STATE OF STORAGE IN NEW YORK

ANNUAL ENERGY STORAGE DEPLOYMENT REPORT
PURSUANT TO PUBLIC SERVICE LAW §74

April 1, 2024

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EXECUTIVE SUMMARY

Enacted in 2018, Public Service Law (PSL) §74 directed the Public Service Commission (Commission) to establish a statewide energy storage goal and programs that will enable the State to meet such target by 2030. As part of the Order Establishing Energy Storage Goal and Deployment Policy (Energy Storage Order), the Commission established a statewide energy storage goal of installing up to 3,000 megawatts (MW) of qualified energy storage systems by 2030, with an interim objective of deploying 1,500 MW by 2025.[1] The Commission also adopted a suite of energy storage deployment policies and initiatives to achieve these goals including the Market Acceleration Bridge Incentive (Bridge Incentive) program administered by the New York State Energy Research and Development Authority (NYSERDA).

In addition to the requirement to establish an energy storage goal and policies, PSL §74(4) requires annual reports on the achievements and effectiveness of the Commission's energy storage deployment policy be submitted to the Governor, the Temporary President of the Senate, and the Speaker of the Assembly. In the Energy Storage Order, the Commission directed the Department of Public Service Staff (DPS Staff) to file the first "State of Storage" annual report by April 1, 2020, for calendar year 2019, and by April 1 of each year thereafter.

In 2022, Department of Public Service (DPS) Staff and NYSERDA published "NY's 6 GW Roadmap: Policy Options for Continued Growth in Energy Storage" (6 GW Roadmap). The 6 GW Roadmap proposes an expanded target of 6 gigawatts (GW) of energy storage by 2030. The energy storage programs proposed in the 6 GW Roadmap build upon the programs approved by the Commission in the Energy Storage Order. Additionally, on March 15, 2024, DPS Staff issued an update to the 6 GW Roadmap to reflect updated cost estimates; public comments are currently being accepted on this update. Future Commission action on the 6 GW Roadmap is expected thereafter.

The Commission's energy storage deployment policy has effectively strengthened the market for developing and installing qualified energy storage systems in the State of New York. Total deployed (396 MW), awarded/contracted (581 MW) projects at the end of March 2024

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[1] Case 18-E-0130, In the Matter of Energy Storage Deployment Program, Order Establishing Energy Storage Goal and Deployment Policy (issued December 13, 2018).

equaled 977 MW in capacity, or about 65 percent of the 2025 target of 1,500 MW and 33 percent of the 2030 target of 3,000 MW. The number of energy storage projects in various interconnection queues, which reflects some of the awarded or contracted projects noted above and potential projects in the pipeline, also indicates robust activity in the industry. Over 38,000 MW of energy storage projects are presently in New York utility interconnection queues and the New York Independent System Operator (NYISO) interconnection queue, although some of these projects may not be built due to unfavorable project-specific economics and for other reasons.

Examples of common energy storage use cases in the state include co-location with solar photovoltaic (PV) developments and other renewable energy resources. Energy storage systems sized up to 5 MW are eligible for Value of Distributed Energy Resource (VDER) compensation, which continues to be the most common compensation mechanism chosen by developers. Coupling energy storage with solar PV, for example, allows developers to maximize VDER compensation under many scenarios. The average total installed costs for non-residential, retail storage projects paired with solar that are in front-of-the-meter, that were awarded NYSERDA Bridge incentives, averaged $463 per kilowatt-hour (kWh).

The average total installed costs for front-of-the-meter retail standalone energy storage projects, receiving NYSERDA incentives, averaged $511 per kWh. For bulk energy storage projects above 5 MW that received an incentive and will provide wholesale market services, the total average install costs were $526 per kWh. The average total installed costs for standalone storage customer-sited projects configured behind the customer's utility meter and used for peak load reduction was $1,285 per kWh. Cost increases were driven by supply chain issues, along with material price increases and increased competition for battery cells across the economy. These cost issues have continued to be a barrier to the expeditious build out of energy storage in New York State.

DPS Staff submits this State of Storage report in compliance with PSL §74 and the directives of the Commission and recommends no additional corrective actions to the Commission's energy storage deployment policy, to those currently before the Commission as described in the 6 GW Roadmap. The next review of the energy storage program is scheduled to occur in 2025 and will present an opportunity to revisit policy issues and assess progress towards the goals of PSL §74.

INTRODUCTION

On December 13, 2018, the Commission established a statewide energy storage goal of installing up to 3,000 MW of qualified energy storage systems by 2030, with an interim objective of deploying 1,500 MW by 2025.[2] The Commission also adopted a suite of energy storage deployment policies and actions intended to accelerate cost reductions, reduce barriers to realizing revenue streams for energy storage services that would otherwise go uncompensated, and improve project economics by sending appropriate price signals to the marketplace. These measures include financial incentives, competitive energy storage procurements, soft cost reduction efforts, and a host of other actions that are cost-effectively contributing to the accelerated deployment of energy storage in New York today. The resulting public benefits of deploying up to 3,000 MW of energy storage are expected to include over $3 billion in gross lifetime benefits to New York's utility customers, approximately 30,000 new jobs, the elimination of approximately 2 million metric tons of greenhouse gas (GHG) emissions, and the avoidance of criteria air pollutant emissions such as nitrogen oxides (NO_X), sulfur oxides (SO_X), and particulate matter.[3]

The Commission's actions in 2018 were taken in response to the enactment of PSL §74, which directs the Commission to establish a statewide energy storage target for 2030 and programs to support that goal. PSL §74 complements a number of State policies intended to increase the use of renewable energy and reduce GHG emissions and criteria air pollutants. The 2019 Climate Leadership and Community Protection Act (CLCPA) requires, among other things, that at least 70 percent of New York's electricity come from renewable energy sources by 2030 and 100 percent zero emissions by 2040; the CLCPA further requires an economy-wide GHG emissions reduction target of 85 percent by 2050 compared to 1990 levels.[4] The CLCPA codified the Commission's

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[2] Case 18-E-0130, In the Matter of Energy Storage Deployment Program, Order Establishing Energy Storage Goal and Deployment Policy (issued December 18, 2018) (Energy Storage Order). The energy storage targets are in addition to 1,400 MW of traditional pumped hydroelectric storage that are already deployed.

[3] Case 18-E-0130, supra, New York State Energy Storage Roadmap and Department of Public Service / New York State Energy Research and Development Authority Staff Recommendations (filed June 21, 2018).

[4] See Chapter 106 of the Laws of 2019. The text of the CLCPA is available at: https://legislation.nysenate.gov/pdf/bills/2019/S6599.

goal, established in the Energy Storage Order, of deploying 3,000 MW of energy storage by 2030.[5] Energy storage is a critical component in enabling renewable energy to be deployed in sufficient quantities to satisfy these targets and may contribute to avoiding or deferring costs associated with electric transmission, distribution, or generation needs.

The programs established in the Energy Storage Order have been modified in response to changing and unforeseen market conditions. In the Order Directing Modifications to Energy Storage Solicitations, filed on April 16, 2021, the Commission approved an extension of the in-service date from December 31, 2022 to December 31, 2025 and extended the maximum contract duration from seven to ten years. Although it was requested by the utilities, the Commission declined to expand utility ownership of energy storage resources. Two years later, in the Order Directing Further Modifications to Energy Storage Solicitations, issued on March 16, 2023, the Commission approved an extension of the in-service date from December 31, 2025 to December 31, 2028 and extended the maximum contract duration from ten years to fifteen years.

On December 28, 2022, DPS Staff and NYSERDA filed "New York's 6GW Energy Storage Roadmap: Policy Options for Continued Growth in Energy Storage" (6 GW Roadmap). The 6 GW Roadmap proposes to adopt a 6 GW energy storage deployment goal by 2030, in line with Governor Hochul's announcement in the 2022 State of the State address. The 6 GW Roadmap proposes new procurement mechanisms to achieve the 6 GW target, along with needed market reforms and research and development opportunities. In the 6 GW Roadmap, Staff indicated that New York would need 12 GW of energy storage by 2040 and over 17 GW by 2050 to reliably decarbonize the electric grid; this investment is estimated to save approximately $2 billion in future electric system costs.

In addition to requiring the establishment of an energy storage goal and programs, PSL §74 also requires reports on the achievement and effectiveness of the energy storage deployment policy be submitted annually to the Governor, the Temporary President of the Senate, and the Speaker of the Assembly. The Commission further required in the Energy Storage Order that DPS Staff, in consultation with NYSERDA, the Long Island Power Authority (LIPA), and the NYISO, to file the first State of Storage report by April 1, 2020, for calendar year 2019, and by April 1 of each year

[5] The CLCPA also requires a minimum percentage of storage projects be deployed: (1) in disadvantaged communities; and (2) to reduce the usage of combustion-powered peaking facilities in those communities.

thereafter.[6]

The Commission directed the State of Storage report to include: (1) progress towards achieving the energy storage targets, total MW deployed, locations of installations, projects in the queue, solutions deployed and the range of common use cases; (2) impediments and proposed solutions to these impediments that may slow deployment, including corrective paths for reallocating bridge incentive funds, and other measures as needed; (3) the status of and recommended adjustments to the utility procurement process, wholesale market design changes, utility rate design actions, data platform development, retail and wholesale market coordination, and any other relevant issues; and (4) average total installed cost of energy storage systems and major progress during the year in reducing soft costs.[7] DPS Staff submits this State of Storage report in compliance with PSL §74 and the directives of the Commission, reflecting the status of the industry in 2023.

Beginning in 2020 and each third year thereafter, the Commission has conducted a review of the progress towards achieving the energy storage deployment goals and the effectiveness of the deployment policies and actions in meeting those goals. The triennial review has and will continue to enable the Commission to determine whether and how such policies should be adjusted based on market conditions. If significant variances occur from anticipated progress, the Commission is expected to consider taking corrective actions based on this review; this review supports the subsequent actions that are proposed by Staff in the 6 GW Roadmap. The 2020 State of Storage Report served as the basis for the Commission's first triennial review in 2020 with the second triennial review concluding in December 2022 with the issuance of the 6 GW Roadmap.

ENERGY STORAGE DEPLOYMENT PROGRESS

The portfolio of programs and actions approved by the Commission in the Energy Storage Order has effectively nurtured and expanded New York's energy storage market since its issuance in 2018. Total deployed (396 MW) and awarded/contracted (581 MW) systems as of March 31, 2024 include projects equaling 977 MW in capacity, or about 65 percent of the 2025 target of 1,500 MW. The breakdown of these figures is described in Table 1, below.

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6 Energy Storage Order, Ordering Clause 13.

7 Energy Storage Order, p. 107.

Table 1: Total Energy Storage Deployed, Contracted, and Awarded in New York (MW)

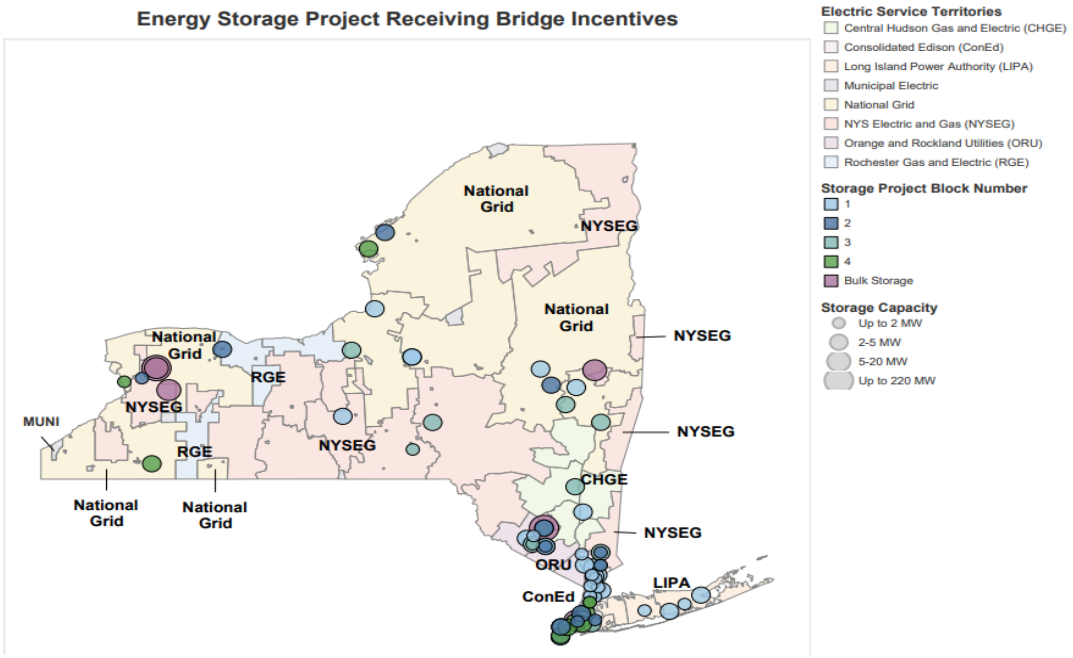
NYSERDA Bridge Incentive Program		675
Of which: Bulk	385	
Commercial Retail	279	
Long Island Residential	11	
Utility Bulk Storage Dispatch Rights Procurement		100
Renewable Energy Standard		20
NYPA North Country Project		20
Utility Demonstration and NWA Projects		62
Other Projects		100
TOTAL		**977**
% of 2025 Goal		65%
% of 2030 Goal		33%
Source: NYSERDA and DPS Staff		

The Bridge Incentive offers financial incentives to install energy storage systems for three categories of projects: (1) bulk energy storage projects larger than 5 MW providing wholesale services, listed as "Bulk" in Table 1;[8] (2) commercial retail energy storage systems up to 5 MW, listed as " Retail" in Table 1;[9] and (3) single-family residential energy storage systems installed with solar PV. The locations of both Bulk and Commercial Retail projects awarded NYSERDA incentives under its Bridge Incentive program are illustrated in Figure 1 below.

[8] Bulk projects are those interconnected with the transmission system through the NYISO Open Access Transmission Tariff.

[9] Retail projects are those interconnected with the distribution system through the New York State Standardized Interconnection Process.

Figure 1: Energy Storage Projects receiving Bridge Incentives



Source: NYSERDA

As of early 2024, approximately 40,500 MW of proposed energy storage projects are presently in either distribution-level or wholesale-level interconnection queues in New York. Con Edison has approximately 1,230 MW of energy storage projects in its interconnection queue, LIPA has 227 MW of projects in its interconnection queue, and an additional 1,100 MW are in interconnection queues administered by the other IOUs throughout the state. Approximately 38,000 MW of energy storage projects are presently in the NYISO queue. These interconnection queues reflect projects in the pipeline that are being considered but have not yet been built, including projects that have received State incentives as well as projects that have not been awarded any funding and are developing on a merchant-basis only.

An indeterminate number of these projects may never be built, however, due to the expense of interconnection, permitting, financing, or for other reasons.

Range of Use Cases

Driven by the Commission-approved VDER compensation methodology, the federal Investment Tax Credit (ITC), exemptions from certain distribution-level charges, and utility demand response programs, energy storage continues to be deployed to augment the existing pipeline of solar PV projects being developed. On Long Island, small storage systems are being

paired with solar PV to help LIPA relieve grid demands during peak summer days under LIPA's Dynamic Load Tariff. During a grid outage, these systems can also be used to provide emergency backup power for critical loads. The VDER compensation methodology is the most common compensation mechanism chosen by developers for monetizing the value of energy storage today.[10] An observable trend in solar PV has been to divide larger projects into smaller components in order to qualify for VDER compensation, which is capped at projects no larger than 5 MW, instead of interconnecting as a larger project at the bulk wholesale level and receiving compensation in those markets. Project development in more rural areas is also being observed due to lower land costs, in contrast to areas downstate where land costs are very high, but grid congestion is more prevalent and VDER compensation is therefore more valuable.

Under the Commission's REV initiative, 62 MW of energy storage systems have been installed, or are in the process of being installed, to defer costs associated with electric transmission, distribution, or generation needs, and to allow utilities to acquire valuable insight into how best the resource can contribute to providing various services. Utilities continue to procure batteries in projects using NWAs. Two NWAs with major energy storage components are also underway in the Orange and Rockland service territory, including a 3-MW installation at Pomona that became operational in 2021.

NYSERDA's RES procurements process is designed to provide large-scale renewable projects the option to augment their generator with energy storage and receive additional consideration during the procurement evaluation process. If the project is selected, it will receive a 20-year contract for the sale of its Renewable Energy Credits (RECs) and a hedge on their wholesale market revenues. These projects will likely use batteries to prevent curtailments or to store renewable generation for sale at times when wholesale prices are higher.

NYPA's North Country Energy Storage project is a 20-MW facility adjacent to an existing substation in Franklin County, New York, which went into operation in August 2023 and is intended to provide frequency regulation service in the wholesale market and help reduce transmission constraints that can prevent renewable energy from being delivered downstate. An additional 54 MW of legacy energy storage projects are also operational, including thermal batteries, NYSERDA's NY Prize smart grid recipients, residential batteries, and a 20-MW flywheel

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[10] Case 15-E-0751, In the Matter of the Value of Distributed Energy Resources, Order Regarding Value Stack Compensation (issued April 18, 2019).

that provides frequency regulation service in the wholesale market.

Two NYPA-owned pumped-storage hydroelectric facilities participate in the NYISO wholesale markets the 1,160-MW Blenheim–Gilboa Pumped Storage Power Station in Schoharie County and the 240-MW Lewiston Pump-Generating Plant in Niagara County.[11] These traditional pumped-storage hydroelectric storage projects, which preexisted the adoption of the Energy Storage Order and the enactment of PSL §74, are not being counted towards fulfilling the State's energy storage deployment goals.

Progress in Reducing Installed Costs, including Soft Costs

While energy storage costs were consistently declining until 2021, costs for lithium carbonate skyrocketed and the still relatively high cost of the energy storage resources today, combined with uncertainties in monetizing its various value streams, has resulted in an uneven pace of deployment. The Commission recognized these challenges in the Energy Storage Order and approved initiatives to address these issues, including utility procurements and upfront incentives that can help achieve economies of scale and long-term revenue certainty, and efforts to reduce soft costs and other non-hardware costs that can hamper deployment by reducing the attractiveness of the investment's business case. More recently, DPS Staff reviewed the storage deployment barriers related to supply chain and material costs in the 6 GW Roadmap.

The average total installed costs for Commercial Retail and Bulk projects that were awarded Bridge Incentives, mainly energy storage paired with a CDG-eligible solar PV system, are detailed in Table 2, below.[12]

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[11] Pumped-storage hydroelectric generation uses two water reservoirs at different elevations to generate and inject power to the system (or discharges) as water moves from the upper reservoir to the lower reservoir down through a turbine, and withdraws system power as it pumps water (or recharges) back to the upper reservoir.

[12] These figures represent contracted projects and estimated installation costs provided by the developer. Due to the very small number of systems contracted, these installed cost figures Due to the very small number of systems contracted, these installed cost figures should be cautiously used since higher installation costs on one project quickly affect the average cost. These average costs are as of 3/21/24.

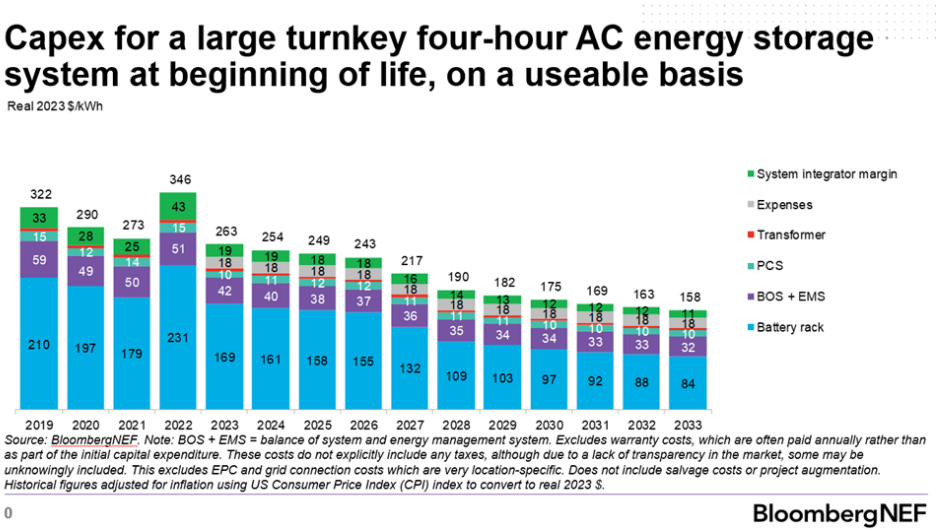
Table 2: Average Cost Per kWh of Projects with Bridge Incentive

	Count of Projects	Total Cost	Total kWh	Average Cost per kWh
Retail Storage Projects Paired with Solar (Behind-the-meter)	5	$2,926,862	2,693	$1,087
Retail Storage Projects Paired with Solar (Front-of-the-meter)	60	$251,654,411	543,610	$463
Retail Standalone Storage Projects (Behind-the-meter)	2	$3,982,881	3,100	$1,285
Retail Standalone Storage Projects (Front-of-the-meter)	22	$184,007,043	360,052	$511
Bulk Storage Projects	7	$410,510,000	780,400	$526

The installed costs for these types of projects are expected to decrease to $175 per-kWh by 2030, according to BloombergNEF, as shown in Figure 2, below. However, supply chain issues, material cost increases, and increased competition for battery cells have led to substantial price increases during the 2021-2022 period. The price increases seen in the 2021-2022 time period have since abated in 2023, with lithium-ion battery packs dropping 14% in price to $139/kWh from 2022 to 2023 due to raw materials and component price decreases.[13]

[13] BloombergNEF, "Lithium-Ion Battery Pack Prices Hit Record Low of $139/kWh," accessed March 19, 2024. https://about.bnef.com/blog/lithium-ion-battery-pack-prices-hit-record-low-of-139-kwh/

Figure 2: Installed Cost for a Four-Hour AC Energy Storage System.[14]



Soft costs associated with engineering and construction, customer acquisition, siting and permitting, interconnection, and the higher cost of capital due to uncertain revenue streams are largely driven by factors that can be directly impacted by State efforts.

SPECIFIC ENERGY STORAGE POLICIES

In the Energy Storage Order, the Commission directed DPS Staff to include in the annual State of Storage report the status of and recommended adjustments to: (1) the utility procurement process; (2) wholesale market design changes; (3) utility rate design actions; (4) data platform development; (5) retail and wholesale market coordination; and (6) other relevant issues. The Commission also directed DPS Staff to evaluate impediments and proposed solutions that may affect deployment of energy storage in the state, and any needed adjustments to the Bridge Incentive.[15] These policies have been reviewed in the 6 GW Roadmap and future Commission action is anticipated.

Utility Procurement Process

In the Energy Storage Order, the Commission directed the electric IOUs to hold competitive procurements for energy storage dispatch rights in order to provide utility grid

[14] The costs are for an existing site and do not include land costs or interconnection costs.

[15] Energy Storage Order, p. 107.

operators and system planners real-world experience using qualified energy storage systems to meet system needs. Each utility was required to procure a minimum amount of storage to be operational by December 31, 2022, with Con Edison required to procure at least 300 MW and each of the other IOUs required to procure at least 10 MW each, provided that bids do not exceed a utility-specific defined ceiling.[16] NYSERDA's Bridge Incentive provides partial funding for these projects, if necessary, at or below the current rate of NYSERDA's incentives for bulk projects. Each of the IOUs held their initial procurement in 2019 and finalized selection and contracting for 120 MW of projects in 2020.

In response to a petition by the Joint Utilities seeking modifications to the energy storage dispatch rights procurement, in 2021 the Commission adopted a three-year extension of the required in-service date for projects (from December 31, 2022 to December 31, 2025) and a ten-year contract length, both of which should allow greater cost amortization and generate lower annual costs for both utilities and ratepayers.[17] The Commission also upheld its preference for competitive ownership of energy storage assets and rejected a proposed utility ownership model. The Commission explained that ongoing refinements of NYISO market participation rules and additional regulatory efforts will continue to reduce barriers to energy storage deployment and obviate any need for utility ownership of these resources.

The Joint Utilities again petitioned the Commission in November 2022 seeking further modifications to the energy storage rights procurement. Specifically, the Joint Utilities requested to extend the in-service dates for projects from December 31, 2025 to December 31, 2028 and extend the maximum allowable contract length from ten-years to fifteen-years. Similar to the first petition, the Joint Utilities stated that the changes would result in more competitive bids and awarded projects. The Commission approved the Joint Utilities' requests in March 2023.

In response to a petition by National Grid to dispatch and market output from a utility-owned energy storage facility into the wholesale markets, the Commission determined in 2021 that such use will provide utilities and third parties with improved information and resources to enhance decision-making and identify requisite collaborations between utilities and third-parties necessary to facilitate successful wholesale market integration.[18] The Commission noted that in addition to

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[16] Energy Storage Order, pp. 113-114.

[17] Case 18-E-0130, Order Directing Modifications to Energy Storage Solicitations (issued April 16, 2021).

[18] Case 18-E-0130, Order Approving Utility-Owned Asset Participation in Wholesale Markets (issued September 9, 2021).

core local reliability functions, energy storage can support the optimal deployment of other resources and integration of intermittent renewable generation output. Furthermore, the Commission recognized that participation by utility-owned energy storage assets in the wholesale market will likely provide financial benefits to ratepayers who funded these projects. Since 2021, other utilities have petitioned and been granted permission to be able to dispatch small storage projects into the wholesale market.

LIPA intends to meet its share of the State's energy storage deployment goals through a combination of existing energy storage contracts, a bulk energy storage solicitation for at least 175 MW that was issued in 2021, and distribution-level storage projects proposed in LIPA's Utility 2.0 Long Range Plan. At this time, LIPA has not executed any agreements for bulk storage projects. In the 6 GW Roadmap, Staff recommend that LIPA voluntarily participates in the proposed programs in proportion to its share of the statewide load.

Wholesale Market Design Changes

It continues to be true that since the inception of this annual report, the wholesale markets have come a long way in developing rules and participation models that enable the use of bulk energy storage systems. Barriers like buyer-side mitigation and limited participation models are no longer a reality. However, as New York progresses toward its goal of developing 6 GW of energy storage by 2030, the wholesale markets will continue to play an important role in enabling the development of energy storage. It is vital that the markets make use of the capabilities of energy storage while also accurately compensating these units for the energy and services they provide to the grid.

Opportunities still exist to expand and refine participation models for energy storage. In the past year, the most significant market change has been the development and approval of the new capacity accreditation model.[19] Under this model, resources are placed into Capacity Accreditation Resource Classes (CARCs) that group similar resources based on their capabilities. Energy storage resources, for example, will be placed in a CARC based on their duration limitation (2-, 4-, 6-, or 8-hours). Each CARC will then receive a Capacity Accreditation Factor (CAF) for each capacity zone based on the marginal value of a new resource being added from that class. This new accreditation model will become effective starting at the beginning of the summer capability period on May 1, 2024. The NYISO has published the final accreditation values applicable to these

[19] Federal Energy Regulatory Commission (FERC) Docket No. ER22-772.

resources.[20] This model will more accurately reflect the value that energy storage provides to resource adequacy. As penetration levels shift, so will the accreditation values for each duration limitation.

Over the next decade, as dispatchable natural gas resources retire, it is expected that the bulk system will require more resources that can output for longer durations to fulfil resource adequacy gaps. The new capacity accreditation model will adapt to and reflect this need with lower capacity accreditation values for shorter-duration energy storage. At the same time, the value of longer-duration resources will remain high. This model more accurately quantifies the value of storage and better incents development of storage systems with capabilities that best support bulk power system reliability.

The NYISO has also made significant progress toward implementation of its Distributed Energy Resource (DER) Aggregation Model. This model originally dates back to 2019 and is set for implementation in 2024. However, in September 2020, FERC issued Order 2222 which requires Independent System Operators (ISO) to expand eligibility and improve participation rules for DER.[21] This order defines DER very broadly and includes energy storage resources, intermittent generation, distributed generation, demand response, energy efficiency, thermal storage, and electric vehicles. ISOs must allow aggregations of a minimum size of no greater than 100 kW and must allow them to sell into the market all services that they are technically capable of providing. The NYISO plans to move forward with implementing its 2019 DER model as a steppingstone toward full Order 2222 compliance, which is not expected until around 2026. In its most recent filing, the NYISO has proposed a minimum size limit of 10kW for a single DER unit within an aggregation.[22] They cite potential reliability issues and implementation delays if they have to process a large number of DER program applications for these resources. This remains the most significant outstanding issue towards Order 2222 compliance. FERC ruling on this issue is pending.

In December 2021, NYISO implemented its co-located storage model, which allows energy storage to co-locate behind a single point of interconnection with a solar or wind intermittent power

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[20] New York Independent System Operator, Final Capacity Accreditation Factors for the 2024/2025 Capability Year available at https://www.nyiso.com/documents/20142/41593818/Final-CAFs-for-the-2024-2025-capability-year.pdf/3efc1e06-c1b0-72d6-f736-22721709c157

[21] FERC Docket No. RM18-9.

[22] FERC Docket No. ER21-2460.

resource where each unit will still operate individually. Similarly, the NYISO developed a hybrid aggregation model that allows energy storage to co-locate with any other resource and operate as if it were a single unit. These two models continue to be expanded to create more opportunities for storage to pair with other resources. Recently, the NYISO considered altering the definition of a Co-located Storage Resources and Hybrid Aggregated Storage Resources to permit co-location and hybridization with non-intermittent power resources. This would allow existing units to pair with an Energy Storage Resources to make better use of their capabilities. These updates have been approved by stakeholders but have not yet been filed with FERC.

There still exist further opportunities for the wholesale markets to better accommodate and make use of energy storage resources. One method for wholesale market participation of energy storage is to implement a participation model for storage to act as a transmission asset. According to the 6 GW Roadmap, storage integrated with the transmission system can help increase energy transmission, inject, or absorb power to increase line efficiency, and also stabilize power flows, reducing the costs and burden of system operator actions. These use cases also have the potential to decrease costs by replacing or deferring the need for transmission upgrades. In 2023, the NYISO began work on a market project proposed by NYSERDA to evaluate potential use cases for storage acting as transmission in the NYISO markets. This project was selected for prioritization and will continue to be worked on in 2024. DPS Staff encourage continued commitment on this effort.

Retail and Wholesale Market Coordination

In the Energy Storage Order, the Commission noted that energy storage in the distribution system should be allowed to provide separate and distinct services to both utilities and the NYISO if technically capable of doing so. This "dual-participation" model would allow resources capable of participating in both wholesale and retail markets to earn additional revenue for these resources and bolster the reliability and resilience of the transmission and distribution systems. The FERC-accepted NYISO DER filing allows for dual participation in wholesale and retail markets. Resources were allowed dual participation on May 1, 2020. The NYISO will coordinate with transmission owners for scheduling and dispatch of dual-participating resources, retain the authority to schedule and dispatch all wholesale resources, and require those resources to bid in a manner that ensures they can meet wholesale obligations. The Commission also directed DPS Staff and NYSERDA, with appropriate contributions from the electric IOUs, NYISO, and stakeholders, to convene and prepare a work plan and schedule for a Market Design and Integration

Working Group (MDIWG) by March 1, 2019.[23] The MDIWG's purpose is: (1) to establish market coordination between utilities, DER operators, and the NYISO; (2) to determine technical and economic requirements for efficient planning, dispatch, measurement, and compensation of DER; and (3) to identify necessary industry roles, responsibilities, and interactions to achieve the State's energy deployment goals. The MDIWG is also to consider the effects of actions at the federal level and was tasked with identifying and evaluating possible alternative approaches to energy resource integration, cost allocation, and compensation methods. Throughout 2021, the MDIWG continued meeting regularly to develop an Entity Relationship Matrix, Entity Category Profiles, and a Grid Products & Services Inventory which together identify and characterize the operational, market, and regulatory relationships between the utilities, DER operators, NYISO, the State government and the Commission, and other entities. A Staff report to the Commission planned for the third quarter of 2022 will document the MDIWG's work to date, describe the existing structure of the State's electric power industry, and present the MDIWG's recommendations for a future modified industry structure that will efficiently and effectively accommodate large-scale deployment, integration, and use of DER.

In 2023, the MDIWG compiled the key findings, questions, and recommendations derived from its body of work developed prior to 2023. Significant matters considered by the MDIWG included: 1) the operational and commercial challenges stemming from the increasing rate electrification and the increasing interconnection of variable renewable energy sources; 2) the operational and commercial effects of grid architecture, industry structure, and regulations; 3) the relative value and cost of DER-provided services at the bulk, distribution, and edge levels; 4) coordinating DER operations to support multiple use cases both within and among the different grid levels; 5) commercial mechanisms for monetizing different types of DER-provided service; 6) coupling of grid operations and commercial operations; 7) assumptions regarding utility customer engagement; 8) utilizing flexible load and supply resources at the distribution and edge levels to reduce the scale and cost of future distribution infrastructure upgrades; 9) gaps in utility and industry readiness for necessary operational and commercial changes; 10) issues and opportunities related to VDER and interconnection policies; and 11) options for strategically evolving technical and commercial elements of the electric power ecosystem to support the State's clean energy goals. The possible approaches to deploying, using, and monetizing energy storage are a significant

[23] Energy Storage Order, p. 103.

consideration in each of these matters.

The MDIWG's findings, questions, and recommendations are now materially informing new work underway at DPS and NYSERDA to launch and support the Commission's new Grid of the Future Proceeding. It is expected the new proceeding will frequently seek and apply additional MDIWG contributions as the proceeding progresses.

Utility Rate Design Actions

Incentivizing energy storage deployment at the distribution level is highly contingent on the level of compensation and grid charges that a project would be subject to under existing utility tariffs. Most energy storage applications receive VDER compensation for projects under 5 MW. Improvements to the VDER methodology have created a highly financeable compensation mechanism for energy storage installations. Larger projects can either be compensated through utility rates that are linked to avoided wholesale costs or sell directly into the NYISO markets. Due to various exemptions that have been applied over the years, most renewable energy applications like solar PV with co-located energy storage have generally not been required to pay certain charges designed to compensate the utility for grid availability, known as Standby Rates, although stand-alone energy storage systems do not qualify for these exemptions.

The Energy Storage Order addressed a number of rate design issues that are applicable to certain non-exempt energy storage applications like stand-alone energy storage, energy storage systems paired with consumption load, and regenerative braking systems. The Commission determined that these non-exempt applications are subject to Standby Rates and noted that continued work to refine cost allocations between shared (i.e., costs incurred to serve all ratepayers) and local costs (i.e., costs incurred to serve only that particular customer) that comprise various utility charges would be ongoing.

In its March 2022 ACOS Order, the Commission approved a new Allocated Cost of Service (ACOS) study methodology and the limited exemption from Buyback Service contract demand charges for stand-alone energy storage systems.[24] The ACOS study methodology allows for careful and thorough consideration of which utility costs should be collected through each Standby

[24] Case 15-E-0751, Order Establishing an Allocated Cost of Service Methodology for Standby and Buyback Service Rates and Energy Storage Contract Demand Charge Exemptions (issued March 16, 2022) (ACOS Order).

and Buyback Service distribution charge, and will improve the economic efficiency of the updated Standby and Buyback Service rates by closely aligning the charges customers pay with how customers' use of the system affects grid costs. The Commission acknowledged that the application of Standby and Buyback Service rates to energy storage system use is appropriate, noting that their ability to align cost causation with cost recovery is particularly valuable as storage systems grant operators the advantageous flexibility of shifting their own energy use outside of conventional patterns established by most customers within a service class.

In the ACOS Order, the Commission also recognized that short-term policies should be implemented to facilitate the expedient deployment of energy storage systems in New York, particularly in view of critical role that energy storage will play in meeting CLCPA mandates. The Commission approved a 15-year exemption from paying applicable Buyback Service contract demand charges for most stand-alone energy storage projects which have paid a 25 percent interconnection deposit or signed an interconnection agreement by December 31, 2025.[25] Further, the Commission directed DPS Staff to initiate a review of whether to extend or modify the limited exemption from Buyback Service contract demand charges for stand-alone energy storage systems, and recommend additional support for stand- alone energy storage systems, if needed, beginning in 2024.

To implement the directives in the ACOS Order, the Commission directed electric IOUs to file draft tariff language to implement the new ACOS study methodology, provide updated Standby and Buyback Service rates, and implement the modified limited exemption from Buyback Service contract demand charges for stand-alone energy storage systems for Commission review and stakeholder comment. The electric IOUs filed their respective updated Standby and Buyback Service rates and associated draft tariff leaves in July of 2022, and the Commission considered those filings in its October 2023 Updated Standby Rates Implementation Order.[26] The Updated Standby Rates Implementation Order accepted the electric IOU's filed ACOS studies, approved with modification the electric IOU's proposed Standby and Buyback Service rate design proposals, and required that the electric IOUs file updated tariff leaves to become effective on a temporary basis until confirmed with updated rate levels reflective of the revenue requirement levels which

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[25] This excludes stand-alone energy storage participating in a Non-Wire Alternative project which did not receive funding through NYSERDA's Market Acceleration Bridge Incentive.

[26] Case 15-E-0751, supra, Order Establishing Updated Standby Service Rates and Implementing Optional Mass Market Demand Rates (issued October 13, 2023) (Updated Standby Rates Implementation Order).

would be in effect during 2024. These updated and revised Standby and Buyback Services generally result in more favorable economics for energy storage technologies compared to the previous rates due to modifications to the levels of revenue requirement allocated between the Contract Demand and As-Used Daily Demand charges, and more actionable rate design for peak- and super-peak As-Used Daily Demand charges.

In the Energy Storage Order, the Commission directed the electric IOUs to hold competitive procurements for dynamic load management (DLM) resources for a minimum three-year term for the 2020 Summer capability period and thereafter, referred to as the "Term-DLM" program. Within this procurement, the Commission also directed the IOUs to establish a premium "Auto-DLM" resource category that requires higher performance factors than is currently required. DLM resources, including energy storage, can provide grid relief services to utilities in these programs, avoiding the need to deploy more equipment to serve peak loads. The Term-DLM and Auto-DLM programs are expected to provide more revenue certainty for energy storage and other resources that participate and provide the utilities with greater confidence that these contracted load relief solutions will be available when needed. On January 29, 2020, each utility separately filed proposals for their respective Term-DLM and Auto-DLM programs in accordance with the Storage Deployment Order. Subsequently, the Commission considered each of the proposals and established a consistent statewide framework for Term-DLM and Auto- DLM programs.[27] In 2020, each of the Joint Utilities issued RFPs to competitively procure these Term- and Auto- DLM resources for the 2021, 2022, and 2023 Vintage Years.[28] As a result, 12.4 MW of load relief was enrolled in the programs during 2021, and 84.5 MW of load relief was enrolled in 2022. In 2023 there was 114.8MW of load relief enrolled in the DLM programs. While the amounts of Term- and Auto-DLM resources procured are not insignificant, Central Hudson, NYSEG, O&R, and RG&E have not been able to procure any Term- or Auto-DLM resources in their respective service territories to date. While National Grid has procured some Term-DLM resources within its service territory, a significant portion of the Term-DLM resources and all of the Auto-DLM resources

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[27] Case 18-E-1030, supra, Order Establishing Term-Dynamic Load Management and Auto-Dynamic Load Management Program Procurements and Associated Cost-Recovery (issued September 17, 2020); Case 18-E-0130, supra, Order Approving Negative Performance Factors (issued March 18, 2021).

[28] "Vintage Year" refers to the first year in a three-year participation period in the Term-DLM and Auto-DLM programs. For example, resources participating in Vintage Year 2021 contracted to provide a specified amount of load relief during the 2021, 2022, and 2023 summer demand response capability periods.

procured to date are located within Con Edison's service territory.

The Joint Utilities have each filed RFPs to procure Term- and Auto-DLM Program resources for Vintage Year 2024.[29] Further, during 2023, Central Hudson, National Grid, NYSEG, O&R, and RG&E petitioned the Commission for authorization to modify and improve their respective Term- and Auto-DLM program procurements. In its March 15, 2024 DLM Procurements, the Commission the Commission agreed that providing a greater level of flexibility in procurement methodology was reasonable, given the relative lack of procurements within the various utilities' service territories, and directed those utilities to propose specific alternate procurement methodologies for Commission consideration. Future alternate procurement methodologies available within the Central Hudson, National Grid, NYSEG, O&R, and RG&E are anticipated to improve the procurement processes at those utilities, while continuing to build on successful procurements at Con Edison.

Data Platform Development

New York's IOUs have continued their efforts to provide needed data to DER developers as described in their Distributed System Implementation Plan (DSIP) filings.[30] Nevertheless, developers and other stakeholders need more and better access to both customer and distribution system data to better target locations on the electric grid where grid needs are the greatest and sufficient hosting capacity is available. In the Energy Storage Order, the Commission noted that IOUs should increase and improve the customer and distribution system data provided to DER developers and operators, and directed Staff and NYSERDA to lead efforts to develop a Pilot DER Data Platform for a third-party to develop and implement.[31] Per the Commission's directives, the Pilot DER Data Platform was to provide both anonymized customer and system data useful to developers for planning and developing energy storage and other types of DER. The Commission anticipated that the Pilot DER Data Platform would allow DER developers to query the anonymized data to identify potential candidates for energy storage and other DER. The effort to

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[29] Case 18-E-0130, supra, O&R 2023 Vintage Year Term- and Auto-DLM RFP (filed November 19, 2021); Con Edison Updated DR DLM RFP (filed November 30, 2021); National Grid RFP for Resource Enrollment in Term- and Auto-DLM Programs (filed October 10, 2021); CHG&E Auto- and Term-DLM RFP – Vintage Year 2023 (filed December 6, 2021); RG&E Term and Auto – DLM Request for Proposal (filed November 30, 2021); and NYSEG Term and Auto – DLM Request for Proposal (filed November 30, 2021).

[30] Case 16-M-0411, In the Matter of Distributed System Implementation Plans.

[31] Energy Storage Order, p. 84.

develop the Pilot DER Data Platform was helpful in determining the extent of system data that is already available to developers.

The Pilot DER Data Platform, a proof-of-concept information resource for DER developers and others, was activated and made accessible via the web on December 31, 2019. The data held in the platform, provided, and regularly updated by the utility partner O&R, comprised several types of account, usage, and related grid data for all of O&R's residential and small commercial customers. The key concept proven by the platform is that users can employ a set of platform-provided query and access control tools to securely identify and obtain useful information without having direct access to the platform's underlying data. A platform user gains access to a customer's data only after the customer has approved the user's request for access. Almost 20 DER developers and stakeholders established access and used the platform.

User reactions were positive and several suggestions for expansion and enhancements were offered. The lessons learned through successful development, implementation, and operation of the platform materially informed the development of further Commission action, as discussed below. Opportunities for productive use of the pilot platform continued through 2021.

On May 29, 2020, DPS Staff filed the "Department of Public Service Staff Whitepaper Recommendation to Implement an Integrated Energy Data Resource (IEDR)," which described the current state of access to energy-related data for New York State and recommended an approach for the creation of an IEDR that would provide a platform for access to customer and system data. The Whitepaper also included an analysis of energy data initiatives in other jurisdictions and specific recommendations for stakeholder engagement, data resource design, data resource use cases, implementation, and operation. In February 2021, the Commission issued an Order requiring the implementation of an IEDR, which is intended to provide New York's energy stakeholders with a platform that enables effective access and use of integrated energy customer and system data.[32] This resource will help attract investment, enable energy analytics, help identify operational efficiencies, promote innovation, encourage new business models, and create value for customers and the state's energy system. In addition, the inclusion of analytic tools that would enable DER providers, utilities, government agencies, and others to develop valuable technical and business insights more readily will, in turn, lead to faster and better policy, investment, and

[32] Case 20-M-0082, Proceeding on Motion of the Commission Regarding Strategic Use of Energy Related Data, Order Implementing an Integrated Energy Data Resource (issued February 11, 2021).

operational decisions that will accelerate realization of New York State's clean energy goals. The Commission directed that the development of the IEDR be executed in two phases, Phase 1 and Phase 2, each based on use case priorities, and each with appropriate timelines and budgets. Following the issuance of the IEDR Order, an Initial Public Version of the IEDR platform was developed and made available to the public on March 31, 2023, as a part of the IEDR Phase 1 process and featured three use cases: installed Distributed Energy Resources (DERs), planned DERs, and consolidated hosting capacity maps. On January 19, 2024, the Commission issued an Order Approving IEDR Phase 2 Budgets, which adopted budget estimates by the Joint Utilities and NYSERDA in Phase 2 and addressed the associated recovery from ratepayers. A Minimum Viable Product is expected to be completed in the first quarter of 2024, marking the end of Phase 1, and adding five use cases related to DER siting, enhanced hosting capacity/DER maps, customer billing data, and rates and tariffs. This initiative should further advance the deployment of energy storage in New York by providing developers with valuable technical and business insights to enable faster and better investment decisions.

Other Relevant Issues

Per the Commission's directive in the Energy Storage Order, the State of Storage report also addresses other relevant issues affecting energy storage policy in New York, including adjustments to the Bridge Incentive and any other impediments and proposed solutions that may slow deployment.

DPS Staff and NYSERDA continually monitor market developments and deployment progress to ensure that the Bridge Incentive and other policies are fulfilling their purpose. Any new programs or funding will be evaluated as part of the ongoing Energy Storage Roadmap update. In February 2024 NYSERDA held a webinar to propose the creation of a fifth retail energy storage funding block in New York City using approximately $54 million of uncommitted funds that were authorized in the Energy Storage Order. NYSERDA highlighted that the value of retail energy storage is high due to its ability to help replace fossil-fuel peaking units, that there are over 100 MWs of shovel ready projects, and that the permitting system and fire safety regulations are well established to allow for safe and quick development of retail energy projects. Following a comment period on the proposal, NYSERDA will file an updated Implementation Plan which will give details to developers on the timing for the opening of the funding block.

A series of fires at three different lithium-ion energy storage facilities in Jefferson, Orange, and Suffolk counties in summer 2023 prompted the creation by Governor Hochul of the Inter-

Agency Fire Safety Working Group in July 2023. This working group is tasked with working with first responders and local leaders to identify best practices, address potential public safety risks, and ensure overall the safe operation of lithium-ion batteries in New York. The working group released 15 draft recommendations to update and add to the existing Fire Code of New York State. Following a public comment period ending on March 5, the draft recommendations will be considered for adoption by the New York State Code Council.

Efforts are underway by developers and stakeholders to extend and increase the abatement and also to seek a statewide sales tax exemption on energy storage systems. Impediments to the energy storage market in New York City can be overcome with a citywide focus on permitting and siting changes and solutions for reducing interconnections costs.

In March 2020, NYSERDA filed the Energy Storage Workforce Development Report, which summarizes workforce development needs and available resources for the energy storage industry in New York.[33] By the Energy Storage Order, the Commission required NYSERDA to "facilitate an industry partnership to develop an inventory of workforce development needs and a blueprint for addressing potential skilled talent shortages."[34] At this time, NYSERDA anticipates that market demand for energy storage training will increase in 2024, particularly for design, installation and operation, and maintenance practitioners. NYSERDA will continue to engage with stakeholders to access skills gaps and training needs over time; facilitate partnerships between training providers and businesses throughout the supply chain, including manufacturers; continue to promote relevant funding opportunities; and assess gaps that may require new funding opportunities.

CONCLUSION

The portfolio of programs and actions approved by the Commission in the Energy Storage Order, pursuant to PSL §74, have been effective in building the foundations of a competitive market for qualified energy storage systems in New York. Total deployed and awarded/contracted projects at the end of March 2024 total 977 MW in capacity, or about 65 percent of the 2025 target of 1,500 MW and 33 percent of the 2030 target of 3,000 MW. The number of energy storage projects in the various interconnection queues also indicates robust growth in the industry. This anticipated growth informed many of the recommendations in the 6 GW Roadmap. At this time,

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[33] Case 18-E-0130, ES Workforce Development Report (filed March 13, 2020).

[34] Energy Storage Order, p. 80.

comments are being accepted on the update to the 6 GW Roadmap. The Commission is considering the 6 GW Roadmap and comments received in response thereto and anticipates that the program updates will further accelerate growth in New York's energy storage industry. The next review of the energy storage program is scheduled to occur in 2025 and will present an opportunity to revisit policy issues and assess progress towards the goals of PSL §74.