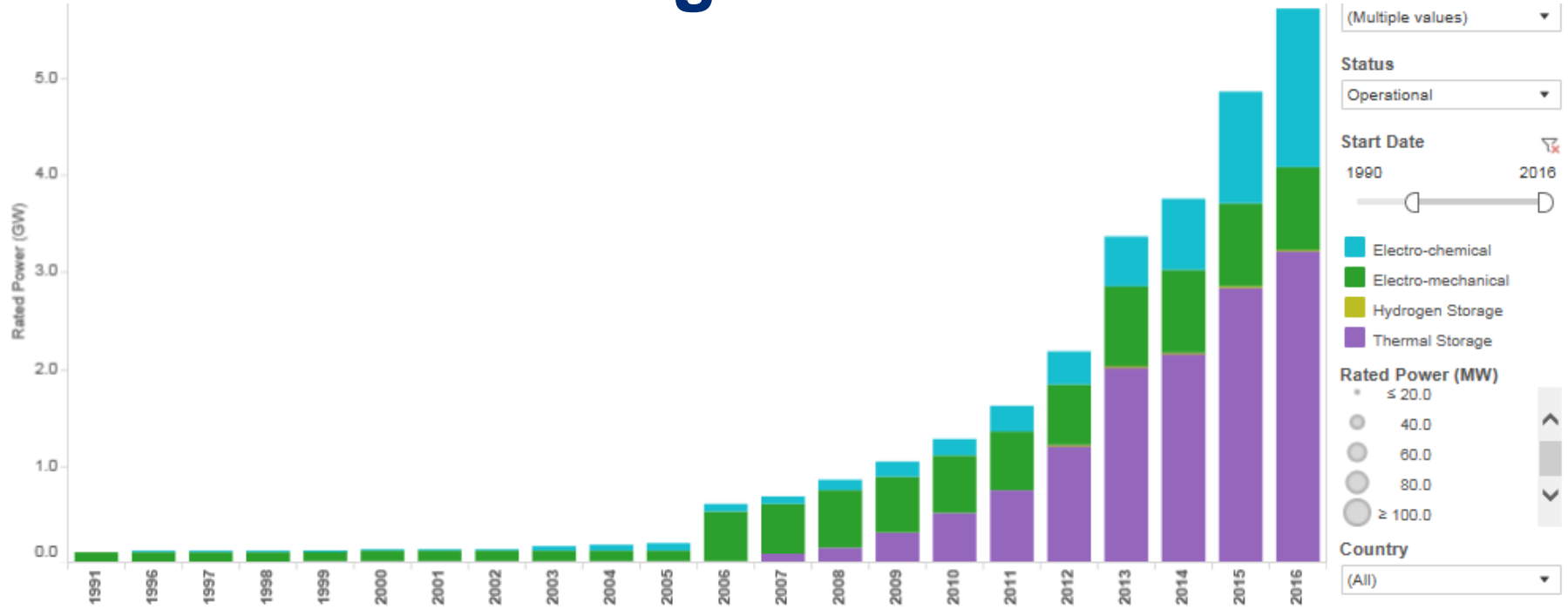


Association of Energy Engineers New York Chapter April 18, 2017

Agenda

- ❑ **State of deployment snapshot**
- ❑ **Policy implications and opportunities**
- ❑ **NYSERDA interventions**

Advanced Storage Worldwide

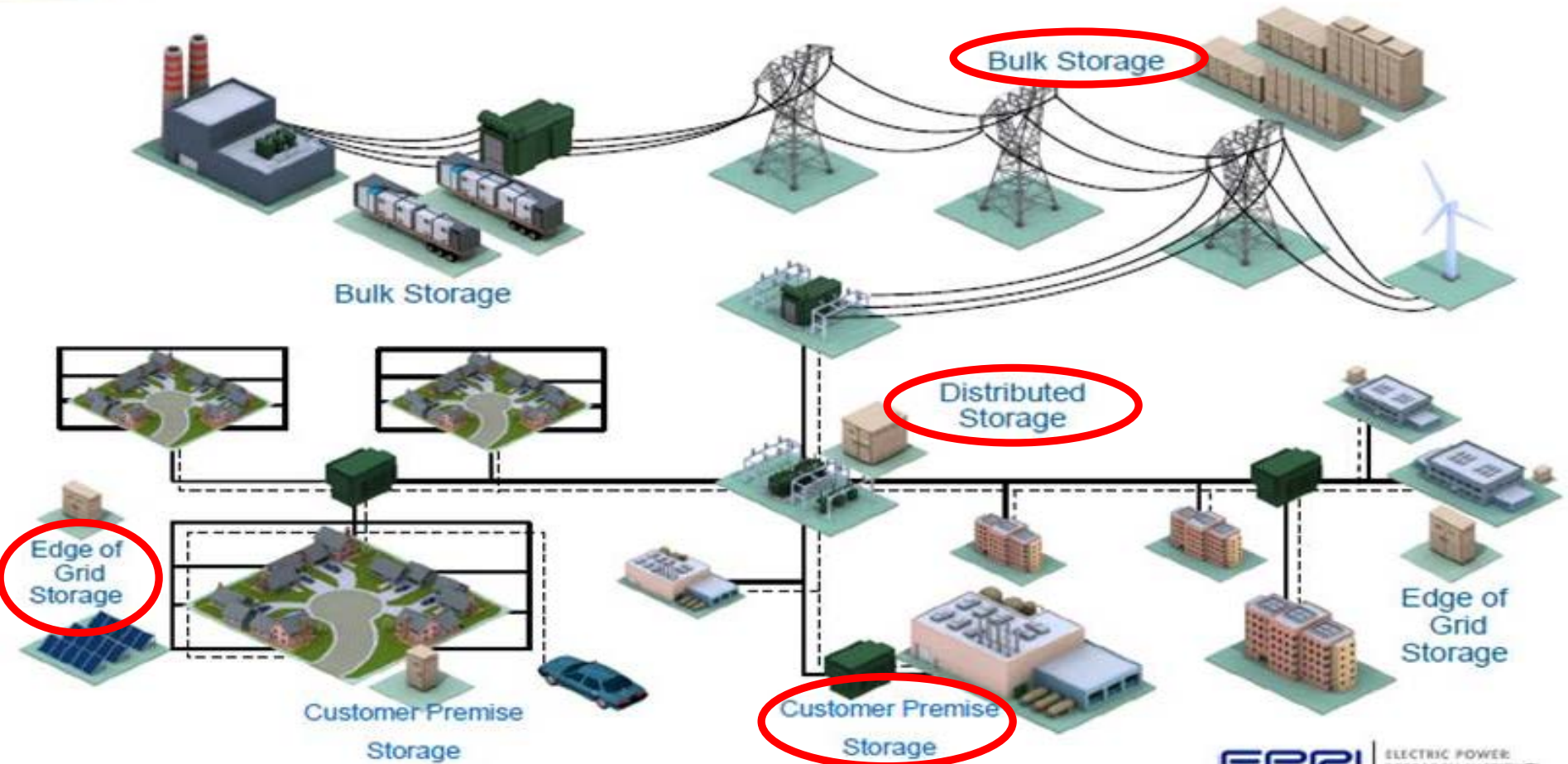


Source: DOE Global Storage Database – operational systems

Installed Energy Storage System Cost

- ❑ **Utility scale:** about \$665/kWh installed, almost 50/50 battery cost and BOS cost (US figures from 2015-16, GTM Research)
- ❑ **BTM:** about \$800-\$900/kWh in NYC
- ❑ **Battery costs declining** by 10%+ per year
- ❑ **Installed costs** expected to decrease by about 7-10% per year through 2020 for li-ion (Navigant Research).

The Roles of Storage on the Grid



REV Clean Energy Goals for 2030

40% **Reduction**
in greenhouse gas emissions from 1990 levels

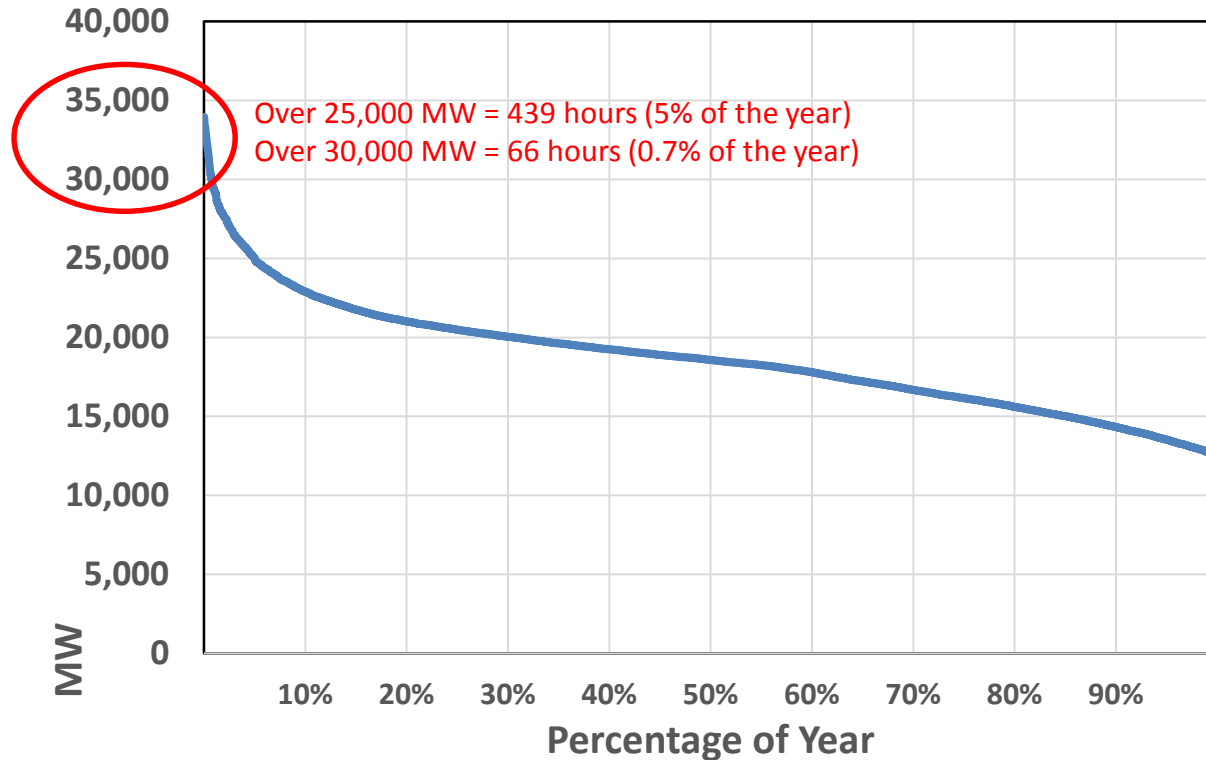
50% **Generation**
of New York State's electricity must come from renewable energy sources

23% **Decrease**
in energy consumption of buildings from 2012 levels

Energy Storage Opportunities

- Ratepayer savings
- Flexible renewable penetration
- Economic growth

2013 NYS Load Duration Curve



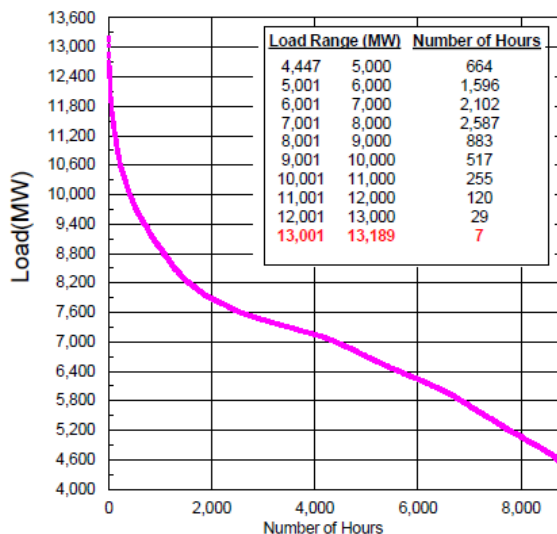
Source: Compiled from NYSIO data

NYC Peak Electric Demand

Load Demand and Projections

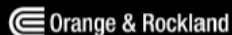
System is planned to: Customer, Network, & Coincident Transmission Peaks

CECONY Service Area Load Duration Curve



- Solar helps but it's not a demand reduction solution
- Solar is generally coincident with the system (transmission) peak
- Solar is not coincident with residential customer peak
- Storage can be used for strategic demand reduction

8



Storage under the Clean Energy Fund

- Technology and product development
- Soft cost reduction
- Value stacking
- PV + storage

Why soft costs?

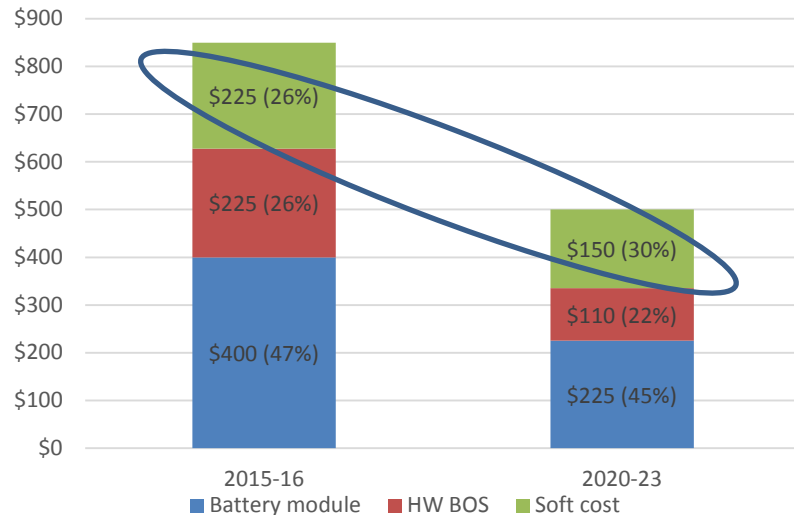
- ❑ Include customer acquisition, design, permitting, interconnection, land or rental fees, construction, financing
- ❑ Can comprise 15% to 20% of FOM and 25% to 35% for BTM
- ❑ Most significant near-term opportunities to reduce soft costs:
 - ❑ permitting
 - ❑ customer acquisition
 - ❑ uncertainty in revenue and performance
- ❑ CEF objective: reduce BTM soft costs by 25% in 3 years and 33%+ in 5 years

Soft Cost Reduction Focus

Reduce soft costs 33% within
3-5 years

- Permitting/interconnection
- Customer acquisition
- Uncertainty (performance or revenue)

= ~\$75/kWh removed from today's cost



Average BTM installed cost for 4 hour system; li-ion used as a representative technology

Safety and Permitting



- [Battery safety testing report](#)
- Work with AHJs (training materials, permitting guides, Q&A)
- Additional safety testing as identified including emerging chemistries

Customer Acquisition



- Data mining and tools to identify best fit customers
- Customer outreach and education

Vendor Engagement



- Storage use cases
- Optimizing tariffs
- Value streams

Performance & Revenue Confidence



- Independent system performance M&V
- Post installation bill analytics
- Aggregated on [NYSERDA DG Portal](#)

Distributed Storage Value Stacking Pilots

- ❑ Enable systems to meet host and electric system needs when needed
- ❑ Evaluate performance and control in reliably meeting system needs
- ❑ Must present a compelling market opportunity to reduce peak demand, reduce GHG, integrate renewables
- ❑ Quantify value in specific use cases
- ❑ \$15.5 million is budgeted through 2019-20
- ❑ Bring best projects and concepts as they are identified

PV + Storage Intervention Focus

High value locations on distribution system

For on-site PV systems, many C&I customers have roof space but value proposition for PV alone had not been compelling under NEM

For off-site PV systems such as CDG (Community Distributed Generation) under VDER, high LSRV locations and those where MTC could be exhausted quickly

Contacts

Join NYSERDA's energy storage [email distribution list](#)

Benjamin.Falber@nyserda.ny.gov or 212-971-5342 ext 3050

Tony.Abate@nyserda.ny.gov or 518-862-1090 ext 3522

Jason.Doling@nyserda.ny.gov or 212-971-5342 ext 3050