Accelerating Resilient Power in Connecticut and New York

Hosted by
Todd Olinsky-Paul, Project Director, CESA
Tuesday, December 16, 2014
About CESA

Clean Energy States Alliance (CESA) is a national nonprofit organization working to implement smart clean energy policies, programs, technology innovation, and financing tools, primarily at the state level. At its core, CESA is a national network of public agencies that are individually and collectively working to advance clean energy.
About the State Leadership in Clean Energy Awards

CESA’s State Leadership in Clean Energy Awards recognize state and municipal programs and projects that demonstrate leadership, effectiveness and innovation in advancing renewable energy and other clean energy technologies.

An independent panel of distinguished judges selected eight recipients for the 2014 Awards. More information, including case studies and links to upcoming webinars featuring the winning programs, is available on our website: www.cesa.org/projects/state-leadership-in-clean-energy/2014
Today’s Guest Speakers

**Dana Levy**, Program Manager for Technology Development and On-site Power Applications, New York State Energy Research and Development Authority (NYSERDA)

**Veronica Szczerkowski**, Microgrid Program Coordinator, Bureau of Energy and Technology Policy, Connecticut Department of Energy and Environmental Protection (CTDEEP)

**Tracy Babbidge**, Bureau Chief, Bureau of Energy and Technology Policy, Connecticut Department of Energy and Environmental Protection (CTDEEP)
Dr. Dana Levy of NYSERDA:

NYSERDA CHP thought-leader since 1999.

Recipient of the USCHPA CHP Champion Award in 2007.

Recipient of the NECHPI CHP Champion Award in 2014.

Dana.Levy@nyserda.ny.gov

www.nyserda.ny.gov/CHP
1. CHP is Good
2. Sequence of Program Evolution
3. The Current Program -- The “Catalog” Approach
4. Other Features of The Current Program
What is Combined Heat and Power (CHP)?

Combined Heat & Power (CHP or cogeneration) is the simultaneous generation of heat and electricity from a single fuel source.
Why is CHP a Good Thing?

Comparison of “status quo” scenario versus “CHP” scenario

- **Power Plant**
  - 32% efficiency

- **Boiler/Furnace**
  - 80% efficiency

- **CHP**
  - 75% efficiency

Combined Efficiency:
- **Status Quo**: ~ 50%
- **CHP**: ~ 75%

Fuel savings = Everyday Financial savings
Fuel savings = Everyday Emission reduction
What are Common Uses of CHP?

• Produce onsite some of your everyday electrical power, while

• Recycling the electric generator’s byproduct heat for use in heating and/or cooling (Combined Cooling Heating & Power = CCHP), and

• Keep power on to some circuits during grid outages
<table>
<thead>
<tr>
<th>Who Should Consider CHP?</th>
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</thead>
<tbody>
<tr>
<td>Manufacturing</td>
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<tr>
<td>Hospitality</td>
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<tr>
<td>Commercial Real Estate</td>
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<tr>
<td>Data Centers</td>
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<tr>
<td>Healthcare</td>
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<tr>
<td>Municipalities</td>
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<tr>
<td>Multifamily</td>
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<tr>
<td>Other energy-intensive</td>
</tr>
<tr>
<td>facilities</td>
</tr>
</tbody>
</table>
1. CHP is Good

2. Sequence of Program Evolution

3. The Current Program -- The “Catalog” Approach

4. Other Features of The Current Program
Sequence of CHP Program Evolution

**CHP Demonstration Program**
Goal: Diversity -- Broad Portfolio for Learning via Trailblazing Examples

**CHP Performance Program**
Goal: Resource Acquisition of Good Projects that don’t otherwise contribute new Demo-type Learning

**CHP Catalog Program**
Goal: Market Transformation via Standardization & Maturity
NYSERDA’s Decade of CHP Experience

• **Strategy:** Portfolio of diverse examples
  - **Size:** 1.2 kW to 40 MW
  - **Sectors:** 56 at Apartment Buildings, 26 at Healthcare, 26 at Farms, 17 at Schools, 6 at Office Buildings
  - **Fuels:** Natural Gas, Biogas, Wood
  - **Machinery:** Engines, Microturbines, Fuel Cells, ORC, Combustion Gas Turbines, Steam Turbines

• **Impacts**
  - 181 projects to yield 200 MW
  - Of these, 140 projects are operational = 170 MW installed
  - **Funding:** NYSERDA … $125 Million
    + Others .......... $675 Million
    = Total ............ $800 Million

http://chp.nyserda.ny.gov
Observation of Purchasing Habits

• Habit #1: Simplicity is most important
  – Small-to-medium (50 kW – 1.3 MW)
  – Identify replicable designs/opportunities
  – Promote standardization for streamlining
  – Many mass-market “appliance-like” sales
    (how an individual person buys a car)

• Habit #2: Customization is most important
  – Medium-to-large (greater than 1.3 MW)
  – Promote custom design to maximize efficiency
  – Few custom-oriented sales
    (how the US Navy buys an aircraft carrier)
Program Administration Formats

- Competitions

- Standard Offers:
  1. List of pre-qualified measures and their associated specific rebates
  2. Pseudo-performance (financial award is computed based on analysis and forecast of site-specific performance)
  3. Performance payments based on measured & verified performance

See Program Logic Model at:
1. CHP is Good

2. Sequence of Program Evolution

3. The Current Program -- The “Catalog” Approach

4. Other Features of The Current Program
CHP Acceleration “Catalog” Program

Program Mechanism:

• Create a catalog of “pre-qualified” systems
  – reputable components that appear to be properly size-matched
  – coordinated with Utilities for generic review

• Assign specific “rebate” to each system

• Invite customers to shop from catalog
  – Streamlined approach to system sizing
  – Customized approach to system sizing
CHP System Sizing Guidelines

NYSERDA has developed a set of conservative CHP system sizing guidelines for common building types based on combinations of site characteristics and CHP system sizes that have been shown to perform well. Applications that fall within the sizing guidelines will receive a streamlined review by NYSESRDA.

<table>
<thead>
<tr>
<th>Building Type</th>
<th>Maximum Microturbine Size</th>
<th>Maximum Reciprocating Engine (RICE) Size</th>
<th>Other Restrictions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Multi-Family Housing</td>
<td>0.25kW/Apartment</td>
<td>0.35kW/Apartment</td>
<td>Building must be master metered</td>
</tr>
<tr>
<td>Assisted Living / Nursing Home</td>
<td>0.15kW/Bed</td>
<td>0.25kW/Bed</td>
<td></td>
</tr>
<tr>
<td>Hospital</td>
<td>1.4kW/Bed</td>
<td>2.0kW/Bed</td>
<td></td>
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<tr>
<td>Hotel</td>
<td>0.14kW/Room</td>
<td>0.20kW/Room</td>
<td></td>
</tr>
</tbody>
</table>

“Safe Harbor” Sizing:
- a hotel with 300 guest rooms should buy not-to-exceed 60 kW system
- a nursing home with 300 beds should buy not-to-exceed 75 kW system
- an apartment building with 300 housing units should buy not-to-exceed 100 kW system
- a hospital with 300 beds should buy not-to-exceed 600 kW system
Right-size is Key to Success

Example: Two Seemingly Similar Hotels

300 Guest Rooms
- No Grand Ballroom
- No Health Club
- No Linens Laundry

Rule-of-Thumb sets cap at 60 kW, probably right size

300 Guest Rooms
- Yes Grand Ballroom
- Yes Health Club
- Yes Linens Laundry

Rule-of-Thumb sets cap at 60 kW, but probably could go bigger
CHP Acceleration “Catalog” Program

Catalog Items:

• Clean and Efficient CHP and CCHP
• Integrated Controls Package
• Built-in Data Monitoring Features
• Bumper-to-Bumper Warrantee / single-point
• 5-year Service Plan
• “Stand-alone” Operability is Mandatory for All

Attention CHP Vendors (system “packagers”):
Instructions at RFI 2568 for how to get your products added to the Catalog
CHP System Catalog

CHP Acceleration Program

(PON 2568 Attachment C)

Release Date: December 2012
Updated: August 2013
Updated: Sept 2014

CHP Acceleration Program
Program Opportunity Notice (PON) 2568

$20M Available

$60 million Available

Applications accepted through 5:00 PM Eastern Time on December 30, 2016
The CHP “Catalog” -- 50 kW to 1.3 MW

<table>
<thead>
<tr>
<th>Eligible Vendor</th>
<th>50 - 100</th>
<th>101 - 200</th>
<th>201 - 300</th>
<th>301 - 400</th>
<th>401 - 500</th>
<th>501 - 600</th>
<th>601 - 700</th>
<th>701 - 800</th>
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<th>901 - 1000</th>
<th>1001 - 1100</th>
<th>1101 - 1200</th>
<th>1201 - 1300</th>
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<tr>
<td>2G Cenergy</td>
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<td>Cogen Power Technologies</td>
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<td>Ener-G Rudin, Inc.</td>
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<td>Kraft Power Corporation</td>
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<td>LC Associates</td>
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<td>RSP Systems</td>
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<td>Teoogen, Inc.</td>
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<td>Unison Energy</td>
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</table>

v1: 8 Vendors & 36 systems  
v2: 10 Vendors & 64 systems  
v3: 13 Vendors & 141 systems  
v4: due to be issued soon

All of these systems are capable of running during a grid outage.

Incentives:
- Upstate/Downstate differential
- Extra for Absorption Chillers
- Bonus for Critical Infrastructure
- Bonus for ConEd Target Zone

Downstate “Base” Incentives:
- 100 kW = $1,800/kW
- 200 kW = $1,750/kW
- 300 kW = $1,700/kW
- 400 kW = $1,650/kW
- ...
Example of a Catalog Cut Sheet
### Examples of Incentives

<table>
<thead>
<tr>
<th>System Size</th>
<th>Typical Customer (these are real examples)</th>
<th>Total Cost</th>
<th>NYSERDA Incentive</th>
<th>Out-of-pocket Expense</th>
</tr>
</thead>
<tbody>
<tr>
<td>100 kW</td>
<td>Multifamily 100 units</td>
<td>$370,000</td>
<td>$198,000</td>
<td>$172,000</td>
</tr>
<tr>
<td>200 kW</td>
<td>Multifamily 500 units</td>
<td>$625,000</td>
<td>$350,000</td>
<td>$275,000</td>
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<tr>
<td></td>
<td>Multifamily 450 units</td>
<td>$850,000</td>
<td>$350,000</td>
<td>$500,000</td>
</tr>
<tr>
<td>300 kW</td>
<td>Multifamily 700 units</td>
<td>$1,800,000</td>
<td>$561,000</td>
<td>$1,239,000</td>
</tr>
<tr>
<td>600 kW</td>
<td>Hotel 400 rooms</td>
<td>$1,800,000</td>
<td>$930,000</td>
<td>$870,000</td>
</tr>
<tr>
<td>800 kW</td>
<td>7-story @ 200,000 sq.ft. mixed-use commercial</td>
<td>$3,400,000</td>
<td>$1,276,000</td>
<td>$2,124,000</td>
</tr>
<tr>
<td>1,200 kW</td>
<td>48-story @ 1,800,000 sq.ft. mixed-use commercial</td>
<td>$5,000,000</td>
<td>$1,500,000</td>
<td>$3,500,000</td>
</tr>
</tbody>
</table>

In this size range, NYSERDA incentives are, on average, about 40% of the overall cost of the project.

39 applicants to-date (19 of which have major equipment on-site already), zero attrition!
1. CHP is Good
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Transformational Aspects of Program

Replacing arms-length transactions with long-term relationships.

Furnishing “Helper Agent” as coach to customer (e.g., help to establish a rationale for choosing between prospectuses).

Annual technical conferences for vendors and consultants. Periodic Expos for potential customers to facilitate comparison-shopping.

NYSERDA funding is paid to the Vendor.

To receive an incentive, the system must be installed and commissioned showing it runs during a grid outage, and must be sited “high and dry” at buildings located in flood prone areas.

Promotes a preferred configuration for enhanced resiliency.

**Compresses timelines:**

- Quicker getting to “yes”
- Quicker design for integration with the building
- Quicker installation
NYSERDA CHP Expo

New York State Energy Research and Development Authority (NYSERDA)

NYSERDA's Combined Heat and Power Expo is designed to help commercial, industrial, and multifamily building owners and managers connect with pre-approved Combined Heat and Power (CHP) equipment vendors and other organizations offering financial incentives and technical support for the installation of CHP systems. NYSERDA's CHP programs offer incentives for systems 50 kW and larger.

Building owners, managers, and other representatives are invited to stop by and speak with CHP system vendors, NYSERDA staff, and U.S. Department of Energy's CHP Technical Assistance Partnership representatives about the various products and services available to capture significant energy savings and improve the resiliency of their buildings.

The Expo will feature:
- Information from vendors of pre-approved CHP systems featured in NYSERDA's CHP Catalog
- Information on FREE technical assistance and project screening offered through the U.S. Department of Energy's Northeast CHP Technical Assistance Partnership
- Q&A time with representatives from Con Edison

Register today: chpExpoWestchester.eventbrite.com

Questions? chpAccreditation@nyseda.ny.gov

Please note: This event is intended to address medium-to-large buildings (those with a monthly electric bill of $5,000 or more).

The World Alliance for Decentralized Energy (WADS) will hold their Annual Meeting and Distribution Conference at the same location on October 14-16. Visit www.localpower.org for more information and to register!
Enhanced Resiliency via N+1 Config

NYSERDA encourages meritorious “N+1” configurations

Example: A hospital suitable for a 600 kW system should consider 3 generators at 300 kW each = 900 kW

Operating schedule on regular days:
- Week #1 use generators A + B = 600 kW
- Week #2 use generators A + C = 600 kW
- Week #3 use generators B + C = 600 kW

Operating schedule on “Demand Response” days and during grid outages: use generators A + B + C = 900 kW

<table>
<thead>
<tr>
<th>Size (kW)</th>
<th>Downstate Incentive ($)</th>
</tr>
</thead>
<tbody>
<tr>
<td>600</td>
<td>$930,000</td>
</tr>
<tr>
<td>900</td>
<td>$1,260,000</td>
</tr>
<tr>
<td>delta</td>
<td>$330,000</td>
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</tbody>
</table>
CHP Acceleration “Catalog” Program

System “re-commissioning analysis” in sophomore year

Win-Win-Win-Win-Win-Win-Win-Win Outcomes:

- **Customer**: confidence, “vetted” system
- **Developer/Financier**: transparency of program
- **Equipment Vendor**: marketing edge
- **Consulting Engineer**: role of “personal shopper”
- **Authority-having-Jurisdiction**: familiarity & comfort
- **NYSERDA**: acceleration of uptake
We’ve proven that this program format:

• Gets good projects.
• Accelerates timelines.
• Drives-down “soft costs” such as customer acquisition.

Transformed the way “deals” occur in marketplace:

• Expanded the tendency toward “healthy” comparison shopping.
• Market embraces a new objective of “partnerships” instead of “sales”.

Program Accomplishments
• The entire marketplace will benefit if other states adopted a similar “Catalog” approach (enables Vendors to claim multi-state approval).

• **NYSERDA is eager to work with other states to evolve this into a common/regionalized “Catalog” to be maintained by a neutral party (for example: Unified List of Small Wind Turbines maintained by ITAC http://www.cesa.org/projects/ITAC/itac-unified-list-of-wind-turbines/).**
Connecticut Microgrid Program

Presenters:

Tracy Babbidge
- Bureau Chief
- Bureau of Energy and Technology Policy

Veronica Szczerkowskki
- Microgrid Program Coordinator
- Bureau of Energy and Technology Policy
Connecticut Microgrid Program

Overview

- Where We Are Coming From
- Vision for Microgrids in Connecticut
- Program Purpose
- Energy Policy
- Round 1 Award Winners
- Round 2
- Round 2 Award Winners
- Round 2 Survey
- Future Rounds
- Municipal Assistance
- Additional Program Information
Connecticut Microgrid Program

Where are We Coming From

- Connecticut has been hard hit with severe weather in recent years
  - 2010 snowstorms
  - Tropical Storm Irene
  - Freak October snowstorm
  - Superstorm Sandy
  - Blizzard of 2013

- Storms have left hundreds of thousands without power for long periods of time, in some cases in excess of 10 days
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.
  – Engineered to “island” from the grid when the larger grid is de-energized
  – Built in a cost-effective manner
  – Contribute to public good by islanding critical facilities
  – Connects more than one critical facility to reliable distributed generation resources
The purpose of the program is to solicit proposals to build microgrids in order to support critical facilities during times of electricity grid outages.
Connecticut Microgrid Program

Energy Policy

• Connecticut’s first-in-the-nation statewide microgrid program is critical piece of larger resiliency strategy

• Power outages are inevitable, but program provides enhanced safety and quality of life for residents in an outage situation

• Program fits in with Governor’s larger vision for cheaper, cleaner, and more reliable energy future for Connecticut

• In line with “portfolio approach” that encourages deployment of distributed generation
# Connecticut Microgrid Program Results

## Round 1 Award Winners

<table>
<thead>
<tr>
<th>Project</th>
<th>Critical Facilities</th>
<th>Generation</th>
<th>Grant $ awarded</th>
</tr>
</thead>
<tbody>
<tr>
<td>UConn Depot Campus</td>
<td>Campus Buildings</td>
<td>400 kW fuel cell, 6.6 kW PV</td>
<td>$2,144,234</td>
</tr>
<tr>
<td>City of Bridgeport</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>Wesleyan</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>University of Hartford</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>SUBASE</td>
<td>Various Buildings and Piers</td>
<td>5 MW cogen turbine, 1.5 MW diesel</td>
<td>$3,000,000</td>
</tr>
<tr>
<td>Town of Windham</td>
<td>2 Schools (Various Public Purposes)</td>
<td>(2) 130 kW natural gas, 250 kW solar, 200 kWh battery; (2) kW diesel,</td>
<td>$709,350</td>
</tr>
<tr>
<td>Town of Woodbridge</td>
<td>Police Stations, Fire Station, Department of Public Works, Town Hall, High School, Library</td>
<td>1.6 MW natural gas, 400 kW fuel cell</td>
<td>$3,000,000</td>
</tr>
<tr>
<td>City of Hartford</td>
<td>School, Senior Center, Library, Supermarket, Gas station</td>
<td>600 kW natural gas</td>
<td>$2,063,000</td>
</tr>
<tr>
<td>Town of Fairfield</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>
</tbody>
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Connecticut Microgrid Program

**Round 2**

- $15 million in funding
- Revised program procedures and criteria
- Financing program in conjunction with the Connecticut Green Bank
- Emphasized participant education
  - Four part microgrid educational webinar series:
    - Financing for clean generation and entire microgrids
    - Technical aspects of microgrids
    - Other microgrid assistance (legal, process, etc.)
    - Clean generation, renewable generation, storage
Connecticut Microgrid Program

Round 2 Stage One Threshold Review Criteria

- Complete proposal
- Documentation
- Serve two or more physically separated critical facilities
- Generation requirements
- Withstand Category 1 hurricane
- 2-4 week fuel supply
- Not located in a flood plane
Connecticut Microgrid Program

Round 2 Stage Two Threshold Review Criteria

<table>
<thead>
<tr>
<th>Review Criteria</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Technical</td>
<td>25%</td>
</tr>
<tr>
<td>Financial, Managerial and Operational Capability</td>
<td>45%</td>
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<tr>
<td>Social Benefits</td>
<td>20%</td>
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<tr>
<td>Environmental</td>
<td>10%</td>
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<tr>
<td><strong>Total</strong></td>
<td><strong>100%</strong></td>
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## Connecticut Microgrid Program

### Round 2 Award Winners

<table>
<thead>
<tr>
<th>Project</th>
<th>Critical Facilities</th>
<th>Generation</th>
<th>Grant $ Awarded</th>
</tr>
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<tbody>
<tr>
<td>City of Milford</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>campus buildings - dining hall, recreation center, student center, 2 residential buildings as shelter, police station</td>
<td>1.4 MW fuel cell</td>
<td>$ 2,180,899</td>
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<tr>
<td><strong>TOTAL GRANTS AWARDED</strong></td>
<td></td>
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<td>$ 5,090,240</td>
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# Connecticut Microgrid Program

## Round 2 Survey

<table>
<thead>
<tr>
<th>Survey Respondents - By Type</th>
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<tbody>
<tr>
<td>State Government</td>
<td>1</td>
</tr>
<tr>
<td>Municipal Government</td>
<td>10</td>
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<tr>
<td>Private Company</td>
<td>13</td>
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<td>Other/Unknown</td>
<td>27</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>51</strong></td>
</tr>
</tbody>
</table>

* Survey conducted from November 4 – 20, 2014
Connecticut Microgrid Program

Future Rounds – What is DEEP Thinking?

• Survey
  – Analyze responses
  – Integrate suggestions into future program design

• Rolling applications

• Work with DAS to develop an approved vendor list

• Possible redesign to individual grant amounts
Connecticut Microgrid Program

Future Rounds cont.

• Continue funding under the $30 million authorized in 2013 legislative session

• Next round of microgrids program will be launched in early 2015
  – Refined procedure
  – Rolling applications
  – More technical support for municipalities
## Municipal Assistance

### Meeting With Municipalities
- Municipal Officials
- Municipal Staff
- DEEP
- EDC
- CT Green Bank

### Meeting Topics
- General Program Questions
- Town Energy Needs
- Identify Critical Facilities
- Project Financing
Connecticut Microgrid Program

• Email DEEP.EnergyBureau@ct.gov

• Link to Microgrid Program Pilot Round and Round 2 information:
  – Request for Proposals
  – Frequently Asked Questions
  – Proposals
  – Presentations
Thank you for attending our webinar

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