2020 Market Project Candidates

Product and Project Management

5/15~~4/24~~/19

This document represents potential 2020 Market project candidates. Market projects are associated with market rule(s) including market design and study projects as well as any project implementing market rule changes. They are identified through (1) the State of the Market (SOM) Report; (2) internal NYISO discussions; and (3) discussions with Market Participants in the stakeholder process. These project candidates and their corresponding descriptions reflect information known about each of the project candidates as of the date of this document.

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Introduction

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Project Type	Description
Mandatory	Strategic Initiatives and FERC Orders. These projects will be included in the budget
Continuing	Approved in a prior year and have progressed to either software design or ~~d~~Development ~~c~~Complete. Additional projects may be classified as Continuing based on stakeholder feedback. These projects will be included in the budget
Future	Consensus from stakeholder discussions of this projects priority relative to other projects has resulted in these projects NOT being prioritized and initiated in the coming budget year. Resources, time constraints, stakeholder feedback, and other project dependencies have been taken in to consideration
Prioritize	Projects to be prioritized and included in the budget based on a feasibility assessment taking into consideration resources, time constraints, stakeholder feedback, priority score, and other project dependencies. Market projects are included in the stakeholder survey

Market projects that are Prioritize (not Mandatory, Continuing, or Future) are included in the stakeholder survey and scored by the NYISO during the prioritization phase. These projects are included in the budget based on a feasibility assessment taking into consideration resources, time constraints, stakeholder feedback, priority score, and other project dependencies. The table that follows identifies project type for each of the projects included in this document.

Project Name	Product Area	Project Type
NYISO Budget (Rate Schedule 1) Cost Recovery Update	Business and Finance Products	Continuing
BSM Evaluation for Small Resources Outside of the Class Year (SOM)	Capacity Market Products	Prioritize
BSM Renewables Exemption Study	Capacity Market Products	Mandatory
Capacity Transfer Rights for Internal Transmission Upgrades (SOM)	Capacity Market Products	Future
Competitive Entry Exemption Non-Qualifying Contract Rule Review (SOM)	Capacity Market Products	Prioritize
Comprehensive Mitigation Review	Capacity Market Products	Prioritize
Demand Curve Reset	Capacity Market Products	Mandatory
Dynamic Creation of Zones (SOM)	Capacity Market Products	Future
Enhanced BSM Forecasts Assumptions (SOM)	Capacity Market Products	Prioritize
Enhanced BSM Mitigation Study Period	Capacity Market Products	Prioritize
Enhancing Fuel and Energy Security	Capacity Market Products	Prioritize
Locational Marginal Pricing of Capacity (SOM)	Capacity Market Products	Prioritize
NYC Part A Test Exemption (SOM)	Capacity Market Products	Prioritize
Tailored Availability Metric	Capacity Market Products	Prioritize
DER Participation Model	DER Products	Mandatory
Dual Participation	DER Products	Mandatory
Expanding Capacity Eligibility	DER Products	Mandatory
Meter Service Entity for DER	DER Products	Mandatory
NYISO Pilot Framework	DER Products	Continuing
5 Minute Transaction Scheduling	Energy Market Products	Prioritize
Ancillary Services Shortage Pricing (SOM)	Energy Market Products	Prioritize
Carbon Pricing	Energy Market Products	Continuing
Constraint Specific Transmission Shortage Pricing (SOM)	Energy Market Products	Prioritize
~~Dynamic Reserve Requirements (SOM)~~	~~Energy Market Products~~	~~Prioritize~~
Eliminate Fees for CTS Transactions with PJM (SOM)	Energy Market Products	Future
Enhanced Fast Start Pricing	Energy Market Products	Mandatory
Enhanced PAR Modeling (SOM)	Energy Market Products	Future
ESR Participation Model	Energy Market Products	Mandatory
Grid in Transition Enhancements	Energy Market Products	Prioritize
Hybrid Storage Model	Energy Market Products	Prioritize
Linked Virtual Transactions	Energy Market Products	Prioritize
Long Island PAR Optimization and Financial Rights (SOM)	Energy Market Products	Future
Mitigation Thresholds Review	Energy Market Products	Prioritize
~~More Granular Operating Reserves (SOM)~~	~~Energy Market Products~~	~~Prioritize~~
~~Pricing Reserves for Congestion Management (SOM)~~	~~Energy Market Products~~	~~Prioritize~~
Relocating the IESO Proxy Bus	Energy Market Products	Prioritize
Reserve Enhancement for Constrained Areas (SOM)	Energy Market Products	Prioritize
Reserves for Resource Flexibility	Energy Market Products	Prioritize
RTC-RTD Convergence Improvements (SOM)	Energy Market Products	Future
WEELR Participation Model	Energy Market Products	Prioritize
Climate Change Impact and Resilience Study	Planning Products	Continuing
On-Peak/Off-Peak TCC's	TCC Products	Future
Reserving Capacity for TCC Balance-of-Period (BOP) Auctions	TCC Products	Prioritize

Business and Finance Products

1 NYISO Budget (Rate Schedule 1) Cost Recovery Update

1.1 Problem / Opportunity

The Management Committee will be voting in July 2019 to determine whether re-evaluation of the current NYISO Budget (Rate Schedule 1) cost allocation may be necessary due to anticipated market impacts resulting from current market design initiatives, such as, but not limited to, Energy Storage Resource (ESR) Participation Model and Distributed Energy Resource (DER) Participation Model. This project is being proposed in order to provide for the possible Management Committee approval of a new cost of service study in 2019/2020. Upon completion of a study recommending changes to the cost allocation, and a vote to change the NYISO Budget (Rate Schedule 1) cost allocation accordingly, a project would be necessary to develop and implement those changes.

1.2 Project Objective(s) & Anticipated Deliverable(s)

Assuming a new cost of service study is conducted, the study recommendations, a precursor to this project, are anticipated to be delivered in Q3 2020, followed by a Management Committee vote on whether or not to proceed with any proposed cost allocation changes. This project will determine the requirements to implement recommended cost allocation changes, as well as impacts to settlement systems. The project will also address Tariff revisions as required by the project.

The anticipated deliverable of this project includes:

- Functional Requirements ~~Specification (FRS)~~: Q4 2020
- Deployment: Q4 2021

1.3 Project Justification

This project will update the NYISO Budget (Rate Schedule 1) cost allocation among Market Participants if a vote to change the NYISO Budget (Rate Schedule 1) is approved by the Management Committee.

2 BSM Evaluation for Small Resources Outside of the Class Year (SOM)

2.1 Problem / Opportunity

Per the **2018 State of the Market Report for the New York ISO Markets**, Potomac Economics recommends, *"Application of the BSM Evaluation Process Outside the Class Year Process. In its recent compliance filing in response to Order 841: Electric Storage Participation in Markets Operated by Regional Transmission Organizations and Independent System Operators, the NYISO highlighted issues with applying the BSM measures to generators that do not go through the Class Year process because they are smaller than 2 MW. The BSM measures are currently applied within the Class Year process, which was designed for conventional generators that take years to develop and bring into commercial operation. However, battery storage projects and other short lead-time projects are capable of entering in just a few months, so we recommend the NYISO develop a set of procedures and requisite tariff changes for applying the BSM measures outside the Class Year process, perhaps on a quarterly cycle."*

~~All new resources that go through the Class Year process are subject to a Mitigation Exemption Test determination per the BSM rules included in the Services Tariff. However, there exists a subset of resources that are under 2 MW in size that do not go through the Class Year process. The NYISO anticipates that a significant number of small resources and distributed energy resources (DER) will be added to the grid in the coming years, and will need to determine if and how these resources will be evaluated for BSM.~~

2.2 Project Objective(s) & Anticipated Deliverable(s)

Per the **2018 State of the Market Report for the New York ISO Markets**, Potomac Economics 2018-4 recommendation is: *"Develop tariff provisions to perform Mitigation Exemption Tests outside the Class Year process for resources that are smaller than 2 MW."*

~~This project is to develop specific BSM rules for those resources smaller than 2 MW not currently subject to the deliverability evaluation in the Class Year process. The NYISO will discuss with stakeholders various considerations to design, develop, and present proposals for BSM treatment of these resources. The deliverable would be Market Design Concept Proposed.~~

2.3 Project Justification

Recommended by Potomac Economics per the **2018 State of the Market Report for the New York ISO Markets**.

~~As the rules for energy storage resources (ESR) and DER become effective in the coming years, the NYISO anticipates that the number of small and distributed resources will grow significantly. As these resources are not currently subject to the Class Year process, the NYISO should develop a new set a rules to ensure that buyer-side market power cannot be exerted to artificially suppress capacity prices through the deployment of these small resources.~~

3 BSM Renewables Exemption Study

3.1 Problem / Opportunity

As the portfolio of resources participating in the NYISO's markets continues to grow and evolve, it is essential that all resources are periodically evaluated to determine which ones should or should not be considered exempt under the NYISO's proposed compliance revisions to its Services Tariff to implement a "Renewables Exemption" under the BSM Rules. This exemption would allow resources that are "both purely intermittent and that have relatively low capacity factors and high development costs" to be exempt from the Class Year Buyer-side Mitigation (BSM) study.

3.2 Project Objective(s) & Anticipated Deliverable(s)

As part of the NYISO's proposed compliance revisions to its Services Tariff to implement a "Renewables Exemption" under the BSM Rules, the NYISO proposed that it would periodically review and determine which renewable technologies should be an "Exempt Renewable Technology", and do so during every ICAP Demand Curve Reset Filing Year.

As 2020 represents the first ICAP Demand Curve Reset Filing Year since the NYISO's 2016 Renewable Exemption compliance filing, provided FERC accepts the filing, the NYISO would be required to review and make a determination of the technologies that should be an "Exempt Renewable Technology." (*See* FERC Docket No, ER16-1404.) The NYISO's compliance filing, in compliance with the Federal Energy Regulatory Commission's (FERC's) Order in Docket No. EL15-64, provides that the review, among other things, would identify renewable technologies that have been shown to have limited or no incentive or ability to suppress capacity prices, nor including technologies that have such incentive or ability.

Under proposed Section 23.4.5.7.13.2.1(b), for each candidate renewable technology evaluated as part of the periodic review, the NYISO will consider the cost of new entry and costs to operate, all potential market revenues, and potential cost savings to Loads due to capacity market price reductions resulting from new entry by the candidate technology. The pending tariff provisions further provide that the NYISO will then use this information to determine which candidate technologies have high development costs and low capacity factors such that they have limited or no incentive to suppress capacity prices. Further, and assuming FERC has accepted the NYISO's compliance filing, this review would be filed within 60 days of FERC's acceptance of the ICAP Demand Curves based on the upcoming periodic review. If the review determines that changes to the tariff definition of "Exempt Renewable Technology" are needed, the NYISO would propose them in the filing for the 2021 ICAP Demand Curves.

3.3 Project Justification

This project would be required if FERC were to accept the NYISO's compliance filing of proposed revisions its Services Tariff filed with the Commission on April 13, 2016 to implement a

"Renewables Exemption" under the BSM Rules. The NYISO cannot predict when FERC will rule on the proposed tariff revisions; however, this project would ensure when FERC does accept the NYISO's proposal, the NYISO has the necessary information to timely fulfill its obligations.

4 Capacity Transfer Rights for Internal Transmission Upgrades (SOM)

4.1 Problem / Opportunity

An opportunity exists to reflect local planning requirements in the capacity market. Granting internal capacity deliverability rights for transmission between zones would incentivize investment in supply resources, demand resources, and transmission facilities, since right-holders would not be subject to a cost-of-service rate.

4.2 Project Objective(s) & Anticipated Deliverable(s)

This project would create a new process for granting capacity transfer rights based on internal transmission upgrades that increase transfer capability into areas with Locational Minimum Installed Capacity Requirements that can be offered into the NYISO's installed capacity market. The deliverable would be Market Design Concept Proposed.

4.3 Project Justification

Deliverability constraints create substantial barriers to entry for competitive new suppliers and imports, which reduces competition in the market. Transfer rights would increase market efficiency by creating a dynamic framework for incorporating system upgrade needs into capacity price signals.

5 Competitive Entry Exemption Non-Qualifying Contract Rule Review (SOM)

5.1 Problem / Opportunity

The current BSM Competitive Entry Exemption (CEE) prohibits developers from having contracts or arrangements with certain prohibited entities (with limited and specific exceptions), no matter the terms of the contract or how it was solicited.

5.2 Project Objective(s) & Anticipated Deliverable(s)

The Market Monitoring Unit (MMU) recommends expanding the list of allowable contracts "to include power supply agreements that can be determined to be open to new and old resource, competitive, and non-discriminatory." The project goal for 2020 would be Market Design Concept Proposed.

5.3 Project Justification

The goal is to explore how competitively solicited contracts that do not serve as de facto subsidies can be allowed under the CEE. This would serve the objective of mitigating buyer-side market power while allowing specific out-of-market payments.

6 Comprehensive Mitigation Review

6.1 Problem / Opportunity

The Installed Capacity market has undergone significant changes in both design and resource mix since the NYISO's BSM measures were first implemented in May of 2008. While there have been many incremental changes to align mitigation measures with changes in the market, there has not been a holistic evaluation of the BSM rules and methodology to evaluate whether the current framework will be adequate in a future with significant renewable resources and policy objectives that impact the capacity market. The BSM rules were originally developed to evaluate traditional generation technologies funded primarily by privately owned capital, but new resource types such as battery storage, renewable generation and distributed energy resources (DER) are fundamentally different in design and operation. Additionally, these resources are more likely than traditional generator technologies to be partially funded by governmental entities to meet policy goals or promote environmental attributes. New rules and tests may be required to provide a better evaluation of these resources for instances of buyer-side market power and thus result in more accurate BSM determinations.

6.2 Project Objective(s) & Anticipated Deliverable(s)

The NYISO will perform a comprehensive review to examine the current BSM framework and principles to determine whether the rules efficiently mitigate concerns of buyer-side market power for both traditional and new resource types with both private and public funding considerations. The 2020 goal for this project is to discuss with stakeholders the scope of a study, to be performed in 2021, along with a schedule for the work to be performed and the selection of a consultant to perform the study. As part of the review, alternative methods to perform the Mitigation Exemption Test for new resources and Additional CRIS projects will be considered.

6.3 Project Justification

In its most recent Strategic Plan (2019-2023), the NYISO identified the "comprehensive review of the NYISO's existing market products and operational and planning practices" as a key strategic initiative. Evaluating the mitigation framework is an essential part to ensuring the efficiency of resource entry and exit as the generation mix rapidly changes in the coming years.

7 Demand Curve Reset

7.1 Problem / Opportunity

Every four years, the NYISO, along with its stakeholder community, conducts a comprehensive review to determine the parameters used in establishing the Installed Capacity (ICAP) Demand Curves. This process is referred to as the demand curve reset (DCR). As required by the tariff, the study includes an examination of potential peaking unit technologies and the financial parameters assumed in the construction and operation of that unit, along with an estimate of the projected profit earned in the Energy and Ancillary Service markets, to determine unit with the "lowest fixed costs and highest variable costs among all other units' technology that are economically viable" that serves in establishing values for each of the ICAP Demand Curves.

7.2 Project Objective(s) & Anticipated Deliverable(s)

This periodic review of the ICAP Demand Curves seeks to ensure that the capacity market continues to efficiently support reliability and send accurate, transparent price signals. The review is performed by engaging an independent consultant to lead the DCR process. In addition to providing recommendations for the parameters and assumptions used in establishing the ICAP Demand Curves, the consultant's efforts include evaluating the shape, slope and zero crossing point for each ICAP Demand Curve. The 2020 objectives and deliverables for this project include a report by the DCR consultant and the NYISO recommendations addressing the ICAP Demand Curves for the 2021/2022 Capability Year, as well as the parameters and assumptions to be used in conducting the subsequent annual updates to derive the ICAP Demand Curves for the 2022/2023, 2023/2024, and 2024/2025 Capability Years.

The process culminates in a filing on or before November 30, 2020 of the proposed curves for the first year of the reset period (i.e., the 2021/2022 Capability Year), along with the assumptions and methodology to be used to set demand curves for the subsequent three Capability Years of the reset period (i.e., the 2022/2023, 2023/2024 and 2024/2025 Capability Years).

7.3 Project Justification

The quadrennial DCR is mandated by the tariff. The DCR is a resource intensive process for both the NYISO and stakeholders that has a significant impact on the market as a whole.

8 Dynamic Creation of Zones (SOM)

8.1 Problem / Opportunity

The opportunity surrounding this project pertains to improving the framework for capacity zones. Pre-defining capacity zones, rather than waiting for a creation signal under the current process, would provide for a more timely market response to the NYCA's installed capacity needs.

8.2 Project Objective(s) & Anticipated Deliverable(s)

Zones would be pre-defined based on system planning requirements. The project will consider binding transmission constraints, resource adequacy needs, as well as variation in the cost of new entry within a large capacity area. The deliverable for this project would be Market Design Concept Proposed.

8.3 Project Justification

This design would create locational capacity price signals throughout the NYCA, including areas that are not currently defined as zones. Thus, markets would more accurately reflect system needs and promote investment where necessary.

Under the current rules, when a new Locality is created, supplier-side and buyer-side market power mitigation rules are automatically applied to it. However, if a comprehensive set of interfaces (and corresponding zones) were pre-defined based on system planning requirements, it would not necessarily be appropriate to apply mitigation rules to every zone. This project would de-couple the application of market power mitigation from the process of creating a new zone.

9 Enhanced BSM Forecasts Assumptions (SOM)

9.1 Problem / Opportunity

The "Part A" and "Part B" Test mitigation exemption tests (*i.e.*, the economic tests) include energy and capacity markets forecasted market revenues that are dependent on the generating units that are modeled as in service (among other things). Current revenue forecast inclusion rules for generating units may model units that have exited the market and are unlikely to return as in service.

9.2 Project Objective(s) & Anticipated Deliverable(s)

This project will propose to revise the forecast inclusion rules to improve the economic forecast. The project goal for 2020 would be Market Design Concept Proposed.

9.3 Project Justification

This project would produce an improved set of inclusion rules will result in a more accurate determination, which as a result would better balance between over and under mitigation.

10 Enhanced BSM Mitigation Study Period

10.1 Problem / Opportunity

The Services Tariff currently states that all Examined Facilities in a Class Year will be assumed to enter the market beginning with the Summer Capability Period three years after the start of the Class Year; the three-year period beginning three years after the start of the Class Year is referred

to as the Mitigation Study Period. This assumption is an oversimplification that was made in an effort to prevent gaming the mitigation tests (Mitigation Exemption Test). However, it is generally an inaccurate assumption that overestimates the timeline of some units, such as Additional CRIS projects, and can underestimate the timeline of larger projects. An inaccurate Mitigation Study Period will result in an inaccurate ICAP Forecast for the unit, and thus an inaccurate BSM determination. Aligning the Mitigation Study Period for each unit with what is realistically expected for that unit will provide more accurate Mitigation Exemption Test determinations.

10.2 Project Objective(s) & Anticipated Deliverable(s)

This effort would continue discussions with stakeholders on the appropriateness of the current evaluation period used during the BSM process and would identify what, if any enhancements can be made to the existing timelines to more appropriately evaluate projects. The deliverable for this project is Market Design Complete.

10.3 Project Justification

Developing a more accurate Mitigation Study Period that aligns more closely with what is expected will improve the accuracy of mitigation determinations.

11 Enhancing Fuel and Energy Security

11.1 Problem / Opportunity

New York's power grid is anticipated to face increased challenges associated with the generating fleet transitioning in response to economic, environmental, and public policy considerations. Increased dependency on natural gas and intermittent technologies creates an elevated risk to system reliability if those fuel supplies were to be interrupted. The NYISO has engaged the Analysis Group to conduct a study in 2019 to help identify the types and magnitude of potential near-term concerns that could arise by examining various scenarios that place strains on fuel and energy security in New York.

11.2 Project Objective(s) & Anticipated Deliverable(s)

The objective of this project is to explore and develop any market design enhancements that may be prudent in response to conclusions from the 2019 Fuel and Energy Security assessment. These efforts would examine potential adjustments to market structures and/or operational practices that could enhance fuel and energy security in New York, as informed by any potential risks identified by the 2019 study.

11.3 Project Justification

This work would be necessary to complete a market design that encompasses any recommendations from the 2019 study in order to maintain grid reliability in the future. Efforts during this project would seek to bolster New York's preparedness for an altered resource

portfolio by elevating the markets to embrace future challenges that could arise with respect to fuel supply security.

12 Locational Marginal Pricing of Capacity (SOM)

12.1 Problem / Opportunity

An opportunity exists to better align capacity market clearing prices with the marginal reliability value of capacity in each Locality. Achieving this alignment would lower overall costs of satisfying capacity needs.

12.2 Project Objective(s) & Anticipated Deliverable(s)

The objective for this project would be to devise a capacity pricing framework where the clearing price at each location is set in accordance with the marginal reliability value of capacity at the location. The deliverable for 2020 would be a Market Design Concept Proposed.

12.3 Project Justification

This proposal could reduce the costs of satisfying resource adequacy needs, facilitate more efficient investment and retirement decisions, be more adaptable to changes in resource mix (i.e., increasing penetration of wind, solar, and energy storage), and simplify market administration.

13 NYC Part A Test Exemption (SOM)

13.1 Problem / Opportunity

With significant changes to the transmission and generation facilities anticipated for southeast New York, an opportunity may exist to improve market efficiency by expanding the Part A test to address a facility located in NYC that is needed to satisfy the G-J Locality LCR. The existing Part A Test only considers a NYC facility's contribution towards meeting the NYC LCR.

13.2 Project Objective(s) & Anticipated Deliverable(s)

The objective for this project would be to evaluate whether it would be prudent to expand the Part A test to exempt a NYC facility needed to fulfill the LCR for the G-J Locality. The deliverable for 2020 would be a Market Design Concept Proposed.

13.3 Project Justification

Given the significant system changes that are expected in the coming years, this project would consider the merits of an exemption for a NYC facility whose capacity is needed to satisfy the LCR for either NYC or the G-J Locality.

~~13~~14 Tailored Availability Metric

~~13.1~~14.1 Problem / Opportunity

One of the issues identified in the Performance Assurance initiative in 2017 included ensuring the availability and performance of capacity suppliers during peak operating hours. The Tailored Availability Metric project addresses this by incentivizing resources to be available and perform during these critical operating periods. Analysis for this project will reassess the current metrics of the derating factors of all capacity resources in order to more accurately reflect performance or availability.

~~13.2~~14.2 Project Objective(s) & Anticipated Deliverable(s)

The objective of this project is to implement a market design that reflects higher value to resources that are available and can perform during peak operating hours. For the current derating factors, all hours of operation are weighted equally, following the belief that outages occur randomly. A tailored metric could weight critical operating periods higher than others, under the assumption that these stressed conditions occur during peak hours. Weighting these peak hours reflects the concept that availability and performance during these hours has higher significance to the reliability of the system. Through reevaluating the current structure of how availability and performance of capacity suppliers is measured, tailored metrics will better indicate how much capacity these resources will be allowed to sell in the market. Through a series of analysis, different weighting factors could be applied to peak hours and months, incenting resources to better perform during these critical time periods. The 2020 deliverable is Market Design Complete.

~~13.3~~14.3 Project Justification

The completed market design for the Tailored Availability Metric project is important to maintain reliability of Installed Capacity Suppliers and transparency by enhancing accountability of capacity suppliers.

DER Products

~~14~~15 DER Participation Model

~~14.1~~15.1 Problem / Opportunity

Technological advancements and public policy support are encouraging greater adoption of DER to meet consumer energy needs as well as system needs. DER offer the potential to make load more dynamic and responsive to wholesale market price signals, potentially improving overall system efficiencies.

~~14.2~~15.2 Project Objective(s) & Anticipated Deliverable(s)

The 2019 deliverable for this project is Functional Requirements. In 2020, a Development Complete deliverable will allow for Deployment in 2021 upon approval from stakeholders and the Board, as well as FERC acceptance of tariff revisions.

Development ~~c~~Complete for new software and/or modifications to existing software that supports the business approved ~~FRS~~functional requirements. Implementation of the dispatchable distributed energy resource participation model in the wholesale markets will include software to facilitate:

- Eligibility and registration
- Aggregations and Modeling
- Bidding and scheduling
- Performance obligations
- Metering and telemetry requirements
- Measurement and verification
- Settlements and cost allocation
- Capacity market participation
- Interconnection, CRIS, and incorporation into planning studies
- Market mitigation
- Dual participation in retail/distribution programs
- Changes to existing demand response programs to enable this effort

This projects expected benefits are to allow the NYISO to cultivate a market that is accessible and competitive for DER, in line with REV state policy goals.

~~14.3~~15.3 Project Justification

Throughout 2018 and in 2019 the NYISO has worked through concepts, proposals and Tariff edits to enhance its market rules for DER participation in NYISO's capacity, Energy and Ancillary Services Markets. The NYISO has also evaluated potential modifications to its existing Demand Response programs in order to enable this effort. Operational and performance changes to existing Emergency Demand Response and Special Case Resource programs are not required at this time but net payments to these resources will be impacted by the outcome of the proposed capacity market rule changes which are to be filed with this project. The NYISO's Day-Ahead Demand Response Program and Demand Side Ancillary Services Program will be folded into the new DER participation model.

This project will have many facets that ultimately support New York's REV goals and compliance with FERC Order Nos. 719, 745 and 841, while simplifying the operational matrix of rule sets for product offerings of both demand response and distributed resources, for all stakeholders involved. These changes more closely align the bidding and performance measurements for

those resources mentioned with the rule sets for generators. By doing this, the NYISO hopes to create a rule set that is more universally applicable to all resources.

This project will use the rules created in the 2018 and 2019 Market Design effort to develop the ~~FRS~~functional requirements that will drive the software development effort in 2020.

The software development required to support the ~~FRS~~functional requirements will include new software and/or modifications to existing software that supports DER eligibility and registration, aggregations, bidding and scheduling, performance obligations, metering and telemetry requirements, measurement and verification of baselines and performance, modeling, settlements, capacity market participation, interconnection, CRIS, incorporation into planning studies, market mitigation, simultaneous participation of DER in retails/distribution-level programs as well as the NYISO's wholesale program, and changes to the payment structure of existing demand response Capacity suppliers (SCRs) to enable this effort.

~~15~~16 Dual Participation

~~15.1~~16.1 Problem / Opportunity

Current NYISO wholesale market rules do not permit Generators to simultaneously participate in both wholesale markets and in retail markets or programs. The NYISO believes that providing resources with the flexibility to meet wholesale and distribution system needs will deliver the maximum benefit to New York electricity consumers.

~~15.2~~16.2 Project Objective(s) & Anticipated Deliverable(s)

The rules proposed in the DER market design allow for the flexibility of all resources in the NYISO markets to also offer services in the retail markets. Dual participating resources will be required to comply with all NYISO market rules for services offered to the wholesale market, and non-compliance may result in financial penalty. Resources must appropriately reflect any non-wholesale (e.g., retail) obligations in wholesale market Bids. Resources will still be required to follow NYISO dispatch instructions at all times, and will submit offers to NYISO when providing non-wholesale service regardless. Resources will receive payments for Energy or Ancillary Services through wholesale offers properly reflecting all obligations.

The 2019 deliverable for this project includes Functional Requirements, and in 2020, Development ~~c~~Complete and Deployment upon approval from stakeholders and the NYISO Board, as well as FERC acceptance of proposed tariff edits. The NYISO will continue to work with utilities to support operational coordination framework for DSP development, which is an ongoing effort in enabling dual participation for DER and Aggregators. The project will have high benefits, enabling resources to access both retail and wholesale market opportunities for maximized economic and grid benefits.

~~15.3~~16.3 Project Justification

Technological advancements and public policy support are encouraging greater adoption of DER to meet consumer energy needs as well as system needs. DER offer the potential to make load more dynamic and responsive to both wholesale and retail market price signals, potentially improving overall system efficiencies. Resources participating in the wholesale markets will continue to be obligated to follow all applicable NYISO market rules and utilize good utility practices.

~~16~~17 Expanding Capacity Eligibility

~~16.1~~17.1 Problem / Opportunity

The NYISO recognizes that resources of various durations provide different reliability benefit to the grid. The NYISO anticipates that shorter duration resources will increasingly enter the markets in the upcoming years, and conducted a review of the Capacity Values and subsequently proposed rules to allow shorter duration resources to participate in the markets and to value these resources based on the reliability benefit that the resources provide to the system. The NYISO has proposed to re-evaluate the identified Capacity Values periodically to accurately reflect the reliability benefit of short duration resources in the As-Found System over time, and to send appropriate investment signals to developers. The implementation of the capacity values requires software changes to the NYISO systems to allow shorter duration resources into the markets.

~~16.2~~17.2 Project Objective(s) & Anticipated Deliverable(s)

The successful implementation of these market changes is dependent on developing software to account for short duration resources and their corresponding capacity values. The NYISO will begin the deployment phase of this project in 2020 and intends to implement the capacity values from its first study for the 2021-2022 Capability Year. This project has high benefits as the NYISO is expecting that a large number of short duration resources will enter the market in the coming years. This project seeks to improve the efficient operation of the grid with respect to these new resources.

~~16.3~~17.3 Project Justification

The NYISO has been engaged in a multi-year effort to allow shorter duration resources to be eligible to participate in the NYISO markets. The market design for the DER project proposes revisions to the NYISO Services Tariff to require a periodic review of the Capacity Values. The goal of the periodic review is to assess the changes to the reliability benefit of resources in the grid through time to continue to support reliable grid operations. Additionally, implementing software for this project will promote overall market efficiency.

~~17~~18 Meter Services Entity for DER

~~17.1~~18.1 Problem / Opportunity

The NYISO relies on accurate and timely information to efficiently and reliably run the grid of today and the grid of tomorrow. The changing landscape of New York's existing metering constructs provides the opportunity for the NYISO to deploy a new metering construct that is equipped to meet the requirements of a dynamic transitioning grid where DER play an increasingly larger role in meeting system needs.

~~17.2~~18.2 Project Objective(s) & Anticipated Deliverable(s)

The NYISO has developed a Market Design for this effort as part of the DER Participation Model throughout 2018 and 2019. It is expected that, pending stakeholder, NYISO Board and regulatory approvals, this project will be deployed in 2020.

Despite the limited years until deployment remaining, the creation of a new metering construct is an area the NYISO has limited subject matter expertise. Project benefits are expected to be medium as well, as a third party metering construct has the potential to reduce barriers to entry for DER in wholesale markets.

~~17.3~~18.3 Project Justification

The proliferation of DER participation in NYISO markets presents a challenge to existing metering constructs in New York with potentially thousands of resources needing meters to be installed, certified, and maintained, along with all the data services associated with meter data submissions.

From 2017 to 2019, the NYISO worked on a comprehensive review of metering constructs throughout North American wholesale markets, culminating with Tariff amendments creating the Meter Services Entity (MSE) construct. The MSE construct is a replacement and enhancement of the New York Public Service Commission's previous Meter Data Service Provider and Meter Service Providers constructs. The MSE construct provides the opportunity for Market Participants to procure metering and meter data services from third party entities while maintaining a reliable and economically efficient grid.

This project helps to position the NYISO to respond to future changes in the rapidly changing world of data services and allow third parties to provide meter services delivering increased optionality and opportunities for Market Participants.

~~18~~19 NYISO Pilot Framework

~~18.1~~19.1 Problem / Opportunity

Technological advancements and evolutions in DER market design drive a desire for the NYISO to understand distributed resource aggregation and dispatch in a test environment before DER developers commit to wholesale market participation. The NYISO and Market Participants can share knowledge on DER coordination efforts and aggregation configurations without risking the economic welfare of consumers and the broader market. Before DER can further define the electrical landscape of the NYISO market, a Pilot Program presents an opportunity for the NYISO and Market Participants to learn and best prepare for a distributed grid.

~~18.2~~19.2 Project Objective(s) & Anticipated Deliverable(s)

The NYISO expects this effort to span two years, with the anticipated Study Complete in 2020. This project involves a number of stakeholders in testing, and requires continuous development of operating procedures to accompany new methodologies. The project will have medium benefits, as the results of the study will ultimately allow the NYISO to identify modifications to market rules that appropriately incorporate new technological capabilities and meet grid needs. In order to effectively execute this study, the following deliverables will need to be completed:

- Share the lessons learned from completed pilot projects assessed with internal and external stakeholders
- Create a final report of the cumulative findings and performance of all pilot projects

~~18.3~~19.3 Project Justification

In conjunction with the development of the Distributed Energy Resource Participation Model, the NYISO will use the Pilot Program to test new energy technologies and identify rule and tariff modifications for DER. This project will use the Pilot Test Environment and framework to allow developers of new or emergent technologies and the NYISO to gain knowledge about the technology's capabilities and uses as well as supporting REV demonstration efforts. Pilot Projects are not compensated for their participation in the Pilot Program.

This project helps to position the NYISO to study and test future trends in electric generation, storage and price responsive dynamic loads that will change the landscape of the current electrical grid. Technological advancements and public policy support are encouraging greater adoption of Distributed Energy Resources (DER) to meet consumer energy needs as well as system needs. DER offer the potential to make load more dynamic and responsive to wholesale market price signals, potentially improving overall system efficiencies.

~~19~~20 5 -Minute Transaction Scheduling ~~with HQ~~

~~19.1~~20.1 Problem / Opportunity

Interchange scheduling with Hydro-Quebec (HQ) is currently achieved on either a 15-minute or an hourly basis using the NYISO's Real-Time Commitment (RTC) software. More frequent transaction scheduling with external control areas could improve convergence between prices in RTC and RTD and offer increased flexibility to the market optimization software, as the penetration of intermittent renewables increases. The NYISO has also determined that 5-minute transaction scheduling would be a pre-requisite for external resources to be eligible to provide operating reserves, and perhaps other ancillary services.

HQUS believes that allowing external resources to be scheduled based on RTD will place these on equal footing with internal generation and will reduce the occurrence of over or under commitment of external resources.

~~Interchange scheduling with Hydro-Quebec (HQ) is currently achieved on either a 15-minute or an hourly basis using the NYISO's Real-Time Commitment (RTC) software. Scheduling transactions with external control areas more frequently could improve convergence between prices in RTC and Real-Time Dispatch (RTD) and offer increased flexibility to the market optimization software as the penetration of intermittent renewables increases.~~

~~This project would propose a mechanism to enhance the real-time interchange scheduling processes by allowing the economic scheduling of interchange across controllable interties with HQ every 5 minutes, using the 5-minute RTD. RTD does not currently have the ability to schedule interchange across controllable interties. Currently, hourly or 15-minute interchange schedules are fixed within RTD, which limits the set of resources available to address changes in system conditions.~~

~~19.2~~20.2 Project Objective(s) & Anticipated Deliverable(s)

The project would study the potential for other interties to also be scheduled on a 5 minutes basis, depending on the discussion with HQ and other control areas, namely, PJM, ISONE and Ontario.

This project would deliver a report that considers a proposed mechanism to enhance the real-time interchange scheduling processes by allowing the economic scheduling of interchange across controllable interties with Hydro-Quebec (HQ) nominally every 5 minutes using the RTD. Interchange scheduling with HQ is performed on a 15-minute and an hourly basis using the RTC software.

~~In order to develop the market design concept, NYISO staff would research efficiency gains from implementing 5-minute scheduling across controllable interties with HQ, propose 5-minute scheduling logic for controllable interties with HQ, seek agreement with HQ on how to coordinate scheduling and pricing rules, identify special pricing rules and other proxy bus pricing logic that will have to be modified when 5-minute scheduling is implemented, identify proxy bus pricing rule changes needed to reflect 5-minute scheduling across controllable interties with HQ, evaluate whether any changes in guarantee payments are needed to incent flexible offers, and investigate North American Electric Reliability Corporation Disturbance Control Standard recovery compliance if HQ is scheduled to provide energy during a DCS event and they do not deliver. The 2020 deliverable for this project would be Market Design Concept Proposal.~~

~~19.3~~20.3 Project Justification

A market design to accommodate 5-minute interchange scheduling across controllable interties with HQ would be expected to improve price convergence between RTC and RTD, improve market efficiency by increasing the amount of available resources for dealing with real-time system changes and/or events, and increase the flexibility of the NYISO's market operations to respond to fluctuations in intermittent output. More frequent interchange scheduling that aligns with internal generation scheduling will also alleviate top of hour and quarter-hour interchange discrepancies.

This is particularly important with the growing objectives in NY State for renewable generation and for the replacement of fossil fuel generation. HQ's large, flexible and low carbon hydropower generation represents a solution to support grid flexibility in a 70% by 2030 world.

~~A market design to accommodate 5-minute interchange scheduling across controllable interties with HQ would be expected to drive price convergence between RTC and RTD, improve market efficiency by increasing the amount of available resources for dealing with real-time system changes and/or events, and increase the flexibility of the NYISO's market operations to respond to fluctuations in intermittent output. This flexibility would likely reduce real time price volatility and could reduce uplift. More frequent interchange scheduling that aligns with internal generation scheduling will also alleviate top of hour and quarter-hour interchange discrepancies.~~

~~20~~21 Ancillary Services Shortage Pricing (SOM)

~~20.1~~21.1 Problem / Opportunity

State energy and environmental policies are expected to encourage significant increases in intermittent generation. As intermittent penetration increases, the provision of ancillary services such as regulation and reserve will become increasingly important. The ongoing transition of the resource fleet presents an opportunity to incentivize increased flexibility and resilience in the NYCA as the grid evolves. In addition, new capacity market pay-for-performance programs and other market changes in neighboring ISO/RTO regions may drive net exports from the NYCA during times of high stress on the grid, which could adversely impact reliability.

The relative value of the NYISO's ancillary service shortage prices will be assessed in a 2019 study. The study will also recommend potential changes to the current shortage pricing architecture intended to strengthen incentives for flexibility and resilience in light of the grid in transition and pricing for services in neighboring markets. Potential market design enhancements will need to appropriately consider the interactions between Operating Reserves, Regulation Service, and transmission shortage cost pricing levels. The proposed market design changes will also consider the implications of other ongoing reserve and shortage pricing related initiatives, including:

- Constraint Specific Transmission Shortage Pricing
- More Granular Operating Reserves
- Reserves for Resource Flexibility

This project was identified as beneficial by the Market Monitoring Unit, the 2018 NYISO Management Response to Analysis Group's Performance Assurance report, and the 2017 Integrating Public Policy Market Assessment report.

~~20.2~~21.2 Project Objective(s) & Anticipated Deliverable(s)

The 2020 project deliverable will be ~~an FRS~~Deployment. Depending on the work completed in 2019, 2020 work may also include a Market Design Complete presentation and the development of ~~an FRS~~functional requirements. ~~The NYISO may seek to accelerate the project plan and deploy in late 2020.~~

~~20.3~~21.3 Project Justification

This project will position the NYISO to incentivize flexibility and resilience as the grid transitions to higher intermittent penetration. It will also address the implications of pricing incentives for products and services in neighboring ISO/RTO regions.

~~21~~22 Carbon Pricing

~~21.1~~22.1 Problem / Opportunity

New York State (NYS) public policy in recent years has been to promote carbon-free resources through the Clean Energy Standard. However, the wholesale electricity markets operated by the NYISO do not fully align with these policy objectives. As a result, the wholesale markets are restricted in their ability to signal cost-effective carbon dioxide ("carbon") abatement options and send effective price signals to retain needed units to sustain the reliable operation of the grid.

In 2017, the Brattle Group published a report detailing how pricing carbon into the NYISO's wholesale markets could help to harmonize wholesale markets and New York State's public policies. After the report was published, a NYISO, New York State Energy Research and Development Authority, and Department of Public Service team worked with the Integrating

Public Policy Task Force (IPPTF) to analyze the mechanics and benefits of incorporating carbon into NYISO's wholesale markets. These efforts culminated in the NYISO's publication of a Carbon Pricing Proposal at the end of 2018. In 2019, the carbon pricing proposal is being vetted through the NYISO's working group process, targeting a 2019 goal of Market Design Complete. The NYISO will seek agreement from the State, as well as approval from stakeholders, the NYISO Board, and FERC on the NYISO carbon pricing proposal.

~~21.2~~22.2 Project Objective(s) & Anticipated Deliverable(s)

This phase of the NYISO's carbon pricing project will develop software to effectuate the NYISO's carbon pricing proposal.

~~21.3~~22.3 Project Justification

Harmonizing state policies and wholesale market design will provide consumers with more efficient ways to achieve public policy goals at the lowest possible cost. This project will improve market signals, which increases locational and temporal efficiency. Carbon pricing will also support the orderly entry and exit of resources consistent with state policy objectives.

~~22~~23 Constraint Specific Transmission Shortage Pricing (SOM)

~~22.1~~23.1 Problem / Opportunity

Transmission facility and line ratings limit the amount of energy that can flow from one location to the next on the bulk electric system. As transmission constraints arise, the NYISO's energy market software prices the quantity of energy that would be necessary to alleviate them. The existing transmission constraint pricing logic applies a single graduated pricing mechanism to all facilities assigned a non-zero constraint reliability margin (CRM) value. Under the current pricing logic, some transmission constraints are relaxed without being resolved by the graduated mechanism.

The NYISO's Market Monitoring Unit, the 2017 Securing 100+ kV Facilities whitepaper, and the 2017 Integrating Public Policy Market Assessment report all recommended that the existing transmission constraint pricing logic be revised.

In 2018, the NYISO's Constraint Specific Transmission Demand Curves study concluded that certain enhancements to the current logic would be beneficial and should be further explored with stakeholders. Based on this study, the NYISO proposes to utilize a revised and more graduated demand curve mechanism that better accounts for the various non-zero CRM values assigned to facilities. Under this new construct, demand curve prices would increase proportionally with the severity of transmission overloads. The NYISO also proposes to eliminate most occurrences of constraint relaxation by instead seeking to resolve constraints for internal facilities through use of a graduated demand curve mechanism that includes pricing values for shortages that exceed applicable CRM values.

~~22.2~~23.2 Project Objective(s) & Anticipated Deliverable(s)

The 2020 deliverable for this project will be ~~FRS~~Functional Requirements ~~Complete~~.

~~22.3~~23.3 Project Justification

Transmission constraint pricing logic enables the NYISO's market software to re-dispatch suppliers efficiently in the short term to alleviate constraints, and incentivizes long-term investment in locations where suppliers could provide the greatest benefits.

~~23 Dynamic Reserve Requirements (SOM)~~

~~23.1 Problem / Opportunity~~

~~The NYISO procures fixed quantities of operating reserves across the state. Under this structure, the procurement of reserves does not reflect the flexibility of the grid to respond to system needs by utilizing the transmission system to import capacity into a generation constrained region. Establishing more dynamic reserve requirements could reflect that it may be least costly to import power into a constrained region rather than hold reserves in such a constrained location. By procuring reserves dynamically, based on real-time conditions, reserves could be shifted to resources in lower cost regions as transmission capacity is made available or shifted to resources that are not export constrained.~~

~~23.2 Project Objective(s) & Anticipated Deliverable(s)~~

~~This effort would seek to develop potential changes to the NYISO's market software such that the optimization would respond to system constraints dynamically by scheduling reserves where they are most needed and most cost effective in consideration of real-time system conditions. The 2020 deliverable for this project will be a Market Design Concept Proposed.~~

~~23.3 Project Justification~~

~~In its 2016 State of the Market Report, the Market Monitoring Unit recommended that the NYISO "[d]ynamically adjust operating reserve requirements to account for factors that increase or decrease the amount of reserves that must be held on internal resources." In some instances, the reserve requirement for a local area can be met more efficiently through the utilization transfer capability provided by the transmission system (i.e., importing energy for reserves), rather than scheduling reserves within a particular region. Dynamic reserves could result in price signals that better reflect the precise locations where operating reserves would provide the most value. Further, dynamic reserves present opportunities to enhance grid resilience, lower total production costs, and increase efficiency in meeting applicable reserve requirements.~~

24 Eliminate Fees for CTS Transactions with PJM (SOM)

24.1 Problem / Opportunity

Coordinated Transaction Scheduling ("CTS") was introduced as a market design concept to allow wholesale market operators the ability to schedule efficient transactions based on close to real-time price information. The efficiency benefits of the CTS process with PJM have been limited since it was implemented in the fourth quarter of 2014. The 2015 SOM report addresses this issue and makes the observation that there has been a far greater utilization of CTS bidding at the ISO-NE interface since it was implemented in the fourth quarter of 2015. The 2017 SOM report notes that overall performance of CTS improved significantly between 2016 and 2017 but that participation is still much stronger at the ISO-NE interface than the PJM interface. The lower utilization of CTS with PJM can partially be attributed to the relatively large fees that are charged to transactions between NYISO and PJM, while no substantial transmission charges or uplift charges on transactions are charged between New York and New England. These charges present an economic barrier to achieving potential benefits from CTS process at the PJM border. The cost of these fees are paid by load, regardless of whether it is charged to transactions, because MPs facilitating transactions must increase their bids to account for the fees.

24.2 Project Objective(s) & Anticipated Deliverable(s)

This effort would seek to eliminate CTS fees at the NYISO and PJM interface. The 2020 deliverable for this effort will be Market Design Concept Proposed.

24.3 Project Justification

Charging fees for transactions introduces an unnecessary cost into the marketplace. Eliminating transaction fees with PJM would provide a market efficiency gain by setting a Locational Based Marginal Price (LBMP) at the border that better reflects the actual marginal cost of energy.

25 Enhanced Fast Start Pricing

25.1 Problem / Opportunity

Start-up and minimum-generation (no load) costs are not included in supplier energy market offers today, because they are not considered marginal costs. Not enabling fast start resources to include these costs in their economic offers may undervalue their contributions to managing an increasingly volatile grid.

On December 20, 2017, FERC instituted a proceeding in Docket No. EL18-33-000, pursuant to Federal Power Act Section 206, concerning fast start pricing in the NYISO's markets. Consistent with the Commission's instructions, the NYISO filed an Initial Brief on February 12, 2018, outlining the NYISO's proposed approach to amend its tariffs and revise its market software to:

(1) modify pricing logic to allow fast-start resources' commitment costs (i.e., start-up costs and minimum generation (no-load) costs) to be reflected in prices; and
(2) allow the relaxation of all dispatchable fast-start resources' economic minimum operating limits by up to 100 percent for the purpose of setting prices.

The NYISO's Market Monitoring Unit has also previously recommended incorporating the startup costs of gas turbines into LBMPs to ensure Gas Turbines (GTs) are able to recover their costs fully through LBMPs.

25.2 Project Objective(s) & Anticipated Deliverable(s)

In its Initial Brief, the NYISO requested an implementation date of Q4 2020. The NYISO expects to complete the fast-start pricing market design in 2019, with implementation to follow in 2020. Project efforts will be dependent on the timeline that is expected to be determined by the FERC. The following deliverables will be in scope once a response is received from the FERC, prior to deployment:

- Revision of ~~FRS~~functional requirements and market design to reflect any changes mandated by the FERC's response to NYISO's initial brief.
- Consumer Impact Analysis
- Determination of necessary tariff revisions
- Presentation describing market design, Consumer Impact Analysis, and any tariff changes to MIWG, BIC, and MC
- Software development

25.3 Project Justification

Anticipating and resourcing this effort will enable the NYISO to quickly bring its markets into compliance with the FERC 206 filing on incorporating startup costs within LBMPs for fast-start resources.

26 Enhanced PAR Modeling (SOM)

26.1 Problem / Opportunity

Variation in loop flows and in flows across certain PAR-controlled lines were among the leading causes of transient price spikes in 2015 and 2016. Discrepancies between modeled and actual loop flows, and modeled and actual flows across PAR-controlled lines lead to transient shortages where generation must be ramped up to account for scheduling discrepancies and flexible generators cannot ramp quickly enough to compensate for changes. This subsequently leads to spikes in shadow costs or LBMPs. Mechanisms incorporated into the market solution may help to alleviate these discrepancies between modeled and actual loop flows and flows on PAR-controlled lines.

Adjusting the last telemetered flows on fixed scheduled PARs and using these adjusted values as inputs to RTC and RTD to account for variations in generation, load, interchange, and other PARs that are located in the NYISO footprint can more accurately model actual PAR flows realized. In addition, developing a mechanism to forecast deviations between telemetered and actual loop flows and telemetered and actual fixed PAR flows and incorporating these adjustments within RTC and RTD can more accurately reflect real-time system conditions, resulting in more efficient prices and schedules and reducing unnecessary price spikes. This initiative also involves evaluating improvements to the modeling of day-ahead loop flows and flows on PAR controlled lines.

26.2 Project Objective(s) & Anticipated Deliverable(s)

The 2020 deliverable for this effort will be Study Complete. The scope of this study will include discussion of the current modeling of loop flows and fixed PAR schedules in the market software. The NYISO will also review potential improvements to PAR Modeling as part of this study.

26.3 Project Justification

This project could lead to more efficient modeling of loop flows and fixed-schedule PAR flows, which has the potential to result in more efficient scheduling of NYCA resources; in addition, this effort has the potential to enhance price transparency by reducing unnecessary price volatility. This project may improve convergence between RTC and RTD, as well as between the Day-Ahead Market (DAM) and Real-Time Market (RTM).

27 ESR Participation Model

27.1 Problem / Opportunity

The NYISO has developed and submitted to FERC in compliance with Order No. 841 a market participation model for ESRs that recognizes their unique physical and operational characteristics to both inject and withdraw energy. ESRs' ability to modulate load in response to prices and grid conditions, can help grid operators handle peak demand, manage the variability of intermittent resources, provide quick responding standby service, such as synchronous operating reserves and could significantly increase both resource flexibility and grid resilience. Although certain types of ESRs can participate in the NYISO markets today, the existing market products offer limited opportunities to provide Energy and Ancillary Services. Recognizing these limitations, this project will implement the participation model for ESRs to provide increased resource flexibility and reliable market operations while preparing for a future where a significant number of generation assets are intermittent and weather-dependent.

In early 2018, FERC issued Order No. 841 requiring to ISOs/RTOs to develop an ESR participation model to allow storage resources to participate in the wholesale markets. The NYISO will develop the software code and implement the ESR participation model to comply with FERC Order No. 841.

27.2 Project Objective(s) & Anticipated Deliverable(s)

The ESR participation model will capture the unique operational characteristics of ESRs, including their ability to withdraw and inject energy onto the grid, and establish rules for participation in the NYISO's Energy, Installed Capacity, and Ancillary Services markets. This project is a continuation of the implementation project started in 2019. The objective of the project in 2020 is ~~d~~Deployment.

27.3 Project Justification

The ESR participation model will be implemented on the new NM platform that will be deployed in October 2019 as part of the EMS/BMS Upgrade project. The participation model will leverage the benefits provided by the new EMS/BMS platform to meet the performance needs that are required to be met in production after the ESR participation model is deployed.

28 Grid in Transition Enhancements

28.1 Problem / Opportunity

New York State's Green New Deal ("GND") 2040 carbon neutral end state and 2030 70% renewable energy transitional state contain specific renewable energy and energy storage capacity targets and mandates. These public policy mandates are likely to implicate multiple areas of market design. Designing markets that achieve these states in an economically efficient manner is important. The NYISO is undertaking a white paper to scope the issues that will need to be addressed in response to New York State's clean energy targets; however, further discussion on specific design objectives and prospective elements throughout 2020 is warranted. Significant cost savings in implementing the clean energy objectives could be realized with well-tailored market design. There is value in considering different stakeholder perspectives in an effort to develop lower cost solutions to achieve state policies.

28.2 Project Objective(s) & Anticipated Deliverable(s)

The objective of this project is to solicit a variety of stakeholder perspectives on key market design issues that may be implicated by New York State's clean energy mandates and objectives. In a series of monthly meetings throughout 2020, the NYISO would make available a forum to address a single topic, allowing stakeholders to provide their perspectives, including presentations that describe the problem and potential solutions. For each topic and/or subject area, the NYISO would provide appropriate background, including any education on the current market design, take stakeholder input, and track issues that generate stakeholder interest. Following this comprehensive review, stakeholders will prioritize NYISO market design changes for 2021 with the target of "Market Design Proposed". Key subject areas and representative questions include but are not limited to the following:

1. Future of Fossil Generation
    - What should the role of combustion units be?
        - Should combustion units be limited to biofuels?
    - The role of fossil units for resilience/outage/unavailability/electrification?
        - For resilience?
        - Other reserves?
        - To address unlikely transmission outages, for example?
        - To reduce more carbon in other sectors through electrification?
        - To the extent fossil purchase offsets elsewhere?

2. Implications of a Carbon Neutral Grid
    - What if any role should loads' carbon footprint offsets play in assuring carbon neutrality given remaining fossil generation?
    - How should we measure and accommodate fossil units to the extent they support electrification of other higher carbon sectors reducing carbon emissions, and how should we measure and accommodate their impact?
    - What is the relevance of carbon pricing for achieving the 2030 transitional 70% renewables state or 2040 carbon neutral end state?

3. Reliability and Market Considerations
    - What are appropriate market structures for assuring reliability in the 2030 and 2040 cases?
    - What are the appropriate ways of setting reliability requirements and measuring reliability with a system comprised primarily or completely of renewables and storage of different durations?
    - How should the system accommodate potentially reduced UCAP contribution arising from correlated renewable outages?
    - What role should real time retail pricing play to assure customer load reductions when correlated outage events occur?
    - Where should the cost of loss of load be considered?

4. Capacity Market Enhancements
    - What, if any, capacity market changes may be needed to maintain reliability at lower cost given state mandates?
    - What changes might allow optimizing the combination of storage, wind (and potentially fossil) resources?
    - Given uneven renewables injection, how should balance of system costs be identified and allocated? What, if any, changes in cost allocation for these resources may be needed?
    - Given a synergetic reliability contribution of storage/renewables/potential fossil facilities, how should capacity payments be allocated?

5. Energy Market Enhancements
    - What, if any, energy and ancillary services market changes may be needed?
    - Absent mandates and moratoria, how might energy market changes assure that transitional and end-state renewable generation targets are met?
    - What, if any, ancillary service changes are needed to support flexible resources?
    - What, if any, changes in cost allocation might be expected or appropriate?

6. Effective Capacity Market Mitigation
    - What does BSM look like in a 2040 full renewables case?
    - How should supply side mitigation change?
    - What BSM and SSM outcomes should we be seeking to support the 2030 transitional mandates?
    - How should bidding rules and SSM change to accommodate increased DAM v. RT risk?

7. Inter-regional Coordination
    - How may these mandates affect trade with neighboring ISO/RTOs?
    - How may these mandates affect New York's historic ability to provide mutual reliability support?

8. Future of the Competitive Market
    - Would we and should we still have a competitive market?

28.3 Project Justification

This project should be considered given mandates highlighted in the PSC Order Establishing Offshore Wind Standard and Framework for Phase 1 Procurement (Case 18-E-0071 – In the Matter of Offshore Wind Energy), PSC Case 15-E-0302, Proceeding on Motion of the Commission to Implement a Large-Scale Renewable Program and a Clean Energy Standard, Order Adopting a Clean Energy Standard (issued August 1, 2016) ("CES Order"), PSC Case 18-E-0130 In the matter of Energy Storage Deployment Program Order Establishing Energy Storage Goal and Deployment Policy (December 13, 2018) and the governor's state of the state commitments and subsequent PSC Orders. The intention is to identify means of addressing the state's goals and mandates in a cost-effective way while continuing to reliably serve load.

~~28~~29 Hybrid Storage Model

~~28.1~~29.1 Problem / Opportunity

The NYISO's market rules do not currently allow two Generators of different types to be co-located at a single point of interconnection and share the same point identifier (PTID). Instead,

where two or more resource types are co-located behind the same point of interconnection, each resource type must be separately metered and have its own PTID.

~~28.2~~29.2 Project Objective(s) & Anticipated Deliverable(s)

This project seeks to develop market participation rules for front-of-the-meter renewable generators collocated with Energy Storage Resources, with a 2020 milestone of Market Design Complete. This deliverable includes a consumer impact analysis and a Market Design Complete presentation to stakeholders. 2020 project efforts will build on work completed as part of the Energy Storage Resource and DER Integration initiatives, by developing market rules that better integrate large-scale weather dependent and energy storage resources co-located behind a single interconnection point.

This project is distinct from the DER Integration initiative which has developed aggregation rules for resources that are generally distributed behind multiple interconnection points.

~~28.3~~29.3 Project Justification

State and Federal initiatives such as REC procurements provide incentives for developers to couple storage and intermittent renewable assets. Such programs are aimed at reducing the output volatility and improving the availability of intermittent resources. Developing a market participation model for front-of-the-meter generators plus storage will better align the NYISO's market procurement with State and Federal efforts to integrate more clean energy into the grid. The new market participation model is also expected to improve grid flexibility and resilience by enabling new resource types to provide their full capabilities.

~~29~~30 Linked Virtual Transactions

~~29.1~~30.1 Problem / Opportunity

The NYISO does not currently offer a product that enables Market Participants to hedge price separation between source and sink zones due to transmission congestion and losses between the DAM and RTM. While Market Participants may currently attempt to hedge Real-Time congestion risks by purchasing offsetting Virtual Supply and Virtual Load positions in the DAM, there is no guarantee that both legs of such a transaction will clear, which exposes Market Participants to congestion risk.

~~29.2~~30.2 Project Objective(s) & Anticipated Deliverable(s)

This market enhancement would create a new financial product, the "Linked Virtual Transaction" (LVT). An LVT will be a virtual trade in which a Market Participant submits an offer to simultaneously inject energy at a specified source and withdraw the same megawatt quantity at a specified sink location in the DAM. The Market Participant will also specify the maximum difference in LBMP between the source and sink that the Market Participant would be willing to

pay. An LVT that fails to meet a Market Participant's bid criteria would fail to clear, thus protecting the Market Participant from exposure to undesired risks.

2020 project efforts will build on work completed during 2016, culminating in a Market Design Complete presentation to stakeholders and a consumer impact study. Past work, including market and credit ~~, and~~ tariff revisions will be updated ~~as part of this process. Because they were not addressed in 2016, credit rules will be developed~~ as part of the 2020 project scope. The draft ~~FRS~~functional requirements that were~~as~~ initiated in 2016 will also be updated to prepare for eventual implementation.

The implementation of this project is expected to ultimately require updates to the NYISO's energy market bidding software (CBMS), Settlements, Network Manager, and associated reporting functions.

~~29.3~~30.3 Project Justification

This potential market enhancement is expected to decrease price divergence between the Day-Ahead and Real-Time Markets. It also has the potential to reduce market risk premiums for interzonal transactions, improve market liquidity, lead to more accurate price signals because the LVT product will enable price-sensitive bidding, improve competition, and allow weather-dependent resources to hedge RTM congestion volatility.

~~30~~31 Long Island PAR Optimization and Financial Rights (SOM)

~~30.1~~31.1 Problem / Opportunity

Scheduling of PAR-controlled lines between New York City and Long Island (i.e., the 901 and 903 lines) is not currently optimized in the NYISO's market software. These lines are scheduled according to the terms of long-standing contracts that predate open access transmission tariffs and the NYISO's markets. This causes power to flow in an inefficient direction for the majority of the time in the DAM. Significant efficiency gains may be achieved by improving the operation of these lines.

~~30.2~~31.2 Project Objective(s) & Anticipated Deliverable(s)

The 2020 deliverable for this effort will be Study Complete. The NYISO will investigate the creation of a financial settlement mechanism to compensate the party that would be giving up some of the benefits from the current operation. Completion of this study will necessitate discussions with PSEG-Long Island and ConEd. The NYISO should work with these parties to explore potential changes to wheeling agreements or to identify how the agreements can be accommodated within the markets more efficiently.

In later project phases, the creation of a new financial product to allow the owner of the LI PARs to benefit from LI PAR optimization will include an internal determination of the necessary

modification/ creation of NYISO credit, settlement, and other processes to facilitate a new financial right and the LI PAR optimization. The market software/ processes will also need to be modified to optimize the LI PARs and create the new financial product.

~~30.3~~31.3 Project Justification

This solution will explore mechanisms to minimize total production cost by ensuring power flows in the economic direction most of the time in the DAM. Optimizing the LI PARs and creating a financial right to compensate the affected transmission owners has been cited by the NYISO's external market monitor as a recommendation for improvement.

~~31~~32 Mitigation Thresholds Review

~~31.1~~32.1 Problem / Opportunity

Load Pocket Thresholds ("LPT") are mitigation measures designed to prohibit exercise of market power by the NYC units that might exist under constrained conditions. These thresholds strictly limit the bidding leeway of NYC energy generators, relative to their energy references—a general requirement explained in Services Tariff Section 23.3.1.2.2. In certain situations, the LPTs, which are based on previous months' data may over or underestimate the future month's true conditions and hence may lead to over or under mitigation. A review of the mitigation behavior thresholds could identify opportunities to improve upon the LPT methodology.

~~31.2~~32.2 Project Objective(s) & Anticipated Deliverable(s)

This project intends to perform a comprehensive review of mitigation behavioral thresholds, including solicitation of feedback from stakeholders. This project will review all thresholds used for conduct and impact for mitigation including the current Load Pocket Threshold process. The objective of this project would be to evaluate methods to improve upon the LPT methodology based on observations from the last several years of its application. For example, this project will consider the following improvements:

- Modifying the measure that predicts potential market power for each load pocket in the coming month, based on the number of transmission constrained hours in the previous 12 months. Among other problems, the existing measure mispredicts upcoming tightness of load pockets by neglecting the systematic tendency for strong summer peaks in constrained hours, but fewer such constraints over the rest of the year.
- Revising the measure of "lowest allowable LPT." That measure uses 12-month averaging of load-weighted and fuel-price-adjusted LBMPs, to calculate expected load-pocket LBMP in the coming month, and takes 2% of that figure to generate "lowest allowable LPT." The formula that calculates a weighted average of past load-pocket LBMPs can be revised in ways that will better predict load-pocket LBMP in the upcoming month, and hence create a more appropriate measure of lowest allowable LPT.

- The Tariff requires the NYISO to fuel-price-adjust the LPTs, allowing the NYISO to specify the method of fuel adjustment. Currently, MMA implements this requirement by fuel-adjusting the LBMP term in on a monthly basis. However, MMA proposes to change the frequency of fuel-adjusting LPTs from monthly to daily, so that each day LPTs maintain consistency with the daily-evolving fuel-price component of energy reference levels.
- Automating the process of calculating LPTs which currently consists of several steps, some of which are time consuming and labor intensive and hence prone to error. MMA proposes to work with IT to create a fully automated process with measures in place to validate results from each execution

~~31.3~~32.3 Project Justification

This project would allow for a comprehensive review of the LPT methodology and process to identify ways to improve the accuracy of and verification process for LPT calculations.

~~32 More Granular Operating Reserves (SOM)~~

~~32.1 Problem / Opportunity~~

~~The NYISO is required to satisfy reliability criteria in New York City to meet New York State Reliability Council (NYSRC) reliability requirements for local areas under certain conditions. These local requirements are not expressly modeled in the market software, and can therefore result in the need for out-of-market action. In the absence of a market mechanism, economic incentives for investment in resources capable of providing the required services within load pockets are limited. As the grid evolves, this could eventually lead to insufficient availability of reserve capability in highly constrained areas of New York City.~~

~~In 2019, the NYISO plans to introduce a Zone J reserve region with 10 and 30 minute reserve requirements. The Zone J reserve region will provide location specific market signals consistent with the reliability need. Building this requirement into the NYISO's market software will better align market signals with certain applicable reliability rules governing reserve requirement within New York City for maintaining NYCA-wide reliability.~~

~~For this initiative, the NYISO will explore the potential implementation of more granular reserve requirements within New York City load pockets that would better represent the value of short-notice responsive resources in desirable locations. This effort was recommended by the Market Monitoring Unit, and was also identified as beneficial in both the 2018 NYISO Management Response to the Analysis Group's Performance Assurance report and the 2017 Integrating Public Policy Market Assessment report.~~

~~This initiative will also include consideration of potential enhancements to improve performance by reserve providers. This could include the potential for adjusting reserve payments to reflect past performance.~~

32.2 Project Objective(s) & Anticipated Deliverable(s)

This project seeks to improve price signals for reserve procurement in New York City by assessing the development of more granular reserve requirements applicable to highly constrained load pockets and expressly incorporating such requirements into the market software.

In 2020, assuming affirmative stakeholder votes in 2019, this project will develop an FRS for any components of the market design related to load pocket reserves within New York City or improvements to reserve performance. The FRS will capture the business requirements necessary for project implementation.

32.3 Project Justification

Load pocket reserve requirements within New York City could provide further incentives for resources to locate in important, supply constrained areas of the NYCA. This effort may also improve incentives for resource performance by examining the potential for restructuring reserve payments to reflect past performance.

33 Pricing Reserves for Congestion Management (SOM)

33.1 Problem / Opportunity

Based on NYSRC rules, the NYISO is required to ensure that transmission facilities are not loaded above their Long-Term Emergency (LTE) rating, post-contingency. In some cases, the NYISO is permitted to use operating reserve capacity to satisfy this requirement. This affords opportunities to reduce production costs by increasing the utilization of the transmission system into load centers. Currently, operating reserve providers are not compensated for helping to manage congestion. In its 2016 State of the Market Report, the Market Monitoring Unit recommended that "the NYISO evaluate ways to compensate operating reserves that help manage congestion efficiently."

33.2 Project Objective(s) & Anticipated Deliverable(s)

This effort will evaluate potential ways to compensate operating reserves that help manage congestion effectively to determine if market signals can be improved to incentivize resource flexibility. The deliverable for this effort in 2020 will be Study Complete.

33.3 Project Justification

The NYISO currently maintains flows on the transmission system to avoid post-contingency LTE overloads, which in some cases, requires the use of operating reserve capacity. Because current reserve compensation does not include such congestion management, the market may not provide optimal price signals for investment in new and existing resources with flexible characteristics. The study will determine if market signals can be improved to allow for operating reserve providers to be compensated for helping to manage congestion. This project is intended

~~to improve price formation, incentivize resource flexibility, and increase incentives for efficient resource operation and investment.~~

33 Relocating the IESO Proxy Bus

33.1 Problem/Opportunity

The NYISO's market software currently uses the BRUCE station as the proxy bus to schedule transactions with Ontario's Independent Electric System Operator (IESO). The selection of the BRUCE station as the location of the IESO proxy bus is the determining factor for how the commitment software distributes the power flow for scheduled energy between IESO and NYISO. Analysis of the actual historical delivered energy from transactions between IESO and NYISO indicate a potential improvement that can be made with the power flow results from the NYISO's commitment software. Historically, ~85%-95% of the scheduled energy between IESO and NYISO is realized over the direct ties, as compared to the ~70%-85% that is scheduled by the commitment software today.

33.2 Project Objective(s) & Anticipated Deliverable(s)

This project would explore the options for a more optimal IESO proxy bus that more closely aligns power flow shift factors for energy schedules between IESO and NYISO with actual, observed power flows. The 2020 deliverable for this effort would be Deployment of the improved IESO proxy bus.

33.3 Project Justification

Developing a more accurate power flow result out of the commitment optimization is expected to lead to improved resource scheduling and pricing outcomes.

34 Reserve Enhancements for Constrained Areas (SOM)

34.1 Problem / Opportunity

The NYISO is required to satisfy reliability criteria in New York City (NYC) to meet New York State Reliability Council (NYSRC) local reliability requirements (LRR) under certain conditions. These local requirements are modeled as capacity constraints, where resources may be committed at minimum generation, or satisfied through Day Ahead Reliability Unit (DARU) and Supplemental Reserve Evaluation (SRE) commitments. This treatment for managing LRR constraints has the potential to result in suboptimal price formation in NYC load pockets and a requirement for uplift payments to resources needed to maintain reliability.

Based on NYSRC rules, the NYISO is also required to ensure that transmission facilities are not loaded above their Long-Term Emergency (LTE) rating, post-contingency. In some cases within NYC, the NYISO is permitted to operate transmission facilities above LTE, using generating

capacity not otherwise scheduled to provide energy and phase angle regulator actions to quickly secure the transmission facilities, post-contingency. This offers opportunities to reduce production costs by relaxing the transmission limits of facilities that feed NYC load pockets. Currently, operating reserve providers in these NYC load pockets are not compensated for the avoided transmission congestion they enable by allowing certain facilities to be secured to a rating that is higher than LTE.

Today, the NYISO procures fixed quantities of operating reserves in specified regions across the state. Under this structure, the static modeling of reserve regions and their associated requirements does not reflect the flexibility of the grid to respond to system needs by utilizing the transmission system to import capacity into generation-constrained regions. As reserve regions become smaller, this static modeling can potentially lead to market inefficiencies and unnecessary price volatility.

The NYISO recently proposed to introduce a Zone J reserve region with 10 and 30-minute reserve requirements beginning in late-June 2019. The Zone J reserve region will provide region-specific market signals consistent with reliability needs in New York City. During 2019, the NYISO is also exploring the potential implementation of more granular reserve requirements within certain New York City load pockets that would better represent the value of short-notice resources in desirable locations. This evaluation will consider cost allocation and an approach to address potential mitigation concerns. As the implementation of load pocket reserve requirements is considered, a dynamic reserve procurement methodology that does not exist today would be useful to improve market efficiency, better aligning market outcomes with how the power system is operated, and avoid the potential for un-necessary price volatility.

34.2 Objective(s) & Anticipated Deliverable(s)

The deliverable for this effort in 2020 will be Study Complete. The study will seek to develop potential changes to the NYISO's market software such that the Energy market's economic optimization would more efficiently schedule operating reserves based on system conditions. Such enhancements would facilitate the capability for reserves to be scheduled in more cost-effective regions if sufficient transmission capability is available to deliver the reserves to another location/reserve region, post-contingency. This study will also evaluate potential ways to compensate operating reserve providers that help manage transmission congestion to determine if market incentives can be improved to maintain resource flexibility. Finally, the study will explore how to most efficiently incorporate the NYC load pocket reserve requirements expected to be developed in 2019 into the market software.

If the NYISO were to determine as a result of its study that the implementation of a dynamic reserve procurement methodology is not currently feasible, the NYISO would pursue alternative approaches to improving reserve procurement for constrained areas.

34.3 Project Justification

In 2015, the Market Monitoring Unit (MMU) recommended that the NYISO "[d]ynamically adjust operating reserve requirements to account for factors that increase or decrease the amount of reserves that must be held on internal resources [Recommendation 2015-16]." A dynamic reserve procurement methodology could improve market efficiency by scheduling reserves in a less expensive region using available transmission capability to import power into a more constrained region post-contingency, rather than hold reserves in the more expensive reserve area. By scheduling reserves dynamically, reserves could be shifted to resources in lower cost regions as transmission capacity is made available or shifted to resources that are not export constrained. Dynamic reserves present opportunities to enhance grid resilience, incentivize resource flexibility, lower total production costs, and increase efficiency in meeting applicable reserve requirements.

In the absence of an appropriate market product/construct, economic incentives for investment in resources capable of providing the required services within load pockets may be insufficient and/or fail to fully reflect the value of these services. As the grid evolves, this could eventually lead to insufficient availability of reserve capability in highly constrained areas of New York City as existing generation retires.

This project also considers two additional recommendations made by the MMU in past State of the Market Reports. In 2016, the MMU recommended that the NYISO "[c]onsider rules for efficient pricing and settlement when operating reserve providers provide congestion relief [Recommendation 2016-1]." Finally, in 2017, the MMU recommended that the NYISO "[m]odel local reserve requirements in New York City load pockets [Recommendation 2017-1]."

~~34~~35 Reserves for Resource Flexibility

~~34.1~~35.1 Problem / Opportunity

The 2017 Integrating Public Policy Market Assessment demonstrated that the volatility of NYCA load may increase significantly from one 5-minute real-time market interval to the next as more weather-dependent renewable resources are added to the grid. As load forecast uncertainty increases, it will become more important to ensure that adequate load following capability is available to instantaneously balance load and generation. The NYISO anticipates that intermittent generators will be able provide adequate down-ramp capability when needed, because both wind and solar units will be dispatchable in the future. However, a product that procures more up-ramp capability could confer significant operational benefits.

The NYISO currently procures the minimum amount of operating reserve required to meet applicable reliability requirements. With this project, the NYISO proposes to examine the potential to increase the amount of reserves procured, thus incentivizing resource flexibility to support grid reliability and improve grid resilience.

The 2018 Master Plan proposed further investigation into a "Flexible Ramping Product," as well as the procurement of additional reserves, under an initiative titled "Reserve Procurement for Resilience." Subsequent research into the flexible ramping products offered by other control areas and discussion with stakeholders led NYISO staff to conclude that these two project descriptions ultimately offered different ways of addressing the same market need for more up-ramp capability, which NYISO staff believes can best be achieved in the near-term by assessing changes to the amount of reserves procured.

~~34.2~~35.2 Project Objective(s) & Anticipated Deliverable(s)

The deliverable for this project in 2020 will be ~~an FRS~~Deployment. 2020 work will further develop the market design concept that is expected to be proposed in 2019 as part of the "Reserve Procurement for Resilience" project. Depending on the 2019 progress, 2020 efforts may include the development of a Market Design Complete presentation and ~~FRS~~functional requirements.

~~34.3~~35.3 Project Justification

Procuring additional reserves could yield more efficient market outcomes by enabling procurement of reserves to respond quickly to the volatility introduced by additional intermittent resources. This project will also support improved incentives for flexible resources and price signals that reflect the resource capabilities required to maintain reliability. By procuring reserves through the market and providing schedules for such service, resources are provided improved incentives for performance and to take the required actions to ensure availability of the capability procured.

~~35~~36 RTC-RTD Convergence Improvements (SOM)

~~35.1~~36.1 Problem / Opportunity

Differences in resource schedules and prices frequently occur between the NYISO's RTC and RTD programs. This divergence influences real-time price volatility and may result in sharp changes in constraint shadow costs or LBMPs. In addition, the look-ahead periods of RTC and RTD are relatively short (2.5 and 1 hours, respectively). As a result of their inability to predict the load shape for longer periods, RTC and RTD may not be capable of scheduling energy to meet load at the least cost in a future that is increasingly reliant on the strategic use of energy storage resources to manage multiple load peaks throughout the day.

A 2018 NYISO study of the drivers of divergences between RTC and RTD concluded that incremental changes to RTC and RTD could improve convergence marginally. The Market Monitoring Unit has also recommended incremental changes that could result in better price convergence. Significant improvements, however, would require a large redesign effort to

completely overhaul the structure of the NYISO's RTM software, in preparation for the grid of the future.

~~35.2~~36.2 Project Objective(s) & Anticipated Deliverable(s)

The 2020 deliverable for this effort is Study Complete. The NYISO will consider whether RTC and RTD are structurally capable of supporting the RTM market and grid operations in a future with more intermittent resources, higher forecast uncertainty, and a large swath of small distributed resources.

~~35.3~~36.3 Project Justification

The NYISO must prepare for significant grid changes that were not considered when RTC and RTD were designed. Failure to carefully review the fundamental structure of the RTM software could eventually lead to reliability concerns such as the failure to retain resources necessary to address intermittent volatility, and an increase in expensive out of market actions.

37 WEELR Participation Model

37.1 Problem / Opportunity

The NYISO is currently developing software for a dispatch-only Energy Storage Resource (ESR) participation model for Deployment in Q2 of 2020. The dispatch-only model considers an Energy Storage Resource to be available for all hours in which it submits a Bid and allows the resource to be dispatched in the full range between its maximum injection capability and maximum withdrawal capability, including to zero MW. The NYISO's use of a dispatch-only model aligns with the characteristics of the advanced storage technologies that are being contemplated for future Deployment in New York. These facilities are expected to be continuously dispatchable while they are participating in the NYISO-administered markets.

At the present time, there is one electric storage facility in the NYISO's markets that is eligible to submit start-up bids, to recover minimum generation costs, and to withdraw Energy as negative generation in the NYISO's markets. That resource is the Blenheim-Gilboa Pumped Storage Power Project ("Gilboa"), which has participated the NYISO's markets since their inception in 1999. Unlike a battery, Gilboa relies on enormous hydroelectric turbines to produce Energy and to pump water back into its reservoirs.

The NYISO's market and settlement systems are not presently designed to economically evaluate Bids to withdraw Energy or settle Energy withdrawals as negative generation at the generator bus for any resource other than the Gilboa pumped storage facility. The market and settlement software that NYISO developed to accommodate pumped storage as Withdrawal-Eligible Energy Limited Resource (WEELR) is specifically tied to the Gilboa unit's operation and to its associated generator buses. The existing software does not include the functionality to add new resources; not even resources that have operating characteristics similar to Gilboa's. Furthermore, the

current software design provides limited bidding flexibility that is sufficient for pumped storage, but that the NYISO no longer expects to be adequate to accommodate new storage technologies.

37.2 Project Objective(s) & Anticipated Deliverable(s)

The NYISO will define the market and settlement upgrades that would be necessary to enhance the existing software to permit the flexible scheduling and settlement of new Energy Limited Resources that withdraw Energy. Alternatively, if determined to be implementable through more research, the NYISO would expand the capabilities and attributes of its ESR participation model. The deliverable for this effort in 2020 will be Market Design Concept Proposed.

37.3 Project Justification

This project will contemplate market rules that would enable the NYISO to accommodate new, non-continuous, withdrawal-eligible Generators that have operating characteristics similar to the Gilboa pumped storage facility. Although no such projects are currently being developed for the bulk electric system in New York State, new technologies may require this functionality in the future. In addition, the development of an advanced WEELR participation model would help the NYISO develop a participation model capable of accommodating a broad range of Energy Storage Resources.

Planning Products

~~36~~38 Climate Change Impact and Resilience Study

~~36.1~~38.1 Problem / Opportunity

To inform the NYISO's planning, forecasting, and operations, as well as the development of wholesale market mechanisms to enhance grid resilience.

~~36.2~~38.2 Project Objective(s) & Anticipated Deliverable(s)

Phase II is expected to identify and examine impacts to the bulk power system under the conditions identified in Phase I that could potentially impact system stability and resiliency, focusing specifically on the ability of the system to meet NYCA load requirements and facilitate prompt system restoration in the event of an outage or disruption. The deliverable would be a reliability type analysis using the load forecasts from Phase I.

~~36.3~~38.3 Project Justification

Continuation of on-going project.

TCC Products

~~37~~39 On-Peak/Off-Peak TCCs

~~37.1~~39.1 Problem / Opportunity

The on-peak/off-peak TCC product is a desired featured requested by certain Markets Participants (MPs) who participate in the TCC auctions. The product would allow MPs to bid for TCCs that are effective only during on-peak hours, off-peak hours or a combination of both in the TCC auctions. Today, TCCs that are awarded are settled across all hours of a day during the time period in which the TCC is active. With the on-peak/off-peak option, MPs would be able to adjust their portfolios to hedge against congestion costs during on-peak or off-peak periods of a day. It is expected that on-peak/off-peak TCCs would be sold in multi-period style auctions. Other ISO/RTOs offer on-peak and off-peak Financial Transmission Rights.

~~37.2~~39.2 Project Objective(s) & Anticipated Deliverable(s)

This project includes working with stakeholders to develop market rule changes for incorporating on-peak/off-peak TCCs into TCC auctions

Completion of this project would define the following within the TCC market and related systems:

- TCC auction design to support the sale of on-peak/off-peak TCCs.
- Revenue allocation methodology adjustments to support on-peak/off-peak TCCs.

Due to the potential increased complexity of multi-period on-peak/off-peak TCC auctions, the implementation of the on-peak/off-peak TCC product may have a dependency on the automation of the ETCNL feasibility analysis process and the automation of an inventory system to calculate the remaining feasible ETCNL and Original Residual TCCs.

~~37.3~~39.3 Project Justification

The proposed solution is intended to:

- Generate more efficient market outcomes.
- Meet stakeholder expectations.

~~38~~40 Reserving Capacity for Balance-of-Period (BoP) Auctions

~~38.1~~40.1 Problem / Opportunity

The NYISO's tariffs require that all transmission capacity not associated with Existing Transmission Agreements or outstanding TCCs and not reserved through conversion of Existing Transmission Capacity for Native Load (ETCNL) to ETCNL TCCs or Residual Capacity Reservation Rights (RCRR) to RCRR TCCs be made available for sale in the Centralized TCC Auctions. Other

ISO/RTOs reserve some transmission Capacity for sale in their monthly Financial Transmission Right auctions.

~~38.2~~40.2 Project Objective(s) & Anticipated Deliverable(s)

This project includes working with stakeholders to develop market rule changes to accommodate the potential for reserving a portion of otherwise available transmission capacity for release in the BoP Auctions.

Due to the potential increased complexity that could arise from making less than the full quantity of the transmission capacity associated with ETCNL available for sale in the Centralized TCC Auctions, the implementation of reserving a portion of otherwise available transmission capacity for release in the BoP Auctions may have a dependency on the automation of the ETCNL feasibility analysis process and the automation of an inventory system to calculate the remaining feasible ETCNL

~~38.3~~40.3 Project Justification

Today the TCC Automated Market System and other supporting systems do not support the reservation of transmission Capacity for sale in BoP Auctions. Certain stakeholders have previously requested this capability.

The proposed solution is intended to:

- Generate more efficient market outcomes;
- Address stakeholder requests for such enhancements to the current TCC auction design; and
- Provide additional opportunities for interested parties to obtain shorter-duration TCCs.