EBC Energy Resources Program: Microgrids – Transforming the Grid
Welcome

John Wadsworth

Chair, EBC Energy Resources Committee

Partner, Brown Rudnick LLP
Program Introduction and Overview

Thomas Rooney

Program Chair & Moderator

Vice President, Programs, TRC
Northampton Community Resiliency

John Tourtelotte

Founder & Managing Director

Rivermoor Energy
Overview for EBC Energy Resources Program: Microgrids

Case Study: Northampton Community Resiliency

May 12, 2017
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Rivermoor Energy: Summary

- Energy development and investment company focused on large municipal, commercial and utility-scale solar assets, resiliency, storage and microgrids. Founded in 2008, Rivermoor was an “early entrant” to the New England utility and commercial solar market.

- Rivermoor Energy works with leading commercial, governmental and utility clients with a focus on resiliency solutions, energy storage and solar development.

- Rivermoor Energy’s clients and partners include (partial list):
• 10 days chosen as planning length for an emergency outage

• 21 day outage would require significant additional effort integrating local business community

• City Department Heads developed consensus on critical buildings list

• 42 critical assets evaluated

• Collaborative planning, shared resources and leadership are the foundation for community resiliency
Outage Duration Creates Performance “Gaps”

<table>
<thead>
<tr>
<th>Buildings Served</th>
<th>DPW Garage &amp; HQ</th>
<th>Fire Dept HQ</th>
<th>Police Dept HQ</th>
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<tbody>
<tr>
<td># Critical assets</td>
<td>2</td>
<td>1</td>
<td>1</td>
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<tr>
<td>All protected</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
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<tr>
<td>Critical Load Served</td>
<td></td>
<td></td>
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<tr>
<td>Peak Critical Load</td>
<td>-</td>
<td>-</td>
<td>-</td>
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<tr>
<td>Load Fully Supported</td>
<td>X</td>
<td>✓</td>
<td>✓</td>
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<tr>
<td>Generator Sized</td>
<td>X</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Generator Reliability</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Target Reliability</td>
<td>0.95</td>
<td>0.95</td>
<td>0.95</td>
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<tr>
<td>Generator Rel. (&lt;10d)</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Generator Rel. (&gt;10d)</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Fuel Duration</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2-Day Outage</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>5-Day Outage</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>10-Day Outage</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>21-Day Outage</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>N-1 Protection</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Protected</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Full Bypass</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>

**Generator Reliability**

![Graph showing generator reliability over days](image_url)
Fire Department HQ: Dispatch, EMT & 911 Services Case Study for Redundancy & Fuel Diversity

- **Risks:**
  - Single onsite backup generator – has failed in the past
  - Redundancy & disaster recovery “gap”

- **Fuel Diversity Recommendations:**
  - Solar PV, Battery storage and energy efficiency
  - Generator testing & maintenance
  - Mobile generator solution “pool”: Pin & Sleeve set up would be installed
  - Benefits: Cost savings, on-site plus “mobile pool” redundancy, emergency fuel savings, and fuel diversity

*Boston Water Commission Solar Rivermoor Energy, 2010*
1. **Integrate Solar Assets, Energy Storage and CHP**

2. **Campus Microgrid**
   - Leverage hospital’s CHP, existing and new solar & new energy storage assets
   - Campus microgrid will provide resiliency improvement for long outages plus cost savings on utility energy & demand charges
   - CHP “advantage” for two + facilities rather than one
Appendix
Case Study: National Grid – Boston

- Rivermoor Energy developed this solar asset for the benefit of property owner National Grid in a development-construction partnership with Fischbach & Moore electrical contractors.
- Largest solar asset in Boston.
- 1.2 megawatts on a seven acre contaminated “brownfield” in front of landmark multi-colored LNG tanks on Boston’s Route 93.
- Provides clean, local power directly to the utility grid. Owned by National Grid and connected to the utility grid by Eversource.
- $7 + million asset, largest solar asset in City of Boston.
Case Study: Boston Water Commission

- Rivermoor Energy developed this solar asset, working successfully with Boston Water, local utility NSTAR (Eversource) and our design and construction team of Fischbach & Moore to develop the largest solar roof in downtown Boston.
- First solar asset to successfully utilize Massachusetts SREC incentives.
- Development, engineering and construction completed in 2010.
- $1.25 million asset
Contact Information

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Boston’s Energy Ecosystem: Microgrids and the Value of District Energy

Travis Sheehan

Senior Infrastructure Advisor

Boston Planning and Development Agency
Microgrids and Community Energy Systems

Resiliency, Sustainability and Affordability: Identifying Challenges and Defining Opportunities

Travis Sheehan, Senior Infrastructure Advisor
A microgrid consists of two or more buildings that:

- Can disconnect from the grid if there is a large-scale power outage
- Can produce local energy via solar power/onsite generation
- Has ‘smart’ and efficient buildings that control peak demand as a group
Existing Community Energy Solutions

1) Veolia Steam System
2) MATEP
3) Boston Medical Center
4) MIT
5) Biogen
6) Harvard

□ indicates electrical microgrid
A microgrid can protect against power outages, powering critical services when the larger grid goes down in a storm, flood, or heatwave.

Microgrids manage energy smarter, lowering peak demand and increasing energy efficiency.

This protects customers from price surges and makes energy more affordable.

The construction of microgrids attracts high-paying industry jobs because of specialized building and electrical trades.

Reliable power is highly valued by businesses vulnerable to outages, like manufacturers, media and tech companies.

A microgrid is more advanced than the larger grid, thus can integrate solar and other local power generation with ease.

This mix of energy sources will help the City meet its climate commitments.
Challenges to Multi-User Microgrids

- Lacks business model
- Perceived threat to utility business model
- No regulatory / statutory support
- Real estate developers unaware of opportunity
- City government involvement not the norm in energy planning
Campus “MUSH Market” vs. Multi User Microgrid

Single Owner:
easy to generate power, distribute benefits to one meter, simple to finance

Multi User:
not easy to distribute benefits, hard to develop user base, difficult to finance, no business model
Projects

1. BCES
2. MG WORKSHOPS
3. Pilot Project

"IIT Campus Microgrid Diagram", credit: Illinois Institute of Technology
BCES

Boston Community Energy Study (2016)

- Study identified 42 potential CES
- Conducted with MIT, Lincoln Labs, and Funding from DOE and DHS
- $1.7 Bn USD in End User and Environmental Savings
- Community Engagement: Online Video, Interactive Map, Report
- U.S. Department of Energy TA - Feasibility Screening of 8 sites
# SUSTAINABLE RETURN ON INVESTMENT

## COMPARISON OF FINANCIAL SAVINGS AND MONETIZED ENVIRONMENTAL BENEFITS

Analysis by Boston Redevelopment Authority, Research Division
2015

<table>
<thead>
<tr>
<th>SCENARIO</th>
<th>TOTAL ELECTRICITY UTILITY COST SAVINGS OVER 25 YEARS</th>
<th>TOTAL NATURAL GAS UTILITY COST SAVINGS OVER 25 YEARS</th>
<th>TOTAL GHG EMISSIONS SOCIAL COST SAVINGS OVER 25 YEARS</th>
</tr>
</thead>
<tbody>
<tr>
<td>COST OPTIMIZATION</td>
<td>$2,980.7 million</td>
<td>-$1,266.8 million**</td>
<td>$30.0 million</td>
</tr>
<tr>
<td>CO₂ OPTIMIZATION</td>
<td>$237.1 million</td>
<td>$272.2 million</td>
<td>$119.2 million</td>
</tr>
</tbody>
</table>

**The Cost Optimization Scenario uses more natural gas each year than the base scenario, meaning the cost "savings" are negative.**
Projects

1. BCES
2. MG WORKSHOPS
3. Pilot Project


“IIT Campus Microgrid Diagram”, credit: Illinois Institute of Technology
MG Workshops

Developed 3-part microgrid workshop

- 12 hours of scenario planning to align interests of key stakeholder
- Chief Regulators of State, Chief Strategy and Distribution Planners from Utilities, Technology providers, Real estate community

Convened Urban Sustainability Directors Network workshop 2015

- New York City, Washington DC, MA Communities: Somerville, Cambridge, Northampton
- Housed by International District Energy Association Conference with 950+ Attendees
- Technology and Policy innovations replicable
Group Exercise

1) A session which describes the microgrid including engineering market interactions.

2) A session which analyzes legal context, opportunities, and challenges for microgrids each jurisdiction.

3) A session which describes the USDN microgrids whitepaper and ‘straw proposal’ business case for multi user microgrids.

4) A scenario planning exercise allows each stakeholder to identify merits and challenges to project deployment. This exercise will conclude with a revision of the straw proposal.
Projects

1. BCES
2. MG WORKSHOPS

Pilot Project
Pilot Project

2014-2016

- Engaging 50 businesses and property owners
- DOE Feasibility Study
- Authorization for MOU with Eversource Energy
- Authorization for Procurement
3: Pilot Project 2014-2016

• Engaging 50 businesses and property owners

• DOE Feasibility Study

• MOU with Eversource Energy

• Authorization for Procurement

3 Government Buildings with Single Vendor = Easy
Government + Private Buildings with Single Vendor = Difficult
Huntington, NY – Community Microgrid Development

Bill Moran

Director, Microgrid Engineering

TRC
Huntington NY Community Microgrid

May 12, 2017
Bill Moran, Director, Microgrid Engineering - TRC
Outline

• What is a Microgrid?
• Types of Microgrids
• Huntington Community Microgrid
  – Background
  – NY Prize
  – Critical Facilities
  – Project overview
  – Business Plan
• Conclusion
What is a Microgrid?

As defined by the US Department of Energy,

“Microgrids are localized grids that can disconnect from the traditional grid to operate autonomously and help mitigate grid disturbances to strengthen grid resilience.”
What is a Microgrid?

To put this another way,

“Microgrids are a group of interconnected loads and distributed energy resources within clearly defined electrical boundaries that acts as a single controllable entity with respect to the grid and that connects and disconnects from such grid to enable it to operate in both grid connected or Island Mode.”

- CT Public Act 12-148 §7
Today’s Grid

Tomorrow’s Microgrids
典型校园系统通常由所有设施的单一所有者拥有，并且通常由单一公用事业电表供电。
Fed from a single utility distribution feeder, which also feeds non-critical facilities that are not included in microgrid.
Huntington, NY Community Microgrid

Background

Town of Huntington
- Population 203,000
- 135 feet above sea level
- Lost power for 10 days during Superstorm Sandy
- Needed shelters, town services suspended
  impacted WWTF, Hospital
New York Prize

- Three stage competitive grant program initiated by Gov. Cuomo 2015
  Part of the Reforming the Energy Vision (REV) program for NY utilities.
- Stage 1 $100,000 Feasibility grant awarded to Huntington, May 2015
- TRC was conceptual designer and engineering consultant.
Critical Facility Needs

• Town Hall, no emergency generator. Need to maintain town services,

• WWTF out of service due to limited emergency power. Sewage flowed to LI sound.

• YMCA, no emergency generator, borrowed one in 2014 to remain open as a shelter

• Huntington Hospital, has Emergency generators but can’t perform surgical procedures during power outage, patients must be moved.
Project Overview
### Table of Planned Generation Assets

<table>
<thead>
<tr>
<th>Location</th>
<th>Description</th>
<th>Capacity</th>
<th>Fuel</th>
</tr>
</thead>
<tbody>
<tr>
<td>Huntington Hospital</td>
<td>Fuel Cell</td>
<td>2.8 MW</td>
<td>Natural Gas</td>
</tr>
<tr>
<td>Huntington Hospital</td>
<td>Battery Storage</td>
<td>2.0 MWh</td>
<td>N/A</td>
</tr>
<tr>
<td>Town Hall</td>
<td>Reciprocating CHP</td>
<td>400 kW</td>
<td>Natural Gas</td>
</tr>
<tr>
<td>Town Hall/YMCA/Senior Center</td>
<td>Solar PV</td>
<td>560 kW</td>
<td>Sunlight</td>
</tr>
<tr>
<td>Town Hall/YMCA/Senior Center</td>
<td>Flywheel</td>
<td>100 kW</td>
<td>N/A</td>
</tr>
<tr>
<td>Wastewater Treatment Plant</td>
<td>Reciprocating CHP</td>
<td>400 kW</td>
<td>Biogas/Natural Gas</td>
</tr>
<tr>
<td>Wastewater Treatment Plant</td>
<td>Reciprocating Generator</td>
<td>1.3 MW</td>
<td>Natural Gas</td>
</tr>
<tr>
<td>Wastewater Treatment Plant (existing)</td>
<td>Reciprocating Generator</td>
<td>900 kW</td>
<td>Diesel</td>
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## Distributed Generation Assets

<table>
<thead>
<tr>
<th>Location</th>
<th>Description</th>
<th>Capacity</th>
<th>Fuel</th>
</tr>
</thead>
<tbody>
<tr>
<td>Huntington Hospital</td>
<td>Fuel Cell</td>
<td>2.8 MW</td>
<td>Natural Gas</td>
</tr>
<tr>
<td></td>
<td>Battery Storage</td>
<td>2.0 MW</td>
<td>N/A</td>
</tr>
<tr>
<td>Town Hall/YMCA/Senior Center</td>
<td>Reciprocating CHP</td>
<td>400 kW</td>
<td>Natural Gas</td>
</tr>
<tr>
<td></td>
<td>Solar PV</td>
<td>560 kW</td>
<td>Sunlight</td>
</tr>
<tr>
<td></td>
<td>Flywheel</td>
<td>100 kW</td>
<td>N/A</td>
</tr>
<tr>
<td>Wastewater Treatment Plant</td>
<td>Reciprocating CHP</td>
<td>400 kW</td>
<td>Biogas/Natural Gas</td>
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<tr>
<td></td>
<td>Reciprocating Generator</td>
<td>1.3 MW</td>
<td>Natural Gas</td>
</tr>
<tr>
<td></td>
<td>Reciprocating Generator (Existing)</td>
<td>900 kW</td>
<td>Diesel (emergency use only)</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>7.5 MW</td>
<td></td>
</tr>
</tbody>
</table>
Objectives

• Increased reliability of power for essential town facilities.
• Reduced dependence on fossil fuels through renewable sources.
• Reduction in GHG and other emissions.
• Increased resiliency during natural disasters

• Lower cost energy for pool heating
• Reduction in cost of electricity and heating energy
• Availability of power to shelter residents during natural disasters
Objectives – Huntington Hospital

• Reduction in cost of electricity and heating energy
• Improved resiliency of power during natural disasters.
• Ability to continue scheduled and emergency surgical procedures during severe weather events
• Less reliance on diesel emergency generators
• Reduction in GHG and other emissions
Huntington Microgrid, LLC
Capital cost and Ownership – Draft

DG Assets
- 2.8 MW Fuel cell
- 2 MW/MWh BESS
- 1 MW Load bank
- Ring Bus

PSEG Dist. Improvements
- Underground cables
- Reclosers
- AMI

Project Funding Resources
- NYSERDA / NYPA
- NY Green Bank

Huntington Microgrid LLC

Town of Huntington
- WWTF
  - 1.3 MW NG Gen.
  - 400 kW Biogas CHP
- WWTF emergency only
  - 600 kW Diesel Gen.
  - 900 kW Diesel Gen.
- Town Hall/YMCA
  - 400 kW CHP
  - 560 kW PV
  - 100 kW Flywheel

Town of Huntington

Huntington Hospital

Microgrid communication and controls
- Microgrid controller
- Communications infrastructure
- Data collection

WWTF emergency only
- 600 kW Diesel Gen.
- 900 kW Diesel Gen.

Town Hall/YMCA

PSEGD Dist.
- Improvements
- Underground cables
- Reclosers
- AMI

Microgrid controller

Communications infrastructure

Data collection

$
NOTES

1. Power flow to PSEG-LI to be net metered to facilities shown.

2. Excess power production to be sold to PSEG-LI at market value TOD rate. Power flow into microgrid from PSEG to be purchased by LLC at same market rate.
<table>
<thead>
<tr>
<th>Power Delivery</th>
<th>Efficiency</th>
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<tbody>
<tr>
<td>Distribution Engineering</td>
<td>Load Analysis</td>
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<td>Protection and controls</td>
<td>Building Energy Efficiency</td>
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<tr>
<td>SCADA</td>
<td>IoT Integration</td>
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<tr>
<td>Data historian</td>
<td>Energy storage Evaluation &amp; Design</td>
</tr>
<tr>
<td>Event logs</td>
<td>Load Management System</td>
</tr>
<tr>
<td>Distribution Engineering</td>
<td>Load Prioritization Planning</td>
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<td>Substation Engineering</td>
<td>Renewable Generation Design</td>
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<td>Telecom</td>
<td>CHP Evaluation &amp; Design</td>
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<td>Cyber Security</td>
<td>Economic dispatch</td>
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<td>Power System Studies</td>
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<td>Power low modeling</td>
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<tr>
<td>Device coordination</td>
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<td>SCADA</td>
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<td>Data historian</td>
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<td>Event logs</td>
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<td>Land Use Permitting</td>
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<td>Air &amp; Water Permitting</td>
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<td>Civil Engineering</td>
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<tr>
<td>Generation &amp; Fuel Handling Structures</td>
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<td><strong>Environmental &amp; Infrastructure</strong></td>
<td><strong>Information Technology</strong></td>
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<td><strong>Information Technology</strong></td>
<td><strong>Am bridge</strong></td>
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<td><strong>Am bridge</strong></td>
<td><strong>Day Ahead Forecasting</strong></td>
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<td><strong>Data Exchange with Utility &amp; Key Stakeholders</strong></td>
<td><strong>Data Exchange with Utility &amp; Key Stakeholders</strong></td>
</tr>
<tr>
<td><strong>Load Management System</strong></td>
<td><strong>Data Exchange with Utility &amp; Key Stakeholders</strong></td>
</tr>
</tbody>
</table>
Questions?

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Connecticut Microgrid Program

Veronica Szczerkowskki

Microgrid Program Manager

Connecticut Department of Energy and Environmental Protection
Connecticut Microgrid Program

Presenter:

Veronica Szczerkowsk

• Microgrid Program Coordinator
Connecticut Microgrid Program

Overview

- Energy Policy
- Vision for Microgrids in Connecticut
- Microgrid Technologies and Policy Implications
- Participant Concerns
- Public Act 16-196
- Lessons Learned – State Perspective
- Approved Projects and their Partners
- Operational Microgrids
- Lessons Learned – Operational Microgrids
Connecticut Microgrid Program

Energy Policy

• Connecticut’s resiliency strategy
• Large-scale weather events knocked out power to hundreds of thousands of citizens for as many as ten days at a time
• Power outages are inevitable
• Public Act 13-298
• Governor’s vision for cheaper, cleaner, and more reliable energy future for Connecticut
• Encourage deployment of distributed generation
Connecticut Microgrid Program

Vision for Microgrids in Connecticut

• Microgrids will provide critical services to residents
  – Generating electricity with cleaner, 24/7 operational power sources
    • Natural gas turbines with combined heat and power, fuel cells, solar panels, etc.
  – Built in a cost-effective manner
  – Contribute to public good by islanding critical facilities when the larger grid is de-energized
  – Connects more than one critical facility to reliable distributed generation resources
Connecticut Microgrid Program

Microgrid Technologies

• Which technologies should be used in different situations?
  – CHP
  – Microturbine
  – Fuel Cell
  – Existing emergency generation
  – PV with or without energy storage
  – Energy storage

• DEEP is technology neutral
Connecticut Microgrid Program

Participant Concerns

- Doesn’t fund generation
- Gas only program
- No guidance from state for microgrid sites
- Not enough time to complete proposal
Connecticut Microgrid Program

Public Act 16-196

• Allows matching funds or low interest loans for:
  – Energy storage system or systems
  – Distributed energy generation placed in service on or after July 1, 2016
    • Class I renewable energy source
    • Class III energy source
Connecticut Microgrid Program

Lessons Learned – State Perspective

• Rolling Applications
• Municipal Track
• Maximum $7,000/kW of eligible expenses funded per project
• Funding for USDA area projects
• Issue revised Request for Applications to allow funding pursuant to Public Act 16-196
## Connecticut Microgrid Program

<table>
<thead>
<tr>
<th>Name of Project</th>
<th>Projected/Actual Date of Completion</th>
<th>Project Status</th>
<th>Facilities</th>
<th>Generation</th>
<th>Program Award</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ROUND 1</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wesleyan University</td>
<td>Mar-14</td>
<td>operational</td>
<td>Campus, Athletic Center (Public Shelter)</td>
<td>(1) 2.4 MW and (1) 676 kW Natural Gas Combined Heat and Power Reciprocating Engine</td>
<td>$693,819</td>
</tr>
<tr>
<td>UCONN</td>
<td>N/A</td>
<td>N/A</td>
<td>Campus Buildings</td>
<td>400 kW fuel cell, 6.6 kW PV</td>
<td>$2,144,234</td>
</tr>
<tr>
<td>Woodbridge</td>
<td>Dec-17</td>
<td>In progress (under construction)</td>
<td>Police Stations, Fire Station, Department of Public Works, Town Hall, High School, Library</td>
<td>2.2 MW fuel cell</td>
<td></td>
</tr>
<tr>
<td>Hartford -- Parkville</td>
<td>Mar-17</td>
<td>operational</td>
<td>School, Senior Center, Library, Supermarket, Gas station</td>
<td>(4) 200 kW fuel cells</td>
<td>$2,063,000</td>
</tr>
<tr>
<td>University of Hartford</td>
<td>Aug-15</td>
<td>operational</td>
<td>Dorms, Campus Center, Operation Building</td>
<td>(2) 1.9 MW diesel (existing), 250 kW diesel, 150 kW diesel</td>
<td>$2,270,333</td>
</tr>
<tr>
<td>Fairfield</td>
<td>Apr-16</td>
<td>operational</td>
<td>Police Station, Emergency Operations Center, Cell Tower, Fire Headquarters, Shelter</td>
<td>50 kW natural gas recip engine, 250 kW natural gas recip engine, 27 kW PV, 20 kW PV</td>
<td>$1,167,659</td>
</tr>
<tr>
<td>Bridgeport</td>
<td>Jul-17</td>
<td>In progress (under construction)</td>
<td>City Hall, Police Station, Senior Center</td>
<td>(3) 600 kW natural gas microturbines</td>
<td>$2,975,000</td>
</tr>
<tr>
<td>Windham</td>
<td>Apr-17</td>
<td>Operational but not yet confirmed</td>
<td>2 Schools (Various Public Purposes)</td>
<td>(2) 100 kW natural gas, (2) kW diesel</td>
<td>$709,350</td>
</tr>
<tr>
<td><strong>ROUND 2</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Milford</td>
<td>Jun-18</td>
<td>In progress (under construction)</td>
<td>Parsons Complex, middle school, senior center, senior apartments, city hall</td>
<td>(2) 148kW natural gas CHP units, 120kW PV, 100kW battery storage</td>
<td>$2,909,341</td>
</tr>
<tr>
<td>University of Bridgeport</td>
<td>Nov-16</td>
<td>operational</td>
<td>campus buildings - dining hall, rec center, student center, 2 residential buildings as shelter, police station</td>
<td>1.4 MW fuel cell</td>
<td>$2,180,899</td>
</tr>
<tr>
<td><strong>ROUND 3</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wesleyan University - expansion project</td>
<td>Dec-17</td>
<td>In progress (under construction)</td>
<td>campus buildings - dining venue, public safety building, physical plant building</td>
<td>EXISTING (1) 2.4 MW and (1) 676 kW Natural Gas Combined Heat and Power Reciprocating Engine</td>
<td>$424,000</td>
</tr>
</tbody>
</table>
# Connecticut Microgrid Program

## Approved Projects and Their Partners

<table>
<thead>
<tr>
<th>Project</th>
<th>Partners</th>
</tr>
</thead>
<tbody>
<tr>
<td>Town of Woodbridge</td>
<td>United Illuminating Company</td>
</tr>
<tr>
<td></td>
<td>Regional School District</td>
</tr>
<tr>
<td>City of Hartford</td>
<td>Grocery Store</td>
</tr>
<tr>
<td></td>
<td>Gas Station</td>
</tr>
<tr>
<td>Town of Milford</td>
<td>Senior Living Facility</td>
</tr>
</tbody>
</table>
Connecticut Microgrid Program

Operational Microgrids

• Wesleyan University – April 2014
• Photo: HBJ File Photo
• Town of Fairfield – June 2015
• University of Hartford – September 2015
• University of Bridgeport – December 2016
• City of Hartford – April 2017
• Town of Windham – May 2017*
Connecticut Microgrid Program

**Lessons Learned – Operational Microgrids**

- **University of Hartford**
  - Track all invoices and keep detailed records of work
  - Have a team of people (at least two) who understand project management and grant accounting work together from the start.
  - Understand what is eligible for funding from the Program and what is not
  - DEEP is there to help

- **City of Hartford/Constellation**
  - Selection of generator technology is important
  - Provide value to the microgrid host
  - Establish a good working relationship with private facilities on the microgrid
  - Make sure members of the development team understand the technical requirements and can overcome any technical hurdles
Connecticut Microgrid Program

• Contact municipal officials and local utility about ideas for critical facilities
• Talk to Green Bank about project financing optionsCT
• General Statutes – Section 16-243y – Microgrid Grant Program
• Questions??
  – Email DEEP.EnergyBureau@ct.gov
• Link to Round 3 information:
  – Request for Applications
  – Frequently Asked Questions
  – Applications
  – Presentations
Panel Discussion

Moderator: **Thomas Rooney**, *TRC*

Panelists:

- **John Tourtelotte**, *Rivermoor Energy*
- **Travis Sheehan**, *Boston Planning & Development Agency*
- **Bill Moran, Director**, *TRC*
- **Veronica Szczerkowsksi**, *CT DEEP*
EBC Energy Resources Program: Microgrids – Transforming the Grid