Energy Storage Roadmap for New York’s Electric Grid

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ENERGY STORAGE ROADMAP FOR NEW YORK’S ELECTRIC GRID
Changing Electricity Grid

Key Goals supported by Energy Storage

- Improving the efficiency and capacity factor (utilization) of the electric grid
- Integrating an increasing amount of renewable energy
- Enhancing the reliability and resilience of the electric grid
Electricity Grid Architecture
## Energy Storage Applications

<table>
<thead>
<tr>
<th>DRIVERS</th>
<th>CUSTOMER-SITED (BEHIND THE METER)</th>
<th>DISTRIBUTION SYSTEM</th>
<th>GENERATION AND TRANSMISSION GRID</th>
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</thead>
</table>
| Capacity and Peak Load Reduction | + Demand charge reduction (peak shaving)  
+ Avoiding interconnection upgrades  
+ Permanent load shifting | + Defer system upgrades (local capacity)  
+ Distributed peaker  
+ Circuit load relief/demand response | + Capacity (peaker plant replacement)  
+ Transmission congestion relief  
+ Transmission upgrade deferral |
| Renewables Integration   | + Integrating distributed generation  
+ Microgrid stability  
+ Optimizing energy cost (Time shifting) | + Increase renewable integration (circuit hosting capacity and prevent reverse power flow)  
+ Reduce renewables curtailments and congestion  
+ Circuit flexibility and stability | + Frequency regulation  
+ Renewable firming  
+ Reduce renewables curtailments and congestion  
+ Spinning/non-spinning reserve  
+ Ramp rate reduction (duck curve issue)  
+ Time shift energy |
| Resilience and Reliability | + Uninterruptible Power Supply  
+ Maintaining power quality  
+ Microgrid stability  
+ Building emergency power | + Circuit flexibility and stability  
+ Improve system reliability  
+ Voltage support and power quality (reactive power) | + Spinning/non-spinning reserve  
+ Renewable firming  
+ Black start |
Flatten the 100 hour peak

Flatten the peak 100 hours would save $1.2 - $1.7 billion annually according to the PSC.

1GW/2GWh would eliminate over 30 hours.

2GW/10GWh would provide over one-third of the total energy to flatten.

Short time allows storage to perform multiple functions.
Renewable Integration

50% Renewable energy by 2030 and a need to go further to meet 80x50 greenhouse gas goal

Capacity factors drive high nameplate capacity requirement

Firming and smoothing

Energy shifting

Project need for at least 4 GW of multi-hour storage and recommend detailed study
Key Challenges

- Inability to currently monetize full value of storage
- Inability to participate in existing markets
- Markets or other monetization mechanisms lacking
- Confidence in future revenue stream
- High soft costs
- Insufficient information availability
Battery prices decline with similar slope to PV
Storage capacity goals in GW are multi-hour systems with GWh levels discussed in Roadmap.
Recommended Actions

**LMP+D and peak load:**

- Extend existing programs
- Interim programs to realize value – particularly of local capacity/load reduction

**Clean Energy Standard:**

- Establish Energy Storage goals
- Flexible Energy Credit

*Address monetization of value in supporting REV, renewable energy and environmental goals along with revenue confidence*
Thank you