daily reports to provide details on anticipated load shed needed. Using this data, the UMass Amherst Energy Response team, in consultation with CES, reviews a day ahead plan to identify any planned load reduction and discharge events, the timing of events and determine when the battery will charge.
- Its additional energy production and storage capacity provides UMass Amherst flexibility to accommodate longer event windows and even choose how much of the window it will fill based on demand response program request. Within hours, in response to a peak event, the team can dispatch 1 MW for four hours, 500 kw for eight hours, or ramp it to its maximum 1.32 MW for up to three hours of dispatch.
- During its first year in service, the battery has been instrumental in the university's performance during targeted curtailment events. During an event called by Eversource in August 2019, the battery contributed 1,192 kW on top of 2,823 kW of load shed, for a total of more than 4 MW.
- UMass Amherst anticipates the revenue from ConnectedSolutions over the next 5 years should be over \$1.3 million and the program will provide the university a full return on investment within 10 years.
- Looking ahead, the battery system will also be interconnected to the campus' distribution loop which is designed to operate as an island in the case of an outage, and serves the Mullins Center, which is designated as a regional emergency shelter for Hampshire County's population of roughly 160,000 residents.

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