



Spotlight Appendix:
InnovateMass Gridtech Spotlight Utility Partnership Opportunities

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Instructions

This round of Massachusetts Clean Energy Center’s [InnovateMass](#) program includes a “Gridtech Spotlight”. This Appendix provides a series of memos from Massachusetts utility entities that are interested in soliciting pilot partnerships with InnovateMass applicants.

Review the attached memos to see if the areas of interest align with your company’s capabilities. If you are interested in pursuing a partnership, develop a short (up to 1 page) concept memo. The memo should include an explanation of the type of pilot you envision with the utility partner, and the proposed or expected role and responsibilities of the utility partner. Consider including with your memo a 3-5 slide deck to introduce your company.

Submit your concept memo and optional deck to **BOTH** grid@masscec.com and the relevant utility contact listed below. **Please submit concept memos as early as you are able**, to allow for ample time to co-develop a project ahead of the application deadline. The last possible day for submitting a concept memo is **Monday, February 17** (four weeks ahead of the application deadline).

You can submit general questions to grid@masscec.com and innovate@masscec.com. Questions for a utility partner below should be submitted only following a concept paper submission.

Utility Partner	Gridtech Topics (detailed in following memos)
Eversource Steve Casey, steven.casey@eversource.com	<ul style="list-style-type: none"> • Behind-the-meter hardware or software solutions that help customers optimize usage and bills • Technologies that target optimization of the distribution grid, focused on analytics • Technologies that help with improved resiliency, including vegetation management and outage restoration
Unitil John Bonazoli, bonazoli@unitil.com	<ul style="list-style-type: none"> • Planning of customer-owned DERs
MA Municipal Wholesale Electric Company (MMWEC) Zoe Eckert, zeckert@mmwec.org	<ul style="list-style-type: none"> • Bi-directional charging for residential meters • Residential battery technology with VPP capabilities
Wakefield Municipal Gas & Light Department (WMGLD) Joe Collins, jcollins@wmgld.com	<ul style="list-style-type: none"> • Advanced heat pump technologies • Residential battery storage with VPP capabilities • Small wind electric system technology • Carbon capture fuel cell technology • Low-noise battery storage
National Grid Michael Porcaro, michael.porcaro@nationalgrid.com	<ul style="list-style-type: none"> • Several interconnection-related analytics use cases, including scenario planning and queue management

Eversource Spotlight

Eversource is New England's largest energy provider, proudly serving more than 3.6 million electric and natural gas customers in CT, MA and NH. Eversource is deeply engaged with many aspects of grid modernization in Massachusetts. In MA the stated objectives for grid modernization are to achieve functionality falling into three broad areas: (1) optimize system performance (by attaining optimal levels of grid visibility, command and control, and self-healing); (2) optimize system demand (by facilitating consumer price-responsiveness); and (3) interconnect and integrate distributed energy resources into the distribution system.

For this round of InnovateMass, Eversource is interested in receiving outreach regarding potential projects in the following topic areas: behind the meter (BTM) hardware or software solutions that help customers optimize their usage and bills, technologies that target optimization of the distribution grid focused on analytics, technologies that help with improved resiliency including vegetation management and outage restoration.

Specific examples of targeted technologies that interest Eversource

Resilience

With increasing reliance on electricity as the Commonwealth electrifies various end uses of energy and climate change impacting extreme weather events, the Company intends to develop, using the newest large AI models, a predictive short-term (<7 days) outage forecast at a granular level to better position its resources and respond to customer needs.

The Company is aiming to develop a large AI model that will consider various weather impacts on outages, such as long-lasting draughts which weaken trees, to predict, using its own weather forecast service providers, trouble spots at a station level. In addition, by combining historical traffic data during weather events, our crew information and weather forecasts, the Company intends to develop a model which will support pre-deployment and positioning of resources to avoid traffic, iced roads, or snow delays. Using large AI models for such an application is the most viable option to continuously model and update the projections based on real-time data and forecast updates.

Vegetation Management

Many utilities across the US have explored the use of remote sensing technologies to inform their data driven vegetation management planning. Utilities also face unique challenges in implementing those technologies, mostly defined by geography and customers density. In addition to exploring the unique challenges related to dense forest canopy with this proof-of-concept Eversource wants to take a step further and develop vegetation management trim cycle optimization model (TCOM). The model goal is to optimize the annual cycle trim schedule based on individual spans (pole to pole) SAIFI impact.



Unitil Spotlight

Unitil Corporation is a public utility holding company with operations in Maine, New Hampshire and Massachusetts. Together, Unitil's operating utilities serve approximately 108,500 electric customers and 88,400 natural gas customers. Unitil is interested in partnering with a technology provider to assist in planning of customer owned DER on the electric distribution system.

Forecasting DER

Unitil forecasts the amount of DER that may interconnect on the electric distribution system using historical interconnection values. We are interested in a tool that would assist in forecasting specific locations of large DER facilities based on land availability and interconnection feasibility.

Analyzing DER output

Most DER interconnected on the electric system is connected behind a meter with electric load. The meter measures the net of the load and DER export. This makes it difficult to know how much actual load is present since the measurement of the load is combined with, and being masked by, the amount of power the DER is exporting. Unitil is interested in a technology to use DER output patterns and load patterns to create an accurate model of time varying loads on the distribution system.

MMWEC Spotlight

The Massachusetts Municipal Wholesale Electric Company (MMWEC) is a not-for-profit, public corporation and political subdivision of the Commonwealth of Massachusetts and is the Commonwealth's designated joint action agency for municipal utilities (MLPs). MMWEC provides expertise and strategic vision to help municipal utilities optimize their energy resources, decarbonize, and find value in the shifting structure of New England's wholesale power markets.

Connected Homes

As a tactic in peak mitigation, MMWEC developed and administers Connected Homes, a residential demand response program, for the municipal utilities of Massachusetts. In its fifth year, Connected Homes leverages the technology of smart appliances and devices into cost savings for light departments and their customers, allowing municipal utilities to better manage their electric load, reduce costs, and keep rates low by reducing their energy consumption during peak energy usage events. Technology types controlled to reduce energy usage during peaks are smart Wi-Fi-thermostats, smart hot water heaters, mini split controllers, electric vehicles and electric vehicle chargers. At present, 14 Municipal Light Department towns are enrolled in Connected Homes including Belmont, Hingham, Holden, Holyoke, Ipswich, Mansfield, Marblehead, Peabody, Princeton, Reading, Shrewsbury, South Hadley, Sterling and West Boylston.

Connected Homes acts as a further accelerator to incentivize the adoption of electrification. Therefore, MMWEC seeks to scale the program from only smart technology energy reduction during peak events, to a program that can reduce peak usage by sharing stored energy from residentially sited devices to the grid during scarcity and constraint events. In anticipation of the growing technical innovation of residential electric batteries, EV chargers and EV technologies, MMWEC has the following project interests:

- MMWEC has an interest in adding bi-directional charging capabilities for residential meters to Connected Homes. The scope of kWh impact of bi-directional chargers and vehicles are significantly impactful to the direct transmission and capacity cost avoidance, but it also allows for aid in managing peak load to minimize investments needed to distribution system and encourages adoption of electrification and smart technologies to improve the resilience of communities.
- MMWEC has an interest in residential battery technology with Virtual Power Plant capabilities. Once an aggregated demand response program is scaled enough for a utility, the ability to shed energy and share energy during peaks will allow a DER program to act as the virtual power plant term details; a power plant, or behind the meter asset scale source of energy, without the utility investment of building a power plant. Strategically incentivizing adoption of this technology on parts of the system infrastructure that need support allows for long term system planning with an additional resource.
- The addition of both bi-directional charging technology and residential battery adoption will coincide with research into innovative rate structuring that accounts for the cost of energy when it is consumed while incentivizing electrification technologies.

Wakefield Spotlights

Wakefield Municipal Gas & Light Department (WMGLD) is a public power utility serving the town of Wakefield Massachusetts. WMGLD and its employees provide their customers with safe, reliable, competitively priced, and environmentally responsible energy resources and services that enhance quality of life, while adjusting to the ever-changing energy marketplace. WMGLD is committed to being a trusted partner for their customers and the greater community in promoting the use of electric power and other energy resources to achieve an affordable, cleaner, and more sustainable energy future.

Massachusetts Municipal Wholesale Electric Company

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Wakefield has three (3) proposed spotlight topics, listed below.

Wakefield Spotlight 1: A Housing Authority Opportunity

In recognition of the necessary action needed to make sure that housing authorities and low-income housing are not left behind in electrification and new technology adoption, WMGLD is pursuing partnership with its local housing authority to test the following technology partnerships.

Scenario One: In the housing authority scenario where the tenant is responsible for their electric bill, residing within an MLP territory already provides equity benefits as MLPs typically have lower electric rates than investor-owned utilities. However, these units still often have gas heating and window AC units, exposing the tenant to harmful impacts of gas heating and the inefficiencies of window AC units. WMGLD is seeking gridtech companies with advanced heat pump technologies that can bring the benefits of heat pumps to a housing authority unit while testing the capabilities of said technology-for example, cold climate heat pump capabilities or demand response capabilities.

Scenario Two: WMGLD is seeking residential battery technology with Virtual Power Plant capabilities. Once an aggregated demand response program is scaled enough for a utility, the ability to shed energy and share energy during peaks will allow a DER program to act as the virtual power plant term details; a power plant, or behind the meter asset scale source of energy, without the utility investment of building a power plant. Strategically incentivizing adoption of this technology on parts of the system infrastructure that need support allows for long term system planning with an additional resource. The addition of residential battery adoption will coincide with research into innovative rate structuring that accounts for the cost of energy when it is consumed while incentivizing electrification technologies.



Wakefield Spotlight 2: WMGLD Energy Park

Wakefield Municipal Gas & Light Department (WMGLD) is a public power utility serving the town of Wakefield Massachusetts. WMGLD and its employees provide their customers with safe, reliable, competitively priced, and environmentally responsible energy resources and services that enhance quality of life, while adjusting to the ever-changing energy marketplace. WMGLD is committed to being a trusted partner for their customers and the greater community in promoting the use of electric power and other energy resources to achieve an affordable, cleaner, and more sustainable energy future.

The Wakefield Municipal Gas and Light Department's innovative microgrid project (a/k/a Energy Park) on Hemlock Road in Wakefield will be interconnected to the WMGLD's electric system, the new Northeast Metropolitan Regional Vocation School (Northeast Metro Tech), and the new Wakefield Memorial High School, all of which are currently under construction. As such, the Energy Park will benefit Wakefield residents, WMGLD rate payers, the environment, and the future needs of a technology and utility-based workforce.

Upon completion, the WMGLD will manage, own, and operate the Energy Park. Each school will have 300 kilowatts solar panels on each school that will supply the school's heating and cooling needs, and any excess solar energy not used by the schools will be stored in the Energy Park's 5-Megawatt hour battery storage (BESS) unit. In an effort to utilize the full potential of the schools' roof space, WMGLD is seeking small wind electrical system technology that could generate additional kilowatts of energy for the schools needs and excess supply for battery storage.

The Energy Park will also include a clean burning natural gas generator that will serve as the emergency power source for both schools during a rare extended power outage, alongside the battery storage system. WMGLD is seeking carbon capture fuel cell technology to integrate with the energy park generators in order to harness emissions into electricity. Both the battery and generator will also provide load management resources to help manage the increasing cost of energy to the ratepayers.

The Energy Park will not only maintain low electric rates to WMGLD ratepayers, but it will also promote electrification, reduce carbon emissions, help the utility maintain its forward momentum toward meeting the state's net-zero 2050 goal, and reduce the construction costs by upwards of \$1.2 million for Northeast Metro Tech and Wakefield Memorial High School by eliminating two diesel generators.

Of utmost importance is the role each of the Energy Park's phases will play in the introduction and understanding of career opportunities within the electric utility industry. Through its partnership with the schools, WMGLD will enhance both the STEM curriculum and the vocational/technical areas. Such opportunities will help foster an understanding of these areas, potentially leading to, and bolstering, interest in careers that students will have an opportunity to observe and identify with as a result of the Energy Park.

Wakefield Spotlight 3: WMGLD Substation

WMGLD's Wakefield Ave Substation is a nine-breaker 345kV GIS ring station with two 345kV line positions, four 400MVA 345/115kV autotransformers; and an 11-breaker 115kV GIS ring station: six 115kV line positions, complete with system one and system two relay protection and control.

WMGLD seeks low noise battery storage technology, capable of using heat pumps for heating and cooling of the system to connect to the substation. Battery Energy Storage Systems (BESS) can generate noise levels of 65–80 decibels (dBA), which can be disruptive to the surrounding community. WMGLD seeks to test technology that will mitigate this issue, increasing local community adoption of this technology.

This battery technology will be used for peak load reduction for transmission and capacity cost avoidance savings and providing electric grid resilience to Wakefield.

National Grid Spotlight

The Commonwealth has been extremely successful in supporting and enabling clean energy solutions over the past few decades. As a result this has pushed Massachusetts to the #2 position in the nation for solar PV installations per square mile, which is a huge success in driving toward the state's aggressive decarbonization goals. However the saturation combined with the increase of large scale energy storage requests has led to challenges in the continued pace of growth and enablement of DER interconnections. To that end National Grid has identified several challenges below which may benefit from a partnership with third party resources to develop meaningful solutions to benefit our customers through this MassCEC grant program.

The grid of yesterday needed only address one way power flow to supply energy to end use load customers. The current grid has complex two way power flow with dynamic DER resources spread across the distribution system. This makes the fluctuations in electrical characteristics on the grid more drastic, increasing the complexity for accurate system analysis.

Challenges

- How to study and assess the grid efficiently, understanding the multi variable, continuously changing nature of the system. Needing to evaluate:
 - For planning purposes to identify required system modification to accommodate capacity or power quality shortfalls
 - For customers to accurately provide existing and projected electrical grid data to inform their energy choices and DER location selection
- How to manage the extensive volume of requested customer connections in a fair and efficient manner.
 - As each customer is evaluated it is necessarily considered against the existing grid characteristics including the impact of other projects prior to them in queue. Therefore any one customer design change, withdrawal, or progression has a direct effect on others in queue. Changes to the queue can cause churn in the form of elongated study times and/or cost allocation shifts for necessary system modifications. This churn creates uncertainty for customers, which can lead to difficulty in progressing a project, which can create more churn. As queue volume increases the impact of this challenge is exacerbated. How to work through this multi-variable challenge.
- Is it possible to work toward a scenario planning construct for utilities and customers to better assess and quantify impacts to the customer site and the utility grid for a given interconnection?
 - Consider an iterative system analysis that could be run efficiently to avoid extensive study durations. An iterative analysis could potentially include millions of runs for varied permutations of grid and customer site conditions, however could provide a much more sophisticated level of insight to quantify different scenarios with various levels of impact.
 - Outputs for the customer could show a range of scenarios with probability of occurrence and potential probability of “success” given specific

predefined criteria such as economic feasibility, total energy production, carbon footprint offset, etc.

- Similarly scenarios output could be provided for the utility to assess the level and probability of risk to the grid to inform what upgrades would be necessary to accommodate the connection. Ultimately the utility needs to maintain safety and reliability as the highest priority.
- Identifying the most impactful variables within the analysis
 - Within a given project’s engineering assessment the most impactful component of the analysis will be heavily site specific and grid location dependent. A solution that would identify the most impactful element of the equation for that specific site under study would allow for increased understanding of challenges and potentially lead to increased opportunity for design adjustments to enable more viable connection options.
- Considering electric grid constraints as a parallel to other industries to leverage out of the box thinking to solve grid challenges
 - Considering challenges overcome within other industries that may have parallels to the electric grid constraint issue. For example, looking to water/sewer utilities, traffic management approaches, crowd control solutions, or advanced data analytics (sports, casino betting, etc) as some examples.