December 3, 2018

By Electronic Delivery

Honorable Kimberly D. Bose, Secretary
Federal Energy Regulatory Commission
888 First Street, NE
Washington, DC 20426

Re: New York Independent System Operator, Inc.; Compliance Filing and Request for Extension of Time of Effective Date; Docket Nos. RM16-23-000, AD16-20-000, ER19-____-000

Dear Ms. Bose:

The New York Independent System Operator, Inc. ("NYISO") respectfully submits this filing in compliance with Order No. 841, *Electric Storage Participation in Markets Operated by Regional Transmission Organizations and Independent System Operators*, which was issued by the Federal Energy Regulatory Commission ("Commission") on February 15, 2018.[1]

The NYISO proposes to revise its Market Administration and Control Area Services Tariff ("Services Tariff") and Open Access Transmission Tariff ("OATT") (collectively, the "NYISO Tariffs") to comply with the directives of Order No. 841.[2] Specifically, the NYISO proposes tariff revisions to establish a new participation model consisting of market rules for Energy Storage Resources or ESRs[3] that, recognizing their physical and operational characteristics, facilitates their participation in the NYISO-administered Energy, Ancillary Services, and Installed Capacity markets.

Part II of this letter provides an overview of the NYISO's compliance with the directives of Order No. 841. Parts IV through IX then describe in detail each of the components of the NYISO's participation model for Energy Storage Resources and related rules. These include: (1) the qualification and registration requirements for Energy Storage Resources; (2) the requirements for Energy Storage Resources' participation in the NYISO-administered Energy and Ancillary Services markets; (3) the settlement rules for Energy Storage Resources; (4) the

[1] *Electric Storage Participation in Markets Operated by Regional Transmission Organizations and Independent System Operators*, Order No. 841, 162 FERC ¶ 61,127 (February 15, 2018), 83 Fed. Reg. 9580 (Mar. 6, 2018), Errata Notice (Feb 28, 2018) ("Order No. 841"). All citations to Order No. 841 in this compliance filing are to the revised order included with the February 28, 2018, errata notice.

[2] The tariff sections referenced in this filing letter are located in the Services Tariff, unless otherwise indicated. Capitalized terms that are not otherwise defined in this filing shall have the meaning specified in Section 2 of the NYISO Services Tariff and Section 1 of the OATT.

[3] "Energy Storage Resource" is defined in Part IV.A of this filing.

requirements for Energy Storage Resources' participation in the NYISO-administered Installed Capacity market; (5) the market mitigation requirements applicable to Energy Storage Resources; and (6) other tariff revisions required to account for the physical and operational characteristics of Energy Storage Resources and the Order No. 841 compliance directives, including, for example, interconnection requirements.

All of the proposed revisions included in this compliance filing are either expressly required under Order No. 841, necessary to implement or clarify the existing tariff language to accommodate the Order's directives, or non-substantive organizational or clarifying adjustments of the kind that the Commission has previously permitted in compliance filings. The proposed revisions build upon the NYISO's existing Commission-approved market, planning, and market power mitigation provisions. They are carefully designed to be compatible with existing rules and processes. The NYISO respectfully submits that its proposed tariff revisions comply with the directives of Order No. 841, are fully supported, are just and reasonable, and should be accepted without modification or condition.

As described in Part X of this filing letter, the NYISO respectfully requests that the Commission take action to accept the proposed tariff revisions within sixty (60) days of this filing, *i.e.*, by February 1, 2019, so that the NYISO can develop and deploy the required software changes for the Energy Storage Resource participation model by its requested effective date. Further, as described in Part X.A of this filing letter, the NYISO respectfully requests that the Commission grant, with a limited exception, an extension of the implementation deadline set forth in Order No. 841 for the proposed tariff revisions until no earlier than May 1, 2020, as the software platform upon which the proposed revisions will be implemented is currently undergoing a significant upgrade.[4] The NYISO currently anticipates completing this upgrade in late 2019 and expects the testing of the Energy Storage Resource specific software to take several additional months after the new software platform is in place. Finally, the NYISO respectfully requests a more immediate effective date as detailed in Part X.B for the proposed revisions to Sections 23.4.5.2 and 23.4.5.7 of the Services Tariff, which concern the reinstatement of certain Buyer Side Market Power Measures applicable to "Category III" Examined Facilities that plan to provide capacity.

[4] *See* 18 C.F.R. § 385.2008(a).

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I. Background

A. Existing Participation Opportunities for Electric Storage Facilities in the NYISO-Administered Markets

Electric storage facilities can currently participate in the NYISO-administered Energy, Ancillary Services, and Installed Capacity markets under various existing participation models of Generators, Energy Limited Resources or "ELRs," Limited Energy Storage Resources or "LESRs," or as a component of a Demand Side Resource in certain demand response programs. Despite these participation opportunities, the NYISO does not currently have a single, consolidated participation model like the one proposed in this compliance filing.

Electric storage facilities are currently eligible to participate as a "Generator" in the NYISO-administered Energy and Ancillary Services markets. However, the existing market rules for Generators are not carefully tailored to the operating characteristics of electric storage facilities. For example, under the current market rules electric storage facilities (other than Limited Energy Storage Resources) do not have the opportunity to have the NYISO manage their state of charge.

Energy Limited Resources are Installed Capacity ("ICAP") Suppliers that are unable to operate continuously on a daily basis due to certain restrictions (*e.g.*, environmental restrictions or the need to re-charge), but that can provide Energy for at least four contiguous hours each day. ELRs, like other ICAP Suppliers, have the obligation to submit Day-Ahead Market Bids for Energy, and may also be eligible to provide certain Ancillary Services, including Spinning Reserve, 10-Minute Non-Synchronized Reserve, 30-Minute Reserve, and/or Regulation Service. ELRs participate in the Energy and Ancillary Services markets as Generators. The majority of ELR megawatts participating in the NYISO-administered markets are from pumped storage hydroelectric facilities.[5]

Limited Energy Storage Resources are Generators that are not able to sustain continuous operation at maximum Energy withdrawal or maximum Energy injection for a minimum period of one hour.[6] The NYISO Tariffs limit LESRs to providing Regulation Service only. As described above, the NYISO manages LESRs' Energy levels.

Finally, electric storage facilities may participate in the NYISO's Special Case Resource ("SCR") program, Day-Ahead Demand Response Program ("DADRP"), Demand Side Ancillary Services Program ("DSASP"), and Emergency Demand Response Program ("EDRP") as a component of a Demand Side Resource such that the electric storage facility helps reduce the Demand Side Resource's Load at the NYISO's direction. That is, the electric storage facility may operate to partially or wholly serve a Demand Side Resource's host load to facilitate the

[5] There are other ELRs that are subject to Energy limitations based on fuel availability or environmental factors. Demand Side Resources are not eligible to be ELRs.

[6] Demand Side Resources and Generators that can sustain operation for longer than 1 hour are not eligible to be LESRs.

provision of demand-side services in the NYISO-administered Energy, Ancillary Services, and/or Installed Capacity markets, as applicable. The electric storage facility must satisfy the requirements of the particular demand response program. Unlike Generators, LESRs, and ELRs, Demand Side Resources participating in the NYISO's demand response programs are prohibited from injecting Energy onto the grid.

B. NYISO Process to Expand Electric Storage Facilities' Participation in its Markets and Order No. 841

In 2016, the NYISO initiated a stakeholder process to develop a market design concept to enable electric storage facilities to offer their full capabilities into the NYISO-administered Energy, Ancillary Services, and Installed Capacity markets. The NYISO issued its *Energy Storage Integration: Market Design Concept Proposal* in December 2017,[7] which laid the foundation for the market rules proposed in this filing, as adjusted to meet the directives in Order No. 841.

At the same time as the NYISO's process, the Commission initiated an inquiry in April 2016, requesting information from the NYISO and other Regional Transmission Organizations ("RTOs") and Independent System Operators ("ISOs") concerning the participation of electric storage resources in their markets.[8] The Commission subsequently issued a Notice of Proposed Rulemaking in November 2016, proposing reforms to its regulations to remove barriers to the participation of electric storage resources in ISO/RTO markets.[9] On February 15, 2018, the Commission issued Order No. 841, requiring ISOs/RTOs to revise their tariffs to facilitate the participation of electric storage resources in their markets. The Commission directed each ISO/RTO to submit a compliance filing within 270 days of the publication of the order – *i.e.,* by December 3, 2018.[10]

II. Overview

A. The NYISO's Compliance with Order No. 841 Directives

In this Part, the NYISO provides an overview of its compliance with the directives of Order No. 841. Parts IV through IX of this filing letter describe the NYISO's proposed

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[7] *See Energy Storage Integration: Market Design Concept Proposal: A Report by the New York Independent System Operator* (December 2017); *available at:* http://www.nyiso.com/public/webdocs/markets_operations/committees/bic_miwg/meeting_materials/2017-12-20/2017%20ESR%20Market%20Design%20Concept%20Proposal.pdf.

[8] *See Response of the New York Independent System Operator, Inc.*, Electric Storage Participation in Regions With Organized Wholesale Electric Markets, Docket No. AD16-20-000 (May 16, 2016).

[9] *See* Notice of Proposed Rulemaking, Electric Storage Participation in Markets Operated by Regional Transmission Organizations and Independent System Operators, 157 FERC ¶ 61,121 (2016) (Nov. 17, 2016).

[10] Order No. 841 at P 348. The date that is 270 days from publication in the Federal Register is Saturday, December 1, 2018. The NYISO is filing this compliance filing on the next Commission business day, Monday, December 3, 2018. *See* 18 C.F.R. §385.2007(a)(2).

participation model for Energy Storage Resources and the related market rules and details the NYISO's compliance with the directives of Order No. 841.

- *Order No. 841 requires each ISO/RTO to establish a participation model consisting of market rules that, recognizing the physical and operational characteristics of electric storage resources, facilitates their participation in the ISO/RTO markets.*[11]

The NYISO proposes to establish a participation model for Energy Storage Resources to facilitate these entities' participation in the NYISO-administered Energy, Ancillary Services, and Installed Capacity markets. Energy Storage Resources will be a subset of Generators under the NYISO Tariffs. As described in Part IV.A, to be eligible to be an Energy Storage Resource, an electric storage facility must satisfy the qualification requirements to be a Generator under the NYISO Tariffs and certain additional qualification requirements that account for the physical and operational characteristics of electric storage facilities, the directives of Order No. 841, and the capabilities of the NYISO's markets and settlements software.

The NYISO has revised its registration requirements and market rules to integrate Energy Storage Resources into its existing market and settlements constructs to ensure, to the extent possible, comparable treatment of Energy Storage Resources and other participants in the NYISO-administered markets. The NYISO's proposed revisions remove barriers to entry for the participation of Energy Storage Resources based on their physical and operational characteristics.[12]

Electric storage facilities that cannot satisfy the qualification requirements for Energy Storage Resources, or that can separately satisfy the qualification requirements of Energy Storage Resources and other participation models, may elect to participate in the NYISO-administered markets through existing participation models that accommodate their physical and operational characteristics (*e.g.*, as Energy Limited Resources).

- *Order No. 841 requires each ISO/RTO to ensure that a resource using the participation model for electric storage resources is eligible to provide all capacity, energy, and ancillary services that it is technically capable of providing in the RTO/ISO markets, including services that the ISOs/RTOs do not procure through an organized market.*[13]

The NYISO proposes to revise its market rules as described in Parts V and VII of this filing letter to provide that an electric storage facility using the Energy Storage Resource participation model can participate in the NYISO-administered Energy, Ancillary Services, and Installed Capacity markets, recognizing that the Energy Storage Resource must satisfy the technical, operational, and/or performance requirements set forth in the NYISO Tariffs and ISO Procedures that are necessary for participating in these markets. As described in Part V.F.5, an

[11] Order No. 841 at PP 3, 51.

[12] *See Id.* at P 20 (requiring ISO/RTOs to revise their tariffs to remove barriers to the participation of electric storage resources in ISO/RTO markets).

[13] *Id.* at PP 4, 76.

electric storage facility using the Energy Storage Resource participation model is also eligible to provide cost-based Ancillary Services that the NYISO does not procure through an organized market, such as Voltage Support Service. In addition, as described in Part VII.B.4, the NYISO has revised its Installed Capacity market requirements to allow Energy Storage Resources to spread their full capability over four hours to meet the minimum four (4) consecutive hour run time qualification requirement.

- *Order No. 841 requires each ISO/RTO to ensure that a resource using the participation model for electric storage resources can be dispatched and can set the wholesale market clearing price as both a wholesale seller and wholesale buyer consistent with rules that govern the conditions under which a resource can set the wholesale price*.[14]

As described in Part V of this filing letter, an electric storage facility participating in the NYISO's Energy Storage Resource participation model may submit Bids to withdraw and inject Energy, can self-schedule megawatts ("MW") to withdraw and inject Energy, and can set the wholesale market clearing prices when injecting and when withdrawing.

Energy Storage Resources will be required to be dispatchable when they are physically available. The NYISO's proposed tariff revisions treat Energy Storage Resources as "dispatch-only." Electric storage facilities using the participation model will be modeled as available and ready for dispatch whenever Bids are submitted and will be permitted to submit an incremental bid-curve representing the entire range of the Energy Storage Resource's capability. Modeling each Energy Storage Resource as a single resource in the wholesale market with a bid-curve that represents the entire operating range from injection to withdrawal will prevent the Energy Storage Resource from being dispatched to withdraw and inject in the same interval. The NYISO has also clarified that withdrawals of Energy that are stored for later injection back to the grid are treated as "negative generation," and are part of the supply stack. As supply, Energy withdrawals will be settled at the applicable Generator bus Locational Based Marginal Price ("LBMP") and will be able to set the market clearing price.

In addition, as described in Part VII, an electric storage facility using the NYISO's Energy Storage Resource participation model may participate as an Installed Capacity Supplier in the NYISO's Installed Capacity market and set the market clearing prices in the NYISO-administered strip, monthly, and spot market auctions.

Finally, as described in Part VI, the NYISO revised its Bid Production Cost Guarantee ("BPCG") payment and Day-Ahead Margin Assurance Payment ("DAMAP") requirements to establish when electric storage facilities using the Energy Storage Resource participation model will be eligible for make-whole payments.

[14] *Id.* at PP 4, 142.

- *Order No. 841 requires that each ISO/RTO account for the physical and operational characteristics of electric storage resources through bidding parameters or other means.*[15]

As described in Parts IV.B and V.D, the NYISO has established new registration and bidding parameters that recognize the physical and operational characteristic of Energy Storage Resources. The new parameters are comparable to those specified in Order No. 841, with the exception of the Minimum and Maximum Run Time and Minimum and Maximum Charge Time parameters. Instead of using the identified run time parameters, the NYISO proposes to use each Energy Storage Resource's Beginning Energy Level (as described in Part V.D.3 below) and Roundtrip Efficiency to ensure that both Day-Ahead and real-time schedules are feasible. In addition, as described in Part V.D, an electric storage facility using the Energy Storage Resource participation model may submit the applicable physical and operational characteristics included in the bidding parameters for both its Day-Ahead Market Bids and Real-Time Market Bids.

- *Order No. 841 requires that each ISO/RTO establish a minimum size requirement for participation in the ISO/RTO markets that does not exceed 100 kW.*[16]

As described in Parts V.D and VII.B.1, the minimum offer size for Energy Storage Resources to participate in the NYISO-administered Energy, Ancillary Services, and Installed Capacity markets will be 100 kilowatts ("kW").

- *Order No. 841 requires that each ISO/RTO allow resources using the participation model for electric storage resources to self-manage their state of charge.*[17]

As described in Part V.D.2, an Energy Storage Resource may self-manage or opt to have the NYISO manage its Energy Level, which Order No. 841 refers to as its state of charge. Suppliers that choose to self-manage the Energy Level of Energy Storage Resources will be required to submit Bids that are consistent with the actual storage level of the Resource. If the Energy Storage Resource is unable to meet its dispatch, it may be subject to settlement charges for not following its Base Point Signal, as described in Part V.F.3. In addition, as described in Part VIII, the NYISO proposes revisions to its market monitoring requirements to evaluate Energy Storage Resources for economic and physical withholding.

- *Order No. 841 requires that the sale of electric energy from the ISO/RTO markets to an electric storage resource that the resource then resells back to those markets must be at the wholesale LMP*.[18]

As described above, Energy withdrawals by Energy Storage Resources that are stored for later injection back onto the grid will be settled at the applicable Generator bus LBMP.

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[15] *Id.* at PP 4, 191.

[16] *Id.* at PP 4, 270.

[17] *Id.* at P 253.

[18] *Id.* at PP 4, 294.

Consistent with the directives in Order No. 841,[19] electric storage facilities that meet the eligibility requirements to be Energy Storage Resources but participate in the NYISO-administered wholesale markets using a different participation model (*e.g.*, as Energy Limited Resources) will also settle Energy withdrawals at the applicable Generator bus LBMP.

- *Order No. 841 requires that each ISO/RTO implement metering and accounting practices as needed to address the complexities of implementing the requirement that the sale of electric energy from the ISO/RTO markets to an electric storage resource that the resource then resells back to those markets be at the wholesale LMP.*[20]

As described in Part IX.A, the NYISO proposes to require Energy Storage Resources to be directly metered, and to require Energy Storage Resources that are co-located with a Load behind the same end-use customer meter to separately meter the injections and withdrawals of Energy specifically from the Energy Storage Resource. Direct metering will enable accurate accounting of Energy injections and withdrawals, and therefore accurate settlement of wholesale market transactions. Direct metering of Energy Storage Resources is consistent with how the NYISO meters other Generators on its system.

B. Stakeholder Process

The NYISO has worked diligently with stakeholders to address its efforts to comply with Order No. 841. As described above, prior to Order No. 841 the NYISO initiated a stakeholder process and held discussions with stakeholders concerning the development of a market design concept for a participation model for electric storage facilities. Following the issuance of Order No. 841, the NYISO built off of its initiative and stakeholder input in developing the participation model for Energy Storage Resources required to comply with the Order's requirements.

The NYISO has presented to, and discussed with, stakeholders its concepts and design features for the participation model for Energy Storage Resources and related market rules at numerous working group meetings. At each of these meetings, the NYISO requested, received, and considered comments from all interested parties. These working group meetings were often joint meetings of the Installed Capacity Working Group ("ICAPWG") and the Market Issues Working Group ("MIWG"). The NYISO shared draft tariff revisions at its October 26, 2018, joint MIWG/ICAPWG meeting. The NYISO has made subsequent modifications to the tariff revisions in light of stakeholder feedback and further refining of its compliance requirements.

The stakeholder process narrowed differences on many of the issues; however, full consensus on all issues was not achievable. In particular, certain stakeholders requested that: (i) Energy Storage Resources be permitted to participate in both the wholesale and retail markets; (ii) entities be eligible to aggregate multiple electric storage facilities across multiple sites to meet the Energy Storage Resource qualification requirements; and (iii) the NYISO adjust its

[19] *Id.* at P 56.

[20] *Id.* at P 322.

minimum run time requirements for participation in the NYISO-administered Installed Capacity market. The NYISO declined to address these proposed changes as they are beyond the scope of the Order No. 841. However, the NYISO will be evaluating these items as part of its ongoing initiative to develop market rules for distributed energy resources. The NYISO will file any resulting tariff changes with the Commission through a Section 205 filing.[21]

III. Documents Submitted

Along with this filing letter, the NYISO respectfully submits the following documents:

1. A clean version of the proposed revisions to the NYISO's Services Tariff ("Attachment I");

2. A blacklined version of the proposed revisions to the NYISO's Services Tariff ("Attachment II");

3. A clean version of the proposed revisions to the NYISO's OATT ("Attachment III"); and

4. A blacklined version of the proposed revisions to the NYISO's OATT ("Attachment IV").

IV. Qualification and Registration Requirements of Energy Storage Resources

A. Energy Storage Resource Qualification Requirements

Order No. 841 requires that an ISO/RTO define in its tariffs the criteria that a resource must meet to use the participation model for electric storage resources (*i.e.,* qualification criteria).[22] Specifically, these "criteria must be based on the physical and operational characteristics of electric storage resources, such as their ability to both receive and inject electric energy, must not limit participation under the electric storage resource participation model to any particular type of electric storage resource or other technology and must ensure that the RTO/ISO is able to dispatch a resource in a way that recognizes its physical and operational characteristics and optimizes its benefits to the RTO/ISO."[23]

1. Energy Storage Resources

The NYISO proposes to define the term "Energy Storage Resource," which establishes the qualification criteria that an electric storage facility must meet to participate in the NYISO-

[21] *See, e.g.*, Order No. 841 at P 54 (providing that ISO/RTOs can propose additional market rules to accommodate electric storage resources with specific physical and operational characteristics through a separate FPA Section 205 filing).

[22] *Id*. at P 61.

[23] *Id.* at P 61.

administered markets under the NYISO's new Energy Storage Resource participation model. An Energy Storage Resource is defined as follows:

> **Energy Storage Resource ("ESR"):** Generators that receive Energy from the grid at a specified location, and are capable of storing that Energy, for later injection back onto the grid at the same location. Resources that cannot inject Energy onto the grid cannot be Energy Storage Resources. In order to qualify for wholesale market participation, Energy Storage Resources must be able to inject at a rate of at least 0.1 MW for a period of at least one hour. Energy Storage Resources are Withdrawal-Eligible Generators.[24]

As set forth in this definition, to qualify as an Energy Storage Resource, an electric storage facility must: (i) satisfy the NYISO's qualification requirements to be a Generator; (ii) be capable of receiving electric Energy from the grid and storing it for later injection back to the grid, as required in the Order No. 841 definition of "electric storage resources;"[25] (iii) be able to inject electric Energy onto the grid; (iv) receive and inject Energy at the same location on the grid; and (v) be able to inject at a rate of at least 0.1 MW of Energy for a period of at least one hour. The proposed qualification requirements do not limit the electric storage facilities eligible to use the Energy Storage Resource participation model to any particular type of electric storage facility or technology.

For purposes of the NYISO Tariffs, an Energy Storage Resource is classified as a "Supplier," is a form of "Generator," and is a "Resource."[26] As such, an Energy Storage Resource is subject to the tariff requirements applicable to Suppliers, Generators, and Resources, except as modified in this compliance filing to account for the physical and operational characteristics of an Energy Storage Resource, the directives of Order No. 841, and the capabilities of the NYISO's markets and settlements software.[27] As detailed in Order No. 841, individual electric storage facilities that participate in the NYISO-administered markets using the Energy Storage Resource participation model must satisfy the technical requirements set forth in

[24] Services Tariff Section 2.5; *see also* OATT Section 1.5 (referencing Services Tariff definition of Energy Storage Resource).

[25] Order No. 841 defines an "electric storage resource" as a "resource capable of receiving electric energy from the grid and storing it for later injection of electric energy back to the grid." Order No. 841 at P 29; *see also* 18 C.F.R. 35.28(b)(9).

[26] Proposed revision to definition of Supplier in Services Tariff Section 2.19 and Resource in Services Tariff Section 2.18. A "Generator" is defined broadly in the NYISO Services Tariff as a "facility … capable of supplying Energy, Capacity and/or Ancillary Services that is accessible to the [New York Control Area]." The NYISO also proposes to clarify that an Energy Storage Resource is not a Behind-the-Meter Net Generation Resource. *See* proposed revision to definition of Behind-the-Meter Net Generation Resource in Services Tariff Section 2.2.

[27] *See* Order No. 841 at P 68 (requiring ISO/RTOs to propose any necessary additions or modifications to their existing tariffs to specify whether particular existing market rules apply to resources participating under the electric storage resource participation model).

the market rules to provide specific services and can provide a service only if it is technically capable of doing so.[28]

2. Participation of Other Electric Storage Facilities in NYISO-Administered Markets

An electric storage facility that cannot satisfy the qualification criteria in the definition of Energy Storage Resource will not be eligible to use the Energy Storage Resource participation model to participate in the NYISO-administered markets. However, such facilities will still be eligible to participate in the NYISO-administered markets through other participation models that accommodate their physical and operational characteristics.

In developing the market design for Energy Storage Resources, the NYISO reviewed the existing opportunities for electric storage facilities in its markets. The NYISO determined that it will not, at this time, make significant changes to its Energy Limited Resource, Limited Energy Storage Resource, or demand response programs as part of its compliance with Order No. 841. The existing participation models supplement the new participation model for Energy Storage Resources and provide opportunities for electric storage facilities that may not meet the requirements to be an Energy Storage Resource based on the facilities' physical or operational characteristics.

The Limited Energy Storage Resource participation model, for example, permits short duration facilities to provide Regulation Service even though they cannot meet the minimum duration requirements to supply Energy and Operating Reserves. The NYISO's demand response programs also permit electric storage facilities' participation in the wholesale markets when they are paired with an end-use Load, are located behind the end-use customer's meter, and can reduce the Load withdrawn from the grid by the end-use customer at the NYISO's direction.[29] These entities do not inject Energy onto the grid and are not "electric storage resources" as defined by Order No. 841. However, they can provide services in the NYISO-administered markets. These existing participation opportunities, paired with the market rules for Energy Storage Resources proposed in this filing, provide electric storage facilities with a number of participation options that recognize the varying characteristics of those facilities.

3. Eligibility to Participate Under Multiple Participation Models

Certain electric storage facilities may be capable of separately satisfying the qualification criteria of an Energy Storage Resource and other existing participation models, such as a Generator or an Energy Limited Resource. In such cases, the facility must register for one model to participate in the NYISO-administered markets. The services that an electric storage facility

[28] *Id.* at PP 65, 77.

[29] The NYISO is separately designing a participation model for distributed energy resources. It is expected that the final market design for distributed energy resources will replace certain existing demand response programs with a comprehensive set of rules for Load reduction assets and other distributed facilities. In the future, electric storage facilities that do not meet the qualifications to be Energy Storage Resources may qualify to use the distributed energy resource participation model.

is able to provide may differ based on the participation model in which it chooses to participate. The NYISO proposes to revise the definition of Energy Limited Resource to make clear that those Resources that choose to be Energy Limited Resources are not subject to the rules applicable to Energy Storage Resources.[30]

The NYISO also proposes to create in its tariffs a new sub-category of Generator – a "Withdrawal-Eligible Generator" – that applies to Energy Storage Resources and Energy Limited Resources that submit Bids to withdraw Energy.[31] The sub-category is defined as follows:

> **Withdrawal-Eligible Generator:** A Generator that is eligible to withdraw energy from the grid at a price for the purposes of recharging or refilling for later injection back to the grid.[32]

The NYISO clarifies in the definitions of Energy Storage Resource and Energy Limited Resource that they are Withdrawal-Eligible Generators.[33]

B. Energy Storage Resource Registration Requirements

Order No. 841 requires ISO/RTOs to specify whether resources that qualify to use the participation model for electric storage resources will participate in the ISO/RTO markets through existing or new market participation agreements.[34] To participate in the NYISO's markets, Energy Storage Resources will be required to register with the NYISO pursuant to its existing customer registration process. Energy Storage Resources will have to execute the service agreements for the NYISO's OATT and Services Tariff and to satisfy the existing customer registration requirements, as modified for Energy Storage Resources.

The NYISO will establish as part of its registration requirements that an Energy Storage Resource is required to: (i) purchase its charging Energy from the NYISO at the wholesale LBMP; and (ii) provide an attestation that it has sufficient metering to identify only that Energy that is withdrawn for later injection back on the grid.

In addition, the NYISO's customer registration materials will be amended to require an Energy Storage Resource to submit information concerning the parameters described in Table 1. Order No. 841 directed ISO/RTOs to account for the physical and operational characteristics of

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[30] Services Tariff Section 2.5. Demand Side Resources and Limited Energy Storage Resources are not subject to the rules applicable to Energy Storage Resources because there is no overlap between the participation models by definition – *i.e.*, Demand Side Resources do not inject onto the grid and Limited Energy Storage Resources have less than a one hour run time.

[31] Services Tariff Section 2.23; *see also* OATT Section 1.23 (referencing Services Tariff definition of Withdrawal-Eligible Generator).

[32] *Id.*

[33] Services Tariff Section 2.5.

[34] Order No. 841 at P 68.

electric storage resources through bidding parameters or other means, including accounting for thirteen parameters specified in the order.[35] The parameters in Table 1 address the parameters specified in Order No. 841, with the exception of: (i) State of Charge, which is addressed as Energy Level and Beginning Energy Level in Parts V.D.2 and V.D.3; and (ii) Minimum and Maximum Run Time and Minimum and Maximum Charge Time, which are commitment parameters that do not apply to the NYISO's dispatch-only model for Energy Storage Resources as described in Part V.B.3. The parameters in Table 1 that are in italics are specific to Energy Storage Resources, while the remainder apply to all Generators.

Table 1

NYISO's Energy Storage Resource Required Registration Parameter	Equivalent Order No. 841 Parameter
Upper Operating Limit ("UOL") – This represents the physical maximum MW level at which the Energy Storage Resource is willing to operate. Upon registration, the Energy Storage Resource must provide the maximum physical Upper Operating Limit of the Resource. While bidding, the Energy Storage Resource must supply Emergency and Normal Upper Operating Limits that are no greater than the maximum physical Upper Operating Limit.[36] UOL may be used to represent either the Maximum Discharge Limit or the Minimum Charge Limit and can be a negative number.[37]	**Maximum Discharge Limit** – represents the maximum MW quantity that a resource using the participation model for electric storage resources can inject to the grid. **Minimum Charge Limit** – The minimum MW level that a resource using the participation model for electric storage resources can receive from the grid.
Lower Operating Limit ("LOL")[38] – This represents the minimum MW level at which the Energy Storage Resource is willing to operate. Upon registration, the Energy Storage Resource must provide the physical Lower Operating Limit of the Resource. When bidding, the Energy Storage Resource must supply a Lower Operating Limit value that is	**Maximum Charge Limit** – represents that maximum MW quantity of electric energy that a resource using the participation model for electric storage resources can receive from the grid. **Minimum Discharge Limit** – The minimum MW output level that a resource using the

[35] *Id.* at PP 4, 191, 211, 220, 229, and 236. These parameters include: State of Charge, Minimum State of Charge, Maximum State of Charge, Maximum Discharge Limit, Maximum Charge Limit, Minimum Charge Time, Maximum Charge Time, Minimum Run Time, Maximum Run Time, Minimum Discharge Limit, Minimum Charge Limit, Discharge Ramp Rate, and Charge Ramp Rate.

[36] Normal Upper Operating Limit is defined in Services Tariff Section 2.14; Emergency Upper Operating Limit is defined in Services Tariff Section 2.5.

[37] *See* proposed tariff revision to definition of Normal Upper Operating Limit in Services Tariff Section 2.14.

[38] The NYISO proposes to insert a definition of Lower Operating Limit in Services Tariff Section 2.12.

NYISO's Energy Storage Resource Required Registration Parameter	Equivalent Order No. 841 Parameter
no less than the physical Lower Operating Limit. LOL may be used to represent either the Minimum Discharge Limit or the Maximum Charge Limit and can be a negative number.	participation model for electric storage resources can inject onto the grid.
Response Rates – This represents how quickly the Energy Storage Resource can respond to dispatch instructions from the NYISO under various operating conditions.	**Charge Ramp Rate** – The speed at which a resource using the participation model for electric storage resources can move from zero output to its Maximum Charge Limit. **Discharge Ramp Rate** – The speed at which a resource using the participation model for electric storage resources can move from zero output to its Maximum Discharge Limit.
Upper Storage Limit – The maximum amount of Energy an Energy Storage Resource is physically capable of storing.[39]	**Maximum State of Charge** – represents a State of Charge value that should not be exceeded (*i.e.,* gone above) when a resource using the participation model for electric storage resources is receiving electric energy from the grid (*e.g.*, 95% State of Charge).
Lower Storage Limit – The minimum amount of Energy an Energy Storage Resource is physically capable of storing.[40]	**Minimum State of Charge** – represents a State of Charge value that should not be exceeded (*i.e.*, gone below) when a resource using the participation model for electric storage resources is injecting electric energy to the grid (*e.g.*, 5% State of Charge).
Roundtrip Efficiency – The ratio of Energy injections to Energy withdrawals for an Energy Storage Resource.[41]	**N/A**

V. Requirements for Energy Storage Resources' Participation in NYISO-Administered Energy and Ancillary Services Markets

A. Overview

Order No. 841 requires that the ISO/RTOs establish market rules so that a resource using the participation model for electric storage resources is eligible to provide all capacity, energy and ancillary services that it is technically capable of providing, including services that the

[39] The NYISO proposes to insert a definition of Upper Storage Limit in Services Tariff Section 2.21.

[40] The NYISO proposes to insert a definition of Lower Operating Limit in Services Tariff Section 2.12.

[41] The NYISO proposes to insert a definition of Roundtrip Efficiency in Services Tariff Section 2.18.

ISO/RTOs do not procure through an organized market.[42] As described in this Part V, an Energy Storage Resource may sell and purchase Energy, provide Regulation Service and Operating Reserves (*i.e.*, Spinning Reserves and 30 Minute Reserves) both when injecting (*i.e.*, discharging) and withdrawing (*i.e.*, charging) Energy, and provide other Ancillary Services if it satisfies the applicable tariff requirements.[43]

As described in Part IV.A above, an Energy Storage Resource is a type of Generator. As such, the vast majority of the NYISO's bidding and scheduling constructs in the Energy and Ancillary Services markets will apply to Energy Storage Resources. However, there are physical and operational characteristics of Energy Storage Resources that are not captured in the existing market rules applicable to Generators. In addition, Order No. 841 required ISO/RTOs to establish certain Energy Storage Resource-specific market requirements. Therefore, the NYISO proposes to modify its existing market rules as described in this Part V to account for Energy Storage Resource characteristics and the directives of Order No. 841. The particular services that an individual Energy Storage Resource may provide will depend on its ability to meet the revised market rules.

B. Energy Storage Resources Will Be Dispatch-Only Resources

1. Commitment and Dispatch Requirements for Traditional Generators

The NYISO's review of a traditional Generator's Day-Ahead and Real-Time Market Bids will generally include an evaluation of both its commitment and dispatch parameters. Commitment parameters include certain physical characteristics (*e.g.*, minimum run time) and costs (*e.g.*, start-up costs) that are required to bring a Resource to its minimum generation level for the evaluated interval.[44] The dispatch parameters include the costs (and time, defined by response rate) necessary to bring a Resource to a particular unit of output. While the majority of Bids for Generators participating in the NYISO-administered markets include both commitment and dispatch parameters, certain Resources are considered to be "dispatch-only." For example, Behind-the-Meter Net Generation Resources, which serve an on-site Host Load and offer excess generating capacity to the wholesale market, are evaluated only on their dispatch parameters. They do not submit commitment parameters because they must be already online and operating (*i.e.*, committed) to meet their local Load prior to offering to the wholesale market.

[42] Order No. 841 at PP 4, 76.

[43] The requirements for Energy Storage Resource's participation in the NYISO-administered capacity markets are described in Part VII below.

[44] When the Resource being evaluated is online and at (or above) its minimum generation level, the commitment costs may be zero dollars for the market interval under evaluation because the resource is already operating.

2. Dispatch-Only Model for Energy Storage Resources

The NYISO's participation model for Energy Storage Resources is a dispatch-only model for the Day-Ahead Market and Real-Time Market. It is designed to best accommodate Energy Storage Resources that have a continuous operating range from withdrawal to injection that does not include an "infeasible operating region" around zero MW where the Resource cannot operate. As a result, Energy Storage Resources will offer Energy using fully dispatchable, continuous Bid curves across their operating ranges. They will be treated as always available for dispatch, consistent with their Bids. They will not need to start-up before they are dispatched, and the NYISO's dispatch may freely transition them between withdrawing and injecting. The NYISO understands from discussions with its stakeholders and other developers that this dispatch-only approach will accommodate the new advanced storage technologies that are currently being contemplated for deployment in New York.

In developing its market design, the NYISO considered an alternative approach that evaluated Energy Storage Resources for both commitment and dispatch. This alternative approach would accommodate both Energy Storage Resources with a continuous operating range and those that had an infeasible operating region around zero MW (*e.g.*, a minimum output level and/or a minimum withdrawal level) where the Resource could not operate. The alternate design that the NYISO considered would have permitted Energy Storage Resources with these non-continuous operating ranges to submit Bids to inject and withdraw Energy in the same market hour. However, the NYISO has determined that accommodating Energy Storage Resources with non-continuous operating ranges is not technically feasible at this time due to the impact their inclusion would have on the timely development of both Day-Ahead and Real-Time Market solutions.

The NYISO's commitment and dispatch software have historically evaluated Resources based on two commitment states – online or offline. An Energy Storage Resource that features an infeasible operating region (*i.e.,* that has a non-continuous operating range between its injecting and withdrawing states) adds a third operating state for the software to evaluate – injecting, withdrawing, and off. The NYISO worked with its software vendor to develop a prototype and test the feasibility of implementing software that would accommodate non-continuous Energy Storage Resources in its markets. Through its testing, the NYISO determined that the time it took to solve its Day-Ahead Security Constrained Unit Commitment ("SCUC") significantly increased when Energy Storage Resources with non-continuous operating ranges were included, exceeding currently acceptable standards. This was determined to be the case with just eight such non-continuous Resources participating in the Day-Ahead Market. It took the SCUC significantly longer to solve for the Energy Storage Resources with a non-continuous operating range because the software had to evaluate three operating states as opposed to two for conventional units and Energy Storage Resources with a continuous operating range.[45] As a result of these performance and scalability concerns, the NYISO determined that, at this time, the

[45] The need to manage an Energy Storage Resource's Energy Level and to account for its Roundtrip Efficiency also impact the amount of time the SCUC software requires to develop a solution.

Energy Storage Resource participation model will only recognize one operating state – *i.e.*, on – and will treat the Energy Storage Resources as fully dispatchable within the operating range offered by the Market Participant. Energy Storage Resources will not be permitted to submit an infeasible operating region to maintain the consistent on/off evaluation in the NYISO's software.[46] This approach significantly reduces the amount of time necessary for the software to evaluate and solve unit commitment and dispatch.

3. Tariff Changes to Accommodate Dispatch-Only Model

Because the NYISO will not be committing Energy Storage Resources, the NYISO proposes to revise Section 4.2.3 of the Services Tariff to provide that for the Day-Ahead Market, the SCUC software will treat Energy Storage Resources as available to be scheduled based on their Bids. Similarly, the NYISO proposes to revise Section 4.4.1.1 of the Services Tariff to provide that the Real-Time Commitment ("RTC") software for the Real-Time Market will treat Energy Storage Resources as already being committed and available to be scheduled based on their Bids.

As Energy Storage Resources are already committed, they are not eligible to submit Start-up Bids or to recover start-up costs. The NYISO proposes to revise the definitions of Start-Up Period and Start-Up Bid such that the Start-Up Period for Energy Storage Resources shall be set to zero, and that Energy Storage Resources shall not submit a Start-Up Bid.[47] Because Energy Storage Resources are required to operate using a fully dispatchable, continuous Bid curve across their operating range, they are not eligible to include Minimum Generation Bids with their offers. Accordingly, the NYISO proposes to revise the definition of Minimum Generation Bid and Minimum Generation Level to indicate that if a Supplier is an Energy Storage Resource or a Limited Energy Storage Resource, it shall not submit these parameters.[48] The NYISO also proposes to modify Section 4.1.8 of the Services Tariff to be consistent with the described changes.

Because the NYISO will not be making commitment decisions for Energy Storage Resources, the NYISO will not require the Energy Storage Resource to provide information concerning the following parameters identified in Order No. 841 – Minimum Run Time, Maximum Run Time, Minimum Charge Time, and Maximum Charge Time. These run time parameters concern the commitment of the facility, which is not taken into account in the NYISO's dispatch-only model for Energy Storage Resources. Instead of using run time parameters, the NYISO proposes to use each Energy Storage Resource's Beginning Energy

[46] The Energy Limited Resource construct is available to accommodate Generators that are capable of withdrawing Energy for later injection back onto the grid, but that have a minimum generation level and/or a minimum withdrawal level that needs to be reflected in its Bids.

[47] *See* proposed revisions to the Start-Up Period and Start-Up Bid definitions in Services Tariff Section 2.19.

[48] *See* proposed revisions to the Minimum Generation Bid and Minimum Generation Level definitions in Services Tariff Section 2.13. The NYISO also proposes to clarify that these parameters do not apply to Limited Energy Storage Resources because they are Regulation-only resources.

Level (as described in Part V.D.3 below) to ensure that both Day-Ahead and real-time schedules are feasible.

4. Participation of Electric Storage Facilities with a Non-Continuous Operating Range

Electric storage facilities that do not have a continuous dispatch range can participate in the NYISO-administered markets as Energy Limited Resources. The current Energy Limited Resource participation model is designed to accommodate Resources that cannot operate continuously on a daily basis due to Energy limitations (including a minimum generation level or a minimum withdrawal level), environmental restrictions or other non-economic reasons, and have a non-continuous operating range. Energy Limited Resources can set the market clearing price when withdrawing and injecting. While the Energy Limited Resource participation model is not uniquely tailored to the characteristics of electric storage facilities, it recognizes the bi-directional nature of those facilities and permits Bids for withdrawals and for injections in individual Bid increments (*i.e.,* for each hour of the Day-Ahead Market, and in each hour of the Real-Time Market). The Energy Limited Resource participation model does not permit a Resource to Bid both withdrawal and injection in the same market hour, and does not support Energy Level Management by the NYISO (as described in Part V.D.2 below).

Electric storage facilities that do not have a continuous dispatch range can elect to participate in the NYISO's markets as Energy Storage Resources, but may have to buy out of their position if they are dispatched to a level that falls within their infeasible operating range.

Finally, an electric storage facility that cannot operate for a least one hour in a single state (injection or withdrawal) can still participate in the NYISO's markets as a Limited Energy Storage Resource.

C. Energy Storage Resources Can Set Wholesale Market Price When Injecting or Withdrawing Energy

Order No. 841 required each ISO/RTO to establish market rules to provide that electric storage resources can set the wholesale market clearing price as both a wholesale seller and a wholesale buyer, consistent with rules that govern the conditions under which a resource can set wholesale price. An Energy Storage Resource's Bid to inject Energy is treated as generation in the NYISO's SCUC, RTC, and Real-Time Dispatch ("RTD") software. This Bid can set the wholesale market clearing price if the Energy Storage Resource is the marginal resource. The Bid of a Withdrawal-Eligible Generator, including an Energy Storage Resource, to withdraw Energy will be treated in the NYISO's SCUC, RTC, and RTD software as "negative generation," rather than "Load." Consistent with the directives in Order No. 841, a withdrawing Energy Storage Resource can be the marginal "Supplier" and will be eligible to set the wholesale market clearing price.

Accordingly, the NYISO proposes to revise Section 17.1 of the Services Tariff to clarify that "[f]or the purposes of calculating LBMPs under this Services Tariff Section 17, Energy

withdrawals by Withdrawal-Eligible Generators are treated as negative generation, and can set price." The NYISO also proposes to revise the definition of Load to clarify that "Energy withdrawals by Withdrawal-Eligible Generators are not Load."[49]

Order No. 841 also stated that "an electric storage resource's wholesale energy purchases should take place at the applicable nodal LMP, and not the zonal price."[50] Unlike Load, for which the LBMP is calculated at the zonal level in New York, the LBMP paid by a withdrawing Energy Storage Resource will be the LBMP at the applicable Generator bus for its negative generation.[51] Accordingly, the NYISO proposes to revise Section 17.1.5 of the Services Tariff to exclude "Energy withdrawals by Withdrawal-Eligible Generators for later injection onto the grid" from inclusion in the zonal model used for LBMP billing related to Loads.[52] As Energy Storage Resource's withdrawals are negative generation, Energy Storage Resources are not responsible for transmission service charges associated with these withdrawals.

The NYISO proposes conforming changes to Service Tariff Sections 4.1.6, 4.2.1.1, 4.2.1.4, 4.2.6, 4.4.1.2.1, and 4.4.1.4 to make clear that Energy Storage Resources can both sell Energy and purchase Energy as "negative generation," and to distinguish Energy Storage Resource withdrawals from Load. The NYISO also proposes to revise Section 17.1.3 to describe how the dispatch of an Energy Storage Resource will be incorporated into the various SCUC software passes.[53] Finally, the NYISO proposes to revise the definition of Injection Billing Units in its OATT to clarify that they will include the "negative injections" by Withdrawal-Eligible Generators for purposes of allocating to these Generators a portion of the ISO annual budgeted costs and annual FERC fee pursuant to Rate Schedule 1 of the OATT.[54]

D. Energy Storage Resource Bids

Day-Ahead and Real-Time Bids for an Energy Storage Resource will be substantially the same as those for traditional Generators. The offer parameters for Energy Storage Resources will include most of the same parameters as traditional Generators, and will include new parameters that will allow the NYISO to evaluate Energy Storage Resource-specific operating characteristics.

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[49] Proposed revision to definition of Load in Services Tariff Section 2.12.

[50] Order No. 841 at P 296.

[51] *See* Services Tariff Section 4.2.6.

[52] The NYISO does not propose to assess transmission charges to Energy Storage Resources, consistent with the treatment of other Resources in the New York Control Area. The transmission charges assessed to Load are calculated at the zonal level, not at the individual Generator bus (or node). This treatment is consistent with Order No. 841's directives related to assessment of transmission charges. *See* Order No. 841 at PP 297-298.

[53] Energy Storage Resources are treated as flexible resources in the SCUC software's initial least-cost commitment (Pass 1), in Pass 5, which determines the LBMPs that are used to settle the Day-Ahead Market, and in Pass 6, which determines final Day-Ahead schedules.

[54] Proposed revision to the definition of Injection Billing Unit in OATT Section 1.9.

Order No. 841 provides that an ISO/RTO must establish a minimum size requirement for electric system resource's participation in the ISO/RTO markets that does not exceed 100 kW.[55] Section 4.1.4 of the Services Tariff describes the current scheduling prerequisites for all transactions in the Energy, Ancillary Services, Installed Capacity and Transmission Congestion Contract markets. While the NYISO does not have a minimum resource size requirement, the existing rules require that the minimum size of each transaction offered in the above-described markets be, at a minimum, one (1) MW.[56] Consistent with the directives of Order No. 841, the NYISO has revised Section 4.1.4 to permit each transaction offered in the Energy, Ancillary Services, and Installed Capacity markets on behalf of Energy Storage Resources to have a minimum offer requirement of 100 kW.[57] This revision will provide small Energy Storage Resources with the opportunity to participate in the wholesale markets.

In addition, the NYISO proposes to revise the requirements for Day-Ahead Market Bids in Section 4.2.1.3 of the Services Tariff and for Real-Time Market Bids in Section 4.4.1.2 of the Services Tariff to establish Energy Storage Resource-specific bidding requirements.

1. Incremental Energy Bid

Section 4.2.1.3.1 of the Services Tariff establishes that the Energy Storage Resource must submit a single, continuous bid curve in the Day-Ahead Market that spans the Resource's operating range from its Lower Operating Limit to its Upper Operating Limit for each market hour. Ordinarily, an Energy Storage Resource's Lower Operating Limit will be its maximum withdrawal level and its Upper Operating Limit will be its maximum injection level. However, Energy Storage Resources can submit a bid curve that only covers the injection portion or only covers the withdrawal portion of its operating range. If the Energy Storage Resource only submits Bids to withdraw, the Lower Operating Limit will be the maximum withdrawal level and the Upper Operating Limit will be the minimum withdrawal level.[58] Conversely, if the Energy Storage Resource submits Bids only to inject, the Lower Operating Level will be the minimum generation level and the Upper Operating Limit will be the applicable maximum injection amount.[59] The proposed tariff revisions explicitly permit the submission of Bids to withdraw Energy by Withdrawal-Eligible Resources, which have been identified as a subset of Generators

[55] Order No. 841 at PP 4, 270. Order No. 841 further states "This minimum size requirement includes all minimum capacity requirements, minimum offer to sell requirements, and minimum bid to buy requirements for resources participating in these markets under the participation model for electric storage resources." *Id.*

[56] The current exceptions to the one (1) MW requirement are for Regulation Service and offers by Special Case Resources, which may be offered at a minimum of 100 kW.

[57] In the Installed Capacity market, offers are made in UCAP terms. See Part VII.D below.

[58] For ISO-Managed Energy Storage Resources, the Upper Operating Limit when withdrawing can be no lower than zero (0) MW.

[59] For ISO-Managed Energy Storage Resources, the Lower Operating Limit when injecting can be no greater than zero (0) MW.

that require Energy from the grid to recharge or refill.[60] Schedules for an Energy Storage Resource will be at a single point on its bid curve, and therefore prevent the Resource from being scheduled to inject and withdraw in the same market interval.[61]

2. Energy Level Management

The NYISO defines an Energy Storage Resource's Energy Level as "[t]he amount of Energy stored in an Energy Storage Resource."[62] The terms Energy Level and Beginning Energy Level (as described below) are equivalent to the term "state of charge" used in Order No. 841. The Order requires that ISO/RTOs allow resources using the participation model for electric storage resources to self-manage their state of charge.[63] The NYISO proposes to provide an Energy Storage Resource with the option to choose its mode of Energy Level Management, which is the "method by which an Energy Storage Resource controls the amount of Energy stored in the Resource. Energy Storage Resources may choose to be Self-Managed or ISO-Managed in their Bid."[64]

Accordingly, Sections 4.2.1.3.1, 4.2.1.3.4, and 4.4.1.2 of the Services Tariff require the Energy Storage Resource to indicate in its Day-Ahead Bids and Real-Time Bids whether its Resource's Energy Level will be ISO-Managed or Self-Managed.[65] The NYISO defines these terms as follows:

> **ISO-Managed Energy Level**: A Bid parameter which when selected indicates that an Energy Storage Resource's Energy Level constraints will be directly accounted for in the optimization. *See* Section 4.2.1.3.4 of this Services Tariff.[66]
>
> **Self-Managed Energy Level**: A Bid parameter which when selected indicates that an Energy Storage Resource's Energy Level constraints will not be directly accounted for in the optimization. *See* Sections 4.2.1.3.4 and 4.4.2.1 of this Services Tariff.[67]

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[60] *See* Order No. 841 at P 142 ("we require that … RTOs/ISOs must accept wholesale bids from resources using the participation model for electric storage resources to buy energy.").

[61] *See* Order No. 841 at P 162.

[62] The NYISO proposes to insert this definition of Energy Level into Section 2.5 of the Services Tariff.

[63] Order No. 841 at P 253.

[64] The NYISO proposed to insert the definition of Energy Level Management in Services Tariff Section 2.5.

[65] For purposes of this filing letter, "ISO-Managed" refers to an Energy Storage Resources that chooses an ISO-Managed Energy Level, and "Self-Managed" refers to an Energy Storage Resource that chooses a Self-Managed Energy Level.

[66] Proposed definition in Services Tariff Section 2.9.

[67] Proposed definition in Services Tariff Section 2.19.

If a Supplier does not choose an Energy Level Management mode in its Bid, the Bid will be treated as invalid and will not be evaluated by the NYISO, which is consistent with the treatment of Bids that fail to include other mandatory parameters. A Bid for an Energy Storage Resource that is invalid may be updated to include the missing information prior to the close of the applicable Bid window.

An Energy Storage Resource may not change its Energy Level Management election within a Day-Ahead Market day (*i.e.*, a uniform election must be made for all hours of a Day-Ahead market day).[68] The Energy Storage Resource may change its Energy Level Management mode election between the Day-Ahead and Real-Time Markets.[69] An Energy Storage Resource may change its Energy Level Management election for different operating hours within the Real-Time Market day (even for hours where the Resource received a Day-Ahead schedule).[70]

a. Evaluation of Bids Incorporating ISO-Managed Energy Levels for Energy Storage Resources

As described in Sections 4.2.1.3.4, 4.4.1.1, and 4.4.1.2 of the Services Tariff, the Day-Ahead and real-time schedule for Energy Storage Resources with ISO-Managed Energy Levels will directly optimize the Energy Storage Resource's Energy Level constraints, including its Beginning Energy Level (as described below), Upper and Lower Storage Limits, and Roundtrip Efficiency consistent with the development of the NYISO's Day-Ahead SCUC or Real-Time Commitment least production cost solution. Once the Energy Storage Resource reaches its Upper Storage Limit, it will not be scheduled to withdraw more Energy, regardless of whether its Bid to withdraw Energy would be scheduled based on economics.[71]

The NYISO's market software will evaluate whether and when it is economic to schedule an ISO-Managed Energy Storage Resource to inject or withdraw based on the Resource's Bids over the entire optimization window that is being evaluated. The SCUC software optimizes over a 24-hour period for the Day-Ahead Market. The RTC software optimizes over a 2.5-hour period, and the RTD software optimizes over 1-hour period in the Real-Time Market. The NYISO's market software will evaluate an ISO-Managed Energy Storage Resource based on both the economics of its Bids and its Energy Level constraints over time. Energy Level constraints are intertemporal in nature; they link operations in one hour with operations in a different hour.

For example, in the Day-Ahead Market optimization, the SCUC software will evaluate whether it is economic to schedule an ISO-Managed Energy Storage Resource to withdraw Energy in Hour Beginning 11, when LBMPs are low, so that the Energy Storage Resource will be able to inject additional Energy in Hours Beginning 14-16, when LBMPs are higher. The

[68] Proposed revision to Services Tariff Section 4.2.1.3.1.

[69] Proposed revision to Services Tariff Section 4.4.1.2.

[70] Proposed revision to Services Tariff Section 4.4.1.2.

[71] Proposed Services Tariff Sections 4.2.1.3.4 and 4.4.2.1.

Energy Storage Resource in this example will incur a cost to purchase Energy in Hour Beginning 11 so that it can earn additional profits by injecting Energy in Hours Beginning 14-16. The optimization will also take into account the expected Roundtrip Efficiency losses of withdrawing and storing Energy for injection into the grid at a later time.

The NYISO's market software will assess the difference between an ISO-Managed Energy Storage Resource's Bids to inject and its Bids to withdraw Energy over all intervals of the applicable optimization period. The difference between an Energy Storage Resource's Bid to withdraw Energy and its Bid to inject Energy is referred to as an "intertemporal bid spread" in this filing letter. However, Energy Storage Resources will not be submitting spread bids to the NYISO, they will be submitting Incremental Energy Bids that include up to 11 distinct price "steps." Some of the price steps may reflect the amount that an Energy Storage Resource is willing to pay to purchase Energy, while other price steps will reflect the payment that the Energy Storage Resource requires to inject Energy.

The SCUC, RTC and RTD software will use the intertemporal bid spread to optimize an ISO-Managed Energy Storage Resource's injection and withdrawal schedule holistically over the entire optimization window. The market software may even schedule an ISO-Managed Energy Storage Resource to withdraw Energy or to inject Energy at a price that appears inconsistent with the Energy Storage Resource's incremental costs of the Bid *if* the optimization expects that it will be able to cover the specified bid spread. An ISO-Managed Energy Storage Resource may, therefore, be scheduled to withdraw Energy when the withdrawal Bids for the Resource would not otherwise be economic for that market hour (*e.g.*, when the Day-Ahead LBMP for a market hour is greater than the Bid price to withdraw Energy). Conversely, an ISO-Managed Energy Storage Resource may be scheduled to inject Energy when the Day-Ahead LBMP is less than the Bid for the Resource to inject Energy, so long as the difference between the LBMPs at which the Energy Storage Resource withdraws and injects Energy satisfy the applicable intertemporal bid spread.

As an example: an ISO-Managed Energy Storage Resource submits a Day-Ahead Bid to purchase (withdraw) Energy at a price of $10/MWh, and to sell (inject) Energy at $35/MWh consistently throughout the optimization window. Assume the LBMP that the SCUC software determines at the Energy Storage Resource's location is $15/MWh in Hour Beginning 3 and $45/MWh in Hour Beginning 14. The ISO-Managed Energy Storage Resource may receive a Day-Ahead schedule from the SCUC software to withdraw Energy in Hour Beginning 3 for $15/MWh, which exceeds its $10/MWh Bid, because the SCUC software also schedules the Energy Storage Resource to inject Energy in Hour Beginning 14 at an LBMP of $45/MWh. Because the Day-Ahead price for Energy in Hour Beginning 14 is at least $25[72] greater than the price in Hour Beginning 3, the SCUC software has honored the desired bid spread. Optimizing based on an Energy Storage Resource's bid spread over the entire optimization window will ensure that the Resource's schedule is economic over the entire window, even if an ISO-Managed Energy Storage Resource receives a schedule that is inconsistent with its Bids for a particular hour (in this example, Hour Beginning 3).

[72] $35/MWh (Bid to inject) - $10/MWh (Bid to withdraw) = $25 (desired intertemporal bid spread).

The NYISO will not directly optimize the Energy Level constraints of Energy Storage Resources with Self-Managed Energy Levels. Such Energy Storage Resources will be responsible for managing their Energy Level constraints through their Bids.[73]

b. Evaluation of Bids for Self-Managed Energy Storage Resources

The Real-Time Dispatch software will account for the Energy Level of all Energy Storage Resources, and will attempt to prevent the infeasible dispatch of Self-Managed Energy Storage Resources in the manner described in Section 4.4.2.1 of the Services Tariff. That is, if the Energy Storage Resource elects to self-manage its Energy Level, and would be scheduled to provide a given quantity over an interval, but is incapable of providing that quantity due to its current Energy Level, then the software will adjust the schedule to align with the Resource's Energy Level. This is done to minimize the likelihood of the NYISO issuing infeasible real-time schedules that cannot be achieved by the Energy Storage Resource due to its Energy Level. This is also done to minimize the need to manually de-rate Energy Storage Resources when their Bids are inconsistent with their Energy Level. When an Energy Storage Resource's real-time telemetered Energy Level is unavailable due to equipment failure or other reason, the NYISO will use the last valid Energy Level value as modified to reflect subsequent schedules.

Order No. 841 requires that electric storage resources that self-manage their state of charge be subject to any applicable penalties for deviating from a dispatch schedule to the extent that the resource deviates from the dispatch schedule in managing its state of charge.[74] The NYISO will account for these deviations through existing and new settlement structures. Specifically, as described in Part V.F.3 below, all Energy Storage Resources may be subject to a Persistent Undergeneration Charge, which is an existing settlement construct that can apply to an Energy Storage Resource when injecting, and a Persistent Over-Withdrawal Charge, which is a new settlement construct that will apply to Energy Storage Resources when withdrawing.

c. Bid Modes Available to Energy Storage Resources

Suppliers may choose one of four Bid modes (ISO-Committed Fixed, ISO-Committed Flexible, Self-Committed Fixed, or Self-Committed Flexible) depending on a Resource's characteristics and how the Supplier wants to operate the Resource.[75] While each of the Bid

[73] Proposed Services Tariff Sections 4.2.1.3.4 and 4.4.1.2.

[74] Order No. 841 at P 253.

[75] ISO-Committed Fixed, ISO-Committed Flexible, Self-Committed Fixed, and Self-Committed Flexible are bidding modes defined in the Services Tariff. Both ISO-Committed Fixed and ISO-Committed Flexible bidding modes require the NYISO to evaluate economic Bids prior to scheduling resources. ISO-Committed Fixed is a bidding mode in which a Generator requests that the NYISO commit and schedule it in the Day-Ahead Market. In the Real-Time Market, it is a bidding mode in which a Generator, with NYISO approval, requests that the NYISO schedule it no more frequently than every 15 minutes. ISO-Committed Flexible is a bidding mode in which a Dispatchable Generator or Demand Side Resource is committed by and follows Base Point Signals issued by the NYISO. *See* Services Tariff Section 2.9. With Self-Committed Fixed and Self-Committed Flexible bidding modes, resources can self-schedule (or self-commit) their output regardless of the LBMP. Self-Committed Fixed is a

modes includes the word "Committed," Energy Storage Resources will not require an explicit commitment decision by the NYISO. Instead, they will be considered online and available for dispatch by the NYISO's SCUC, RTC, and RTD software, and will not be permitted to submit certain unit commitment parameters, such as start-up and minimum generation parameters.

The Energy Level election for an Energy Storage Resource will impact the Bid modes available to the Resource. If an Energy Storage Resource elects to employ ISO-Managed Energy Levels, then any Bids submitted into either the Day-Ahead Market or Real-Time Market must be ISO-Committed Flexible because the NYISO needs to have the freedom to develop the optimal schedule for charging and discharging the Resource based on the economics of the Bid and the Resource's Energy Level. An Energy Storage Resource that elects to use Self-Managed Energy Levels will be able to choose from any of the four Bid modes in the Day-Ahead Market.[76] Energy Storage Resources that Bid with Self-Managed Energy Levels in the Real-Time Market may use the Self-Committed Fixed, Self-Committed Flexible, or ISO-Committed Flexible Bid modes.

d. Provision of Energy Level in Real-Time

As set forth in Section 3.5.2 of the Services Tariff, *all* Energy Storage Resources will be required to submit their real-time Energy Level signal to the NYISO in accordance with ISO Procedures. All Generators dispatched by the NYISO are required to provide real-time operating data via telemetry in 6-second increments.[77] This information helps the NYISO maintain its situational awareness and the reliability of the grid. Because Energy Storage Resources are run-time limited, real-time Energy Level information is necessary to ensure that Energy Storage Resource schedules are feasible, and, for Operating Reserves awards, meet applicable reliability requirements.

3. Additional Bidding Parameters

In addition to Energy Level Management, an Energy Storage Resource will be required to submit the following Bid parameters set forth in revised Section 4.2.1.3.3 of the Services Tariff and in new Section 4.2.1.3.4: its Normal Upper Operating Limit, Emergency Upper Operating Limit, Lower Operating Limit, Beginning Energy Level, Roundtrip Efficiency, and Upper and Lower Storage Limits.[78] Order No. 841 requires that to the extent that an ISO/RTO adopts

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bidding mode in which a Generator is self-committed and opts not to be Dispatchable over any portion of its operating range. Self-Committed Flexible is a bidding mode in which a Dispatchable Generator self-commits to a specified output level, but is also made available to follow NYISO-issued Base Point Signals within a portion of its operating range. *See* Services Tariff Section 2.19.

[76] *See* Order No. 841 at P 142 ("we require that … resources using the participation model for electric storage resources must be allowed to participate in the RTO/ISO markets as price takers, consistent with the existing rules for self-scheduled resources.").

[77] *See also* proposed changes to Section 4.4.2.1 of the Services Tariff.

[78] Use of certain new Energy Storage Resource Bid parameters, such as Roundtrip Efficiency, are currently being tested in the NYISO's software systems to determine if there is any impact on performance (*e.g.*, solution

bidding parameters to account for the physical and operational characteristics of electric storage resources set forth in the Order, it must permit a resource using the participation model for electric storage resources to submit those bidding parameters in both the Day-Ahead and the Real-Time Markets.[79] Consistent with this requirement, all of the listed parameters apply to Day-Ahead Bids and Real-Time Bids.[80]

Like other Generators, an Energy Storage Resource must specify a "Normal Upper Operating Limit" and an "Emergency Upper Operating Limit" for each hour.[81] An Upper Operating Limit is the parameter that is comparable to Order No. 841's Maximum Discharge Limit and Minimum Charge Limit parameters. The NYISO proposes to revise the definition of Normal Upper Operating Limit ("UOL_N") in Section 2.14 of the Services Tariff to provide that "Bids for Energy Storage Resources may include a negative UOL_N when the Resource bids to withdraw Energy from the grid. The UOL_N for ISO-Managed Energy Storage Resources shall not be lower than 0 MW."

The NYISO also proposes to revise Section 4.2.1.3.3 of the Services Tariff to require that Withdrawal-Eligible Generators also specify the Generator's "Lower Operating Limit" for each hour. The NYISO proposes to revise Section 2.12 of the Services Tarff to define "Lower Operating Limit" as follows: "For an Energy Storage Resource, the maximum amount of megawatts (MW) the Resource can consume from the grid, if it is bidding to withdraw Energy, or the minimum amount of MW the Resource can supply the grid if it is not bidding to withdraw Energy. The Lower Operating Limit of an ISO-Managed Energy Storage Resource that is not bidding to withdraw Energy shall not be set to less than 0 MW." Lower Operating Limit is the parameter that is comparable to Order No. 841's Maximum Charge Limit and Minimum Discharge Limit parameters.

In addition, an Energy Storage Resource must submit as part of its Day-Ahead Market Bids its "Beginning Energy Level." Energy Level and Beginning Energy Level are comparable to Order No. 841's "State of Charge" parameter.[82] The NYISO proposes to define this parameter in Section 2.2 of the Services Tariff as follows:

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times). While the NYISO expects that the Bid parameters described in this document will be available to Energy Storage Resources upon the effective date of these tariff revisions, such availability will be dependent on satisfactory performance of the software.

[79] Order No. 841 at P 193.

[80] As described below, the Beginning Energy Level is determined by 6-second telemetry in real-time.

[81] *See* Services Tariff Section 4.2.1.3.3.

[82] Order No. 841 defines "State of Charge" as "State of Charge represents the amount of energy stored in proportion to the limit on the amount of energy that can be stored, typically expressed as a percentage. It represents the forecasted starting State of Charge for the market interval being offered into." Order No. 841 at P 236. Beginning Energy Level is the Energy Level at a defined point in time (the beginning of a market run that

> **Beginning Energy Level:** For Energy Storage Resources, the total amount of Energy stored by the Resource at the beginning of a market interval. An Energy Storage Resource's Beginning Energy Level shall be estimated for the Day-Ahead Market. An ISO-Managed Energy Storage Resource shall submit an estimated Beginning Energy Level on each day that it submits a Day-Ahead Market Bid. The Beginning Energy Level shall be determined by 6-second telemetry data in real-time. If the ISO does not receive real-time telemetry from the Resource due to equipment failure or other reason, the ISO will use the last valid Energy Level value as modified to reflect subsequent schedules.

This bid parameter is provided in both Day-Ahead and real-time.[83] It is submitted by the Energy Storage Resource with Day-Ahead Bids and is determined by 6-second telemetry in real-time.

An Energy Storage Resource must also submit its "Roundtrip Efficiency," which the NYISO proposes to define as: "The ratio of energy injections to energy withdrawals for an Energy Storage Resource."[84] Roundtrip Efficiency will be used by the NYISO to schedule Resources that opt to be ISO-Managed. The inclusion of this parameter in the scheduling of the Energy Storage Resource will provide for more accurate accounting of a Resource's Energy Level throughout the scheduling horizon. For example, an Energy Storage Resource with a Roundtrip Efficiency of 0.85 will only be able to inject 850 kW hours of Energy for each MW of Energy consumed. Therefore, including this parameter allows the NYISO to account for an ISO-Managed Energy Storage Resource's Energy losses in determining its schedule.

Finally, the Energy Storage Resource must submit its "Upper Storage Limit" and "Lower Storage Limit" parameters, which are comparable to Order No. 841's Maximum State of Charge and Minimum State of Charge parameters. The NYISO proposes to define them as follows:

> **Upper Storage Limit** - The maximum amount of Energy an Energy Storage Resource is physically capable of storing.[85]

> **Lower Storage Limit** - The minimum amount of Energy an Energy Storage Resource is physically capable of storing.[86]

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establishes the Resource's schedule). Both Beginning Energy Level and Energy Level encompass the Order No. 841 term "State of Charge."

[83] *See* Order No. 841 at P 213 (requiring each ISO/RTO to allow a resource using the participation model for electric storage resources to submit its State of Charge in both day-ahead and real-time markets).

[84] The NYISO proposes to insert a definition of Roundtrip Efficiency in Services Tariff Section 2.18.

[85] The NYISO proposes to insert a definition of Upper Storage Limit in Services Tariff Section 2.21.

[86] The NYISO proposes to insert a definition of Lower Operating Limit in Services Tariff Section 2.12.

E. Miscellaneous Energy Market Related Changes

The NYISO proposes to revise Section 4.4.1.4 of the Services Tariff to revise certain RTC requirements from specifying a "one hour minimum run time" to "a minimum run time of least 15 minutes, but not longer than one hour." The proposed clarification reflects the actual RTC implementation. If a Generator offers a minimum run time that is less than 1 hour, then RTC will shut the unit down in less than an hour. Section 4.4.1.4 currently states that the NYISO will always give a Generator a minimum run time of at least one hour. This is inconsistent with how the current software capabilities handle Generators that submit minimum run time parameters that are less than one hour.

The NYISO also proposes to revise the definition of Base Point Signals to replace "output" with "setpoint" to make clear that the signals apply for both injections and withdrawals.[87]

F. Ancillary Services

1. Overview

The NYISO proposes to modify its Ancillary Service requirements to account for the physical and operational characteristics of Energy Storage Resources and to enable these Resources to provide Ancillary Services in a manner comparable to other Generators to the extent possible. Specifically, an Energy Storage Resource may provide Regulation Service and Operating Reserves when injecting comparably to other Generators, and will have the added flexibility to provide those services when they are scheduled to withdraw Energy, or when they receive a zero MW schedule.

The majority of the NYISO's proposed tariff revisions concerning Ancillary Services address an Energy Storage Resource's capability to provide these services while withdrawing Energy. The NYISO's proposed tariff revisions also ensure that the scheduling and dispatch of Energy Storage Resources for Regulation Services and Operating Reserves account for the Energy Level of the Resource, independent of whether the Resource elects ISO-Managed mode for its Energy Level Management.[88] Limiting the Regulation Service and Operating Reserves schedules consistent with real-time Energy Levels will help ensure that Energy Storage Resources can meet reliability requirements and that the NYISO receives the services it schedules an Energy Storage Resource to provide. In addition, Energy Storage Resources may also seek to qualify to provide cost-based Ancillary Services under the existing rules for providing those services.

[87] The NYISO proposes to revise the definition of Base Point Signals in Services Tariff Section 2.2.

[88] *See* Services Tariff Sections 4.4.2.1 and 15.3.2.1.

2. Energy Storage Resource's Provision of Regulation Service

An Energy Storage Resource may provide Regulation Service when it meets the eligibility requirements to provide the service. As with other Generators, an Energy Storage Resource offering Regulation Service must register its qualified Regulation Capacity, provide applicable response rates, offer in the ISO-Committed Flexible or Self-Committed Flexible Bid modes, specify that part of its capacity that is offered to provide Regulation Service, and ensure that the Resource can respond to 6-second Base Point Signals at all times. Consistent with the directives of Order No. 841, the minimum size of a Regulation Service offer on behalf of an Energy Storage Resource shall be one tenth (0.1) of one MW.

An Energy Storage Resource may offer Regulation Service both when injecting and when withdrawing Energy.[89] The NYISO selects Regulation Service suppliers when co-optimizing for the Day-Ahead and Real-Time Markets. Energy Storage Resources that Bid to provide Regulation Service will be considered along with all other offers. The NYISO will award a Regulation Service schedule for an Energy Storage Resource that is injecting in the same manner as other Generators, based on its offered Regulation Capacity, the Bid price for that Capacity, and the Bid price for Regulation Movement. The NYISO will award a Regulation Service schedule for Energy Storage Resources that are withdrawing based on the same Bid parameters used for resources that are injecting. To provide Regulation Service when withdrawing, an Energy Storage Resource will modulate the amount of withdrawal being taken from the grid, rather than the amount of generation being provided to the grid.

For all Energy Storage Resources, the NYISO will cap Regulation Service schedules in real-time to respect the actual real-time Energy Level it receives from the Resource via 6-second telemetry.[90] The NYISO will use the real-time 6-second telemetry data to ensure that the Energy Storage Resource's Energy Level will allow the Resource to meet its dispatch.

The NYISO will evaluate in its Day-Ahead and Real-Time Market optimizations the Regulation Capacity (in MW)[91] offered by an ISO-Managed Energy Storage Resource against the Energy Level of the resource at the beginning of each evaluation period. These evaluation periods are hourly for the Day-Ahead optimization, a fifteen-minute period for the RTC optimization, and typically a five-minute period for the RTD optimization.[92] Optimizing an Energy Storage Resource's Energy Level is an additional, necessary, step in determining the

[89] The NYISO's tariff revisions include a corresponding change that will permit eligible Energy Limited Resources to provide Regulation Service when injecting or withdrawing.

[90] Proposed Services Tariff Section 15.3.2.1(e).

[91] "Regulation Capacity" is the "Energy or Demand Reduction capability, measured in MW, that a Regulation Service provider offers and/or which it is scheduled to provide for Regulation Service." Services Tariff Section 2.18.

[92] The NYISO's real-time dispatch intervals are normally five minutes long, although they can be shorter or longer at times when the NYISO's real-time dispatch software has entered "corrective action mode."

amount of Regulation Service an Energy Storage Resource can provide because such Resources are Energy limited.[93]

Energy Storage Resources that choose to offer Regulation Service will be eligible to set Regulation Capacity and Regulation Movement prices like other Suppliers of Regulation Service. The payments for Regulation Service provided to Energy Storage Resources will be calculated in the same manner as for traditional Generators, which requirements are set forth in Rate Schedule 3 of the Services Tariff. The NYISO proposes to revise the Day-Ahead and Real-Time Market clearing price calculation requirements for Regulation Service in Rate Schedule 3 to accommodate an Energy Storage Resource providing Regulation Service when it is injecting or withdrawing Energy.[94]

3. Persistent Undergeneration Charges and Persistent Over-Withdrawal Charges

Pursuant to Rate Schedule 3-A of the Services Tariff, a Resource that is *not* providing Regulation Service may be subject to special settlement charges if it deviates from its Energy schedule. An Energy Storage Resource will be subject to two such charges when it deviates.

First, as with other Suppliers (with certain exceptions), an Energy Storage Resource will be subject to a "Persistent Undergeneration Charge" when it operates below its Energy schedule, subject to a *de minimis* tolerance band.[95] The requirements for the Persistent Undergeneration Charge are set forth in Rate Schedule 3-A of the Services Tariff. The Persistent Undergeneration Charge is only applicable to Suppliers with a positive Energy schedule (*i.e.*, those that are injecting Energy). An Energy Storage Resource, therefore, will only be subject to this charge when it is scheduled to inject Energy, and shall not be evaluated for Persistent Undergeneration Charges when scheduled to withdraw Energy.[96]

Second, the NYISO proposes to establish in Rate Schedule 3-A, a new charge to mirror the existing Persistent Undergeneration Charge that will apply to Energy Storage Resources when they make Persistent Over-Withdrawals. The "Persistent Over-Withdrawal Charge" described in Section 15.3A.1.2 would apply to an Energy Storage Resource scheduled to withdraw that is not providing Regulation Service and that persistently withdraws Energy at a level exceeding its scheduled withdrawal level, subject to the same *de minimis* tolerance band used in the Persistent Undergeneration Charge.[97] The Persistent Over-Withdrawal Charge will be calculated by multiplying: (i) the Energy Difference – *i.e.*, the difference between the

[93] An Energy Storage Resource's Energy Level shall not be presumed to be reduced or increased in the optimization of future market intervals (*e.g.*, the next hour for the Day-Ahead Market and next 5 or 15-minute period in real-time) due to Regulation Capacity Awards.

[94] Proposed revisions in Services Tariff Sections 15.3.4.1 and 15.3.5.1.

[95] The *de minimis* tolerance band is currently 3% of the Resource's applicable Upper Operating Limit.

[96] Proposed revisions in Services Tariff Section 15.3A.2.8.

[97] Proposed Services Tariff Section 15.3A.1.2.

Resource's actual Energy withdrawn and its real-time base point – with (ii) the greater of real-time and Day-Ahead Regulation Capacity prices; and (iii) the length of the interval (in seconds)/3,600.[98] The proposed charge is appropriate because, when an Energy Storage Resource over-withdraws Energy in excess of its scheduled withdrawal, it has the same effect as when a Generator under generates below its scheduled injection—a deficit of MW on the system.

4. Energy Storage Resource Provision of Operating Reserves

An Energy Storage Resource may offer Operating Reserves both when injecting and when withdrawing Energy.[99] The requirements for providing Operating Reserves are set forth in Rate Schedule 4 of the Services Tariff.

The NYISO procures several different Operating Reserves products, including: (i) Spinning Reserve (also known as 10-Minute Synchronized Reserve); (ii) 10-Minute Non-Synchronized Reserve; and (iii) 30-Minute Reserve (which includes both synchronized and non-synchronized components). As with other Resources, an Energy Storage Resource's eligibility to provide a particular Operating Reserves product for Energy Storage Resources will be defined by the criteria for the particular product and the characteristics and operating status of the Resource. In particular:

- An Energy Storage Resource may provide Spinning Reserve when it: (i) is Bid as ISO-Committed Flexible or Self-Committed Flexible; (ii) is operating within the dispatchable portion of its operating range; (iii) is capable of responding to NYISO instructions to change its operating level within ten minutes; and (iv) meets the qualifications identified in the ISO Procedures.[100] All Energy Storage Resources, including inverter-based Energy storage technology such as Lithium-ion batteries, are eligible to provide Spinning Reserve while they are withdrawing Energy or injecting Energy, or when idle.

- An Energy Storage Resource may also provide 30-Minute Reserve when and to the extent it: (i) is capable of changing its output level in response to NYISO instructions within thirty minutes; and (ii) meets the criteria set forth in the ISO Procedures.[101] An Energy Storage Resource may provide 30-Minute Synchronized Reserve when it: (i) is Bid as ISO-Committed Flexible or Self-Committed Flexible; and (ii) is within the dispatchable portion of its operating range. As is the case for Spinning Reserve, Energy Storage Resources, including inverter-based Energy Storage Resources, will be considered "online" when the Resource is withdrawing, injecting or idle.

[98] *Id.*

[99] Proposed revision to Services Tariff Sections 15.4.1.2.1 and 15.4.1.2.3.

[100] *See* Services Tariff Section 15.4.1.2.1.

[101] *See* Services Tariff Section 15.4.1.2.3.

An Energy Storage Resource is not eligible to provide 10-Minute Non-Synchronized Reserve or 30-Minute Non-Synchronized Reserve as Energy Storage Resources are considered online when withdrawing, injecting, or idle.

The NYISO proposes to revise the Operating Reserves bidding requirements in the Day-Ahead and Real-Time Markets to accommodate Energy Storage Resources when injecting Energy and Withdrawal-Eligible Generators when withdrawing Energy. Specifically, the NYISO proposes to revise the maximum Operating Reserves levels for Suppliers, including Energy Storage Resources, that are injecting Energy. Suppliers may provide Operating Reserves up to the following maximum levels.

- For Spinning Reserves, the maximum Operating Reserves levels will be revised to be: "the least of the Resource's emergency response rate multiplied by ten, or the Resource's applicable Upper Operating Limit (*i.e.*, UOL_N, UOL_E)."[102]

- For synchronized 30-Minute Reserves, the maximum Operating Reserves levels will be revised to be: "the least of the Resource's emergency response rate multiplied by twenty and its applicable Upper Operating Limit."[103]

These maximum Operating Reserve award levels are consistent for all Resources, and recognize that Operating Reserves may be provided up to the applicable Upper Operating Limit, accounting for the Resource's ramp rate over the identified time period.

The NYISO's proposal includes a new calculation for the amount of Operating Reserves that an Energy Storage Resource that is withdrawing can provide. Per the calculation, the sum of the Resource's Energy schedule, the amount of Regulation Capacity it is scheduled to provide, and the amount of Operating Reserves product it is scheduled to provide shall not exceed its UOL.[104] This rule recognizes that Energy Storage Resources have a continuous operating range from withdrawing to injecting, and that the amount of Operating Reserves and Regulation Service combined can span the entire operating range from the Resource's Energy schedule to its Upper Operating Limit.

The NYISO also proposes to make an analogous change for Withdrawal-Eligible Generators that have an infeasible operating range. For an Energy Limited Resource that is withdrawing Energy, the sum of the Resource's Energy schedule, the amount of Regulation Capacity it is scheduled to provide, and the amount of each Operating Reserves product it is scheduled to provide shall not exceed the lesser of zero or its Upper Operating Limit.[105] This rule recognizes that the Energy Limited Resource has an infeasible operating region such that it

[102] Proposed revisions to Services Tariff Sections 15.4.2.1 (Day-Ahead) and 15.4.3.1 (Real-Time).

[103] *Id.*

[104] *Id.*

[105] Proposed revisions to Services Tariff Sections 15.4.2.1 (Day-Ahead) and 15.4.3.1 (Real-Time).

cannot operate between a minimum withdrawal level and a minimum generation level. The rule is the mirror of the rule for traditional Generators.

In addition, the NYISO may limit the availability of an Energy Storage Resource to provide Operating Reserves based on its Energy Level constraints. The NYISO will use an Energy Storage Resource's Beginning Energy Level in its RTC and RTD software to ensure that Operating Reserves scheduled from the Resource can be sustained for an hour.[106] Limiting the Operating Reserves schedules to be consistent with real-time Energy Levels will help ensure that Energy Storage Resources comply with the requirement set forth by the Northeast Power Coordinating Council ("NPCC") that Reserve awards must be sustainable for at least one hour.[107]

The NYISO also proposes to make additional conforming tariff revisions to indicate that a Resource can now provide Operating Reserves when injecting or withdrawing.[108]

Finally, the NYISO proposes to mirror the existing requirements in Section 15.4.1.3 of Rate Schedule 4 of the Services Tariff that permit Generators and Demand Side Resources selected to provide Operating Reserves in the Day-Ahead Market or in a supplemental commitment to increase their Bids for portions of their Resources that have been scheduled to provide Incremental Energy and apply them to Withdrawal-Eligible Generators providing Operating Reserves while withdrawing Energy from the grid. As revised, a Withdrawal-Eligible Generator scheduled to withdraw Energy and selected to provide Operating Reserves in the Day-Ahead Market or supplemental commitment may similarly decrease its Bids to withdraw Incremental Energy for portions of its Resources that have been scheduled.

5. Energy Storage Resource Provision of Other Ancillary Services

Order No. 841 requires an ISO/RTO to ensure that an electric storage resource is eligible to provide all services that it is technically capable of providing, including services that the ISOs/RTOs do not procure through an organized market.[109] An Energy Storage Resource may provide cost-based Ancillary Services such as Voltage Support Service if it meets the tariff requirements to provide such service.

VI. Settlement Rules for Energy Storage Resources

Order No. 841 requires that each ISO/RTO revise its tariffs to "ensure that resources available for manual dispatch as a wholesale buyer and wholesale seller under the participation model for electric storage resources are held harmless for manual dispatch by being eligible for

[106] Proposed revision to Services Tariff Section 4.4.2.1.

[107] *See* NPCC Directory #5 Reserve Section 5.13 Sustainability of Operating Reserve available at: https://www.npcc.org/Standards/Directories/Directory_5-Full%20Member%20Approved%20clean%20-GJD%2020150330.pdf.

[108] Proposed revisions to Services Tariff Sections 4.6.3, 15.4.3.5, and 15.4.6.4.

[109] Order No. 841 at PP 76, 80.

make-whole payments."[110] As described below, the NYISO proposes to revise its Services Tariff to establish the circumstances in which Energy Storage Resources are eligible for make-whole payments.

A. Bid Production Cost Guarantee Payments

A Bid Production Cost Guarantee ("BPCG") payment is the mechanism by which the NYISO guarantees that a qualifying Supplier will recover its as-bid costs over the applicable period if it is committed by the NYISO. Different rules for paying BPCG apply to the Day-Ahead and Real-Time Markets. The NYISO proposes to revise the BPCG requirements in Section 18 (Attachment C) of the Services Tariff to establish when an Energy Storage Resource is eligible for Day-Ahead and real-time BPCG payments in a manner that is different from other Generators.

1. Day-Ahead BPCG Payments

The NYISO proposes to revise Section 18.2.1.1 of the Services Tariff to provide that an Energy Storage Resource is eligible to receive a Day-Ahead BPCG payment whether it is ISO-Managed or Self-Managed, as long as it satisfies the Day-Ahead BPCG eligibility requirements. Consistent with the existing eligibility requirements, an Energy Storage Resource must be scheduled by the NYISO based on an ISO-Committed Fixed or ISO-Committed Flexible Bid to be eligible for a Day-Ahead BPCG payment.[111] The NYISO's Day-Ahead Market evaluation selects the least cost mix of Ancillary Services and Energy from Suppliers, Demand Side Resources, and Customers submitting Virtual Transaction Bids over a 24-hour market day. Consistent with the NYISO Tariffs, the NYISO will make a Resource whole to its Bids if the resource accrued a net loss over the 24-hour Day-Ahead Market day.

On the other hand, if a Resource is scheduled for any hour of the day as a result of Self-Committed Fixed or Self-Committed Flexible Bids, it is not eligible to receive a Day-Ahead BPCG payment.[112] These Resources are ineligible for Day-Ahead BPCG because they are scheduling themselves at specified operating levels regardless of the LBMP, rather than asking the NYISO to schedule them based on the economics of their offers and Day-Ahead LBMPs. Since Self-Committed Resources' schedules are not the result of an economic evaluation, their costs are not protected through a Day-Ahead BPCG payment.[113] Consistent with the existing criteria, Energy Storage Resources will also be ineligible for Day-Ahead BPCG if they are

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[110] *Id. at* P 174.

[111] ISO-Committed Fixed and ISO-Committed Flexible bidding modes are described in footnote 75 above.

[112] *See* Services Tariff Section 18.2.1.2. Self-Committed Fixed and Self-Committed Flexible bidding modes are described in footnote 75 above.

[113] A Resource using the Self-Committed Flexible bidding mode schedules itself at a specified minimum operating level without an economic evaluation. While the Resource may also be scheduled above its minimum operating level based on the economic evaluation of its Bid, the Resource remains ineligible for Day-Ahead BPCG because its minimum operating level schedule was not based on an economic evaluation.

scheduled for any hour of the day as a result of Self-Committed Fixed or Self-Committed Flexible Bids.

The NYISO also proposes to revise the variables in the Day-Ahead BPCG formula in Section 18.2.2.1 to clarify that Energy Storage Resources may be eligible for Day-Ahead BPCG payments whether scheduled to inject Energy or withdraw Energy. Similarly, the NYISO proposes to revise the description of the Day-Ahead BPCG for Generators in Section 4.6.6.1 of the Service Tariff to clarify that BPCG payments are not limited to Bids to inject Energy.

2. Real-Time BPCG Payments

Suppliers bidding Energy Storage Resources will be eligible for real-time BPCG payments if they Bid with a Self-Managed Energy Level in the Real-Time Market, as long as they satisfy the existing eligibility requirements. Suppliers are eligible for real-time BPCG payments if they Bid as ISO-Committed Flexible or ISO-Committed Fixed in Real-Time Market, or Self-Committed Flexible, provided the real-time Minimum Generation Bid does not exceed the Resource's Day-Ahead Energy schedule at any point in the dispatch day. Additionally, consistent with the directives of Order No. 841, Suppliers bidding Energy Storage Resources will be eligible to receive real-time BPCG when they are committed via Supplemental Resource Evaluation ("SRE") or are dispatched by the NYISO Out-of-Merit to ensure New York Control Area ("NYCA") or local reliability regardless of whether they Bid as ISO-Managed or Self-Managed.[114]

Energy Storage Resources that Bid with an ISO-Managed Energy Level for any hour in the Real-Time Market day are not eligible to receive a real-time BPCG payment for that day, unless the Resource is committed via SRE or committed or dispatched by the NYISO Out-of-Merit to ensure NYCA or local reliability.[115] As described below, Energy Storage Resources are not eligible to receive BPCG in real-time when they elect to rely on the NYISO to optimize their Energy Level over the 2.5 hour RTC and 1 hour RTD optimization horizons.

The NYISO's RTC and RTD software for the Real-Time Market will optimize the ISO-Managed Energy Storage Resource's Energy Level over the entirety of its 2.5 hour or 1 hour optimization window and dispatch the Resource based on its available and expected Energy Level over that window. Real-time offers from ISO-Managed resources are subject to RTC and RTD decisions about how best to inject the available Energy, and when to withdraw Energy for later injection back onto the grid, over a significantly shorter time horizon than Day-Ahead. The shorter optimization window can result in the NYISO scheduling an Energy Storage Resource in real-time above or below its Day-Ahead schedule. As a result of the NYISO optimizing the Energy Storage Resource's Energy Level over a rolling series of 2.5 hour and 1 hour increments across the day in real time, an ISO-Managed Energy Storage Resource can receive Real-Time Market schedules that optimize the Energy Level in each optimization window but would otherwise result in a daily real-time BPCG payment to the resource. It is not reasonable to

[114] Order No. 841 P 174.

[115] Proposed Services Tariff Section 18.4.1.2.3.

expect NYCA Loads to assume the risk that ISO-Managed Energy Storage Resources dispatch will always be appropriately optimized by RTC or RTD.

For example, assume there is an Energy Storage Resource without a Day-Ahead schedule that has a Beginning Energy Level of zero MWh. The Energy Storage Resource bids in real-time to withdraw Energy at $10/MWh or below and to inject Energy at $30/MWh or above. The RTC software, which is looking over the next 2.5 hours, may schedule the Energy Storage Resource to withdraw in Hour 1 at a real-time LBMP of $15/MWh because it expects to schedule the Resource to inject in Hour 2 based on an anticipated Hour 2 real-time LBMP of $50/MWh.[116] However, if system conditions change between the RTC initialization and the RTD software run that establishes the binding prices during Hour 2 such that the Hour 2 Real-Time LBMP turns out to be $25/MWh, the Energy Storage Resource will not actually be dispatched by RTD to inject Energy in Hour 2. As a result, the Energy Storage Resource would incur a $5/MWh loss in Hour 1 relative to its $10/MWh real-time withdrawal Bid, which would otherwise be made up by a real-time BPCG. Given the NYISO's limited ability to optimize the schedules of Energy Storage Resources in the Real-Time Market due to RTC's 2.5 hour optimization window, if a resource opts for the NYISO to manage its Energy Level in the Real-Time Market, it is reasonable that this risk be borne by the Energy Storage Resource, rather than by NYCA Loads. The Energy Storage Resource retains the ability to manage this potential risk by selecting the Self-Managed Energy Level Management mode.

The NYISO's proposed approach provides the Energy Storage Resource with an incentive to self-manage its Energy Level in real-time if it believes it can do so better than the NYISO's Real-Time Market RTC and RTD software. If ISO-Managed Energy Storage Resources were, instead, made eligible for a real-time BPCG when the NYISO's projections of forward prices prove inaccurate, then Energy Storage Resources would have an incentive to opt for NYISO management of their Energy Levels, even if the Supplier thinks it can forecast how to operate the Energy Storage Resource more efficiently than the NYISO, because electing to have an ISO-Managed Energy Level would make the resource eligible to be reimbursed for its Bid costs when the forecasted LBMP differs from the actual LBMP.

The NYISO also proposes to insert new formulas that account for real-time schedules to inject Energy and real-time schedules to withdraw Energy into Sections 18.4.2 (for RTD Intervals) and 18.5.2 (for Supplemental Event Intervals) of the Services Tariff. The NYISO proposes corresponding revisions to the definitions of the formulas' variables in Section 18.4.2, to provide for the calculation of real-time BPCGs for Energy Storage Resources. Similarly, the NYISO proposes to revise the description of the real-time BPCG for Generators in RTD Intervals in Section 4.6.6.3 of the Services Tariff and in Supplement Event Intervals in Section 4.6.6.4 to clarify that BPCG payments are not limited to Bids to inject Energy.

[116] *See also* Part V.D.2 of this compliance filing.

B. Day-Ahead Margin Assurance Payments

Day-Ahead Margin Assurance Payments ("DAMAP") protect Day-Ahead Margins that are lost when a Generator offers flexibly in real-time and follows its real-time dispatch. Protecting a Generator's Day-Ahead Margin provides an incentive for it to respond to the NYISO's instruction in real-time. Generators that offer as ISO-Committed Flexible or Self-Committed Flexible for the same hours in the Day-Ahead Market and Real-Time Market are eligible for DAMAP. A DAMAP is generally reduced or eliminated when Generators decrease their availability in real-time absent a specific NYISO instruction to do so.

A DAMAP is determined for each 5 minute RTD interval and is an hourly settlement. A Supplier's eligibility for DAMAP is based on its maintaining the same availability and flexibility between the Day-Ahead Market and Real-Time Market. If a Supplier increases its minimum operating level (in MW) or increases the price component of its Incremental Energy Bid for the accepted portion of its Day-Ahead schedule, it becomes ineligible to receive a DAMAP.

Energy Storage Resources have to withdraw Energy from the grid in some intervals for the purposes of recharging or refilling, so that they can inject Energy back onto the grid at a later time. As a result, Energy Storage Resources are affected by intertemporal Energy Level constraints. The decision to withdraw or inject in one interval or hour impacts both the physical ability to withdraw or inject and the opportunity costs of withdrawing or injecting in future intervals or hours. These intertemporal constraints make it impractical to apply the existing DAMAP settlement construct to Energy Storage Resources. The NYISO expects Suppliers bidding Energy Storage Resources to account for their intertemporal Energy Level constraints and reflect relevant opportunity costs in real-time Bids.

Unlike other Generators, an Energy Storage Resource's Day-Ahead and real-time schedules will depend on both the Resource's Energy Level and its Bid, rather than just its Bid. The Beginning Energy Level that an Energy Storage Resource submits with its Day-Ahead Bids is the Supplier's good faith estimate of the expected Energy Level. The Energy Storage Resource's actual Energy Level in real-time may be quite different from the Beginning Energy Level that was submitted with Day-Ahead Bids. An Energy Storage Resource (regardless of whether it is Self-Managed or ISO-Managed) could be dispatched by the NYISO below its Day-Ahead schedule in real-time due to not having the appropriate Energy Level to sustain its Day-Ahead Energy and/or Operating Reserves awards in real-time. In addition, real-time offers from ISO-Managed resources are subject to the RTC and RTD decisions about how best to use the available Energy over significantly shorter time horizons than the Day-Ahead 24 hour optimization (as discussed in the Real-Time BPCG Payments section above). The shorter real-time optimization windows can result in the NYISO scheduling an Energy Storage Resource in real-time above or below its Day-Ahead schedule. Paying DAMAP to an Energy Storage Resource when it is physically incapable of following its Day-Ahead schedule in real-time, or when it relies on the NYISO to manage its Energy Level over the substantially shorter real-time

optimization periods, would create perverse incentives and could result in Energy Storage Resources being paid to do nothing in real-time, and/or not respond to changing real-time conditions. Consistent with the directives of Order No. 841, the NYISO proposes to make Energy Storage Resources eligible for DAMAP when a Resource has been taken Out-of-Merit by the NYISO or a Transmission Owner for reliability reasons, regardless of whether it Bid an ISO-Managed or Self-Managed Energy Level.[117]

The NYISO proposes to revise Section 25.2.1 of the Services Tariff to provide that Energy Storage Resources are only eligible for DAMAP when the NYISO schedules them Out-of-Merit order or derates or decommits the Resource in response to a NYISO or Transmission Owner system security need or to permit the NYISO to procure additional Operating Reserves.[118] The NYISO further proposes to revise Section 25.3.4 of the Services Tariff to update definitions to certain variables used in the DAMAP formula to reflect an Energy Storage Resource's ability to inject and withdraw Energy.

C. Future Revisions to Real-Time Market Settlements Impacting Energy Storage Resources

The NYISO has been engaged with its stakeholders in an ongoing effort to revise certain Real-Time Market settlement rules located in Section 4.5 of the Services Tariff as part of a separate initiative from its compliance with Order No. 841. The tariff revisions that are under discussion will consolidate and clarify a number of the existing real-time settlement rules for Suppliers injecting Energy that was not scheduled Day-Ahead, Customers withdrawing Energy that was not scheduled Day-Ahead, and Import and Export transactions scheduled in the Real-Time Market. The proposed tariff revisions will accommodate Energy Storage Resources. In particular, the settlement rules being developed are expected to establish rules for Energy Storage Resources that withdraw Energy in the Real-Time Market when the withdrawal was not scheduled Day-Ahead.

While the proposed tariff revisions include modifications to the Real-Time Market settlement rules that will apply to Energy Storage Resources, the majority of the proposed revisions are unrelated to and outside the scope of the directives of Order No. 841. The Energy Storage Resource-specific rules that are under development cannot be cleanly carved out for inclusion in this compliance filing. Therefore, the NYISO intends to seek shared-governance approval to file all of the Real-Time Market settlement related tariff revisions it is working with stakeholders to develop, including additional settlement rules that will apply to Energy Storage Resources, as part of a separate filing pursuant to Section 205 of the Federal Power Act in the first quarter of 2019. Given that the NYISO expects to submit a complete set of updated settlement rules to the Commission in the near future, it would be inappropriate for the NYISO to attempt to incorporate portions of its as-yet incomplete rules that pertain to Energy Storage

[117] Order No. 841 P 174.

[118] *See also* proposed revision to Services Tariff Section 25.1 (indicating the sections including exceptions to the requirements for DAMAP payments).

Resources into this filing – only to then remove and replace them with a complete set of rules in a Section 205 filing that the NYISO will submit in the first quarter of 2019.[119] If the described Section 205 filing is delayed beyond the first quarter of 2019, the NYISO will notify the Commission in this docket and explain any changes to its plans.

VII. Requirements for Energy Storage Resources' Participation in NYISO-Administered Capacity Markets

A. Overview

Order No. 841 requires that ISO/RTOs establish market rules so that a resource using the participation model for electric storage resources may be eligible to provide all the Installed Capacity that it is technically capable of providing into the ISO/RTO-administered capacity market.[120] Currently, the NYISO has several different participation models that allow conventional resources as well as Energy Limited Resources, Capacity Limited Resources, Demand Side Resources, and Behind-the-Meter Net Generation Resources to qualify to offer capacity into the NYISO-administered market. With this filing and the tariff modifications described below and provided in the attached tariff sections, the NYISO is proposing a separate Installed Capacity participation model that treats Energy Storage Resources comparably with the other resources that may qualify as Installed Capacity Suppliers in the NYISO's markets. The NYISO discussed the existing market rules and the proposed framework for this participation model with its stakeholders at several Installed Capacity Working Group meetings in 2018. The discussions included the proposed eligibility, qualifications, and performance requirements for, and administrative obligations of Energy Storage Resources. The NYISO's proposal sets forth a set of qualification and performance requirements comparable to the existing requirements for other resource types participating in the NYISO's Installed Capacity market.

Order No. 841 also requires that resources using the participation model for electric storage resources be able to set the price in the capacity markets, where applicable.[121] With the proposed set of rules, Energy Storage Resources can set capacity price in the same manner as other Installed Capacity Suppliers. As described below, the NYISO proposes to revise its Installed Capacity market rules so that an Energy Storage Resource is eligible to participate in the NYISO-administered Installed Capacity market in a comparable manner to all other resource

[119] To the extent that the Commission believes that including these Energy Storage Resource provisions in a later Section 205 filing is inconsistent with Order No. 841's compliance filing deadline, the NYISO respectfully requests an extension of time to address such provisions in a subsequent compliance filing. For purposes of Commission Rule 2008, there would be "good cause" for granting an extension because the NYISO expects to make its Section 205 filing and implement the new tariff requirements well before the requested effective date of the tariff revisions in this compliance filing. Including the Energy Storage Resource provisions planned for the Section 205 filing here would serve no useful purpose. The Energy Storage Resource provisions would be incomplete without the closely related non-Energy Storage Resource language and would in any case shortly be re-filed along with those provisions in a different part of the tariff. Incorporating them into this filing would only create confusion and impose administrative burdens related to tracking and updating the NYISO Tariffs.

[120] Order No. 841 at PP 4, 76.

[121] Order No. 841 at P 142.

types that participate as Installed Capacity Suppliers, including the ability to set the market price for Installed Capacity in the NYISO-administered strip, monthly and spot auctions.

B. Installed Capacity Supplier Qualification Requirements

In order to participate as an Installed Capacity Supplier, a Resource must satisfy all applicable qualification requirements set forth in Section 5.12 of the Services Tariff and ISO Procedures. Some of the existing requirements will apply to Energy Storage Resources. In this filing the NYISO proposes to revise portions of Section 5.12.1 of the Services Tariff to provide the specific qualification requirements for Energy Storage Resources. These specific qualification requirements address Energy Storage Resources' unique physical and operational characteristics and comply with the directives in Order No. 841. Thus, under the proposal, an Energy Storage Resource may qualify as an Installed Capacity Supplier if it satisfies the existing qualification requirements for a Generator as well as meets the Energy Storage Resource-specific requirements described below.

1. Offer Size Requirements

Order No. 841 provides that an ISO/RTO must establish a minimum size requirement for electric storage resource's participation in the ISO/RTO markets that does not exceed 100 kW.[122] Accordingly, the NYISO proposes to revise Section 5.12.1 of the Services Tariff to establish that an Energy Storage Resource seeking to qualify as an Installed Capacity Supplier must have a "nameplate capacity rating that allows a minimum injection to the NYS Transmission System or distribution system of 0.1 MW or greater."[123] This is the minimum threshold for participation of a single facility that is directly metered.

2. ISO-Managed Bid in Day-Ahead Market

Due to the unique characteristics of Energy Storage Resources, the NYISO proposes to revise Section 5.12.1 of the Services Tariff to require such Resources to elect to have an ISO-Managed Energy Level in its Day-Ahead Market Bids.[124] This requirement will allow the NYISO to fully control and optimize the scheduled Energy injections as well as withdrawals associated with the Energy Storage Resource throughout the day. The NYISO will evaluate each Energy Storage Resource's physical parameters, such as Lower Operating Limit, Upper Operating Limit, Roundtrip Efficiency, Upper Storage Limit, and Lower Storage Limit for ISO-Managed Bids to ensure that the Resource is given a feasible schedule. This election is necessary to prevent infeasible Day-Ahead Market schedules, which could cause insufficient capacity to be procured in the Day-Ahead Market to meet real-time need.

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[122] Order No. 841 at PP 4, 270.

[123] Energy Storage Resources must still satisfy the minimum UCAP requirement. *See* Part VII.C below. Further, the minimum injection threshold does not reduce or otherwise alter any minimum thresholds or requirements for Energy Storage Resources or other NYISO rules, such as those that apply to External resources in order to qualify and participate in the NYISO-Administered Markets.

[124] Proposed Services Tariff Section 5.12.1.14.

3. Capacity Resource Interconnection Service

To qualify as an Installed Capacity Supplier, a Resource must possess Capacity Resource Interconnection Service ("CRIS"),[125] which is obtained in accordance with the NYISO's interconnection process.[126] The proposed revisions to the NYISO's OATT to address the CRIS requirements and related revisions to its interconnection requirements are discussed below in Part VII.E of this filing letter.

4. Minimum Run-Time Requirement

The NYISO proposes to insert a new Section 5.12.1.13 of the Services Tariff to provide that an Energy Storage Resource seeking to qualify as an Installed Capacity Supplier must "be capable of running for a minimum of four (4) consecutive hours each day" except for days when it is not capable of doing so because of an outage reported pursuant to the relevant outage requirements in Section 5.12 and related ISO Procedures. The four-hour minimum run time is consistent with the NYISO's existing qualification requirements for Energy Limited Resources[127] and Special Case Resources.[128] Consistent with Order No. 841,[129] an Energy Storage Resource may spread its output across four hours to meet the four-hour minimum run time, which requirement will be set forth in ISO Procedures.

5. Dependable Maximum Net Capability (DMNC) Test

As with other capacity Resources, the amount of Installed Capacity that an Energy Storage Resource can qualify to sell in the NYISO Installed Capacity market is limited by the lesser of the CRIS it possesses and its demonstrated maximum net capability to provide Energy (for Energy Storage Resource's over four (4) consecutive hours each day). As with other types of Resources, an Energy Storage Resource participating in the NYISO's Installed Capacity market will need to provide the NYISO with the results of a DMNC test or historical production data[130] to establish the maximum Installed Capacity it is qualified to provide during each Capability Period. The existing tariff provisions for DMNC tests or historical data encompass Energy Storage Resources. The specific DMNC test requirements for resources are set forth in ISO Procedures. The NYISO will work with its stakeholders to supplement those procedures to establish the DMNC test requirements for Energy Storage Resources.

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[125] CRIS is interconnection service that allows a Developer to interconnect its facility to the New York State Transmission System or Distribution System in accordance with the NYISO Deliverability Interconnection standard, which allows participation in the NYISO's Installed Capacity market to the extent of the facility's deliverable capacity.

[126] Services Tariff Section 5.12.1.

[127] *See* Services Tariff Section 5.12.11.3.

[128] *See* Services Tariff Section 5.12.11.1.

[129] *See* Order No. 841 at P 94 (requiring ISO/RTOs to allow electric storage resources to de-rate their capacity to meet minimum run-time requirements).

[130] *See* Services Tariff Section 5.12.1.2.

C. Calculating an Energy Storage Resource's Unforced Capacity Value

Unforced Capacity ("UCAP") is the measure of Installed Capacity that an Installed Capacity Resource can offer into the NYISO-administered capacity auction or certify in a Bilateral Transaction. UCAP is also the measure of the quantity of capacity that Load Serving Entities must supply to meet minimum requirements. The amount of UCAP an Installed Capacity Supplier can offer is based upon the CRIS-adjusted DMNC test results that establish a Generator's Installed Capacity Obligation, which is then derated to a UCAP value using a derating factor calculated based upon the Resource's availability and historic performance over a 17 month period. The NYISO calculates the UCAP value by multiplying the ICAP amount by one minus a derating factor (1 – derating factor).[131] The revisions proposed in this filing to establish the UCAP value for Energy Storage Resources are designed using a methodology that results in treatment comparable to other Generator types participating as Installed Capacity Suppliers. The NYISO proposes to modify Section 5.12.5.1 to include Energy Storage Resources in the existing provision that requires other capacity resources to submit the necessary Generating Availability Data System ("GADS") data or Operating Data. That information will enable the NYISO to evaluate the availability of the Resource.

The NYISO also proposes to revise Section 5.12.6.2 of the Services Tariff to specify how it will calculate the UCAP that an Energy Storage Resource is authorized to supply in the New York Control Area. That provision states that it "shall be based on the individual availability of the Energy Storage Resources in the Real-Time Market and calculated by the ISO in accordance with ISO Procedures." Section 5.12.6.2 notes that, with limited exception, the calculation will not include hours in any month that the Energy Storage Resource was in an outage state that started on or after May 1, 2015 and that precluded its eligibility to participate in the Installed Capacity market. That date corresponds to the effective date of certain tariff revisions in which specified Mothball, Forced Outage, and Retired generator outage states were defined and their participation was prescribed.[132] The proposed revisions further specify that the NYISO shall calculate separate Summer and Winter UCAP values for Energy Storage Resources and update them seasonally as described in ISO Procedures. That provision corresponds to the same provision that applies to all other capacity Resources. The revisions proposed in Section 5.12.1 that establish the 0.1 MW qualification threshold do not alter the minimum 0.1 MW UCAP requirement. That is, if an Energy Storage Resource qualifies to be an Installed Capacity Supplier, it will only be eligible to offer into the Installed Capacity market or be certified in a

[131] The NYISO has discussed potential de-rating concepts for Energy Storage Resources with NYISO stakeholders and will continue to work with stakeholders to finalize the concepts in ISO Procedures. *See, e.g., Capacity Market Rules for Energy Storage Resources Presentation*, NYISO Installed Capacity Working Group (September 21, 2018); available at: http://www.nyiso.com/public/webdocs/markets_operations/committees/bic_icapwg/meeting_materials/2018-09-21/3%20ESR%20Capacity%20Model%20Tariff%20092118%20presentation.pdf.

[132] *See New York Indep. Sys. Operator*, 151 FERC ¶ 61,075 (2015).

capacity Bilateral Transaction if its derating factor results the Resource having at least 0.1 MW of UCAP.[133]

D. Day-Ahead Market Bidding Requirements for Energy Storage Resources that Are Installed Capacity Suppliers

An Energy Storage Resource participating as an Installed Capacity Supplier, as with other Installed Capacity Suppliers, must on a daily basis schedule a Bilateral Transaction, bid, or be declared to be unavailable in the Day-Ahead Market, expressed in terms of Installed Capacity equivalent of the UCAP sold or certified. If it does not, it is subject to sanctions.[134] The NYISO proposes to revise the existing requirement, which is in Section 5.12.8 of the Services Tariff, to accommodate Energy Storage Resources. The proposed revision would increase the precision from one whole MW by providing that the required amount is rounded down to nearest 0.1 MW, with the exception of External Installed Capacity Suppliers.[135] The NYISO also proposes to make the same change to the sanctions provisions in Section 5.12.12.2.

E. Energy Storage Resources' CRIS and Interconnection Requirements

Attachments X and Z of the OATT contain the procedures for processing interconnections of Large Facilities and Small Generating Facilities, respectively. In addition, Attachment S of the OATT contains the procedures for the Class Year Interconnection Facilities Study ("Class Year Study"), in which a project must participate to obtain CRIS with limited exceptions. The NYISO proposes revisions in these OATT attachments to address the CRIS and interconnection requirements applicable to Energy Storage Resources.

A number of the NYISO's proposed revisions to Attachments S, X, and Z would modify tariff language that the Commission adopted in Order Nos. 2003 and 2006, or their successors as part of the *pro forma* interconnection procedures. The Commission has accepted other modifications and improvements to the NYISO interconnection procedures,[136] recognizing that where changes to *pro forma* interconnection procedures "are clarifying and/or ministerial in nature and/or NYISO has supplied sufficient justification," such modifications are acceptable under the "independent entity variation" standard.[137] The Commission has explained that under this standard, "the Commission will review the proposed variations to ensure they do not provide

[133] *See* Proposed Services Tariff Section 4.1.4; *see also* Section 5.14 of the *Installed Capacity Manual*.

[134] *See* Services Tariff Section 5.12.8.

[135] For External Installed Capacity Suppliers, the requirement would remain as rounded down to the nearest whole MW.

[136] *See, e.g.*, *New York Indep. Sys. Operator, Inc*., 135 FERC ¶ 51,014 (2011); *New York Indep. Sys. Operator, Inc*., 124 FERC ¶ 61,238 (2008).

[137] *New York Indep. Sys. Operator, Inc*., 124 FERC ¶ 61,238 at PP 17-18.

an unwarranted opportunity for undue discrimination or produce an interconnection process that is unjust and unreasonable."[138]

The revisions to Attachments S, X, and Z that are proposed herein are fully justified under the Commission's "independent entity variation" standard because they are necessary to fully comply with Order No. 841. The tariff revisions have been reviewed with the NYISO's stakeholders through an extensive and open process. As discussed in detail in this Part VII.E, the proposed tariff revisions enhance, revise, and clarify the tariff provisions related to the interconnection of Energy Storage Resources and the manner in which Energy Storage Resources may obtain CRIS.

1. CRIS Requirements

The Class Year Study serves two purposes. First, the Class Year Study is the final interconnection study for evaluating the Energy Resource Interconnection Service ("ERIS")[139] requested by Large Facilities and certain Small Generating Facilities[140] in the NYISO's interconnection process. In this part of the Class Year Study, those projects that have satisfied the tariff requirements and applicable milestones to enter into the Class Year are evaluated as a group – a "Class Year" – to determine their collective impact under the NYISO's Minimum Interconnection Standard and to identify and cost allocate any System Upgrade Facilities required to mitigate any reliability issues.

The second primary purpose of the Class Year Study is a deliverability analysis that evaluates a project's requested MW of CRIS under the Deliverability Interconnection Standard to determine whether the requested MW of CRIS are deliverable and to identify and cost allocate any required System Deliverability Upgrades required for a project's requested MW of CRIS to be fully deliverable. The Class Year Study procedures are primarily contained in Attachment S.[141]

The Class Year Study's deliverability evaluation is based on the MW level of CRIS requested by the Class Year Project. Currently, Attachment S limits CRIS requests as follows:

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[138] *See id.* at P 18.

[139] ERIS is basic interconnection service that allows a Developer to interconnect its facility to the New York State Transmission System or Distribution System in accordance with the NYISO Minimum Interconnection Standard to enable the New York State Transmission System or Distribution System to receive electric energy from the facility.

[140] Small Generating Facilities no larger than 20 MWs proposing to interconnect to the New York State Transmission System or to the Distribution System are studied in accordance with the SGIP in Attachment Z. As described in Section 32.3.5.3 of Attachment Z, if any Interconnection Study determines that a Small Generating Facility requires a non-Local SUF to interconnect, then that Small Generating Facility is placed in the next Class Year Study, and cost responsibility is allocated to the Small Generating Facility in accordance with the procedures and methodologies in Attachment S.

[141] Attachment X details the obligations related to execution of a Class Year Study Agreement and provides a high level scope of the Class Year Study and Class Year Study procedures, but it incorporates by reference the terms of Attachment S, which provide more detailed Class Year Study procedures.

- A BTM:NG Resource cannot request CRIS in excess of its Net-ICAP;

- A Class Year Transmission Project requesting CRIS in the form of External-to-ROS Deliverability Rights ("EDRs") cannot request CRIS in excess of the increase in transfer capability created by its project; and

- Other generation and Class Year Transmission Projects cannot request CRIS in excess of their nameplate.[142]

As the NYISO has for other specific resource types (*e.g.*, BTM:NG Resources and Class Year Transmission Projects requesting EDRs), the NYISO proposes to establish an Energy Storage Resource-specific requirement for the maximum CRIS amount that an Energy Storage Resource can request in a Class Year Study. This requirement is necessary in light of the unique physical and operational characteristics of Energy Storage Resources. Similarly, other resource-specific requirements proposed by the NYISO in light of their unique physical and operational characteristics have previously been approved by the Commission.[143] Specifically, the NYISO proposes to revise Section 25.8.1 of Attachment S of the OATT and Section 30.3.2.4 of Attachment X of the OATT to provide that, if the Class Year Project is an Energy Storage Resource, "the requested MW level of CRIS cannot exceed the minimum of the following: (a) its maximum sustained four-hour injection capability in MW hours; (b) the nameplate capacity of the facility (*i.e.*, injection capability of the facility expressed in MW); or (c) the sum of facility's requested and existing ERIS, as applicable…."

The three prongs limiting an Energy Storage Resource's CRIS request included in the proposed tariff revisions serve the following purpose:

- The "maximum sustained four-hour injection" prong captures the amount of capacity that a resource would be able to provide under the duration requirements to be an Installed Capacity Supplier (as described above in Part VII.B.4);

- The "nameplate capacity" prong captures the resource's maximum injection capability; and

- The "sum of facility's requested and existing ERIS" prong captures the maximum amount of Energy the resource is permitted to inject into the system in accordance with the resource's ERIS level determined in the applicable interconnection studies.

This proposed limitation on the MW level of CRIS that an Energy Storage Resource may request is consistent with limits placed on other resources' CRIS requests, all of which have been designed to align a resource's maximum CRIS level as close as possible to the resource's

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[142] *See* OATT Attachment S, Section 25.8.1.

[143] *See, e.g.*, *New York Indep. Sys. Operator, Inc.*, 155 FERC ¶ 61,166 (2016) (accepting tariff revisions providing for a maximum requested CRIS level for BTM:NG Resources); *New York Indep. System Operator, Inc.*; Letter Order, Docket No. ER118-1668-000 (July 13, 2018) (accepting tariff revisions providing for a maximum requested CRIS level for Class Year Transmission Projects requesting EDRs).

maximum possible Installed Capacity market contribution. In this instance, the lowest value determined by the three prongs best reflects an Energy Storage Resource's maximum possible Installed Capacity market contribution.

In addition to the revisions to Section 25.8.1, the NYISO proposes to revise other references in Attachments S and X of the OATT to the maximum MW levels of CRIS that may be requested. For internal consistency, the NYISO has revised all such provisions concerning the maximum MW levels of CRIS, so that they simply refer back to Section 25.8.1 of Attachment S or Section 30.3.2.4 of Attachment X.[144]

2. Deliverability Methodology Applied to Energy Storage Resources

To clarify the manner in which the Class Year Study deliverability evaluation will study Energy Storage Resources, the NYISO proposes revisions to Section 25.7.8.2.3 of Attachment S of the OATT. This section of Attachment S sets forth the methodology for the deliverability evaluation of the requested MW of CRIS. Pursuant to Section 25.7.8.2.3 of Attachment S, the MW of CRIS requested by a Class Year Project represent Installed Capacity and are derated to a UCAP value used for the deliverability analysis.[145]

The deration factor used in the deliverability study is a derated generator capacity incorporating availability and is based on the unforced capacity or "UCAP" or Net-UCAP, as applicable, of the resource. This factor, unique to the deliverability study, is referred to as the UCAP Deration Factor ("UCDF"). Section 25.7.8.2.3 of Attachment S of the OATT provides that the UCDF used for the deliverability study is the average from historic ICAP to UCAP translations on a Capacity Region basis, as determined in accordance with ISO Procedures. Section 25.7.8.2.3 of Attachment S further provides that the UCDF used will be the average Equivalent Forced Outage Rate on demand ("EFORd"), which will be used for all ICAP providers that are not Intermittent Power Resources. The UCDF for Intermittent Power Resources is calculated based on their resource type in accordance with ISO Procedures.

The NYISO proposes to clarify that Energy Storage Resources will not be treated as Intermittent Power Resources for purposes of the deliverability study. The proposed tariff revisions clarify that for Class Years commencing after the current Class Year 2017, Energy Storage Resources will be among the non-Intermittent Power Resources for which the Deliverability Study applies a UCDF based on the average from historic ICAP to UCAP translations on a Capacity Region basis, as determined in accordance with ISO Procedures.

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[144] *See* OATT Attachment S, Section 25.8.1 and OATT Attachment X, Sections 30.3.2.4, 30.3.2.6 and 30.14, Appx. 2.

[145] At the conclusion of the analysis, the NYISO will reconvert only the deliverable MW and report them in terms of MW of Installed Capacity using the same derating factor utilized at the beginning of the deliverability analysis.

3. Additional Interconnection-Related Tariff Revisions for Energy Storage Resources

While the NYISO currently processes Energy Storage Resources through its interconnection process, the NYISO proposes to revise the Interconnection Request forms and the data forms in Section 30.14 of its *pro forma* Large Facility Interconnection Procedures ("LFIP") in Attachment X of the OATT and in Section 32.5 of its *pro forma* Small Generator Interconnection Procedures ("SGIP") in Attachment Z of the OATT to align the data requirements for these resources.

Specifically, the NYISO proposes to revise the Large Facility Interconnection Request form in Appendix 1 of the LFIP, the data form for the Interconnection Facilities Study Agreement in Attachment B to Appendix 2 of the LFIP, the Small Generator Interconnection Request form in Appendix 2 of the SGIP, and the data form to the Facilities Study Agreement in Attachment A to Appendix 6 of the SGIP. These tariff revisions align the Energy Storage Resource data requirements to include all of the following information:

- Energy storage capability (MWh)
- Minimum Duration for full discharge (*i.e.*, injection) (Hours)
- Minimum Duration for full charge (*i.e.*, withdrawal) (Hours)
- Maximum withdrawal from the system (*i.e.*, when charging) (MW)
- Inverter manufacturer, model name, number, and version
- Primary frequency response operating range for electric storage resource
- Minimum State of Charge (%)
- Maximum State of Charge (%)

As revised, therefore, the developer of an Energy Storage Resource that is a Small Generating Facility or a Large Generating Facility will provide the same information concerning the project in the NYISO's interconnection process.

The proposed tariff revisions to the Small Generator Interconnection Request and Large Facility Interconnection Request forms not only align the Energy Storage Resource data requirements with those requested but also align the BTM:NG Resource data requirements with those requested in the Large Facility Interconnection Request. The revisions do not substantively change the information required of a BTM:NG Resource in the interconnection process, but simply streamline and align the provisions of the respective Interconnection Request forms.

Finally, the NYISO proposes tariff revisions to the Small Generator Facilities Study Agreement to add a section for requested CRIS, if any. Additional proposed revisions to this *pro forma* agreement clarify that a request for CRIS above 2 MW or a request for CRIS for a facility

larger than 2 MW must be requested by executing a Class Year Interconnection Facilities Study Agreement pursuant to the form of the agreement contained in Appendix 2 to Section 30.14 of Attachment X to the OATT. These revisions make clear to a Small Generating Facility, before it enters a Facilities Study, that it may be required to enter a Class Year Study for deliverability if it elects CRIS greater than 2 MW or if it is a facility larger than 2 MW requesting CRIS.

F. Reinstating the Applicability of the Buyer-Side Market Power Mitigation Measures for Installed Capacity

The NYISO is proposing modifications to Sections 23.2.1 and 23.4.5.7 of the Services Tariff in connection with its proposed Energy Storage Resource compliance revisions. Those Sections are part of the NYISO's Buyer Side Market Power Measures for Installed Capacity (the "BSM Rules.") The NYISO is not proposing any substantive changes to the exemptions or the tests in the BSM Rules in this filing but is seeking to reinstate their applicability to certain Generators. The current BSM Rules would apply to the entry of new Energy Storage Resources that are larger than 2 MW. The proposed changes to the BSM Rules are related to the NYISO's adoption of Energy Storage Resource rules in this filing that would govern the entry of Energy Storage Resources that are 2 MW or less. Given the need for consistent rules across all generation types, it is appropriate, and consistent with precedent, for the BSM Rule revisions proposed in this compliance filing to also apply to generators that are not Energy Storage Resources.[146] Making the BSM Rule revisions part of this filing will also ensure that Market Participants and investors have clear notice of the BSM Rules' applicability to, and possible impact on, an Energy Storage Resource in Mitigated Capacity Zones.

"Examined Facilities" are those facilities that are subject to evaluation, and potential mitigation, under the BSM Rules. Prior to 2016, the Services Tariff defined three specific categories of Examined Facilities. "Category III" facilities included, in relevant part, "each proposed new Generator that is . . . not subject to a deliverability requirement (and therefore, is not in a Class Year)".[147] To qualify as a Category III facility, the Generator was also required to provide "specific written notification to the ISO no later than the date identified by the ISO, that it plans to commence commercial operation and offer UCAP in a month that coincides with the Capability Period of the Mitigation Study Period."

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[146] The Commission has previously authorized the NYISO to include limited, but necessary, additional revisions that were not explicitly directed in compliance filings and should follow that precedent here. *See New York Independent System Operator, Inc.*, 125 FERC ¶ 61,206 (2008), *reh'g*, 127 FERC ¶ 61,042 (2009) (accepting proposed additional tariff revisions that were necessary to implement the modifications directed by the Commission).

[147] References herein to "Category III" herein mean the quoted language, which was Subsection (ii) of the original "Category III" definition. It does not pertain to what had been Subsection (i) of the original definition which applied to facilities that were in the NYISO interconnection queue for a Class Year prior to 2009 that had not commenced commercial operation or been cancelled and for which the NYISO had not made a prior determination under the BSM Rules. The NYISO is not proposing to reinstate Subsection (i) of the original Category III definition.

In 2016, the NYISO submitted tariff revisions to govern the participation of Behind-the-Meter Net Generation Resources (the "BTM:NG Filing").[148] As part of that filing, the NYISO proposed several "housekeeping" revisions to eliminate BSM Rules that it then believed were "outdated" and that could "no longer be applied."[149] Specifically, the NYISO proposed to eliminate the definition of, and references to, Category III facilities based on its understanding at the time that it was "no longer possible for a proposed new project to be a Category III facility, . . ."[150] The sole reason for removing Category III was this understanding that it had become obsolete. Similarly, the Commission's order accepting the BTM:NG Filing did not address the elimination of Category III Examined Facilities (other than to acknowledge its acceptance of their elimination).[151]

Since the NYISO made the BTM:NG Filing it has become evident that it remains possible for facilities to fall under the Category III definition. In particular, an Energy Storage Resource 2 MW or smaller – that is not subject to a deliverability requirement by virtue of its size – might enter the capacity market under the market rules proposed in this filing. Such resources would not fall within the currently effective definitions of "Category I" or "Category II" facilities under the BSM Rules.[152] But, if interconnecting in a Mitigated Capacity Zone, they would fall under the previously effective definition of "Category III" facilities. The treatment of such Energy Storage Resources under the BSM Rules would therefore be unclear whereas there would have been no ambiguity concerning their status prior to the BTM:NG Filing's elimination of Category III.[153]

The tariff revisions that were accepted in the BTM:NG Filing included a "transition rule"[154] that provided a 60-day window, which ended July 18, 2016, under which certain facilities that would meet the definition of Category III could receive CRIS without going

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[148] New York Independent System Operator, Inc., *Proposed Amendments to the NYISO Open Access Transmission Tariff and Market Administration and Control Area Services Tariff to Incorporate Behind-the-Meter Net Generation Resources into the NYISO's Energy, Ancillary Services and Capacity Markets*, Docket No. ER16-1213-000 (March 17, 2016).

[149] *Id*. at pp. 36-37.

[150] *Id. See also supra* at n. 147. The BTM:NG Filing's use of "Category III" pertained to both Subsections (i) and (ii).

[151] *See New York Independent System Operator, Inc.*, 155 FERC ¶ 61,166 (2016) at P 1 and n. 3.

[152] A generator 2 MW or smaller can obtain CRIS under Section 32.1.1 of the OATT without having to enter a Class Year, therefore, it is highly unlikely that such a generator would be an expected recipient of transferred CRIS at a different location and thus be a Category II Examined Facility.

[153] In 2017, the NYISO explained to its stakeholders what had occurred and presented proposed tariff revisions to address the issue in the same manner proposed in this filing. That proposal was part of the NYISO's proposal to create an eliminate Localities (commonly referred to as the "On Ramps/Off Ramps" proposal.). On February 14, 2018, the On Ramps/Off Ramps proposal did not obtain the necessary supermajority vote in order to make a FPA Section 205 filing proposing the tariff revisions. The stakeholder vote on the On Ramps/Off Ramps proposal was driven by issues unrelated to the incorporation of the "Category III" revisions.

[154] *See* Section 25.9.3.4.1 of the OATT.

through a Class Year. It is possible that a limited number of other potential facilities could also have an anomalous status under the BSM Rules unless Category III is reinstated.

Commission precedent requires that new entrant Generators and UDR projects in Mitigated Capacity Zones[155] be evaluated under the BSM Rules.[156] The BTM:NG Filing did not intentionally create an exclusion. Accordingly, the "Category III Examined Facilities" tariff provisions should be reinstated. The NYISO is therefore proposing to return the relevant portion[157] of the Category III language to the tariff. That is the language applicable to "each proposed new Generator that is . . . not subject to a deliverability requirement (and therefore, is not in a Class Year)" and that provides notice to the NYISO that it plans to commence commercial operation and offer UCAP by a prescribed time. The NYISO is largely proposing to reinstate the Category III language because it was previously found to be just, reasonable, and not unduly discriminatory.[158] The NYISO is also making limited additions to other tariff provisions to include references to the Category III where relevant and necessary.

Specifically, the NYISO is proposing to revise Section 23.4.5.7.3 of the Services Tariff to restore the relevant portion of the Category III definition. The revised section would read:

> 23.4.5.7.3 The ISO shall make such exemption and Unit Net CONE determination for each "Examined Facility" (collectively "Examined Facilities") which term shall mean (I) each proposed new Generator and proposed new UDR project, and each existing Generator that has ERIS only and no CRIS, that is a member of the Class Year that requested CRIS, or that requested an evaluation of the transfer of CRIS rights from another location, in the Class Year Facilities Study commencing in the calendar year in which the Class Year Facility Study determination is being made (the Capability Periods of expected entry as further described below in this Section, the "Mitigation Study Period"), and (II) each (i) existing Generator that did not have CRIS rights, and (ii) proposed new Generator and proposed new

[155] The BSM Rules also apply to New Capacity Zones and entrants other than certain identified existing facilities and ones that have "Commenced Construction." *See* Services Tariff Section 23.4.5.7.8 and Section 23.2.1's definition of "Commenced Construction" and" NCZ Examined Projects."

[156] *See, e.g., New York Independent System Operator, Inc.*, 158 FERC ¶ 61,317 (2017) at P 2 ("NYISO's buyer-side market power mitigation rules provide that, unless exempt from mitigation, new capacity resources must enter the New York City or G-J Locality ICAP markets (mitigated capacity zones) at a price at or above the applicable offer floor and continue to meet the offer floor until their capacity clears twelve monthly auctions.") (citations omitted). As described by the Commission, in order for there to be a determination of whether an entrant is exempt, and if not, whether the Mitigation Net CONE Offer Floor or the Unit Net CONE Offer Floor should apply, an examination must be conducted. *See, e.g., New York Independent System Operator, Inc.*, 122 FERC ¶ 61,211 (2008) at P 117 ("To ensure the mitigation rules do not deter economic entry, the Commission agrees that units should be exempted when their decision to enter was based on price signals the market sent indicating that entry was needed.").

[157] As stated in n. 147, the NYISO is not proposing to restore language that had been in Subsection (i); *i.e.*, regarding new facilities that were in the NYISO interconnection queue for a Class Year prior to 2009 since it still appears that no entrant could possibly fall into that category.

[158] *New York Independent System Operator, Inc*., 133 FERC ¶ 61,178 (2010).

> UDR project, provided such Generator under Subsection (i) or (ii) is an expected recipient of transferred CRIS rights at the same location regarding which the ISO has been notified, by the transferor or the transferee of a transfer pursuant to OATT Attachment S Section 25.9.4 that will be effective on a date within the Mitigation Study Period ("Expected CRIS Transferee"), and (III) each proposed Generator that (a) is not subject to a deliverability requirement (and therefore, is not in a Class Year) and (b) provides specific written notification to the ISO, received by the Director of Market Mitigation and Analysis, no later than the Class Year Start Date, that it plans to commence commercial operation and offer UCAP in a month that coincides with a Capability Period of the Mitigation Study Period (a "Category III Examined Facility"). The term "Examined Facilities" does not include any facility exempt from an Offer Floor pursuant to the provisions of Section 23.4.5.7.7.

The proposed Category III definition language closely tracks the relevant portion of the language in effect prior to the BTM:NG Filing. The previously effective language did not specify that Category III facilities must submit written notification to the NYISO's Director of Market Mitigation and Analysis but adding that clarifying detail to the tariff is not a material change.

The last sentence that the NYISO is proposing to restore to Section 23.4.5.7.3 is not a part of the Category III definition. Instead, it is language that was erroneously removed, as if it had been a part of the "Category III" definition, by the BTM:NG Filing. The language simply confirms that "grandfathered" resources that entered the market before the BSM Rules became effective in their respective Mitigated Capacity Zone are not considered to be "Examined Facilities."

In addition, the NYISO proposes to add references to Category III Examined Facilities (or the Category III tariff provisions) where relevant and necessary in Sections: (i) 23.4.5.7.2; (ii) 23.4.5.7.2.1; (iii) 23.4.5.7.2.3.2; (iv) 23.4.5.7.3.3.4; (v) 23.4.5.7.3.3.5; (vi) 23.4.5.7.3.4; (vii) 23.4.5.7.3.5 (and would contain the requested effective date, as described below in Part X.B of this transmittal letter); (viii) 23.4.5.7.13.4.2; (ix) 23.4.5.7.14. None of these additions are material. Most of these additions are necessary to update tariff rules that were added after the BTM:NG Filing, such as the "bifurcated" Class Year rules and exemptions for renewable resources or self-supply which currently do not account for Category III facilities or specify how they are to be treated.

Finally, the NYISO is proposing to revise Section 23.2.1 of the Services Tariff, which includes definitions related to the BSM Rules, to update its definition of "NCZ Examined Project" to reflect the restoration of the Category III Examined Facility provisions.

G. Additional Capacity Requirements

The NYISO proposes to revise Section 5.12.5.1 of the Services Tariff to require Energy Storage Resources, as with other Installed Capacity Suppliers, to submit GADS data. In

addition, an Energy Storage Resource will be responsible for providing State of Charge telemetry to the NYISO. As described above, each Energy Storage Resource will be required pursuant to Section 3.5.2 of the Services Tariff to provide a real-time Energy Level signal to the NYISO in accordance with ISO Procedures. Finally, as part of its development of a market design for distributed energy resources, the NYISO is exploring several concepts with its stakeholders, including aggregating Energy Storage Resources and dual participation of these resources in wholesale and retail markets. The NYISO is also evaluating the capacity value provided by run-time limited ICAP Suppliers. The NYISO intends address these concepts in subsequent tariff revisions as part of a Section 205 filing concerning distributed energy resources. Energy Storage Resources will not be permitted to aggregate or engage in dual participation until the tariff changes permitting those market concepts become effective, and may be subject to new or additional generally applicable minimum run-time obligations.

VIII. Energy Market Mitigation Requirements for Energy Storage Resources

A. Overview

In order to accommodate participation by Energy Storage Resources in its Energy markets, the NYISO made three broad categories of changes to its existing Energy market mitigation rules. First, the NYISO proposes additional mitigation conduct thresholds and financial sanctions to explicitly address Energy Storage Resources and other Withdrawal-Eligible Generators that are permitted to Bid to withdraw Energy. The proposed new thresholds and sanctions address the potential for Energy Storage Resources to consume Energy in order to alter resource commitments or to increase market clearing prices. A discrete set of conduct thresholds has been proposed for assessing the Bids submitted by Energy Storage Resources that elect to have their Energy Level managed by the NYISO (*i.e.*, ISO-Managed Resources).

Second, the NYISO proposes to significantly enhance its ability to incorporate opportunity costs into Energy Storage Resources' reference levels.[159] The NYISO has allowed opportunity costs to be included in Generator reference levels since 1999, when it first began developing reference levels. In the past, the opportunity cost component of reference levels has been fairly static. The tariff revisions proposed in this filing were developed to permit the NYISO to implement opportunity costs as a component of Generator reference levels on a far more dynamic basis. The proposed tariff revisions will be implemented using new software that will permit claimed opportunity costs to be submitted along with an Energy Bid. Opportunity cost submissions that comply with the NYISO's rules and pass the NYISO's screening process will be incorporated into the Energy Storage Resource's or other Generator's reference level(s).

Finally, the NYISO proposes to broaden its review of Virtual Bids to more fully incorporate Virtual Supply Bids because Energy Storage Resources and other Withdrawal-

[159] A "reference level" is the NYISO's expectation of how a Resource would Bid if it is offering competitively. The methods that the NYISO uses to develop reference levels are explained in Section 23.3.1.4 of the Services Tariff.

Eligible Generators submit Bids to withdraw Energy that can impact the LBMP at which Virtual Supply positions are settled.

B. Description of Changes to Specific Tariff Provisions

To accommodate Energy Storage Resources, and to better define the rules that apply to all Withdrawal-Eligible Generators, the NYISO developed the following new or revised mitigation rules:

1. Proposed Changes to Conduct Thresholds and Reference Levels

Section 23.2.4.1.1 of the Services Tariff was revised to state that refusing to offer to withdraw Energy for Generators that must withdraw Energy in order to be able to inject Energy at a later time may constitute the physical withholding of an Electric Facility.

Section 23.2.4.1.2 of the Services Tariff was revised to state that economic withholding includes Bids to withdraw Energy that are unjustifiably high in order to indirectly (by increasing demand) or directly set a high market clearing price.

Section 23.3.1.2.1.1.1 of the Services Tariff has been revised to include a new conduct threshold for Bids to withdraw Energy in unconstrained areas. The NYISO changed the conduct threshold because it expects Bids to withdraw Energy to be very low, and possibly negative. The conduct thresholds that apply in Constrained Areas did not need to be changed to accommodate Bids to withdraw Energy.

Sections 23.3.1.2.1.1.2 and 23.3.1.2.2.6 of the Services Tariff set forth proposed new conduct thresholds that will apply to Energy Storage Resources with ISO-Managed Energy Levels. Instead of using fixed "strike prices" to schedule Incremental Energy injections and withdrawals, these Generators can be dispatched by the NYISO based on the difference between their Incremental Energy Bid[160] to inject Energy and their Incremental Energy Bid to withdraw Energy, which presents a new opportunity to exercise market power by increasing the difference (or spread) between the lowest Incremental Energy Bid and their highest Incremental Energy Bid for an Energy Storage Resource with an ISO-Managed Energy Level.

The NYISO has developed two new conduct thresholds that it proposes to apply to these Generators to prevent the potential exercise of market power. The first threshold compares the difference between the Generator's lowest Incremental Energy Bid and its greatest Incremental Energy Bid to the difference between the corresponding reference level values for the relevant hour. If the difference between the two Bid values is substantially greater than the difference between the corresponding reference level values, then the Bid will fail the conduct threshold and will be reviewed for possible market impact. The second threshold only applies to the Day-Ahead Market. The threshold it tests is the difference (or spread) between the greatest Incremental Energy Bid submitted at any point during the Day-Ahead market day and the lowest

[160] Incremental Energy Bids may include up to eleven distinct cost steps. For Energy Storage Resources, some of the Bid steps may represent offers to withdraw Energy while other Bid steps represent offers to inject Energy.

Incremental Energy Bid submitted at any point for the same Day-Ahead market day. The difference between the two Incremental Energy Bids that are selected is compared to the difference between their reference levels. If the difference between the two Bid values is substantially greater than the difference between the corresponding reference level values, then the Bid will fail the conduct threshold and will be reviewed for possible market impact.

Sections 23.3.1.2.1.4 and 23.3.1.2.1.5 of the Services Tariff were revised to add new, non-dollar Bid parameters that can be used to commit and dispatch Withdrawal-Eligible Generators to the mitigation thresholds. Proposed Section 23.3.3.3.1.3.3 was revised to address mitigation consultations for Bids that are based on these new non-dollar Bid parameters.

The scope of Section 23.3.1.3 of the Services Tariff was expanded to develop mitigation thresholds to apply to uneconomic withdrawals of Energy. Proposed Sections 23.3.1.3.2, 23.3.1.3.2.1, and 23.3.1.3.2.2 are primarily directed at resources that self-schedule Energy withdrawals, or that fail to follow the NYISO's dispatch instructions while withdrawing Energy. Proposed Section 23.3.1.3.2.1 expressly excludes from its scope Bids to withdraw Energy that are tested for economic withholding by applying the thresholds set forth in Section 23.3.1.2.

The NYISO proposes to revise Section 23.3.1.4.1 to explain that Withdrawal-Eligible Generators' reference levels will be determined using negotiated (cost-based) or ISO-developed reference levels. The NYISO cannot use Bid-based or LBMP-based reference levels for Withdrawal-Eligible Generators because both of these types of reference levels rely on historical information. Bid-based reference levels are developed based on Bids previously submitted for a Generator during competitive hours. LBMP-based reference levels are developed based on the LBMP at a Generator's location at times when the Generator was previously scheduled to operate. The NYISO expects that Energy Storage Resources' Bids will instead be based on forecasted LBMPs, and will incorporate the expected cost of withdrawing in order to be able to inject Energy at a later time.

2. Proposed New Opportunity Cost Submission Rules

A key goal of a competitive Energy Storage Resource is to make more money injecting Energy than the cost the Resource incurs to withdraw Energy. The expected cost of Energy across the hours of the market day (and across market days) will factor heavily into how Energy Storage Resources are offered into the NYISO's markets. To better accommodate Bids that are based on expected LBMPs at an Energy Storage Resource's location, the NYISO has proposed a set of tariff revisions that are designed to enhance the NYISO's ability to incorporate opportunity costs into Generator reference levels.

The NYISO has allowed opportunity costs to be included in Generator reference levels since 1999, when it first began developing reference levels. In the past, the opportunity cost component of reference levels has been fairly static. The tariff revisions proposed below were developed to permit the NYISO to implement opportunity costs as a component of Generator reference levels on a far more dynamic basis.

The proposed tariff revisions will be implemented using new software that will permit claimed opportunity costs to be submitted along with an Energy Bid. Opportunity cost

submissions that comply with the NYISO's rules and pass the NYISO's screening process will be incorporated into the Energy Storage Resource's or other Generator's reference level(s).

In Section 23.3.1.4.1.3 of the Services Tariff, the NYISO proposes to explicitly add opportunity costs as a component of a cost-based (negotiated) reference level. The NYISO also proposes to add a definition of opportunity cost to indicate how it will review offers that include an opportunity cost component.

Section 23.3.1.4.8 of the Services Tariff grants the NYISO explicit authority to modify reference levels to reflect opportunity costs. Revisions to address the enhanced opportunity cost bidding functionality proposed herein are further described below.

Proposed Section 23.3.1.4.8.1 prohibits abuses of the reference level software functionality that is used to enable fuel cost adjustments and that will be used to permit dynamic opportunity costs to be submitted with each offer. The proposed rules prohibit: (a) simultaneously submitting the same cost as both a fuel cost and an opportunity cost; (b) dividing a cost into a fuel component and an opportunity cost component and simultaneously submitting the two components in order to avoid the application of the NYISO's screening thresholds (*see* existing Sections 23.3.1.4.6.3 through 23.3.1.4.6.9 and proposed Sections 23.3.1.4.8.4 through 23.3.1.4.8.9); (c) traditional fossil-fired Generators from submitting their fuel costs as opportunity costs; and (d) Energy Storage Resources from submitting the cost they incur to withdraw electricity as a fuel cost. If the NYISO determines that any of the described potentially abusive behaviors have occurred, it will report them to the Market Monitoring Unit for possible referral to the Commission's Office of Enforcement.

Proposed Section 23.3.1.4.8.2 parallels an existing Services Tariff rule that addresses fuel cost adjustment (*see* Section 23.3.1.4.6.1).[161] It states that when the NYISO does not adjust a Generator's reference level to include a timely-submitted and appropriate opportunity cost, the NYISO will report such a failure to the Commission Staff and to its Market Participants *if* it caused a market clearing price or guarantee payment impact that cannot be corrected.

As explained above, proposed Sections 23.3.1.4.8.4 through 23.3.1.4.8.9 of the Services Tariff establish the rules that the NYISO will employ to screen opportunity cost submissions. Each of these rules parallels an existing Services Tariff rule that addresses the NYISO's obligation to screen Market Participant fuel cost submissions for possible inaccuracies. For example, proposed Section 23.3.1.4.8.4 (addressing opportunity cost submissions) is substantially similar to existing Section 23.3.1.4.6.3 (which addresses fuel cost submissions) and proposed Section 23.3.1.4.8.9 (addressing opportunity cost submissions) is very similar to existing Section 23.3.1.4.6.8 (which addresses fuel cost submissions). In some cases, the NYISO was able to simplify the proposed rules that address its screening of opportunity cost submissions.

Proposed Sections 23.3.3.3.1.5.1 and 23.3.3.3.2.1.6 are components of the Services Tariff rules that address consultation between the NYISO and the Market Participant when the NYISO

[161] Section 23.3.1.4.6.1 of the Services Tariff was accepted by the Commission in *New York Indep. Sys. Operator, Inc.*, 154 FERC ¶ 61,111 at PP 8, 39, 45 (2016).

is considering imposing *ex post* mitigation. The proposed provisions have been modified to address the NYISO's authority to retroactively revise reference levels to reflect opportunity costs (Sections 23.3.3.3.1.5.1), or to permit the NYISO to incorporate demonstrated opportunity costs and conclude the mitigation consultation process on an expedited basis for certain reliability-committed Generators (Section 23.3.3.3.2.1.6). The proposed modifications align with rules that the Commission has already accepted addressing Market Participant fuel cost submissions.

3. Proposed Change to Impact Testing

The NYISO proposes one change to its market impact assessment. The NYISO proposes to modify Section 23.3.2.2.3 to exclude violations of the newly proposed Sections 23.3.1.2.1.1.2(b) and 23.3.1.2.2.6(b) conduct thresholds that will apply to Energy Storage Resources with ISO-Managed Energy Levels from automated *ex ante* mitigation because the test that must be performed is intertemporal in nature (it compares Bids submitted in different hours across a Day-Ahead market day), and is more readily performed on an *ex post* basis. The NYISO proposes to apply an *ex post* sanction to deter violations of these mitigation rules. *See* the discussion of the proposed revisions to Sections 23.4.1, 23.4.3.2, 23.4.3.3.1.1.1 and 23.4.3.3.1.2.1 of the Services Tariff below.

4. Proposed Changes to Financial Sanction Rules

The proposed revisions to Sections 23.4.1, 23.4.3.2, 23.4.3.3.1.1.1, and 23.4.3.3.1.2.1 of the Services Tariff address the application and calculation of a financial sanction when a Market Participant is determined to have submitted Bids for an Energy Storage Resource with an ISO-Managed Energy Level that violate the conduct thresholds set forth in proposed Sections 23.3.1.2.1.1.2 or 23.3.1.2.2.6 and are determined to have caused a market impact that exceeds the applicable market impact threshold.[162]

The NYISO proposes to apply *ex ante* mitigation (instead of a financial sanction) to Day-Ahead Bids by Energy Storage Resources located in the New York City Constrained Area that violate the thresholds that the NYISO proposes to add to Sections 23.3.1.2.1.1.2(a) or 23.3.1.2.2.6(a) of the Services Tariff.[163] For all violations of Sections 23.3.1.2.1.1.2(b) or 23.3.1.2.2.6(b) by Constrained Area Energy Storage Resources, and for any violations of proposed Sections 23.3.1.2.1.1.2(a) or (b) by Energy Storage Resources located outside the Constrained Area, the NYISO proposes to instead apply a financial sanction. The NYISO has determined that the application of a financial sanction is the appropriate deterrent because it expects that a substantial period of time will need to be spent consulting with the Market Party in order to develop an appropriate opportunity-cost based reference level for Energy Storage Resources before mitigation can be applied. The time required to consult with the Market Party and to develop an appropriate reference level would be expected to consume most of the six

[162] The market impact thresholds are set forth in Section 23.3.2.1 of the Services Tariff.

[163] The 23.3.1.2.1.1.2(a) threshold will apply when New York City is not experiencing transmission constraints.

months that the NYISO has available to apply default bid mitigation in accordance with Section 23.4.8 of the Services Tariff.

The rules for calculating the proposed financial sanctions are set forth in proposed new Sections 23.4.3.3.1.1.1 and 23.4.3.3.1.2.1. The proposed penalty is more limited than most of the NYISO's other financial sanctions because the "Penalty market clearing price" is not the LBMP at the Energy Storage Resource's location. Instead, it is the difference between the market clearing price (LBMP) that was set and the market clearing price that would instead be determined if reference levels are substituted for conduct-failing Incremental Energy Bids.[164]

The NYISO also proposes to modify the financial sanctions that apply when a Market Party submits inaccurate fuel price information to apply similarly to inaccurate opportunity cost submissions. The NYISO's proposed modifications to Sections 23.4.3.3.3 through 23.4.3.3.3.2 of the Services Tariff implement financial sanctions for the submission of inaccurate opportunity costs that parallel the financial sanctions that the Commission has authorized the NYISO to apply when a Market Party submits inaccurate fuel cost information.[165]

5. Mitigation and Penalty Rules Addressing the Interaction Between Virtual Supply Bids and Bids to Withdraw Energy

Because Withdrawal-Eligible Generators have the ability to submit Bids to withdraw Energy at a location in a Load Zone that can affect the LBMP that is set for the Load Zone (which is used to settle Virtual positions), the NYISO proposes to enhance its authority to identify and address inappropriate interaction between offers to withdraw Energy and Virtual Supply Bids to prevent the exercise of market power.

For example, a Withdrawal-Eligible Generator that is scheduled in the Day-Ahead Market to withdraw Energy could submit revised Incremental Energy Bids in real-time that are lower than the Day-Ahead Incremental Energy Bids during the hours when the Resource has a Day-Ahead schedule to withdraw Energy. This would make the withdrawal Bids less likely to be scheduled in real-time, potentially reducing demand for Energy and decreasing real-time LBMPs in the Load Zone where the Withdrawal-Eligible Generator is located. The Market Party that is responsible for offering the Energy Storage Resource could benefit from the reduced real-time LBMPs *if* it also scheduled Virtual Supply Bids in the Day-Ahead Market in the relevant Load Zone.

The NYISO proposes modifications to Sections 23.4.7.1 through 23.4.7.3 of the Services Tariff to add monitoring and mitigation of Bids to withdraw Energy that are submitted on behalf of Withdrawal-Eligible Generators that parallel the existing rules addressing the submission of Bids to inject Energy by all Generators. Each of the new provisions that the NYISO proposes in this filing parallels an existing, currently effective, Services Tariff rule.

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[164] Compare proposed Services Tariff Section 23.4.3.3.1.2.1 to currently effective Section 23.4.3.3.1.2.

[165] *See New York Indep. Sys. Operator, Inc.*, 132 FERC ¶ 61,270 at P 10-11, 17, 22-25 (September 29, 2010) (directing further compliance filing); Letter Order accepting NYISO compliance filing in ER10-2062-001 (December 21, 2010).

The NYISO proposes to modify Section 23.4.3.3.4 of the Services Tariff to permit it to impose a financial penalty to take back gains from a Virtual Supply position when (a) the NYISO revokes a Market Party's ability to vary its Withdrawal-Eligible Generator's real-time Incremental Energy Bids to withdraw Energy from its accepted Day-Ahead Incremental Energy Bids in accordance with Sections 23.4.7.2 and 23.4.7.3; and (b) the Market Party held Virtual Supply positions that benefitted from the inappropriate bidding behavior that the NYISO identified.

IX. Other Matters

A. Metering and Accounting Requirements

Order No. 841 requires that each ISO/RTO implement metering and accounting practices as needed to address the complexities of implementing the requirement that the sale of electric Energy from the ISO/RTO markets to an electric storage resource that the resource then resells back to those markets be at the wholesale LBMP.[166] In particular, Order No. 841 requires each ISO/RTO to directly meter electric storage resources, so all the Energy entering and exiting the resource is measured by that meter, or to make an alternative proposal to address the complexities of the sale of Energy from an ISO/RTO market to an electric storage resource that then resells back to the markets at the wholesale LBMP.[167]

The NYISO proposes to require all Energy Storage Resources to be directly metered, including Energy Storage Resources that are co-located with a Load. Specifically, Energy Storage Resources that are co-located with Load behind a single end-use customer meter will be required to have metering such that the Energy Storage Resource is separately metered from the Load. This proposal will allow comparable treatment of all Energy Storage Resources, independent of their location on the grid.

Section 13 of the Services Tariff requires all NYISO Customers to provide the meter data information necessary for the NYISO to perform its functions and to fulfill its responsibilities under the Services Tariff. The meter specifications and standards for all Generators are located in the ISO Procedures and will be updated as necessary to include any additional specifications and standards necessary for Energy Storage Resources.

Directly metering Energy Storage Resources will reduce the changes necessary to the NYISO's settlements software and ensure that all injections and withdrawals of Energy are settled at wholesale market LBMPs. Like other Generators, Energy Storage Resources will be required to submit one set of meter data for all injections. Energy Storage Resources will also be required to submit a second set of meter data for all Energy withdrawals. This will ensure that the NYISO can separately and accurately account for Energy withdrawals and injections. The NYISO will require the Meter Authority for the Load co-located with the directly metered Energy Storage Resource to submit the full Load for the appropriate Load Serving Entity, without netting the Energy Storage Resource's injections and withdrawals. This will ensure that

[166] Order No. 841 at P 322.

[167] *Id.*

the directly metered Energy Storage Resource's injections and withdrawal MW are treated as generation and negative generation respectively, and not counted as the wholesale Load for the corresponding Load Serving Entity.

Order No. 841 also requires ISO/RTOs to prevent resources using the participation model for electric storage resources from paying twice for the same charging Energy.[168] The NYISO has discussed this requirement with the New York Transmission Owners and has raised it at its stakeholder meetings, and understands that New York's utilities do not intend to invoice Energy Storage Resources for Energy withdrawals for wholesale market participation.

B. Station Power

The NYISO proposes to revise the definition of Station Power in Section 2.19 of the Services Tariff to clarify that Energy withdrawals by Energy Storage Resources when that Energy is stored for later injection back onto the grid is not "Station Power." This clarification is consistent with Order No. 841's directive that Energy withdrawn for later injection back to the grid be settled at the applicable wholesale LBMP. Energy Storage Resources will need to have adequate metering in place to separately account for Energy withdrawals for Station Power.

C. Miscellaneous

The NYISO proposes to make additional clarifications and clean-up revisions to the Service Tariff, as described in Table 2, and the OATT, as described in Table 3. The NYISO also made several non-substantive changes, such as correcting spacing.

Table 2

Services Tariff Section	Reason for Modification
Section 2.3	Relocated "Commenced Repair" term, so that it is in alphabetical order.
Section 2.5	Separated defined terms "Emergency Upper Operating Limit" and "Energy ("MWh")."
Section 2.9	Separated defined terms "ISO Market Power Monitoring Program" and "ISO OATT."
Section 2.12	Added period to the end of the defined term "Limited Energy Storage Resource ("LESR")."
Section 2.13	Separated defined terms "Market Services" and "MCZ Import Constrained Locality."
Section 2.13	Separated defined terms "Member Systems" and "Minimum Generation Bid."
Section 2.15	Corrected commas in definition of Operating Reserves.
Section 2.14	Separated defined terms "NYCA Minimum Unforced Capacity Requirement" and "NYPA."

[168] Order No. 841 at P 326.

Section 4.1.9.1	Added space between “Local Reliability Rules” and “addressing.”
Section 4.2.1.3.1	Created new paragraph following “Supplier will voluntarily enter into dispatch commitments.”
Section 4.2.1.3.1	Created new paragraph following “quantity of Operating Reserves that it is capable of providing.”
Section 4.2.1.3.1	Created new paragraph following “Demand Side Resources offering Energy in the Day-Ahead Market.”
Section 4.2.3	Removed extra space between “Generation Bids” and “Start-Up Bids.”
Section 4.4.1.2.1	Removed extra space between “Minimum Generation Bids” and “or Regulation Service Bids.”
Section 4.4.1.2.1	Replaced “NYISO” with defined term “ISO.”
Section 4.4.2.4	Reversed order of “capable of starting” and “meeting Minimum Generation Levels” to be consistent with the order of these actions in practice.
Section 5.12.1.6	Separated Section with 5.12.1.7.
Section 15.3.5.2	Removed space between “Capacity Market Price” and “;.”
Section 15.3A.1	Removed space between “Rate Schedule” and “not.”
Section 15.3A.1	Inserted comma following “Regulation Service.”
Section 15.3A.1	Deleted “that” following “Regulation Service,.”
Section 15.4.1.2.1	Inserted a hyphen between “ISO” and “Committed Flexible.”
Section 15.4.1.3	Inserted “respectively” to denote relationship between Generators and Incremental Energy Bids, and Demand Side Resources and Demand Reduction Bids.
Section 15.5.4	Inserted space between “Appendix” and “I.”
Section 25.2.2.4	Capitalized “real-time market” as it is a defined term.
Section 25.3.4	Removed space from section numbering in heading.

Table 3

OATT Section	Reason for Modification
Section 30.14, Attachment B to Appendix 2	Corrected number of paragraphs in the Interconnection Studies Facilities Agreement following Paragraph 5.
Section 30.14, Appendix F	Removed unnecessary period following “Notices.”
Section 32.5, Appendix 2	Added letters to section headings.
Section 32.5, Appendix 2	Added section heading “Application Information.”
Section 32.5, Appendix 2	Added additional lines to “Project Description.”
Section 32.5, Appendix 6, Attachment A	Removed extra space between “Initial Synchronization” date line and “Generation Testing” date line.
Section 32.5, Attachment 7	Bolded “Insurance Coverage” heading

X. Effective Date

The NYISO respectfully requests Commission action within sixty (60) days of the date of this filing; *i.e.*, by February 1, 2019, accepting the tariff revisions proposed in this filing. Commission action within sixty days will: (a) allow the NYISO to confidently proceed with developing and deploying the software changes necessary to implement the Energy Storage Resource participation model; and (b) enable the NYISO to achieve its requested effective date for all aspects of this proposal.

A. Requested Effective Date for Tariff Revisions Except Those Revisions in Sections 23.4.5.2 and 23.4.5.7 of the Services Tariff Concerning the Reinstatement of "Category III" Examined Facility Provisions

Paragraph 348 of Order No. 841 specifies that the proposed compliance tariff revisions must be implemented within 365 days of compliance filings being made.[169] With the exception of those tariff revisions described in Part X.B below, the NYISO respectfully requests that, pursuant to Rule 2008(a) of its Rules of Practice and Procedure,[170] the Commission grant an extension of the implementation timeframe for the proposed tariff revisions contained in this compliance filing until no earlier than May 1, 2020. The NYISO is unable to propose a precise effective date for these changes at this time due to software development that must be completed prior to these tariff revisions becoming effective. There is "good cause" for granting the extension because, as discussed below, it will not be practicable for the NYISO to complete necessary software modifications in time to meet the 365 day deadline. The NYISO will work diligently to implement its proposed compliance revisions as soon as is practicable.

The NYISO is currently in the midst of a three-year effort to upgrade to its Energy Management System ("EMS") and Business Management System ("BMS") platforms, which comprise the hardware and software that run the NYISO's wholesale Energy markets and monitor the reliability of the bulk electricity grid. The EMS is used by NYISO's system operators to monitor the reliable operation of the grid and for situational awareness. It includes applications that monitor load flows and perform contingency analyses, such as security monitor, state estimator, outage monitoring, and automatic generation control. The BMS is a suite of applications that comprise the SCUC, RTC and RTD software used to develop schedules and prices for the NYISO's Energy and Ancillary Services markets.

The EMS/BMS upgrade will provide several important benefits. The new system is expected to have less downtime and greater flexibility due to an improved high-availability and disaster recovery design. The system will also be more secure, with enhanced cyber security protections. Functional enhancements will provide greater analytic and training capabilities for grid operators, schedulers, planners, and engineers. An updated user interface will provide enhanced visualization capabilities. Network model and database maintenance workflows will be reduced from hours to minutes. The new, improved EMS and BMS systems will provide a

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[169] Order No. 841 at PP 6, 348 (establishing a 365 day implementation timeframe).

[170] *See* 18 C.F.R. § 385.2008(a).

solid foundation for building the next generation of innovative market designs and operational capabilities to ensure a reliable future that includes expansive integration of Energy Storage Resources, distributed energy resources, and other innovative technologies that improve the reliability and resilience of the grid.

The software necessary to implement the tariff enhancements attached to this filing is being coded consistent with the new, upgraded, EMS/BMS platforms. The majority of the software development will be undertaken prior to the completion of the EMS/BMS upgrade, but certain additional work, including testing of the new software, can only be completed after the upgrade is finished. The NYISO currently anticipates completing the EMS/BMS upgrade in the fourth quarter of 2019, and expects that testing of the software specific to Energy Storage Resources will take several additional months after the EMS/BMS upgrade is completed. Consistent with previous matters in which it has requested a flexible effective date contingent upon completion of software upgrades, the NYISO proposes to submit a compliance filing at least two weeks prior to the proposed effective date that will specify the date on which the revisions will take effect. Consistent with Commission precedent, such filing will provide adequate notice to the Commission and Market Participants of the implementation for integration of Energy Storage Resources.[171] In addition, because implementation of the software to integrate Energy Storage Resources is contingent on the completion of the EMS/BMS upgrade, the NYISO further proposes to advise the Commission, via an informational filing, of the date upon which the NYISO completes the EMS/BMS upgrade. This informational filing will provide the Commission and NYISO stakeholders with additional information on the NYISO's progress, and greater certainty of the effective date for the Energy Storage Resource tariff revisions attached to this filing.

B. Requested Effective Date for Tariff Revisions to Sections 23.4.5.2 and 23.4.5.7 of the Services Tariff Concerning the Reinstatement of "Category III" Examined Facility Provisions

The NYISO is requesting different effective dates for its proposed revisions to Sections 23.4.5.2 and 23.4.5.7 of the Services Tariff and the corresponding revisions to the definition of NCZ Examined Project in Section 23.2.1 to identify Category III, which concern the reinstatement of "Category III" Examined Facility provisions under the BSM Rules. The NYISO proposes that those revisions become effective one day after the Commission issues an order accepting them, unless the timing of the order is such that immediate effectiveness would disrupt the NYISO's administration of the Class Year process or the BSM Rules. In that case, the NYISO would request that the BSM Rule revisions become effective for the first Class Year[172] commencing after the issuance of the Commission's order accepting such revisions.

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[171] *See, e.g., New York Indep. Sys. Operator, Inc.*, 106 FERC ¶ 61,111 at P 10 (2004); Docket No. ER 11-2544-000, *New York Indep. Sys. Operator, Inc.*, Letter Order at 1 (February 10, 2011); Docket No. ER15-485-000, *New York Indep. Sys. Operator, Inc.*, Letter Order at 2 (January 15, 2015); *New York Indep. Sys. Operator, Inc.*, 151 FERC ¶ 61,057 at P 20 (2015).

[172] Such date as specified below.

The NYISO has previously explained that the "BSM Rules are closely aligned with, and are applied in close coordination with, the Class Year decision and settlement phases."[173] It has also emphasized the risk that altering BSM Rule deadlines could disrupt both the BSM Rules and the Class Year process.[174] Reinstating the Category III provisions during the period between the approval of a Class Year Study and the time that the NYISO gives notice that the Class Year decisional process is complete[175] could be similarly disruptive. Implementing a change to the BSM Rules within that timeframe could impact BSM Rule determinations for other proposed new entrants in the capacity market in ways that those entrants could not have reasonably anticipated. Such disruptions could result in the kind of over-mitigation or under-mitigation that the Commission has sought to avoid in the administration of the BSM Rules.

Accordingly, the NYISO requests that its proposed revisions be made effective either:

(a) One day after the Commission issues an order accepting the Category III revisions, provided that the Commission's order is not issued during the period between the date that the NYISO's Operating Committee approves the Class Year Study for a Class Year and the date that the NYISO issues a notice to stakeholders that the Class Year decisional process has been completed (or issues a notice that the decisional process for Class Year X-1 has been completed in the case of a Bifurcated Class Year) (the "interim period").[176] In the event of the occurrence of (a), as provided under the proposed revisions to Section 23.4.5.7.3, the notice requirement will instead be 10 business days after the Commission's issuance of the order rather than the Class Year Start Date.[177]

Or,

(b) If the Commission's order is issued during the interim period of a Class Year, one day after the NYISO issues a notice to stakeholders that the Class Year decisional process has been completed (or issues a notice that the decisional process for Class Year X-1 has been completed in the case of a Bifurcated Class Year). The effect of the occurrence of (b) is that the tariff revisions will first apply to Category III Examined Facilities that would be examined along with the Examined Facilities in the subsequent Class Year.

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[173] *See Motion to Intervene and Comments of the New York Independent System Operator, Inc.*, Docket No. ER18-1301-001 at 6 (April 18, 2018).

[174] *See, e.g., Motion to Intervene and Comments of the New York Independent System Operator, Inc.*, Docket No. ER17-2049-000 at 3-4 (July 24, 2017) ("Because the BSM Rules and Class Year Study process are so closely integrated, extending a deadline generally has the potential to cause delays and disruption to both. Thus, deadlines should not be altered lightly and it is important that the Commission reinforce their importance.") (internal footnotes omitted).

[175] Such interim period as specified below.

[176] Under the proposed revisions to Section 23.4.5.7.3.3.5, if a Class Year bifurcates, Category III Examined Facilities would be examined and would receive a final determination with Class Year X-1. They would not be examined with Class Year X-2.

[177] If (a) does not occur, the proposed language inserted in brackets in Section 23.4.5.7.3 in the Services Tariff will be removed when the NYISO makes the compliance filing to establish the effective date of the BSM Rule revisions.

The NYISO needs this flexibility because it is impossible for it to know with certainty either exactly when interim periods will occur or when the Commission will issue an order. The NYISO requests that the Commission direct it to make a subsequent compliance filing to insert the actual Commission-accepted effective date in 23.4.5.7.3.5 after it is ultimately determined.

Whichever effective date is ultimately adopted, the BSM Rule revisions would apply prospectively to Category III Examined Facilities that may be examined along with facilities in the Class Year (or if bifurcated, Class Year X-1) in which those revisions become effective.[178] The reinstatement of the Category III provisions would not impact any determinations previously made under the BSM Rules. Their reinstatement also would not impact any entrant that—prior to these tariff revisions being in effect (as described above)—was not a Category III Examined Facility but would have been had the BSM Rule revisions proposed herein been effective.

XI. Service

The NYISO will send an electronic link to this filing to the official representative of each party to this proceeding, to the official representative of each of its customers, to each participant on its stakeholder committees, to the New York Public Service Commission, and to the New Jersey Board of Public Utilities. In addition, a complete copy of the documents included with this filing will be posted on the NYISO's website at www.nyiso.com.

XII. Communications

Communications and correspondence regarding this filing should be directed to:

Karen Georgenson Gach, Acting General Counsel
Raymond Stalter, Director, Regulatory Affairs
*Gregory J. Campbell, Attorney
New York Independent System Operator, Inc.
10 Krey Boulevard
Rensselaer, NY 12144

*Ted J. Murphy
Hunton Andrews Kurth LLP
2200 Pennsylvania Avenue, NW
Washington, DC 20037
tmurphy@huntonak.com

*Michael J. Messonnier, Jr.

[178] Applying the reinstated tariff provisions prospectively is consistent with the fundamental structure of the Federal Power Act. *See, e.g., Old Dominion Elec. Cooperative v. FERC*, 892 F.3d 1223 at 1226 (2018) ("The Act also empowers the Commission to fix or change rates and charges, but only prospectively . . . The Commission may waive the sixty-day notice requirement for good cause, but the Commission has no authority under the Act to allow retroactive change in the rates charged to consumers.") *citing Columbia Gas Transmission Corp. v. FERC, 895 F.2d 791, 795–796 (D.C. Cir. 1990) (Columbia III); Consolidated Edison Co. v. FERC, 958 F.2d 429, 434 (D.C. Cir. 1992).* Prospective application is also in keeping with Commission precedent regarding the implementation of revisions to the BSM Rules. *See, e.g., New York Independent System Operator, Inc.*, 158 FERC ¶ 61,317 (2017) at P 35 ("The Commission's long-standing practice has been that any exemption granted from NYISO's buyer-side market power mitigation rules only will be applied prospectively to new entrants. For example, in the Commission's order directing NYISO to implement a competitive entry exemption from its buyer-side market power mitigation rules, the Commission confirmed that new entrants that had received final offer floor determinations were bound by those determinations and, thus, could not apply for the competitive entry exemption.").

kgach@nyiso.com
rstalter@nyiso.com
gcampbell@nyiso.com

A. Chris Alderman
Hunton Andrews Kurth LLP
951 East Byrd Street
Richmond, VA 23219
mmessonnier@huntonak.com
calderman@huntonak.com

*Designated to receive service.

XIII. Conclusion

Wherefore, the NYISO respectfully requests that the Commission accept this compliance filing.

Respectfully submitted,

/s/ Gregory J. Campbell
Gregory J. Campbell
New York Independent System Operator, Inc.
10 Krey Boulevard
Rensselaer, NY 12144
Counsel for the New York Independent System Operator, Inc.

cc: Nicole Buell
Anna Cochrane
James Danly
Jignasa Gadani
Jette Gebhart
Kurt Longo
David Morenoff
Daniel Nowak
Larry Parkinson
Douglas Roe
Kathleen Schnorf
Gary Will