



NYSERDA

NYS Energy Storage Roadmap

NYSERDA Program Planning Committee

June 26, 2018

Agenda

- Roadmap Approach
- Modeling and Project Economics
- Roadmap Recommendations
- Path Forward

The Team

NYSERDA: Jason Doling, Schuyler Matteson, Ben Falber, Tony Abate. Support and expertise provided by Legal (Janice Dean, Sarah Main, Peter Keane), Energy Analysis (Carl Mas, David Coup), Communications (Kate Muller, Sue Gold, Arthur Sprogis), Marketing (Susan Moyer, Meg Mariany, Cynthia Klopfer), Innovation (Scott Egbert)

DPS: Marco Padula, Andy Owens, Sean Isakower, Chris Graves, Bridget Woebbe, Warren Myers, John Garvey, Beth Fiteni, Colleen Gerwitz

Consultants: E3, Climate Policy Institute, Center for Renewables Integration, Acelerex, Industrial Economics

Governor Cuomo's 2025 Storage Target

- **Deploy 1,500 megawatts** of energy storage by 2025
- Delivering roughly **\$2 billion in gross benefits** to New York customers
- **Avoiding more than one million metric tons of CO₂ emissions**, on a path to even greater benefits as larger levels of intermittent renewables are deployed
- **Adding resiliency** to the electric system by reducing impact of outages; for illustrative purposes, 1,500 MW of storage is the equivalent electric demand of one-fifth of all NYS homes
- **Adding flexible resources** that allow intermittent renewables like solar and wind to be available when needed, especially during peak demand
- Growing the energy storage sector in New York to create **30,000 jobs by 2030**



Energy Storage Deployed

Today:

- Approximately 60 MW of advanced storage (batteries, flywheels, thermal)
- 1,400 MW pumped hydro

Additional storage to be added:

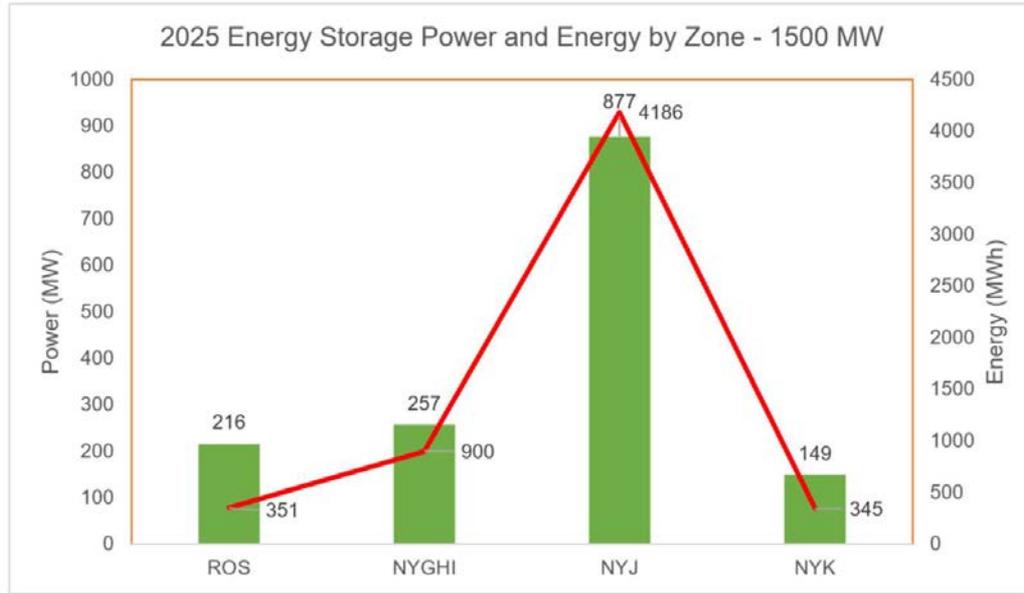
2025

**+1,500 MW
advanced storage
(technology agnostic)**

2030

**PSC to
establish target**

Modeled Build of 1,500 MW in Acelerex Study



Energy Storage Buckets

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

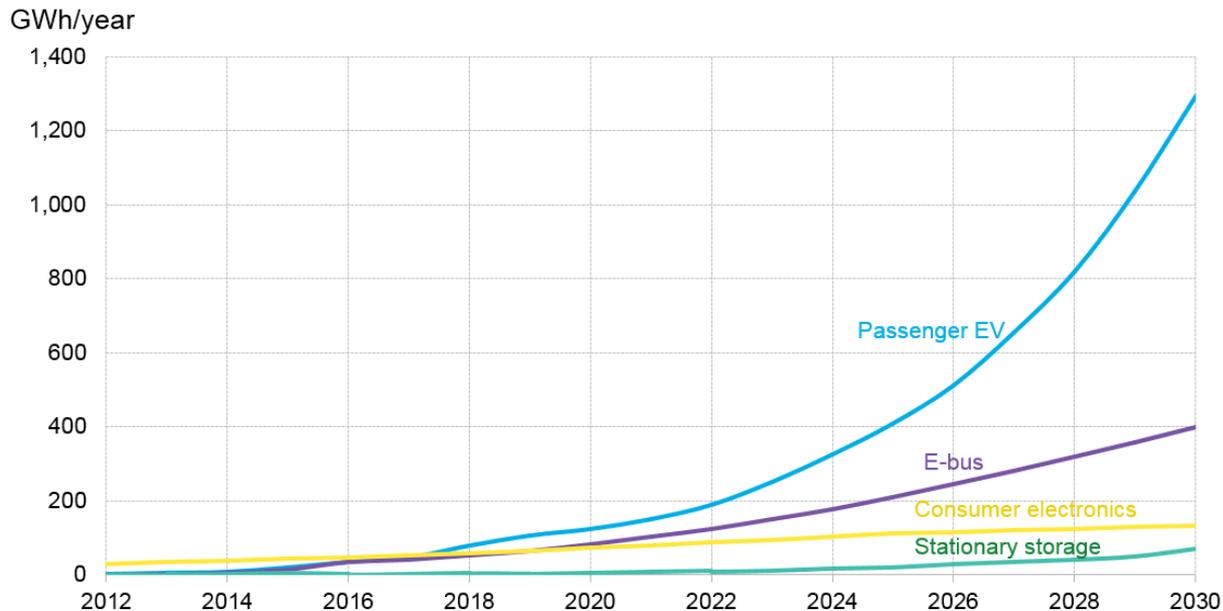
acelerex

Shown is the Governor Cuomo's 1,500 MW target allocated by the Acelerex model by zone (all upstate and western zones are included in "ROS," rest of state). This is not intended to represent zonal targets.

MW (power rating) is the green bar and MWh (duration) is the red line.

Cost declines are real and largely driven by EV adoption

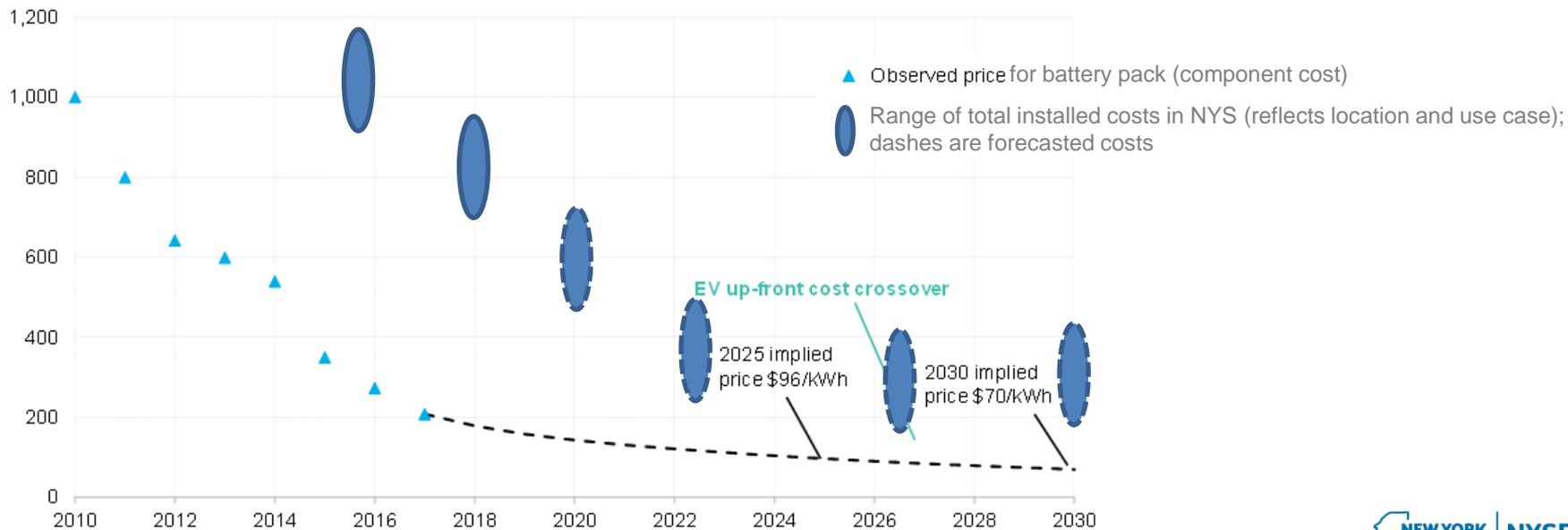
Annual battery demand by sector



Source: Bloomberg New Energy Finance

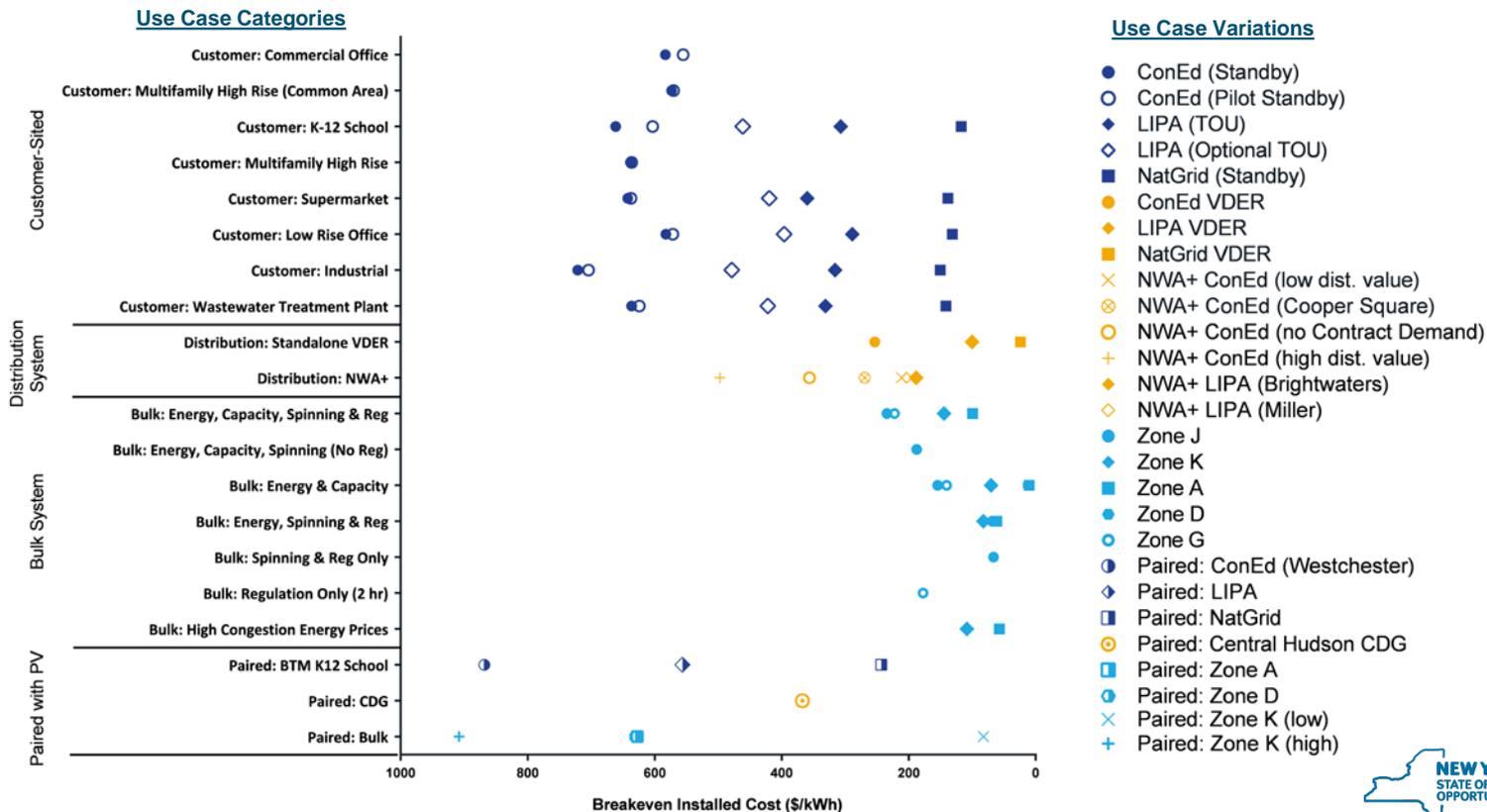
Battery Pack and System Costs: Historical and Projections (Lithium-ion example)

Volume weighted average battery pack price (\$/kWh)

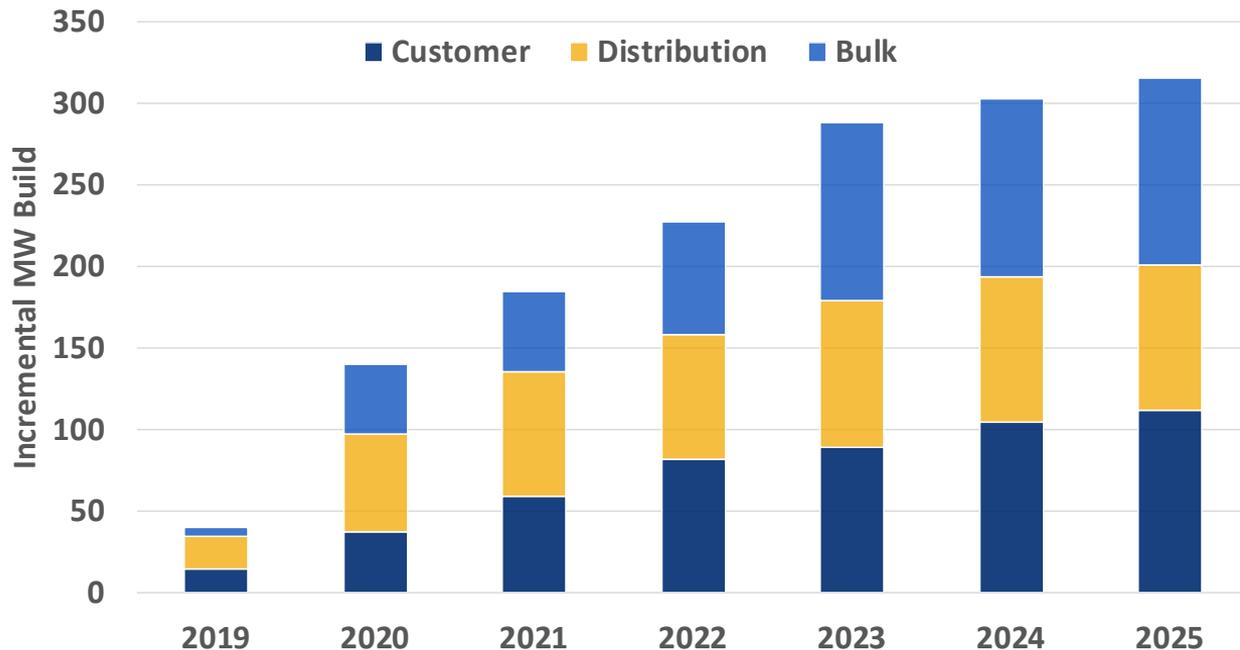


Source: Bloomberg New Energy Finance.

Summary of All Use Cases Modeled by E3



Market Deployment (incremental)



One scenario to reach
1,500 MW by 2025

Customer sited: 500 MW,
Distribution sited: 500 MW,
Bulk (wholesale) sited: 500 MW

Roadmap Recommendations

- Retail Rate Actions and Utility Programs
- Investor-Owned Utility Roles
- Direct Procurement Approaches through NAWs, RECs, and NYS Leading by Example
- Market Acceleration Incentives
- Address Soft Costs including Barriers in Data and Finance
- “Clean Peak” Actions

Roadmap Recommendations

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

- Apply 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
- **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**
- Offer **multi-year load management contracts** through utilities for 3-5 year terms

Roadmap Recommendations

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

- 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 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 to that end, con't.

- 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**
- Allow developers to maintain a project's **interconnection** for wholesale services after the NWA term if distribution services are discontinued
- Promote **competitive procurement and third-party ownership of storage** in DER markets as per REV Track One Order

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
- 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

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
- Calibrate proposed **bridge incentives** to maximize carbon reduction by aligning with local or system peak loads
- Continue incentivizing **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, con’t.

- Partnership between DPS, NYSERDA, DEC, Con Edison, LIPA, NYISO and peaker plant owners to develop a methodology for analyzing peakers’ operational and complete emission profiles on a unit-by-unit basis to **determine best potential candidates for peaker hybridization, repowering or replacement** by 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”** to address potential retirement of these generation facilities
- Continue to examine other mechanisms to enable cleaner generation to meet periods of peak electric demand

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, and 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 firming 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 storage from Buyer Side Mitigation**
- Expand system planning to include integrated **T&D planning**
- 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

- Staff recommend establishing an approximately \$350 million bridge incentive statewide, including in LIPA, from existing sources of funds, such as those authorized under the Clean Energy Fund and other collected but currently uncommitted funds
- 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

Path Forward

1Q18

- Acelerex Energy Storage Study completed
 - Voice of customer/stakeholder meetings
-

2Q18

- Stakeholder engagement including JU, LIPA, NYPA, NYISO
 - Key state partner engagement on leading by example
 - Energy Storage Roadmap released for formal public input
-

3Q18

- Technical conferences during July and August
 - Formal public comments
 - PV + storage CEF investment plan submitted to DPS
-

4Q18

- PSC establishes 2030 Energy Storage Target and deployment actions
- Implementation filings including NYSERDA CEF Investment Plan after commission order

Thank you

For more information, visit:

nyserdera.ny.gov/Energy-Storage-Roadmap