Integrating Distributed Energy Resources onto the Utility System
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• 3 states
• 3.6m customers
• 8,000 employees
• $500m+ annual EE investment

#1 Ranking

www.peakload.org
Emerging Trend – Increased Saturation of Distributed Energy Resources

• Increased saturation of behind the meter (BTM) distributed energy resources (DERs) presents risks and opportunities for the grid

• Fundamental question is how do we safely integrate new resources onto the grid?

Source: CPower
Increased Saturation of Distributed Energy Resources Can Lead to Reduced Visibility on Grid Edge

• Visibility
  • Certain types of non-exporting technologies do not go through the interconnection process
  • Many types of load reducing assets do not require a service upgrade
  • Other controllable loads like EVs may not necessarily be visible

Source: CPower
Demand Side Management Program is Designed to Control Assets and Pay Incentives to Customers

<table>
<thead>
<tr>
<th>Residential</th>
<th>Devices</th>
<th>C&amp;I</th>
<th>Typical Application</th>
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</table>
| **Thermostat** | • 13 to 17 events per summer  
• 3 hours per event  
• $20 for signing up  
• $25 per year | | |
| **Battery*** | • 30 - 60 events per summer,  
• 2 - 3 hours per event  
• $225/kW-summer  
• $50/kW-winter | | |
| **Electric Vehicle** | • 2 to 8 events per summer  
• 3 hours per event  
• Scheduling  
• Eversource – Charger Control | | |
| **Targeted Dispatch** | • 3 - 8 events per summer  
• 3 hours per event  
• $35/kW-summer  
• Targeted Storage $100/kW | | |
| **Daily*** Dispatch | • 30 - 60 events per summer,  
• 2 - 3 hours per event  
• $200/kW-summer | | |
| **Winter Dispatch** | • 5 events per winter  
• 3 hours per event  
• $25/kW-winter | | |

*Per Order: Demonstration for 2019 – expect to reach full offering for 2020
Multiple Paths to Integrating Assets into Distribution Systems

There are different types of market actors but they all require a process for integration.
How do We Create a Win-Win Situation?

1) Do no harm – protect safety and reliability of the system

2) Have a beneficial impact – pull together all the different resources to optimize the grid

3) Provide an additional value stream to customers and businesses
Key Areas of Concern

Eversource has an obligation and primary focus to provide safe and reliable electrical service

Challenges

Private market aggregators are looking for additional ways to monetize their portfolios

Municipal aggregators running a retail demand response program want to maximize their impact

Issues

Dispatch strategy
Limited geographies
Interconnection
Utility scale storage
Distribution system configuration

D.P.U. 11-75-E at 34:
“Safety and reliability are of paramount importance to the Department. Although the advancement of DG in the Commonwealth is a very important goal, it must not jeopardize the reliability of the electric distribution system, the distribution equipment itself, or the safety of customers and those who maintain the system.”
### Key Principles for Integration

<table>
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<th><strong>Dispatch</strong></th>
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<td>• Eversource has ability to dispatch the assets</td>
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<tr>
<th><strong>Location</strong></th>
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<tr>
<td>• Insight and review/approval of assets</td>
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<th><strong>Aggregation</strong></th>
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<td>• More insight into the proposed aggregation of assets</td>
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<tr>
<td>• All customers included in the aggregation</td>
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<th><strong>Interconnection</strong></th>
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<td>• Applications for aggregated resources to come in blocs</td>
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<th><strong>Costs</strong></th>
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<td>• 3rd parties to pay for reasonable incremental costs</td>
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What Allows for this Approach?

• System Architecture
• Standardization across operating companies
• Cloud to cloud integration
• Internal governance procedures
System Architecture Allows for Inclusion of 3rd Party Assets

Experience with 3rd parties informed the decision to create a framework and platform that could accommodate non-utility owned assets.

Key Points:

- As long as there are compatible communication protocols, 3rd party assets can be incorporated into dispatch platform.
- Avoids redundant need to procure dispatch platforms.

Eversource took a standardized approach across its 3 state service territory in the development of the system architecture.
Standardization Across Multiple Operating Companies Provides Consistency and Confidence

Eversource Active Demand Management Team

NSTAR Electric
Western Massachusetts Electric Co

Connecticut Light & Power

Public Service of New Hampshire
Cloud to Cloud Integration Allows for 3rd Party Assets

Communication protocols allow the DERMS platform to communicate with the OEM clouds and send dispatch instructions.
Governance Structure and Process

Develop annual dispatch plan; agreed upon thresholds/triggers

2-7 Days Before Event

ISO-NE Load Forecasts

Load Predictive Analytics

24-48 Hours Before Event

Decision to Dispatch

Inform Appropriate Parties

24 Hours Before Event

Inform Appropriate Parties

 Updates in Real Time

Control Room

System Engineering

Distribution Planning

Grid Mod
Governance Structure and Process Cont’d

Governance structure outlines how event days will be determined...

... and what will happen 24-48 hours before an actual dispatch.
Thank You

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