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**Department
of Public Service**

NYS Energy Storage Roadmap

Albany Technical Conference

August 21, 2018

Acenda

- 10:00-10:15 Welcome, Stakeholder Input Opportunities, Process Forward and Implementation
- 10:15-10:45 Roadmap Analytics and Approach
- 10:45-11:30 Retail Rate Actions and Load Management Programs
- 11:30-12:15 Utility roles and Non-Wires Alternatives
- 12:15-1:00 Lunch (on your own)
- 1:00-1:45 Clean Peak Actions
- 1:45-2:15 NYISO Presents on Wholesale Market Actions Related to Storage
- 2:15-3:00 Wholesale Market Actions, Dual Market Participation, Distribution/Wholesale Market Coordination
- 3:00-4:00 Market Acceleration Bridge Incentive Design and Implementation
- 4:00-4:30 Other Actions (NYS Leading by Example, Renewable Energy Certificate Procurement, Addressing Soft Costs)
- 4:30-5:00 NY Green Bank: Financing Solutions for the Energy Storage Marketplace

Stakeholder Input Opportunities

[CASE 18-E-0130 - In the Matter of Energy Storage Deployment Program](#)

- To facilitate review, commenters should organize their comments based on the Roadmap's table of contents headings. For example, "4.2.1 Earnings Adjustment Mechanisms."
- Interested parties are invited to submit initial comments regarding the Roadmap by September 10, 2018, and reply comments by September 24, 2018. All comments shall be submitted to the Secretary by e-filing through the DPS Document and Matter Management System (register at www.dps.ny.gov/e-file/registration.html) or by e-mail to the Secretary at secretary@dps.ny.gov. If unable to file electronically, commenters may make submissions by post or hand delivery to the Hon. Kathleen H. Burgess, Secretary, Three Empire Plaza, Albany, New York 12223-1350.
- Provide input on relevant DPS Staff Whitepapers (Expanded Eligibility for Value of DER compensation, Changes to DRV/LSRV, Standby Rates)
- These slides are filed on DMM. Those observing by webinar are in listen only mode.
- Three technical conferences are being held: 7/31 in NYC, 8/7 in Farmingdale LI, 8/21 in Albany



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Today's structure

- Staff will briefly introduce each topic and the major recommendations (10 minutes). After each section, we will stop for questions.
- Slides present high level recommendations, questions and feedback may be on anything contained in the roadmap or other recommendations you would like to offer
- Audience questions, clarifications and input to inform written comments
- Not the forum for debating actions
- To accommodate as many stakeholders as possible, please state your name and organization and limit your remarks to 1-2 minutes and come to the microphone
- Those on the webinar are in listen only mode
- The webinars are being recorded and will be posted on DMM



Path Forward

1Q18

- Governor Andrew M. Cuomo announces 1,500 MW storage target
 - Acelerex Energy Storage Study completed
 - Voice of customer/stakeholder meetings
-

2Q18

- Stakeholder engagement
 - NYS Energy Storage Roadmap released for formal public input
-

3Q18

- Technical conferences held
 - Formal public comments on Roadmap
 - PV + storage adder anticipated in Sep/Oct 2018
-

4Q18

- PSC establishes 2030 energy storage target and deployment of mechanisms and programs to meet the 2025 target on a pathway to meeting the 2030 target that will be established pursuant to Public Service Law Section 74.
- Recommended \$350 million market acceleration incentive implementation to begin within 90 days of Commission order



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Roadmap Analytics and Approach

Acelerex Energy Storage Study

Determine ranges of energy storage that could result in net positive benefit to ratepayers, compared to alternatives, in meeting electric system needs including installed capacity, transmission/sub-transmission, and distribution needs, that arise under various scenarios, sensitivities, and time horizons (2020, 2025, 2030).

Identify performance specifications (MW, MWh) of the deployed storage as well as costs and benefits consistent with Benefit Cost Analysis framework.

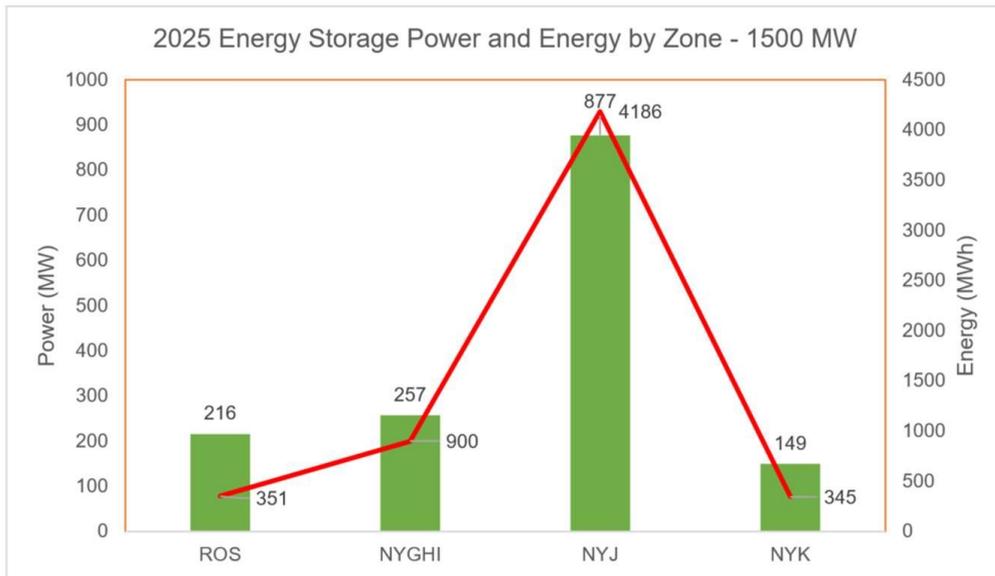


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Base Case

Energy Storage 1,500 MW Analysis for 2025



Energy Storage Buckets

Duration	MW	MWh
Long (6 hrs)	633	3,795
Medium Long (2-4hr)	242	970
Medium Short (1-2hr)	470	940
Short (30 mins)	155	78
Total	1,500	5,783

- Shown is the Governor's 1,500 MW storage target allocated by the model by zone (all upstate and western New York zones are included in "ROS," rest of state).
- This is not intended to show allocation of target deployment by utility.
- MW (power rating) is the green bar and MWh (duration) is the red line.



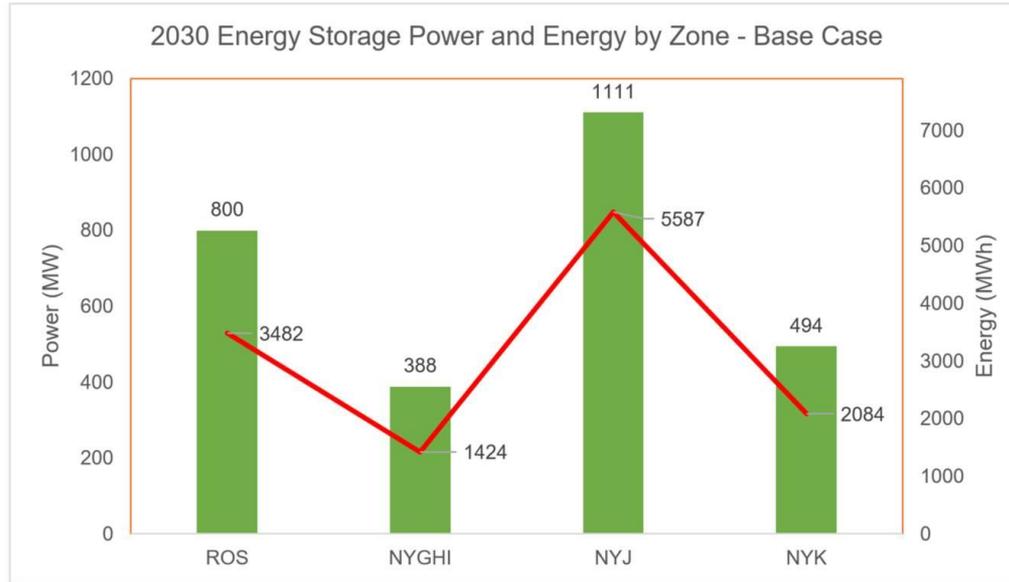
acelerex

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Preliminary Base Case Results

Energy Storage Sizing Analysis for 2030



Energy Storage Buckets

Duration	MW	MWh
Long (6 hrs)	1,447	8,682
Medium Long (4 hrs)	714	2,856
Medium Short (2 hrs)	467	934
Short (30 mins)	154	77
Total	2,795	12,557

By 2030, nearly 2,800 MW of storage is deployed by the model; 80% of the deployments between 2025 and 2030 occur outside New York City.

E3 Primary Use Cases Examined by Market Segment

Customer-Sited use cases examined storage for customer retail bill management and demand response within eight illustrative commercial, industrial or municipal customer types selected based on their greater consistency with other customers' load shapes to examine the potential market impact from the recommended actions. These were not exhaustive.

Distribution System use cases analyzed VDER tariff compensation for electricity exported into the distribution system, non-wires alternatives (NWAs) with wholesale market participation, and PV paired with energy storage cases.

Bulk System use cases analyzed combinations of wholesale market services including energy arbitrage, capacity, spinning reserves and frequency regulation, high zonal congestion energy prices, and large scale renewables paired with energy storage. Dual market participation in which storage met Distribution and Bulk system needs was examined.

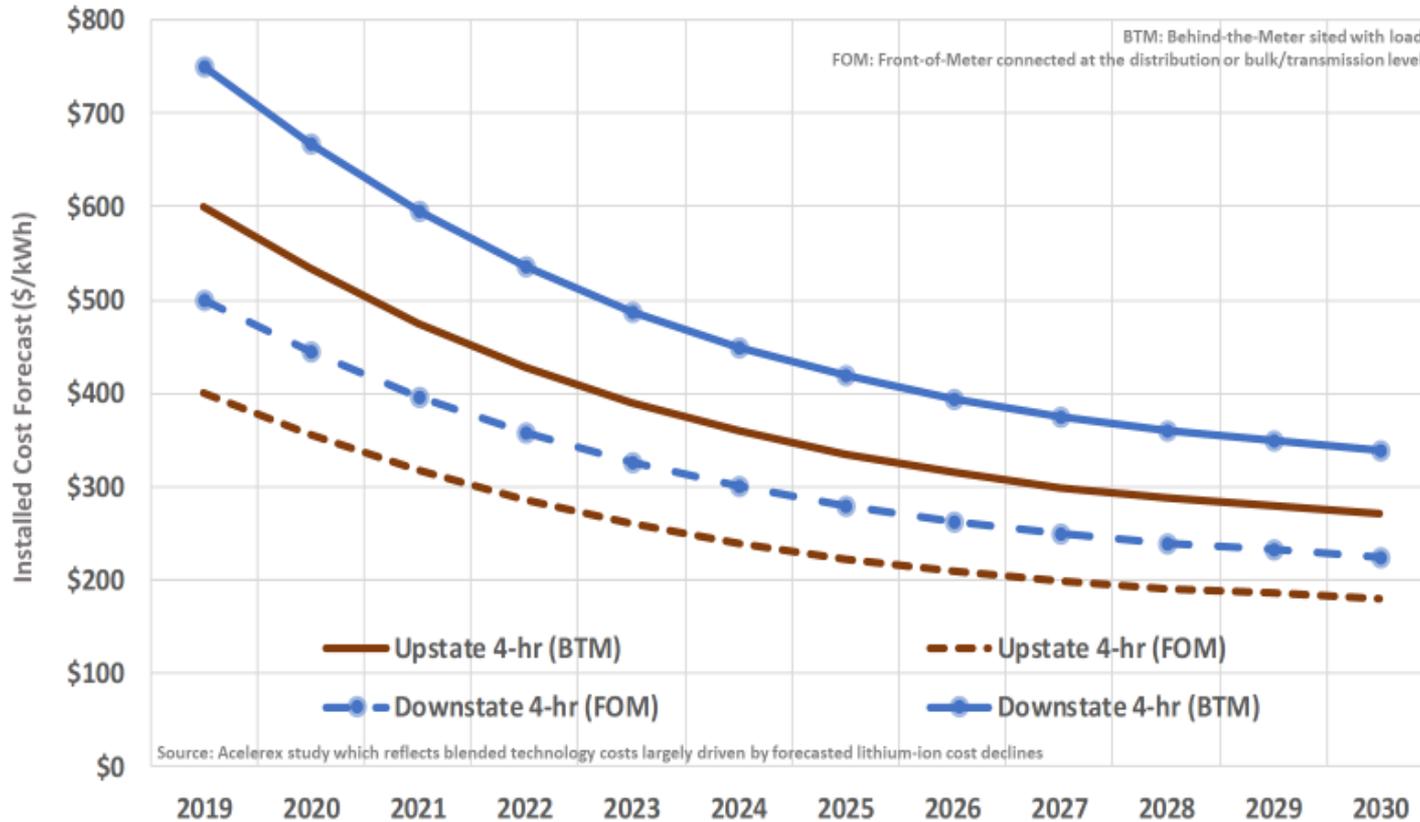
Project modeling was completed for several utility territories and NYISO zones



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Storage Cost Forecasts used in Analyses



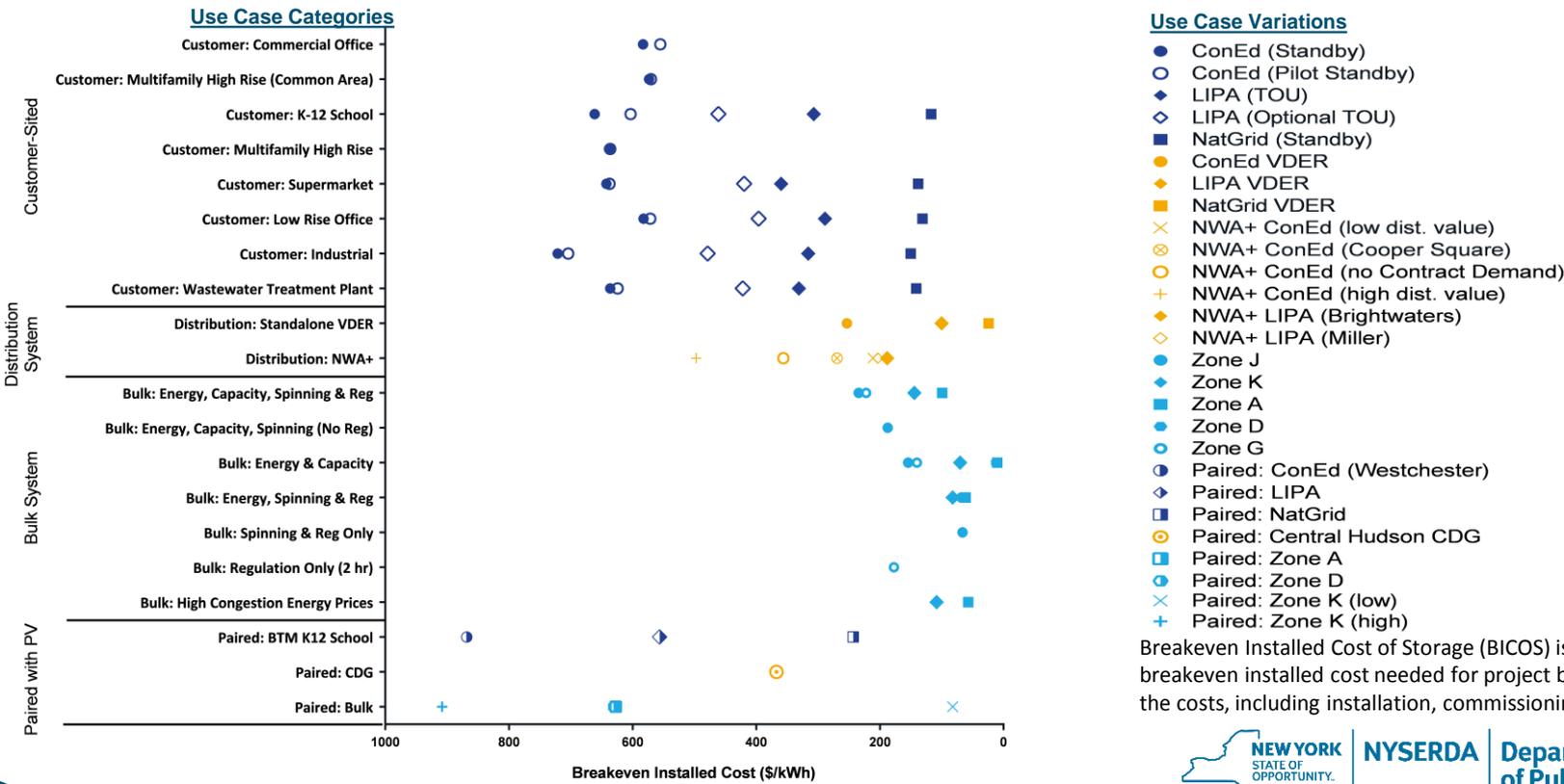
Reflects blended costs of various storage technologies and market research sources

E3 Project Economic Modeling Takeaways

- Many Customer-sited and Distribution system use cases including paired solar + storage projects are, or will soon become, viable in downstate New York between now and 2025.
- Economically attractive opportunities to pair storage with renewables and potentially to hybridize and/or replace fossil peaking units will also begin to arise.
- High-value Distribution system use cases in upstate New York will be economic.
- In the longer term, numerous diverse use cases will become economic across New York, especially as the system adds more renewables and the cost of storage solutions continues to decline.
- There will be cases in which project economics far surpass the illustrative economics shown due to different load shapes and local electric system needs.



Summary of All Use Cases Modeled by E3



Breakeven Installed Cost of Storage (BICOS) is the upfront, breakeven installed cost needed for project benefits to equal the costs, including installation, commissioning and financing.

Retail Rate Actions and Load Management Programs



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Roadmap Recommendations

Retail Rate Actions and **Utility Programs** to provide more accurate compensation and increase the ability to finance projects

- Offer optional, **more granular daily as-used demand charges** as a pilot tariff for demand metered customers, as delivery charge rate designs continue to better reflect cost-causation among customer classes through time and location
- Re-examine **charging/discharging rules and rates** for energy storage connected at customer, distribution, and bulk levels
- Offer **multi-year load management contracts** through utilities for 3-5 year terms



Roadmap Recommendations

Retail Rate Actions: Value of Distributed Energy Resources Compensation for Exported Electricity

- **Extend DRV lock** under the VDER value stack from 3 years to 7 years and implement a call signal
- Create a 4-8 hour window for a statewide “peak ‘E’” Value within the VDER value stack that varies by season to **recognize higher carbon emissions during peak periods**

Total VDER Compensation =

Energy value (LBMP)

Capacity value (ICAP)

Environmental (E)

Distribution value (DRV) *

High value distribution (LSRV)

** or Market Transition Credit for community solar projects*



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Investor Owned Utility Roles and Non-Wires Alternatives

Roadmap Recommendations

Investor-Owned Utility Roles to enable a market-based storage sector and align utility incentives and business models

- Promote **competitive procurement and third-party ownership of storage** in DER markets as per REV Track One Order
- Improve **utility NWA procurement** through greater visibility into future NWAs, interconnection costs, and NWA-eligible utility land; better data to indicate high-need areas of the electric grid; and other actions
- Improve utility **BCA framework** by including optionality valuation, terminal value and greater transparency into the components and calculation of each BCA application
- Create a new EAM for each utility incentivizing distribution system-wide **load factor improvement and peak reduction** to align utility actions with DERs' delivery of system value



Roadmap Recommendations

Investor-Owned Utility Roles to enable a market-based storage sector and align utility incentives and business models (continued)

- Include an **extension option** for the utility to extend an NWA contracts when an asset's life expectancy will exceed original NWA term
- Procure **NWA+ that reduce system peak load and provide wholesale market ancillary services** in addition to utility T&D deferral to provide greater ratepayer benefits by **focusing on the full customer bill**
 - Sub-transmission and distribution deferral value
 - + Capacity cost savings
 - + Ancillary services revenues (spinning reserves, frequency regulation)
- Allow developers to maintain a project's **interconnection** for wholesale services after the NWA term if distribution services are discontinued



Clean Peak Actions

Roadmap Recommendations

“**Clean Peak**” **Actions** to align storage approaches with DEC draft combustion turbine peaking unit regulations related to NOx and effectively value differential carbon reduction at peak.

- **Differentiate E value** in the VDER value stack to reflect time of day/season marginal carbon emissions
- Procure utility **NWA+ solutions** that defer utility T&D investment and reduce peak system loads which typically occur during periods of largest carbon emissions, including a fixed capacity value in the NWA+ term for the contracts duration
- Calibrate proposed **bridge incentives for distribution and bulk storage** to maximize carbon reduction by aligning with local or NYISO system peak loads
- **Encourage energy storage paired with large-scale renewables** through NYSERDA REC procurements (either co-located with the renewable or bid as a single REC price but located in a higher-value location on the grid)



Roadmap Recommendations

“Clean Peak” Actions to align storage approaches with DEC draft combustion turbine peaking unit regulations related to NOx and effectively value differential carbon reduction at peak (continued)

- Develop in partnership with DPS, NYSERDA, DEC, Con Ed, LIPA, NYISO and plant owners a methodology for analyzing peaker plant operational and emission profiles to **determine best potential candidates for hybridizing with storage, repowering or replacement** with storage
- Work in close coordination with DEC as potential NOx peaker regulations are developed, and order impacted utilities to develop a **“Peaking Unit Contingency Plan”** with initial results by July 2019 to address potential retirement of these generation facilities including a study quantifying
 - Impacts on the utility T&D system reliability
 - T&D incremental cost to maintain reliability
 - Alternatives to traditional T&D solutions
- Other near term mechanisms such as bridge incentives for clean capacity attributes



Wholesale Market Actions, Dual Market Participation, Distribution/Wholesale Market Coordination



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Roadmap Recommendations

Wholesale Market Actions to directly or indirectly access wholesale market values and **Distribution and Wholesale Market Coordination**

- Implement changes enabling **storage participation in capacity and ancillary services markets** in compliance with FERC Order 841; include storage as a **transmission resource in NYISO planning**
- **Remove impediments to pairing storage with bulk renewables** by re-examining how preferential treatment is applied for intermittent renewables that are partially firmed by storage
- Accelerate “**dual market participation**” by recognizing an asset may simultaneously provide distribution and wholesale system needs in the NYISO’s electric storage resource participation model Order 841 compliance tariff filing
- **Exempt DERs including distribution and bulk storage from Buyer Side Mitigation**
- Expand integrated **T&D planning to include storage**
- Develop **clear control, coordination and dispatch requirements** including visibility into asset state of charge to enable greater use of DERs including energy storage in meeting system customer, distribution and wholesale system needs



Market Acceleration Bridge Incentive Design and Implementation

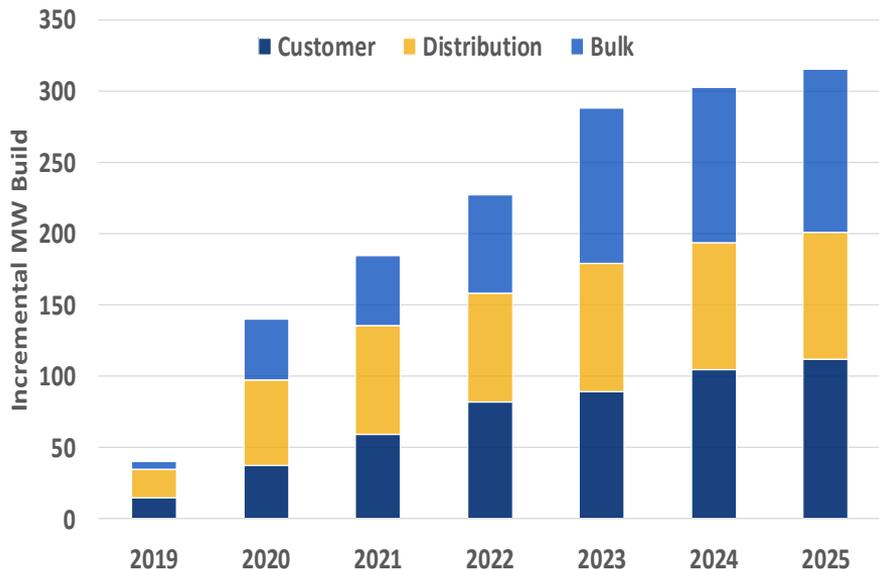


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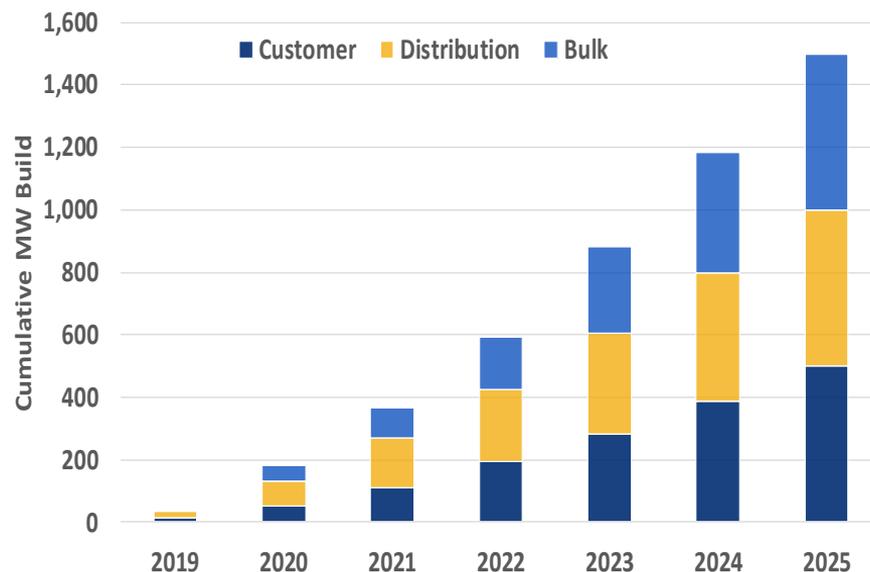
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Market Deployment Scenario

Incremental



Cumulative



One deployment scenario for reaching 1,500 MW by 2025

(customer sited 500 MW, distribution sited 500 MW, and bulk (wholesale) sited 500 MW)

Roadmap Recommendations

- Establish a **Market Acceleration Bridge Incentive** of approximately \$350 million statewide, including in LIPA, from existing sources of funds to Accelerate adoption of customer-sited, distribution or bulk systems
- Implement a NY-Sun adder for pairing storage with PV using approved CEF funds
- Align incentive levels with declining storage costs
- Deploy over one-third of the 1,500 MW target by 2021-22 and establish critical foundations for a self-sustaining market without direct incentives
- Reduce soft costs by up to \$50 per kWh for distribution/bulk-sited systems and up to \$150 per kWh for customer-sited systems by 2025 compared to 2017-18 costs
- Accelerate cost decline curve by almost two years and save approximately \$200 million from projected cost of deploying 1,500 MW of storage by 2025 and more than \$400 million from projected cost of deploying 3,000 MW by 2030



Roadmap Recommendations

Market Acceleration Bridge Incentive Structure (ideas for discussion):

Customer sited: (standalone or paired with on-site generation) declining block incentive on a per kWh basis, tied to peak reduction, participate in utility demand response program

Distribution: partner with utility within their RFPs, seek multiple bids (one for T&D deferral and second for T&D deferral + long-term capacity through peak hour load relief), could be a maximum incentive per kW/kWh or determined case by case based on utility BCA delta between the two bids

Bulk: exploring clean capacity attributes that could be captured (e.g., in a “storage REC” certificate like mechanism such as hosting capacity/reduced curtailment, avoided emissions, avoided transmission costs / impacts of peaker retirement)



Roadmap Recommendations

Market Acceleration Bridge Incentive Principles (for discussion):

- Prioritize use cases with best economics and ability to scale within the next 3-5 years
- Interested in stakeholder feedback on near-term deployment potential across all market segments
- Interested in stakeholder input into the modeled project economics presented in the Roadmap, assumptions used, and timeframe within which the installed costs are expected to be achieved
- Standalone storage and storage paired with intermittent renewables and on-site power should all be permitted. Incorporate flexibility to reallocate bridge incentive funding within use cases to ensure that the maximum amount of energy storage is deployed as market conditions and deployment factors change
- Work with LIPA/PSEG to develop an equivalent set of market acceleration bridge incentive mechanisms on Long Island



Other Actions:

NYS Leading by Example

Renewable Energy Certificate procurement

Addressing Soft Costs

Other Items



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Roadmap Recommendations

NYS Leading by Example to expand the market and engage public entities in State energy objectives

- Leverage the State's purchasing power to **act as a catalyst** for early adoption of storage among municipal cooperatives, schools, public buildings, SUNY, OGS, MTA and others
- NYPA and NYSERDA to work with State Education Department to maximize deployment of **solar + storage at K-12 schools**
- Engage MTA to pursue opportunities that maximize use of energy **from NYC Subway regenerative braking** that would otherwise be wasted to reduce peak impacts
- **NYPA** to pursue storage project design and deployment, procurement, public/private partnerships, and data validation through its NYEM and EDGE platforms



Roadmap Recommendations

Addressing Soft Costs including Barriers to Data and Finance

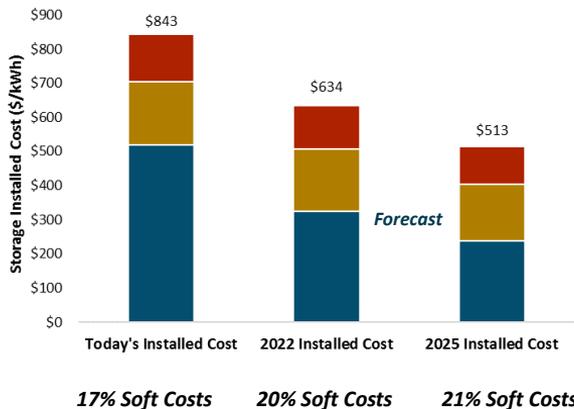
- **Leverage NYGB and commercial PACE financing** to achieve greater economies of scale and reduce the cost of capital / financing
- Utilities to provide developers and operators with **hourly load data** (actual and forecasted) for substations connecting the distribution and bulk systems (i.e., transmission nodes) with increasing granularity provided over time
- Develop, implement, and maintain a **searchable data platform** containing aggregated customer-related data through utility and NYSERDA coordination
- Build a skilled talent pipeline through workforce development



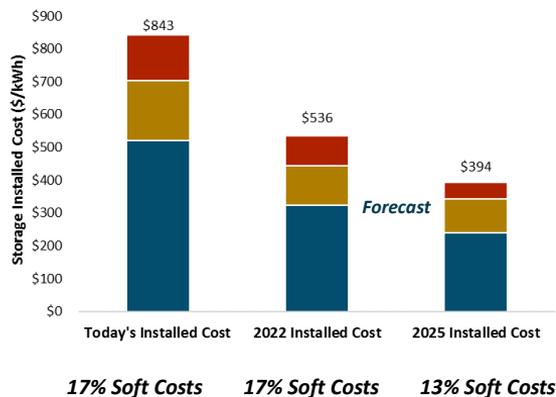
Roadmap Recommendations

Addressing Soft Costs

Retail Customer Sited Storage Cost Components in NYC
without roadmap and bridge incentive actions
Soft costs increase as a % of total costs



Retail Customer Sited Storage Cost Components in NYC
with roadmap and bridge incentive actions
Soft cost reduction has significant impact on installed cost over time



■ Hardware ■ Engineering and Construction ■ Soft Costs

- Permitting and siting
- Customer acquisition
- Industry assistance
- Interconnection
- Reducing cost of capital
- Other items?



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Roadmap Recommendations

Accountability

- Prepare an **Annual State of Storage report**, led by DPS and NYSERDA, that tracks storage deployments, progress in meeting the 2025 and 2030 storage targets, impediments and recommended solutions that must be addressed
- **Deployments** by zone/utility, technology and use cases
- **Real-time dashboard** of bridge incentive availability
- **Ongoing monitoring** with recommendations for Commission consideration as needed to ensure these targets are achieved



Thank you for participating!

[CASE 18-E-0130 - In the Matter of Energy Storage Deployment Program](#)

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