2019 Master Plan

Reliability and Markets for the Grid of the Future

A Report by the
New York Independent System Operator

May 2019 Draft

Table of Contents

Introduction

The NYISO serves the public interest and provides benefit to consumers by fulfilling an array of essential responsibilities, which include reliable operation of New York's bulk power system, fair and open administration of competitive wholesale electricity markets, planning for the future of New York's power system, and advancing the technological infrastructure of the electric system serving New York. To meet evolving regulatory requirements, and expected technical, financial and market challenges, the NYISO has identified key strategic initiatives in addition to its core responsibilities and ongoing project plans, as described in this document.

Wholesale energy markets reflect the confluence of economics, technology, and public policy. Markets have successfully facilitated efficiency gains on the grid and cleaner energy production in the state since their inception. Those gains and improvements have been gradual as price signals have worked over time to influence more efficient (and often cleaner) generation, and investments in the grid that have further enabled energy production from cleaner resources. The NYISO views its markets as an effective platform for reflecting public policy and technological influences in an economically efficient manner to reliably meet consumers' energy needs.

The NYISO continues to be proactive in its efforts to harmonize wholesale markets and state policies while using markets to drive resource investment and performance. The NYISO also continues to provide authoritative information on bulk power system needs. The challenge for the NYISO will be to examine its market structures, rules, and operational and planning processes to develop a cohesive plan that supports the necessary incentives for investment in, and maintenance of, the types of resources and bulk power system upgrades needed to sustain reliability. The NYISO's Master Plan (Master Plan) for the wholesale markets details the plans to examine these market structures, rules and processes, and develop enhancements over the next five years that will help ensure the reliability and economic efficiency of the grid.

In producing this document, the NYISO aims to achieve three concurrent goals: establish a clear framework for achieving the NYISO's vision of the future wholesale markets; align the objectives for the next five years with the most recent Strategic Plan (2019-2023); and support annual stakeholder-driven project prioritization efforts. Together, these goals will help to synthesize a clear and direct path forward as we engage in transforming the grid and markets.

2019 Update

In previous years, the NYISO has examined "what" the future grid and corresponding wholesale markets may look like considering the opportunities and challenges in front of us. As part of the NYISO's commitment to the success of wholesale markets supporting the delivery of reliable electricity at the lowest cost to the consumers of New York, the NYISO is collaborating with its stakeholders to sharpen its focus on *Reliability and Market Considerations for a Grid in Transition*. This effort is designed to raise awareness of the operational and market challenges that New York's wholesale market may face as the State transitions to a cleaner and more decentralized grid with more uncertainty of supply and demand, due to the weather dependent nature of large-scale wind and rooftop solar, respectively. The first deliverable of this effort is a May 2019 whitepaper that discusses the challenges, identifies "no regrets" actions that should be taken now, and establishes considerations that will take more time to analyze and assess in collaboration with stakeholders.

The goal of this year's Master Plan is to establish the framework for continuing the work that the NYISO and its stakeholders believe will bring high value to the wholesale markets, while reconsidering some of the previous efforts that may no longer be as critical to pursue at this time given the shifts in public policies and technologies over the last year. Many of the projects included in this Master Plan are large efforts that were based on previous work that the NYISO and its stakeholders undertook to holistically examine whether the current constructs are effective in a future with significantly more renewable, distributed and demand-side resources. These projects include exploring ways for the markets and planning processes to provide effective signals that support the reliability needs of the grid in a future with more weather-dependent intermittent resources, how to integrate new technologies, and make considerations for fuel security of a fleet increasingly dependent on natural gas.

The Master Plan ties these initiatives into a cohesive five-year plan for our wholesale markets. With the help and input of our market participants, this document discusses the NYISO's recommendations for evolving the wholesale markets and planning processes that the NYISO administers. Projects discussed include those developed or suggested in one or more of the following publications or projects:

- Capacity Resource Performance in NYISO Markets (Analysis Group, November 2017)
- Carbon Pricing Proposal, (NYISO, December 2018)
- Constraint Specific Transmission Shortage Pricing (NYISO, September 2018)
- Distributed Energy Resources Roadmap for New York's Wholesale Electricity Markets (NYISO, December 2017)
- NYISO Management Response to Capacity Resource Performance (NYISO, February 2018)

- Power Trends 2019 (NYISO, May 2019)
- State of Storage (NYISO, December 2017)
- Wholesale Market Assessment of the Impact of 50% Renewable Generation, "2017 Market Assessment" (NYISO, December 2017),

The Master Plan establishes a strategic set of market reforms and planning process improvements that when executed effectively places the New York's wholesale electricity markets in the best position to attract and retain the needed resources and infrastructure to reliably operate the grid.

Project Initiatives

This Master Plan will continue to harmonize the NYISO's annual Strategic Plan with initiatives that improve New York's wholesale markets. The Strategic Plan is an important document that guides the NYISO's overall direction and establishes priorities and initiatives for the next several years; it should be considered in parallel to this document, which dives deeper into market design goals.

Each project included in this year's Master Plan was considered for how it advances one or more of the following three initiatives included in the Strategic Plan: Grid Reliability and Resilience, Efficient Markets for a Grid in Transition, and New Resource Integration. Many projects serve to advance more than one initiative, but for the purposes of this document, have been organized into one of the three categories.

Grid Reliability and Resilience

Maintaining power system reliability is the NYISO's primary responsibility in which wholesale markets play a critical role. Wholesale energy and capacity market products form price signals that indicate both current and future reliability needs, incentivizing both real-time performance and long-term investment. The changing portfolio of resources serving the electric needs of New York requires an ongoing review of the NYISO's existing market products and planning processes to ensure the continued ability to efficiently and reliably serve New York's electricity requirements. Projects categorized under this initiative serve to maintain reliability and efficient operation of the grid under normal, stressed and extreme conditions.

The NYISO is currently conducting a wide-ranging study to examine what market changes should be made to address potential operational gaps as New York State transitions to the grid of the future. The *Reliability and Market Considerations for a Grid in Transition* report (Grid in Transition report), will include suggestions for operating and market design changes that will better prepare the NYISO to maintain and enhance grid reliability and resilience. This report will identify opportunities and offer guidance as we transition to a future grid with increasing numbers of renewable resources, energy storage resources (ESR), distributed energy resources (DER), and changing load profiles. Fundamentally, the NYISO's planning processes and wholesale market prices must continue to identify and reflect the operational need of the grid.

RESILIENCE

FERC proposed definition in Docket No. AD18-7-000:

The ability to withstand and reduce the magnitude and/or duration of disruptive events, which includes the capability to anticipate, absorb, adapt to, and/or rapidly recover from such an event.

The NYISO believes the Grid in Transition report and the Master Plan are intricately linked in that findings from the Grid in Transition report will inform Master Plan projects, while the Master Plan will reflect the strategic market design and planning process efforts over the next several years. Some of the recommendations from the Grid in Transition report may become projects in the Master Plan going forward, or will lend support to existing projects within the Master Plan. The Grid in Transition report is currently being drafted, and will be updated as more information becomes available; the first release of a draft is anticipated in late May 2019.

Efficient Markets for a Grid in Transition

The addition of renewable resources, energy storage resources, and DER expected as a result of New York's Clean Energy Standard and other policy initiatives will create a more dynamic grid. Many of the projects discussed in the 2019 Master Plan are expected to improve market efficiency as we move towards this new, more dynamic paradigm. Some of the projects in this section are holistic evaluations of governing principles and frameworks of existing market constructs. *Improving Capacity Price Formation,* for example, includes exploring alternative slopes and shapes of the ICAP Demand Curves that may help stabilize capacity market pricing outcomes and improve the predictability of future market revenues as large quantities of new resources are deployed across New York State over the coming years. Other projects will evaluate and adjust today's market products to represent the challenges and opportunities presented by a changing grid, such as the *Tailored Availability Metric* which seeks to better incent performance during peak load hours through capacity payments.

In a future where energy prices may often be low or negative, more granular ancillary services price signals will be required to promote real-time performance. Some initiatives in this category will examine whether existing ancillary services products should be disaggregated or decoupled, such as *More Granular Operating Reserves,* which seeks to improve reserve procurement and price formation in constrained regions of the NYCA. *Ancillary Services Shortage Pricing* will consider whether current shortage pricing levels are adequate to incent investment in and/or retention of needed performance capabilities and promote real-time responsiveness.

Several proposed products and initiatives in this category will help support a changing grid by adding more flexibility to the Energy markets. As suppliers become increasingly comprised of weather-dependent renewable resources, flexible resources will be needed to balance intermittent generation. Incenting resource flexibility, which includes the ability to respond rapidly to dynamic system conditions, provide controllable ramp with fast response rates, and provide frequent startup/shutdown capability, will be key to future market enhancements at the NYISO. For example, *Reserves for Resource Flexibility* proposes to address this need through expanding the procurement of operating reserves that would support resources that can provide additional upward ramping flexibility.

New Resource Integration

Technological advancements and public policies, particularly Reforming the Energy Vision (REV) and the State's storage initiative, are encouraging greater adoption of DER, energy storage resources, and other new resource types to meet consumer energy needs. DER and energy storage resources offer the potential to make load and supply resources more dynamic and responsive to wholesale market price signals and system needs, potentially improving overall system efficiencies. Developing projects that capture the unique operating characteristics of these new resources will allow DER, energy storage resources, and aggregations to maximize wholesale market participation and improve the reliability and efficiency of New York's electric grid. This category of projects consists of designing the obligations and requirements for how these new resources will participate in the NYISO markets, and improving the processes for studying and interconnecting new resources.

Strategic Market Design Concepts and Plans

Proposed Project Timelines

Finally, this document also serves to support the annual stakeholder-driven project prioritization effort. The project prioritization process engages stakeholders to collaboratively determine which projects the

NYISO will devote its resources to in the next year. While the process is effective and useful in receiving input from stakeholders, it can be difficult to develop a larger, multi-year plan from the process. This document aims to fill that gap by providing a snapshot of what the NYISO sees as the most important projects over the next several years. The Master Plan is in no way meant to replace, circumvent, or reduce the project prioritization effort in anyway.

This document suggests timelines for product development and identifies target dates for key milestones. These standard definitions for typical NYISO project milestones directly correspond to those used in the project prioritization process and are provided below for the reader's convenience.[1] Some project phases may require more time to complete than others, depending on the nature of the topic and complexity of the solution.

Study Defined: The scope of work for the study has been presented to stakeholders, including a discussion on the necessary input(s), assumption(s) and objective(s) of the study.

Study Complete: Scope of work to be performed has been completed; results and recommendations have been presented to the appropriate Business Owners and stakeholders.

Market Design Concept Proposed: NYISO has initiated or furthered discussions with stakeholders that explore potential concepts to address opportunities for market efficiency or administration improvements.

Market Design Complete: NYISO has developed with stakeholders a market design concept such that the proposal can be presented for a vote at the Business Issues Committee (BIC) and/or Management Committee (MC) to define further action on the proposal.

Functional Requirements: NYISO has completed documentation of the functional requirements (FRS) and the Business Owner has approved.

Development Complete: Software development has been completed, packaged and approved by the Supervisor.

Deployment: Required software changes to support commitment have been integrated into the production environment.

The Master Plan provides project timelines for informational purposes only, with several important caveats. First, the project milestones are recommendations only and will assist with longer term planning. Projects will be selected through the stakeholder prioritization process, which takes place annually in the NYISO's Budget and Priorities Working Group (BPWG).

[1] These milestone definitions are consistent with those used by the NYISO's Budget and Priorities Working Group.

Second, as part of market design development, extensive analysis is conducted to determine whether each product is needed and what value it would have for the markets and consumers, so that the NYISO can make an informed recommendation to stakeholders prior to a BIC vote. As a result of such analysis, the NYISO may recommend that certain designs not move forward to implementation. This document should not be viewed as a commitment to complete any of the projects discussed herein.

The Master Plan attempts to strike a balance between aggressive pursuit of market evolutions to meet the future needs of the grid, and the time necessary to thoroughly develop and evaluate the market designs. The NYISO understands the stakeholders' expectations to allocate sufficient time to develop a market design, evaluate its effectiveness, and analyze any other implications.

After careful examination of each project's intended benefits and potential impact to the market, there are some projects that were in the 2018 Master Plan but are excluded from this year's plan. Some of these projects no longer help drive toward the improvements that the NYISO is targeting or were excluded due to resource constraints imposed by other, more impactful projects.

Anticipated Project Benefits, Effort and Dependencies

Along with the project timeline, the NYISO is including a discussion of each project's anticipated benefits and level of effort to drive to completion. The intention in describing both the benefit to the NYISO market and effort required is to better communicate the level of internal resources needed to achieve each project's stated goals, and how impactful those goals are to the overall market. Each project will be rated from Low to High for both "benefits" and "effort", based on the criteria discussed below. Three projects, *Reliability and Market Considerations for a Grid in Transition, Enhancing Fuel and Energy Security,* and *Comprehensive Mitigation Overview* have not been scored for their benefits and effort at this time, as they represent ongoing studies that may result in market design or operational recommendations. Without knowing what those recommendations will be, if any, it is difficult to anticipate the benefits or effort of projects that may arise from those studies.

Benefits

Some of the projects in which the NYISO engages focus on enhancing a specific segment of the market while others are wide-ranging revisions that broadly impact market participants. Each project included in this Master Plan, with the exception of the three noted above, has been rated from Low to High to convey how much impact the NYISO believes each individual effort will have on the market. Projects with a High level of benefit are broad efforts that have the potential to impact a wide-range of market outcomes and grid reliability; examples of High benefit projects include the *Reserves for Resource Flexibility* and *Carbon Pricing*.

Projects with a Medium benefit are typically more focused enhancements that improve specific operating areas and products, such as *Enhanced Fast Start Pricing*. Considering the strategic nature of this plan, no Low benefit projects are included in the Master Plan.

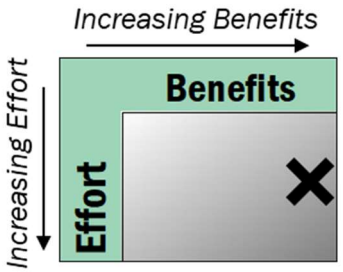
Effort

Along with the benefits of each project, the NYISO has also included a discussion on the level of effort required to achieve the stated goals of each project. Effort can vary not only from project to project, but within the different parts of each project. For example, some projects have lengthy market design phases with little to no implementation time required, such as the *Comprehensive Mitigation Review*. By contrast, other projects may require more extensive stakeholder discussions of the market design issues and have complex implementation considerations, such as the *DER Participation Model*. These projects affect many different markets (such as capacity, energy and ancillary services) and systems (from bidding and scheduling to settlements), which require significant software development, and quality assurance testing before they are deployed for use in a zero downtime environment.

A High level of effort typically requires a large amount of NYISO and/or stakeholder resources over a period of four of more years; a Medium level of effort can typically be focused on a specific team or department within the NYISO or be taken from design through implementation in two to three years; a Low level effort may already be underway with only a few steps required to complete the effort, and typically can be completed within two years. The number of years anticipated for a project is not expected to be the sole determinant of effort, but meant to help guide the expectation of how much effort a specific project will take. Other factors, such as the number of people working on and amount of resources dedicated to a specific project will also impact the effort rating.

Matrix

To better visualize the interplay of benefits and effort for each project, the NYISO has included a matrix along with each project timeline. This matrix captures the designation of High, Medium and Low for both benefits and efforts: benefits are depicted on the horizontal axis and effort is depicted on the vertical axis. The "X" designates where on this matrix the specific project falls, benefits increase as the "X" moves right, and effort increases as the "X" moves down, following the gradient to show more benefits and effort.



This project has High Benefits and Medium Effort

Dependencies

Project dependencies are an important consideration when deciding how to prioritize projects, and many projects included in the Master Plan have either design or implementation considerations or both. For example, *Constraint Specific Transmission Shortage Pricing* should be completed after both *Ancillary Services Shortage Pricing* and *Reserves for Resource Flexibility*. In this case, it would be best to finish the latter two projects, which impact reserve procurement pricing, before beginning *Constraint Specific Transmission Shortage* Pricing, as transmission shortage pricing will be informed by the changes to reserve pricing.

Other projects have significant implementation dependencies. For example, the *DER Participation Model* is dependent on the successful, timely implementation of several other projects, such as the *ESR Participation Model, Meter Service Entity for DER,* and *Expanding Capacity Eligibility*. The *DER Participation Model* will require significant software development to facilitate the integration of new resources, and proper sequencing of the different aspects will help to expedite the process and ensure the complete market design performs as expected. Dependencies are discussed in detail within each of the project descriptions.

2019 Master Plan

Grid Reliability and Resilience	2019	2020	2021	2022	2023	2024
1 Comprehensive System Planning Process Review	MDC					
Reliability and Market Considerations for a Grid in Transition						
2 Further Discussions on Concepts Proposed in Grid in Transition Report	Ongoing					
3 Development of Potential Projects Resulting from Concepts Proposed		Ongoing				
Enhancing Grid Resilience						
4 Enhancing Fuel and Energy Security	SC	Ongoing				
5 Reserves for Resource Flexibility [8][2]	CP	DEP				
6 Large-Scale Solar On Dispatch		MDC	DEP			
Efficient Markets for a Grid in Transition	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**
7 Carbon Pricing	MDC	DC	DEP			
Evolution of Ancillary Services						
8 Ancillary Services Shortage Pricing [5]	SC	DEP				
9 More Granular Operating Reserves [8, 5, 10]	MDC					
10 Reserve Enhancements for Constrained Areas [7, 9, 20, 22]		SC	FR	DC	DEP	
Enhancing Locational Price Formation						
11 Constraint Specific Transmission Shortage Pricing [5, 8]	MDC		DC	DEP		
12 Enhanced Fast Start Pricing	FR	DEP				
Reliability Value of Resources						
13 Demand Curve Reset [16, 17]	SD	SC			SD	SC
14 Expanding Capacity Eligibility/Capacity Value Study	FR	DC	DEP	SD	SC	
15 Tailored Availability Metric	CP	FR	DEP			
Capacity Market Fundamentals						
16 Improving Capacity Price Formation			SC	MDC	DC	
17 Capacity Zone Evaluation			SC	CP	MDC	DC
18 Comprehensive Mitigation Review		SD	SC	MDC	DEP	
New Resource Integration	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**
19 Class Year/Interconnection Queue Redesign Review	DEP					
New Resource Participation Models						
20 Energy Storage Resource Participation Model [25]	DC	DEP				
21 Hybrid Storage Model [22]		MDC	FR	DC	DEP	
DER Integration						
22 DER Participation Model [14, 20, 24, 25]	FR	DC	DEP			
23 NYISO Pilot Framework	SC	SC				
24 Meter Service Entity for DER		FR	DEP			
25 Dual Participation [20]	DC	DEP				

Ongoing	Additional Work Anticipated, Not Yet Defined
SD	Study Defined
SC	Study Complete
CP	Market Design Concept Proposed

MDC	Market Design Complete
FR	Functional Requirements
DC	Development Complete
DEP	Deployment

[2] Numbers shown in brackets are project dependencies. For example, the *Hybrid Storage Model* is dependent on completion of the DER Participation Model.

Grid Reliability and Resilience

Comprehensive System Planning Process Review

This project continues the effort that started in 2018 to review the comprehensive system planning process, and identify measures that could lead to more efficiently addressing the reliability, economic, and public policy needs through an integrated process.

Problem Statement

As currently designed, the NYISO's Comprehensive System Planning Process (CSPP) Review identifies and addresses reliability, economic and public policy needs through three separate processes. Due to the evolution of the grid, power markets, and regulatory concerns as noted below, it is necessary review the CSPP and consider all of these needs in a more holistic manner.

Background

The NYISO's current CSPP has evolved over time. It began with the first approval for the reliability planning process by FERC in 2004, and subsequently expanded to address FERC Order 890 and FERC Order 1000. Today, the various components of the CSPP, namely reliability, economic, and public policy planning, build off of each other by using the resulting plans and databases from other processes at the initial kickoff stage, but subsequently each component is relatively independent when identifying system issues and seeking solutions.

New York's bulk power system has continued to age and new public policy and regulatory initiatives have emerged. As a result, the NYISO's CSPP will need to be more agile to respond to new challenges to New York's bulk power system. Over the next ten years, it is likely that old generators will retire at an accelerated rate due to state DEC proposals and CES mandates. Transmission needs are likely to change due to several factors including aging infrastructure, changes to generation, and the potential rapid emergence of DER on both the transmission and distribution system. Overall, the system needs are likely to be driven by multiple factors, and not as independent as historically they have been.

Project Scope

2019	2020	2021	2022	2023	2024		Benefits
Market Design Complete						Effort	✕

During 2018, a conceptual strawman proposal to address the challenges described above was presented to stakeholders. In 2019, this project will continue to be refined and develop the initial proposal as well as

develop tariff language to support the redesigned CSPP. Specific deliverables include:

- Continue developing revisions to the existing CSPP to simultaneously consider needs driven by reliability, economic, and public policy considerations.
- Ensure that the final solution addresses the entire planning horizons.
- Work through the stakeholder process to develop revised tariff language to support changes to the CSPP.
- File revised tariff language with FERC prior to the end of 2019.

Benefits & Effort

This is a **high benefit** project that will streamline the various aspects of the current planning process into one cohesive process. The NYISO believes that considering reliability, economic and public policy planning needs under a single integrated process will improve the planning process by allowing greater flexibility to respond to changing conditions and by fully recognizing the value of proposed projects that address multiple planning needs (reliability, economic, and/or public policy).

The effort required to continue the conceptual redesign of the CSPP will be moderate. Diagrams of the proposed process have been shared with stakeholders. The effort to draft the revised tariff language to support the needed changes to the CSPP will be intense. Due to the limited number of stakeholder meetings available, it will be necessary to develop and follow a rigorous schedule to complete the work of drafting the tariff language and following the stakeholder process prior to filing. Overall, this is a **medium effort** project, with the bulk of the work to be completed this year.

Dependencies

There are no dependencies for this project.

Reliability and Market Considerations for a Grid in Transition

As discussed above, the *Reliability and Market Considerations for a Grid in Transition* study is an ongoing effort from which we expect to have several project recommendations that will be included in the Master Plan. The goals of this study are to identify what market changes might be prudent in order to support reliability, efficient markets, and investment given the expected future resource mix. With the integration of more intermittent resources, reliability risks may no longer be concentrated in peak load hours, but rather shifted to periods with low wind and solar generation, or rapid or unexpected ramps in load. This study aims to shape how the NYISO should structure markets in the future to support the entire fleet and maintain reliability, given expected shifts in market revenues and the evolving value of various resource attributes.

Project Scope

2019	2020	2021	2022	2023	2024
Study Complete	Ongoing				

The NYISO expects this study to be completed during 2019, at which point discussions will begin with stakeholders about the concepts proposed in the study. It is likely that projects, which may be included in future Master Plans, will develop as a result of this study and subsequent discussions; however, it is difficult to anticipate what those projects, and respective milestones, would be at this time. Therefore, the NYISO has designated the period through 2023 as "Ongoing" to reflect that additional work resulting from this study will be performed, without being able to clearly articulate the specific project work. As projects that result from the report's recommendations crystallize, will be updated.

Enhancing Grid Resilience

Enhancing Fuel and Energy Security

This project seeks to enhance NYISO markets to provide for anticipated generating fuel needs, which will support grid reliability.

Problem Statement

New York's power grid is anticipated to face increased challenges associated with the generating fleet transitioning towards more renewable and natural gas resources. Increased dependency on natural gas and intermittent technologies creates an elevated risk to system reliability if those fuel supplies were to be interrupted. The 2019 Analysis Group (AG) Study on Fuel and Energy Security will help inform these concerns by examining various scenarios that could put strain on fuel and energy security in New York.

Background

The objectives of this project are to explore and develop any market design and/or operational enhancements that may be prudent in response to conclusions from the 2019 AG Study on Fuel and Energy Security assessment. These efforts would examine potential adjustments to market structures and/or operational practices that could enhance incentives for maintaining system security given the possibility of fuel supply deficiencies.

Work under this project would be necessary to complete a market design that encompasses any recommendations from the 2019 AG Study on Fuel and Energy Security aimed at promoting grid reliability. Market design efforts for this project would seek to bolster New York's preparedness for an altered resource portfolio by adjusting the markets to embrace future challenges that could arise with respect to fuel supply

security.

Project Scope

2019	2020	2021	2022	2023	2024
Study Complete	Ongoing				

The 2019 AG Study on Fuel and Energy Security is planned to be completed in 2019. Timeline and scope for this project are unknown until the conclusion of the study. If additional project work is deemed necessary, it will likely take several years to complete.

Reserves for Resource Flexibility

This project seeks to encourage resources to provide additional upward ramping capability, which will improve grid reliability and flexibility.

Problem Statement

The 2017 Market Assessment demonstrated that the volatility of the net 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 maintain adequate load-following capability to instantaneously balance load and generation. The NYISO anticipates that intermittent generators will be able provide adequate downward ramping capability when needed, because both wind and solar units will be dispatchable in the future. However, a product that procures more upward ramping capability could confer significant operational benefits.

Background

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 quantity of reserves procured, thus encouraging resource flexibility to support grid reliability and improve grid resilience. Procuring additional reserves will yield more efficient market outcomes by enabling the NYISO's energy markets to respond quickly to the volatility introduced by additional intermittent resources.

The 2018 Master Plan proposed further investigation into a "Flexible Ramping Product," as well as the procurement of additional reserves, under the project 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 upward ramping capability. NYISO staff believes this need can best be achieved in the near-term by modifying the NYISO's reserve procurement requirements. The Flexible

Ramping product that was discussed in the 2018 stakeholder process would procure additional up-ramp on a longer time horizon than 10- and 30-minute reserves, and could be introduced in the future as the need arises.

This project will help the NYISO integrate large amounts of renewable generation and continue to meet stringent reliability standards economically.

Project Scope

2019	2020	2021	2022	2023	2024		Benefits
Concept Proposed	Deployment					Effort	✕

The NYISO is developing a Market Design Concept Proposal for this project in 2019. It is expected that, pending stakeholder approvals, this project could be accelerated for deployment in 2020. In order to achieve this milestone, the following deliverables will need to be completed prior to deployment:

- Market Design Complete presentation to MIWG, BIC, and MC to include consumer impact analysis and tariff revisions
- Tariff filing with FERC under FPA Section 205
- FRS
- Software development
- Testing

Benefits & Effort

This project is expected to provide **high benefits**, because additional upward ramping capability would enhance the NYISO's ability to more effectively manage the transmission system and real-time operations uncertainty. Additionally, providing resources with a reserve schedule incents those resources to take additional steps to prepare for conversion from reserve to energy; these steps, such as managing fuel and conducting maintenance, increasing the likelihood that resources will be able to perform when called upon. Procuring additional reserves would also allow the NYISO to introduce more gradual demand curve steps, signaling an approaching shortage of reserve procured for the minimum reliability standards as the system becomes more constrained.

It is expected that these deliverables will require **low effort** because the software changes anticipated are small and could be completed in one year.

Dependencies

NYISO staff recommends that this initiative be developed and deployed in parallel with the *Ancillary*

Services Shortage Pricing effort because of the potential for both projects to alter the NYISO's Operating Reserve Demand Curves. *Reserves for Resource Flexibility* and *Ancillary Services Shortage Pricing* have been included in the ongoing project prioritization process with proposed milestones of deployment in 2020. In order to deploy both projects in 2020, the remaining market design tasks would require dedicated resources in 2019 and 2020.

Large Scale Solar on Dispatch

This project seeks to place front-of-the-meter solar resources on dispatch in the NYISO's energy markets, so that they can provide downward ramping capability when necessary and improve operational flexibility.

Problem Statement

The participation of front-of-the-meter solar installations in the NYISO's wholesale markets is expected to grow significantly in the coming years; there are currently more than 75 large solar projects in the NYISO's interconnection queue, totaling more than 4,000 MW.[3] While solar technology can offer many benefits, it can also pose challenges to reliable grid operation due to its variable nature. Indeed, the NYISO already contracts with solar forecasting entities to provide predictions of output from such resources. As higher levels of intermittent resources like solar connect to the grid, it will be important to have appropriate market mechanisms to manage this variability with flexible resources that can follow a dispatch signal.

Background

In preparation for this shift in the resource mix, the NYISO implemented tariff revisions in 2018 to better accommodate front-of-the-meter solar generators.[4] As a result of those efforts, front-of-the-meter solar plants are now required to provide meteorological data and pay a forecasting fee to cover the NYISO's costs to procure a unit-specific forecast. Similar requirements also exist for wind generators today.

Solar resources have a demonstrated ability to reduce their output in response to a dispatch signal, and the NYISO seeks to implement this capability within its energy markets. The NYISO recommends that front-of-the-meter solar resources be treated on an equivalent basis to wind resources in NYISO-administered markets. This would require solar plants to submit flexible offers that indicate their willingness to generate at various price levels, and to receive and respond to economic dispatch instructions to curtail output. Like wind plants, the NYISO proposes that solar plants meeting these requirements retain eligibility for

[3] For more information, see *Power Trends, New York's Dynamic Power Grid*, NYISO (April 2018), available at this link: https://www.nyiso.com/documents/20142/2223020/2018-Power-Trends.pdf/4cd3a2a6-838a-bb54-f631-8982a7bdfa7a

[4] See FERC approval of NYISO filing of Services Tariff revisions addressing forecasting data requirements and service costs for solar resources in the New York Control Area, FERC Docket No. ER18-1408-000

Compensable Overgeneration payments and be exempt from Persistent Undergeneration charges.

Project Scope

2019	2020	2021	2022	2023	2024	Benefits
	Market Design Complete	Deployment				Effort ✕

This project will develop detailed requirements for treating solar resources as dispatchable in the NYISO energy markets, similar to the model currently in place for wind resources. A completed market design will be presented to stakeholders and the Board, along with tariff revisions, approximately 6 months prior to deployment. Deliverables to be completed prior to deployment will include:

- Market Design Complete presentations to MIWG, BIC, and MC to include consumer impact analysis and tariff revisions
- Tariff filing with FERC under FPA Section 205
- FRS
- Software development
- Testing

Benefits & Effort

This project is expected to offer **high benefits** because placing front-of-the-meter solar resources on dispatch would positively influence price formation, grid reliability, and resource flexibility. The ability to dispatch front-of-the-meter solar resources would reduce less efficient out of market actions by (1) enabling solar plants to indicate their economic willingness to generate, (2) identifying the most efficient resources to limit during overgeneration events, (3) minimizing the duration of necessary energy curtailments, and (4) incorporating NYISO dispatch instructions into market clearing prices. The ability to send an economic market basepoint to a solar resource to reduce its output in response to system needs would also increase reliability, decrease total production cost, and increase system ramp capability by enabling solar suppliers to provide down ramp.

Because this project would require limited software changes, its completion is expected to require **low effort**. At such time that this project is prioritized, it could be implemented in less than one year.

Dependencies

This project does not share any dependencies with other projects. The NYISO recommends that the market rule changes needed to place solar on dispatch be implemented in a few years, subject to the necessary stakeholder, NYISO Board, and regulatory approvals. The necessary tariff and software changes

can be prioritized beyond the immediate short term because the impact of large-scale solar installations will be minimal for the next several years as proposed projects begin construction.

Efficient Markets for a Grid in Transition

Carbon Pricing

The NYISO's Carbon Pricing proposal seeks to harmonize New York State (NYS) public policy and the NYISO's wholesale markets by incorporating the social cost of carbon dioxide ("carbon") emissions when scheduling resources through the energy markets.

Problem Statement

New York State (NYS) public policy in recent years has been to promote carbon-free resources through the Clean Energy Standard.[5] 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 abatement options and send effective price signals to retain needed units to sustain the reliable operation of the grid.

Background

In 2017, the Brattle Group published a report detailing how pricing carbon into the NYISO's wholesale markets could help to harmonize wholesale markets with New York State's public policies. After the report was published, a NYISO, NYSERDA, and DPS 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, which outlines a potential approach to capture the social costs of carbon emissions in the wholesale electricity markets to provide a market-oriented, cost effective approach to harmonize state policy and the NYISO markets.

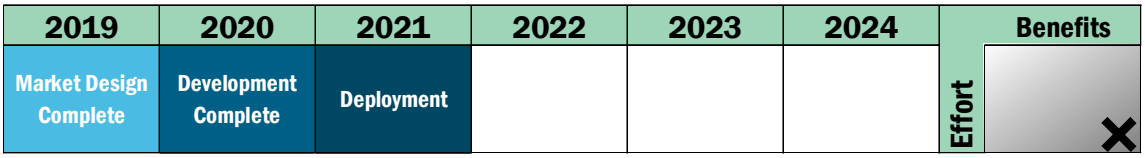
Carbon pricing will charge generators for their carbon emissions, while allowing these generators to include the carbon charge within their offers. Under the proposal, the NYISO would continue to commit and dispatch resources to meet load; however, the resulting energy prices would be higher as a result of incorporating the price of carbon emissions. The carbon charge collected from generators would ultimately be returned to Load Serving Entities (LSEs).

Currently, the social cost of carbon is not reflected within the NYISO markets, thus resources compete

[5] New York Public Service Commission, *Order Adopting a Clean Energy Standard*, Issued and Effective August 1, 2016. Available at http://documents.dps.ny.gov/public/Common/ViewDoc.aspx?DocRefId=%7B44C5D5B8-14C3-4F32-8399-F5487D6D8FE8%7D .

mainly on fuel costs. Implementation of the NYISO's carbon pricing proposal will allow resources to compete on emissions costs, in addition to fuel costs.

Project Scope



In 2019, the carbon pricing proposal is being vetted through the NYISO's working group process, targeting a goal of market design complete. The NYISO will be looking for agreement from New York State, followed by approval from stakeholders, the NYISO Board, and FERC on the NYISO carbon pricing proposal. In addition to all necessary approvals, the following deliverables will need to be completed prior to deployment:

- Market Design Complete presentations to MIWG, BIC, and MC to include consumer impact analysis and tariff revisions
- Tariff filing with FERC under FPA Section 205
- FRS
- Software development
- Testing

Benefits & Effort

Carbon Pricing is expected provide a way to advance New York State public policy goals at lower cost. This project is therefore expected to yield **high benefits**.

Though the proposed pricing methodology is expected to work well within the NYISO's existing market structure, significant upgrades to software and the ISO procedures will be necessary to implement Carbon Pricing. The NYISO anticipates approximately two years to develop, test, and deploy once the design is approved. It is therefore expected that the Carbon Pricing initiative will require **high effort** to complete.

Dependencies

Due to the significant development effort that will be required to implement Carbon Pricing, the NYISO recommends that it be deployed no sooner than Q2 2021, after the EMS/BMS system upgrade and the ESR participation model have been completed. Additionally, the NYISO is looking to achieve alignment with stakeholders and New York State before filing with FERC, which may impact the timing of this project.

Evolution of Ancillary Services

Ancillary Services Shortage Pricing

The purpose of this project is to evaluate the NYISO's Ancillary Services shortage pricing values, considering the implications of the grid of the future and the payment incentives in neighboring markets, including pay-for-performance capacity market designs.

Problem Statement

The 2017 Market Assessment demonstrated increased system volatility as output from intermittent generators changes and the power system has to respond quickly to un-forecasted changes in generation. Resource flexibility and responsiveness are increasingly important to maintain system reliability in a future of increased system volatility. Therefore, the NYISO is considering re-evaluation of its Ancillary Services shortage pricing values.

Background

Performance incentives in neighboring ISO/RTO regions indicate that a review of the NYISO's current Ancillary Services shortage pricing values could offer significant value. For example, neighboring ISOs/RTOs have introduced capacity market performance incentives that are expected to financially reward resource performance during critical operating periods. Shortage pricing for Ancillary Services performs a similar function in the NYISO markets.

Because the NYISO's market software makes tradeoffs between Energy and Ancillary Services products and transmission limitations based on pricing levels and other constraints, the relative value of Ancillary Service shortage prices from one product to another should be reassessed as the NYISO moves towards a future with high penetration of intermittent generation.

Project Scope

2019	2020	2021	2022	2023	2024		Benefits
Study Complete	Deployment					Effort	✕

In 2019, the NYISO is conducting a study of Ancillary Services shortage pricing. As part of that effort, the NYISO will review its pricing practices during Thunderstorm Alert (TSA) events and scarcity events. NYISO staff intends to propose revisions to the current pricing values and develop corresponding market rule changes. Pending stakeholder, NYISO Board, and regulatory approvals, the NYISO recommends that this market design project be accelerated for deployment in 2020. The following deliverables will need to be completed prior to deployment:

- Revision of market design to reflect any changes resulting from the dependent Ancillary Services

projects.

- Market Design Complete presentation to MIWG, BIC, and MC to include consumer impact analysis and tariff revisions
- Tariff filing with FERC under FPA Section 205
- FRS
- Software development
- Testing

Benefits & Effort

This project will help to prepare for a future where a significant number of generation assets are intermittent and weather-dependent. Higher Ancillary Services shortage pricing values can help incentivize resource flexibility, support grid reliability during critical operating periods and appropriately reflect the incremental value of Ancillary Services. This is expected to be a **high benefit** project for its impact on price formation. The Market Monitoring Unit, the NYISO Management Response to Capacity Resource Performance, and the 2017 Market Assessment all identify appropriate Ancillary Services shortage pricing values as beneficial to efficient market outcomes.

The NYISO anticipates that this project will require a total of two years to complete from the initial study to deployment, and it is therefore classified as **low effort**. This topic will require substantive research and analysis and stakeholder discussion during both the study and market design phases. It is anticipated that the study complete milestone and market design milestones will take approximately one year to complete with normal resourcing considerations and a hired consultant. Once the market design is complete, the NYISO anticipates that software changes and deployment could be completed within one year.

Dependencies

As part of this project, the NYISO will consider the interaction of Operating Reserve, Regulation Service and Transmission Shortage Cost pricing levels, to ensure that they appropriately reflect tradeoffs between market products under various grid conditions. The NYISO recommends that market designs for *Constraint Specific Transmission Shortage Pricing* and *More Granular Operating Reserves* be completed after *Ancillary Services Shortage Pricing* because these projects will affect the efficiency of wholesale energy price formation. Please see the discussions of those projects for more information about their dependencies.

NYISO staff also recommends that this initiative be developed and deployed in parallel with the *Reserves for Resource Flexibility* effort because of the potential for both projects to alter the NYISO's Operating Reserve Demand Curves. *Reserves for Resource Flexibility* and *Ancillary Services Shortage Pricing* have been included in the ongoing project prioritization process with proposed milestones of deployment in 2020. In order to

deploy both projects in 2020, the remaining market design tasks would require dedicated resources in 2019 and 2020.

More Granular Operating Reserves

This project seeks to establish a new operating reserve region for Load Zone J in 2019 and propose future enhancements to reserve procurement in constrained load pockets of New York City (NYC).

Problem Statement

New York State Reliability Council (NYSRC) reliability rules require that certain quantities of reserved be held within New York City.[6] The NYC load zone (Zone J) is not currently modeled as an independent reserve region in the NYISO's market software. The existing practice is to review market results and if the reserve requirements for Zone J have not been satisfied, the NYISO coordinates with the local transmission owner to take manual actions to procure additional reserves in Zone J. A locational reserve region for Zone J, together with the associated 10-minute and 30-minute reserve requirements, could incentivize resource flexibility, support grid reliability, and provide location specific market signals.

The NYISO is also required to satisfy reliability criteria in NYC to meet NYSRC reliability requirements for local areas under certain conditions.[7,8] These local requirements are not expressly modeled in the market software, and can, therefore, require the need for out-of-market commitments. In the absence of a market mechanism, economic incentives for investment in resources in load pockets capable of providing the required reserves are muted. As the grid evolves, this could eventually lead to insufficient availability of reserve capability in constrained load pockets of NYC.

Background

The NYISO Management Response to Capacity Resource Performance and the Market Monitoring Unit recommend that the NYISO consider establishing and securing a separate 10-minute reserve requirement for New York City.[9, 10] In Q1 2019, the NYISO proposed a market design to establish a Zone J Operating

[6] See New York State Reliability Council, Reliability Rules and Compliance Manual, September 8, 2017, version 41, rules G.1 B.R3, available at the following link: http://www.nysrc.org/pdf/Reliability%20Rules%20Manuals/RRC%20Manual%20V41.pdf

[7] See *More Granular Operating Reserves,* NYISO (MIWG, June 13, 2018), available at this link: https://www.nyiso.com/documents/20142/1403334/More%20Granular%20Operating%20Reserves%20June%202018%20MIWG%20FINAL.pdf/e2d1b1e5-c5c6-b9a8-73fe-13bcfccac7ee

[8] See *TO Applications of NYSRC Reliability Rules*, available at this link: https://www.nyiso.com/documents/20142/1406014/reliability_rules_2_2003.pdf/d2d643c8-18a6-3565-50c7-d8965b62ffd1

[9] See Management Response to the Analysis Group's Report Capacity Resource Performance in NYISO Markets: An Assessment of Wholesale Market Options, NYISO (February 2018) p. 2, available at this link: https://www.nyiso.com/documents/20142/1395217/Performance%20Assurance%20Management%20Response%20Feb%2021%20%20MIWG%20FINAL.PDF/67b61532-490d-5562-a493-c32dc3514004

[10] See Recommendation 2017-1 in 2017 State of the Market Report for the New York ISO Markets, Potomac Economics (May 2018) p. 97, available at this link: https://www.nyiso.com/documents/20142/2223763/2017-State-Of-The-Market-Report.pdf/cd4ee8a0-1989-dfa0-b53e2d642c65e46d

Reserve region. This effort received stakeholder support at the March 2019 BIC and MC meetings.[11] Pending FERC approval, the NYISO plans to introduce a new Zone J reserve region with 10 and 30-minute reserve requirements in June 2019. The requirements will establish procurement targets for 1,000 MW of 30-minute reserves and 500 MW of 10-minute total reserves within New York City. This effort will enhance the location-specific value of maintaining short notice responsive resources in desirable locations, and incent improved performance by providing resources with schedules for the reserves procured in response to the in-city requirements.

The Market Monitoring Unit also recommends that the NYISO model local reserve requirements in NYC load pockets.[12] In 2019, the NYISO and its stakeholders are exploring the development of more granular reserve requirements for load pockets within NYC and considering how to incorporate such requirements into the market software. Exploring load pocket reserve requirements builds upon the development of Zone J Operating Reserve requirements by enhancing the location-specific value of maintaining short notice responsive resources in constrained load pockets in NYC. This effort was also identified as beneficial in both the NYISO Management Response to Capacity Resource Performance and the 2017 Market Assessment.

The Market Monitoring Unit has also expressed concern that some reserve providers may routinely underperform. As part of this project, NYISO and stakeholders will review existing practices and resource performance to determine whether operating reserve resources are provided appropriate incentive to perform.[13]

Project Scope

2019	2020	2021	2022	2023	2024		Benefits
Market Design Complete						Effort	✕

As part of the June 2019 implementation, operating reserve demand curves that assign a $25/MWh value to each Zone J reserve product will be established. As part of ongoing 2019 efforts related to the *Ancillary Services Shortage Pricing* project, NYISO staff and stakeholders will assess potential further enhancements to the proposed Zone J reserves implementation, including potential changes to the operating reserve

[11] See *Establishing More Granular Operating Reserves*, NYISO (Management Committee, March 27, 2019), available at this link: https://www.nyiso.com/documents/20142/1403334/More%20Granular%20Operating%20Reserves%20June%202018%20MIWG%20FINAL.pdf/e2d1b1e5-c5c6-b9a8-73fe-13bcfccac7ee

[12] See Recommendation 2017-1 in *2017 State of the Market Report for the New York ISO Markets*, Potomac Economics (May 2018) p. 97, available at this link: https://www.nyiso.com/documents/20142/2223763/2017-State-Of-The-Market-Report.pdf/cd4ee8a0-1989-dfa0-b53e2d642c65e46d

[13] See Recommendation 2016-2 in 2017 State of the Market Report for the New York ISO Markets, Potomac Economics (May 2018) p. 74, available at this link: https://www.nyiso.com/documents/20142/2223763/2017-State-Of-The-Market-Report.pdf/cd4ee8a0-1989-dfa0-b53e2d642c65e46d

demand curve value assigned to these reserves and the quantity of Zone J reserves procured in real-time during TSAs.

The NYISO is expecting to complete the market design for load pocket reserves in 2019. The NYISO plans to consider cost allocation and potential mitigation concerns during its market design development. It is expected that, pending stakeholder and regulatory approvals, this market design project could take several years to be deployed. In order to achieve this milestone, the following deliverables will need to be completed prior to deployment:

- Market Design Complete presentation to MIWG, BIC, and MC to include consumer impact analysis and tariff revisions
- Tariff filing with FERC under FPA Section 205
- FRS
- Software development
- Testing

Benefits & Effort

This project will establish effective price signals for more granular reserve procurements in NYC (including load pockets within NYC). It is a **high benefit** project because it will improve the location-specific price signals for maintaining short notice responsive resources in constrained regions.

It is expected that the project deliverables will require **medium effort** over the course of the next several years to complete due to their impacts on several different NYISO software applications.

Dependencies

The market design for the load pocket reserve requirements component of this project will likely result in changes to reserve pricing, and therefore may benefit from being developed in parallel with *Ancillary Services Shortage Pricing* and *Reserves for Resource Flexibility*, which are also expected to change reserve pricing. Further, it may not be possible to implement load pocket reserve requirements absent the development of a dynamic reserve procurement methodology, which will be explored as part of the *Reserve Enhancements for Constrained Areas* project.

Reserve Enhancements for Constrained Areas

This project seeks to dynamically procure operating reserves based on system needs and transmission capabilities, which will enable operating reserves to be scheduled more efficiently in constrained areas.

Problem Statement

The NYISO is required to satisfy reliability criteria in New York City to meet 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 lead to market inefficiencies and unnecessary price volatility.

Background

The Market Monitoring Unit (MMU) has 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]." In each reserve region, NYISO has defined locational reserve requirements (in MW) for its three Operating Reserve products: Spinning Reserve, 10-Minute Non-Synchronous Reserve, and 30-Minute Reserve.[14] The NYISO procures static quantities of the various reserve types within each reserve region, according to the reliability requirements set forth by the NYSRC, North American Electric Reliability Corporation (NERC), and Northeast Power Coordinating Council (NPCC).[15]

In 2019, as part of the *More Granular Operating Reserves* project, the NYISO will explore the potential

[14] Further information on the Operating Reserve locational reserve requirements are available in NYISO's *Ancillary Services Manual*(https://www.nyiso.com/documents/20142/2923301/ancserv.pdf/df83ac75-c616-8c89-c664-99dfea06fe2f) and in the following document: https://www.nyiso.com/documents/20142/3694424/nyiso_locational_reserve_reqmts.pdf/ab6e7fb9-0d5b-a565-bf3e-a3af59004672.

[15] To qualify to provide locational reserves, a Supplier must be physically located within the applicable reserve region. For example, a resource located in Zone G in Southeastern New York would contribute the reserve requirement for the SENY, East, and NYCA regions. A resource located in Zone C would contribute to the reserve requirement for NYCA.

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. The most efficient implementation of load pocket reserve requirements may be via a dynamic reserve procurement methodology that does not exist today.

This project would also consider two separate recommendations made by the Market Monitoring Unit 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]."

Project Scope

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 reserve region, post-contingency. This study will also evaluate potential ways to compensate operating reserve providers that help manage transmission congestion to assist in identifying if market incentives can be improved to maintain resource flexibility. Finally, this study will explore how to most efficiently incorporate the load pocket reserve requirements that are expected to be developed in 2019 as part of the *More Granular Operating Reserves* project into the market software. In order to develop and ultimately implement the design, the following deliverables will need to be completed prior to deployment:

- Proposal and study of a dynamic reserve methodology that the NYISO believes can be feasibly implemented
- Market Design Complete presentation to MIWG, BIC, and MC to include consumer impact analysis and tariff revisions
- Tariff filing with FERC under FPA Section 205
- FRS
- Software development
- Testing

If the NYISO were to determine as a result of its study in 2020 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.

Benefits & Effort

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.[16] Dynamic reserves present opportunities to enhance grid resilience, incentivize resource flexibility, lower total production costs, and increase efficiency in meeting applicable reserve requirements.

Because this project would provide a cost-effective approach to securing reserves across the NYCA, it is considered a **high benefit** project. In the absence of such a market mechanism, economic incentives for investment in resources capable of providing the required services within load pockets may be understated. As the grid evolves, this could eventually lead to insufficient availability of reserve capability in highly constrained areas of New York City.

Due to the expected complexity of this project and the potential impacts to several different NYISO software applications, including the market optimization, it will require **high effort** to complete. Study and market design are anticipated to take approximately one year, with implementation requiring approximately two to three years of development and testing before deployment.

Dependencies

Due to the expected complexity of this effort, the NYISO currently envisions deployment after large projects such as *Carbon Pricing*, *DER Participation Model*, and the *Energy Storage Resource Participation Model* have been completed. This project should be considered in tandem with the implementation of NYC load pocket reserve requirements that may be determined in 2019 as part of the *More Granular Operating Reserves* project.

Enhancing Locational Price Formation

Constraint Specific Transmission Shortage Pricing

This project seeks to improve resource scheduling efficiency and investment signals by enhancing the

way that constraints on the transmission system are priced in the NYISO's energy markets.

Problem Statement

Transmission facility and line ratings limit the amount of energy that can flow from one location to the another 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 excludes certain conditions, and may over or under-value constraints in other instances, which has the potential to cause market inefficiencies and adversely impacts long-term investment signals.

Background

Transmission constraint pricing logic enables the NYISO's market software to re-dispatch efficiently to alleviate constraints, and incentivizes long-term investment in locations where resources could provide the greatest benefits. The existing transmission constraint pricing logic applies a single graduated transmission pricing mechanism to all transmission facilities assigned a non-zero constraint reliability margin (CRM) and does not utilize the graduated mechanism to price constraints in all instances. Some transmission constraints are relaxed without being resolved by the graduated mechanism.

The Market Monitoring Unit, the 2017 Securing 100+ kV Facilities whitepaper, and the 2017 Market Assessment all recommended that the existing transmission constraint pricing logic be revised. A 2018 NYISO study concluded certain enhancements to the current transmission constraint pricing logic should be further explored with stakeholders.[17] Based on that study, the NYISO proposed to utilize more refined demand curves that better account for the various non-zero CRM values assigned to facilities.

The NYISO also proposed to eliminate most occurrences of constraint relaxation, by instead seeking to utilize demand curve mechanisms to value all shortages for internal facilities. Appropriately pricing transmission violations should lead to more efficient resource scheduling in the short term, and more informed investment and retirement decisions in the long term.

Project Scope

2019	2020	2021	2022	2023	2024		Benefits
Market Design Complete		Development Complete	Deployment			Effort	✕

Deployment timelines are currently being considered for this and other competing projects. As the

[17] See Constraint Specific Transmission Shortage Pricing report, https://www.nyiso.com/documents/20142/2549789/Constraint%20Specific%20Transmission%20Shortage%20Pricing%20-%20Paper_Final.pdf/7f69227a-7ca8-656e-b895-0f8147635319 .

designs for this and other dependent projects evolve, the NYISO will consider whether an accelerated deployment may be possible. The following deliverables will need to be completed prior to deployment:

- Revision of market design concept to reflect any changes resulting from the dependent ancillary services projects.
- Market Design Complete presentations to MIWG, BIC, and MC to include consumer impact analysis and tariff revisions
- Tariff filing with FERC under FPA Section 205
- FRS
- Software development
- Testing

Benefits & Effort

This project is expected to require **medium effort** to implement, due to its impact on several NYISO systems and processes, including the NYISO's market software and price validation procedures. The project is expected to provide **medium-high benefits** as well, because it will promote incremental improvements in price formation and investment signals compared to the current transmission constraint pricing logic. Using more refined demand curves to establish pricing levels will enable the NYISO's market software to reflect the severity of transmission constraints with better precision.

Dependencies

The NYISO's energy market software uses factors such as resource costs and facility ratings to evaluate tradeoffs between transmission constraints and procurement of other required products and services, such as reserves. If transmission constraint prices intersect with reserve prices incorrectly, they might drive non-intuitive or inefficient market outcomes. Because operating reserve prices must be considered in parallel with transmission constraint prices, this project is dependent on the completion of both *Ancillary Services Shortage Pricing* and *Reserve for Resource Flexibility*, which are expected to change reserve pricing.

Enhanced Fast Start Pricing

This project seeks to revise pricing logic for resources that can start up in 30 minutes or less, to improve price formation and incentivize new investment.

Problem Statement

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.

Background

On December 21, 2017, the FERC issued an order to the NYISO related to fast-start pricing in the NYISO-administered 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."[18],[19]

The NYISO's MMU has previously recommended that the startup costs of gas turbines be included in LBMPs to allow the NYISO's real-time energy prices to "reflect the full costs of the resources needed to satisfy the system's demands."[20]

The FERC issued a final Order on April 18, 2019, which accepted the NYISO's proposed, conceptual fast-start pricing market design as described in its initial brief. The Order does not propose to change the NYISO's start-up time requirement or other price setting eligibility criteria for fast-start resources. The NYISO will continue to require fast-start resources to be able to start, synchronize to the grid and inject Energy in 30 minutes or less. The NYISO will also continue to require fast-start resources to have a minimum run time of one hour or less and to submit economic energy offers (*i.e.*, not self-schedule offers) into the market for evaluation. Finally, the NYISO will continue to exclude Generator offers to self-schedule Energy from the resource offers used to establish prices. In New York, all resources must submit flexible, economic energy offers to have their offers considered during price setting in the NYISO-administered markets.

Project Scope

2019	2020	2021	2022	2023	2024		Benefits
Functional Requirements	Deployment					Effort	✕

The NYISO expects to complete the fast-start pricing market design in 2019, with implementation to

[18] See FERC Docket No. EL18-33-000, available at this link: https://www.ferc.gov/whats-new/comm-meet/2017/122117/E-3.pdf

[19] See NYISO Initial Brief, FERC Docket No. EL18-33-000, NYISO (February 12, 2018), available at this link: https://nyisoviewer.etariff.biz/ViewerDocLibrary//Filing/Filing1351/Attachments/20180212_NYISOInitialBrief_FastStart206.pdf

[20] See Recommendation 2014-10 in *2016 State of the Market Report for the New York ISO Markets*, Potomac Economics (May 2017), p 96, available at this link:

https://www.nyiso.com/documents/20142/2223763/2016-State-Of-The-Market-Report.pdf/2feb2a59-df4c-e967-0a53-6818458a3138

follow by December 31, 2020, as required by the FERC. The following deliverables are in scope prior to deployment:

- Development of amortization methodology for commitment costs via the NYISO's stakeholder process
- Consumer impact analysis
- Tariff development
- Submission of compliance filing by December 31, 2019
- FRS
- Software development
- Testing

Benefits & Effort

Because the NYISO did not receive significant revisions from the FERC, the remainder of the market design work for this project is expected to be straightforward. Software development and testing will require **medium effort** through deployment in 2020 due to the impact to several different NYISO software applications, including the market optimization and settlements software. Due to the focused nature of this project, it is expected to produce **medium benefits**.

Dependencies

The proposed pricing logic will influence price formation in the NYISO-administered Day-Ahead and Real-Time markets, and should be considered in conjunction with other projects such as the implementation of the ESR and DER participation models.

Reliability Value of Resources

Demand Curve Reset

The demand curve reset (DCR) is a quadrennial study required by the NYISO Services Tariff of the various parameters used to set the Installed Capacity (ICAP) Demand Curves that seeks to align the capacity market with the expected costs of adding new capacity in New York State.

Problem Statement

Every four years, the NYISO and its stakeholder community engage in a study, referred to as the DCR, to examine the various parameters used to set the ICAP Demand Curves. Per the NYISO Services 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 the unit with the "lowest fixed costs and highest variable costs

among all other units' technology that are economically viable."

Background

This periodic review of the ICAP Demand Curves is done to analyze whether the capacity market continues to efficiently support reliability and send accurate, transparent price signals. The frequent, 4-year assessment also enables the NYISO to create new capacity zones when established criteria are met. NYISO is required by its Services Tariff to hire an independent consultant every four years to assist with completion of the DCR and to provide recommendations for updating the demand curves. The consultant performs the demand curve study and support tasks, which require assistance from the NYISO staff. Recommendations regarding the parameters and assumptions used to establish the demand curves are subject to stakeholder comment and review and approval by the NYISO Board.

Project Scope

2019	2020	2021	2022	2023	2024		Benefits
Study Defined	Study Complete			Study Defined	Study Complete	Effort	✕

The review is performed by engaging an independent consultant to lead stakeholders through the DCR process. The consultant's efforts extend beyond examining demand curve inputs and parameters to include supporting evaluation of alternative demand curve shapes and zero crossing point methodologies that may achieve enhanced market performance. The DCR is a two-year long effort that begins two years prior to when the new ICAP Demand Curves become effective; the current DCR will determine how to set the ICAP Demand Curves for the four Capability Years covered by the periodic review (2021-2025) beginning with the Summer 2021 Capability Period. This project reflects the second year of work that began in 2019, and the 2020 milestone for this project is Study Complete. The deliverables for this project include:

- A report by the DCR consultant and the NYISO recommendations on the parameters and inputs for the ICAP Demand Curves.
- A NYISO filing submitted to FERC

The DCR process culminates in a filing submitted to the FERC on or before November 30, 2020 of the proposed curves for the first year of the reset period (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 (the 2022/2023, 2023/2024, and 2024/2025 Capability Years) pursuant to the tariff-prescribed annual update process. A ruling from FERC with respect to the NYISO's 2020 filing is anticipated to be issued in early 2021.

Benefits & Effort

The DCR is a complex, resource intensive process for both the NYISO and stakeholders and is considered a **high effort** project. In approximately 18 months, several potential peaking units will be separately analyzed for each Locality along with a multitude of operational and financial considerations that must be evaluated and discussed with stakeholders. At this time, the NYISO does not anticipate a significant implementation effort, however, it is possible that additional changes to the ICAP Demand Curves that would require software updates can result from the study.

This project has a significant impact on the ICAP market as a whole by establishing the parameters for how the market will clear over the next several years. As a result, this project is a **high benefit** project.

Dependencies

The current DCR is underway with no dependencies. The next DCR, scheduled to begin in 2023 also does not have any required project dependencies; however, the NYISO has two projects, *Improving Capacity Price Formation* and *Capacity Zone Evaluation,* that may result in recommendations that can impact the DCR scheduled to begin in 2023.

Expanding Capacity Eligibility/Capacity Values

Every four years, the NYISO will select a consultant to reassess the reliability benefit of short duration resources in the NYISO markets and provide the right investment signals to developers.

Problem Statement

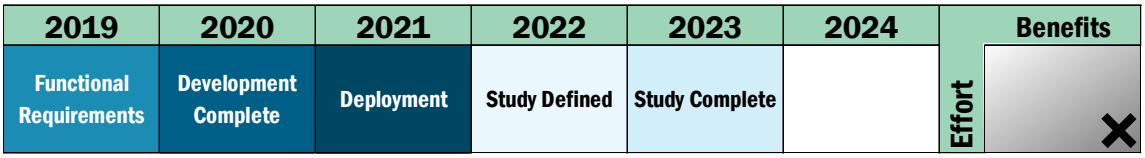
The NYISO recognizes that resources of various durations provide different reliability benefit to the grid. As the NYISO anticipated that shorter duration resources will increasingly enter the markets in the upcoming years, the NYISO conducted a review of the Capacity Values and subsequently proposed 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. Through the stakeholder process for the DER project, the NYISO proposed to re-evaluate the Capacity Values periodically to accurately reflect the reliability benefit of short duration resources in the As-Found System over time and 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.

Background

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.

Project Scope



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 its deployment phase of this project in 2020 and intends to implement the capacity values from its first study for the 2021-2022 Capability Year.

In 2022, the NYISO will begin its periodic review process to evaluate the reliability benefit of Resources with Energy Duration Limitations. The NYISO will select a consultant to evaluate the durations, capacity values, and Peak Load Windows associated with Resources with Energy Duration Limitations participating in the NYISO Installed Capacity Market. The consultant will discuss the review process and present results to stakeholders throughout the review years. As prescribed in the proposed revisions to the Market Services Tariff, the review will be completed in 2023 and the results associated with the review are intended to be implemented in the 2025-2026 Capability Year. Modifications of the program will be subject to the NYISO's standard stakeholder process and, if changes are warranted, the determinations will be submitted with a 205 filing. The deliverables for this project include:

- FRS
- Software Development
- Testing
- Discussions with stakeholders at MIWG/ICAPWG to define the scope of the review
- Hiring and assisting a consultant to perform the review as defined by stakeholders and the NYISO
- A report by the consultant and NYISO recommendations for the durations, capacity values, and Peak Load Windows associated with Resources with Energy Duration Limitations
- Presentations to the BIC and MC
- FERC tariff filing under FPA Section 205

Benefits & Effort

This project is currently underway and will have a recurring evaluation every 4 years. 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 as well as align the value of these resources with the reliability benefit that they provide to the system.

The NYISO anticipates that the periodic review process will take one to two years from hiring the consultant to completing the stakeholder process for review. The results associated with the current market changes will be implemented in the 2021-2022 Capability Year, and the results of future periodic reviews will be implemented three Capability Years after the review process begins. Implementing this software change, along with revisiting capacity values on a recurring basis, represents a **high effort**.

Dependencies

This project is dependent on FERC acceptance of related tariff revisions before the current set of capacity values can be deployed. Additionally, timely implementation of the DER Participation Model is dependent on this project. Subsequent capacity value reviews can be performed with no dependencies and the dates are defined by the tariff.

Tailored Availability Metric

This project looks to incentivize capacity resources to be available and perform during peak hours of operation.

Problem Statement

One of the issues identified in the Performance Assurance initiative in 2017 included maintaining the availability and incentivizing 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.

Background

The Tailored Availability Metric project is a result of the ongoing Performance Assurance effort, which was prompted by a report by the Analysis Group in 2017. The report identified areas where the NYISO could improve its market design to better incent performance and reliability of all capacity suppliers. The objective for this project is to implement a market design that reflects higher value to resources that are available and can perform during peak operating periods. 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 periods. Weighting these peak periods reflects the concept that availability and performance during these times 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 a complete market design by the second quarter.

Project Scope

2019	2020	2021	2022	2023	2024	Benefits
Concept Proposed	Functional Requirements	Deployment				Effort ✕

Analysis for this project will reassess the current metrics of the derating factors of all capacity resources and consider modifications that will allow the NYISO to more appropriately account for each resource's performance or availability during critical peak periods on the system. The completed market design for the Tailored Availability Metric project is important to maintaining reliability and transparency by enhancing accountability of capacity suppliers. The project will reach the implementation stage through a series of deliverables including:

- Discussions with stakeholders at MIWG/ICAPWG to define the scope
- Market Design proposals presented to stakeholders at MIWG/ICAPWG
- Market Design Complete presentations to MIWG and BIC
- Changes to the NYISO ICAP Manual

Benefits & Effort

The NYISO expects a tailored metric to have **medium benefits** to the reliability and efficiency of the grid. The project is currently underway in the Market Design Concept Proposed phase, with the anticipated Market Design Complete in 2020 and the implementation in 2021. From the Market Design Concept Proposed to implementation, this project is expected to be a **medium effort** with normal resourcing considerations.

Dependencies

There are no dependencies for this project.

Capacity Market Fundamentals

Improving Capacity Price Formation

The Improving Capacity Price Formation project aims to examine the effects of using different slopes and shapes for the ICAP Demand Curves.

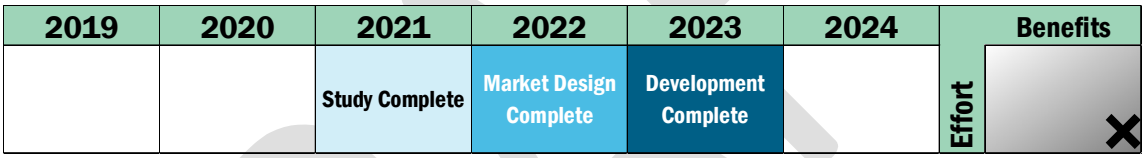
Problem Statement

The NYISO is aware of potential price volatility that may occur in part due to the current slope and shape of its ICAP Demand Curves. The current structure of the ICAP Demand Curves is a fixed linear slope from the Zero Crossing Point (ZCP), through the Reference Point up to the established price cap. With this project, the NYISO intends to evaluate whether this current structure is still effective in producing efficient price outcomes as new resource types enter the market at a fast rate in the upcoming years.

Background

The NYISO establishes its ICAP demand curves every 4 years for the upcoming years, which are used to set prices and send market signals in the capacity market for a four-year period. In recent years, the NYISO has discussed the possibility of re-evaluating the slope and shape of the demand curves with stakeholders. It is important that the NYISO re-assess the slope and shape of the demand curves to provide the appropriate price signals for the market.

Project Scope



For the Improving Capacity Price Formation project, the NYISO will hire a consultant to conduct a study in 2021 to assess the impacts on capacity prices of various slopes and shapes of demand curves. It is essential that significant analysis is conducted and that discussions with stakeholders occur during the study process to foster sufficient stakeholder engagement regarding this potential market change. Any changes would be considered for implementation for the ICAP Demand Curves beginning with the Summer 2025 Capability Period. This project must occur during the interim period between the NYISO's study periods for the Demand Curve Reset. The deliverables for this project include:

- Discussions with stakeholders at MIWG/ICAPWG to define the scope of a study
- Hiring and assisting a consultant to perform the study as defined by stakeholders and the NYISO
- Market Design proposals presented to stakeholders at MIWG/ICAPWG
- Market Design Complete presentation to MIWG, BIC, and MC, to including tariff revisions
- FERC tariff filing under FPA Section 205
- FRS
- Software Development
- Testing

Benefits & Effort

This project has the potential to affect a wide-range of capacity market outcomes, impacting price signals and the cost of meeting reliability requirements state-wide. With significant changes anticipated in the generation profile for the state, the NYISO views this as an important project to work on in the near future, after the upcoming DCR. It is considered a **high benefit** project.

The NYISO anticipates that this project will take a total of three years from the initial study to deployment. This is a complex topic that will require extensive analysis and stakeholder discussion during both the study and market design phases. Any change to the shape and/or slope of the demand curve could have significant impacts to other capacity market constructs, such as Buyer-side Mitigation rules, analysis and methodologies, that would have to be considered throughout the development of this project; as such, this project will require **high effort** to fully analyze, develop, and design. It is anticipated that each milestone will take approximately one year to complete with a hired consultant for the market design phases. Once the market design is complete, software changes and deployment should be complete within a year as capacity market changes are typically impact fewer systems than energy market changes.

Dependencies

There are no dependencies for this project; however, due to the nature of this project the NYISO believes that this project should begin after the current Demand Curve Reset, using any recommendations that result from the report, and be completed before the next one begins in 2023. Any changes would be considered for implementation for the ICAP Demand Curves beginning with the Summer 2025 Capability Period.

Capacity Zone Evaluation

The Capacity Zone Evaluation project will review the existing rules that govern how, when and why Capacity Zones are established, changed or eliminated, and evaluate if additional rules or modifications to the existing rules are needed.

Problem Statement

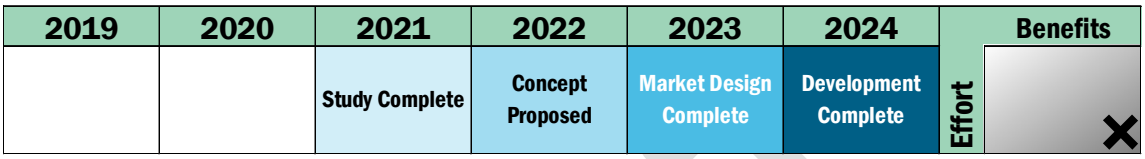
The NYISO currently only has rules for the evaluation of whether to create, and if appropriate, to create Capacity Zones (i.e., Localities) on a time line that coincides with the demand curve reset. The rules are based upon a generator deliverability test. A more holistic model governing a larger scope of Capacity Zone processes and issues, and potentially including a process to eliminate zones, may be warranted.

Background

The rules surrounding Localities have been a focus of stakeholders, the NYISO, and the external Market Monitoring Unit for a number of years. Efforts to revise the rules initiated in 2017 and 2018 were not fruitful.

Localities recognize the need for capacity additions in different areas of the NYCA when there are transmission constraints between the Load Zones that prevent installed capacity from one area from meeting capacity needs in another area. Localities provide a mechanism to send proper price signals for locational capacity needs beyond statewide resource adequacy, attract new resources to enter the market and to retain existing resources in order to maintain system reliability.

Project Scope



The NYISO is proposing to evaluate changes to the methodology for evaluating the creation of Localities, rules for the elimination of Localities, adjusting the frequency of establishing Localities, separating import and export constrained zones, and Dynamic Capacity Zones.

This project is expected to start with a study in 2021, evaluating the various options available for Capacity Zone designs. From that study, a Market Design will be developed and presented to stakeholders for review and approval, with any revisions that are approved in time for the 2023-2024 Demand Curve Reset process used to establish Demand Curves for the 2025-2028 Capability Years. The deliverables for this project include:

- Discussions with stakeholders at MIWG/ICAPWG to define the scope of a study
- Hiring and assisting a consultant to perform the study as defined by stakeholders and the NYISO
- Market Design proposals presented to stakeholders at MIWG/ICAPWG
- Market Design Complete presentations to MIWG, BIC, and MC, including tariff revisions
- FERC tariff filing under FPA Section 205
- FRS
- Software Development
- Testing

Benefits & Effort

This project will improve market efficiency and reliability by establishing a full set of rules for Localities to send more accurate price signals for resource adequacy needs. As such, the NYISO views this as a **high benefit** project for the capacity market.

Considering past experience with this topic, the NYISO considers this to be a **high effort** project due to the complexity of redesigning a capacity market fundamental at the nexus of transmission congestion,

reliability and market dynamics. The NYISO expects to study this topic for one year before holding discussions with stakeholders about market design and tariff, which are anticipated to last approximately two years. Software development will continue through 2024, though any changes would be best implemented with the Summer 2025 Capability Period, along with the new ICAP Demand Curves adopted during the next Demand Curve Reset, slated to begin in 2023.

Dependencies

There are no dependencies for this project; however, due to the high effort nature of this project and the broad potential impact to ICAP market outcomes, the NYISO believes that this project should begin after the current Demand Curve Reset and be completed before May 2025. It would be best to substantially complete the market design and tariff for this project before the next Demand Curve Reset begins in mid-2023.

Comprehensive Mitigation Overview

This project will conduct a holistic evaluation to consider whether the current framework of Buyer-side Market Power Mitigation ("BSM") rules will be adequate in a future with significant penetration of renewable and distributed energy resources that are expected to result from ambitious policy objectives.

Problem Statement

The capacity market has undergone significant changes in both design and resource mix since the BSM measures were first implemented in May of 2008. The BSM rules were originally developed to evaluate traditional generators, but new resource types, such as battery storage, renewable generation and 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 rule sets and tests may provide a better evaluation of these resources for instances of buyer-side market power and thus result in more accurate BSM determinations.

Background

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 maintaining efficient resource entry and exit as the generation mix rapidly changes in the coming years.

Project Scope

2019	2020	2021	2022	2023	2024
	Study Defined	Study Complete	Market Design Complete	Deployment	

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. As part of the review, alternative methods to perform the Mitigation Exemption Test for new resources and Additional CRIS projects will be considered. 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. If changes are deemed to be warranted, proposed market design changes will subsequently be completed and deployed, subject to stakeholder, NYISO Board, and acceptance by FERC. The deliverables for this project include:

- Discussions with stakeholders at MIWG/ICAPWG to define the scope of a study
- Hiring and assisting a consultant to perform the study as defined by stakeholders and the NYISO
- Market Design proposals presented to stakeholders at MIWG/ICAPWG
- Market Design Complete presentation to MIWG, BIC, and MC, including tariff revisions
- FERC tariff filing under FPA section 205
- Implementation

Benefits & Effort

The goal of BSM is to ensure competitive behavior within mitigated capacity zones, which would remain unchanged if a different or new Mitigation Exemption Test methodology that seeks to produce more accurate BSM determinations is implemented. Additionally, only a small set of projects in a limited portion of the NYCA are subject to BSM rules. As this project is a multiyear effort that may or may not result in a material redesign of the BSM rules and exemption framework, it is premature to characterize the benefits of the project but it will require **high effort** and a hired consultant. It is not anticipated that this project will require significant software development.

Dependencies

There are no dependencies for this project.

New Resource Integration

Class Year/Interconnection Queue Redesign (CY/IQ Redesign) Review

This project continues the effort that was started in 2019 to review the interconnection process, and identify key areas that could lead to improvements that could (1) expedite the interconnection study process overall, particularly Class Year Study, (2) limit the possibility for unique circumstances where a single or few

projects may cause delays to numerous other projects, (3) provide an alternative and/or expedited process for deliverability analyses and BSM determinations, where appropriate; and (4) add efficiencies to the Class Year and interconnection study processes.

Problem Statement

As currently designed, the overall time to complete the interconnection studies, e.g., Optional Feasibility Study (OFES), System Reliability Impact Study (SRIS), and Class Year Interconnection Facilities Study (CYFS), of Large Facilities could vary significantly based on the unique circumstances of individual projects. A particularly impactful variable is the impact of a single or limited number of projects whose studies might delay the completion of other projects' in the Class Year Study process. This is evident in the Class Year Study where the need for additional deliverability studies for a single or limited number of projects have delayed completion of the Class Year Study and commencement of the next Class Year Study. Due to the project developers' concern related to the time that it may take for their projects to complete the interconnection studies and the concern regarding the time within which CRIS-only projects must participate in the Class Year Study process, it is necessary to redesign the interconnection.

Background

The rights and obligations of Large Facility project Developers (for projects larger than 20 MW) and Small Generating Facility Interconnection Customers (20 MW or less) (collectively, "Developers"), Transmission Owners and the NYISO— related to the interconnection or modification of Large Facilities and Small Generating Facilities are set forth in Attachments S, X, and Z to the OATT.

Attachment X contains the procedures for processing interconnections of Large Facilities, e.g., Large Generating Facilities and Class Year Transmission Projects. Attachment X calls for three successive Interconnection Studies of each proposed project. These studies analyze proposed projects in varying levels of detail. First is the OFES, which is a high-level evaluation of the project's configuration and local system impacts. The second study is the SRIS, a detailed single-project study that evaluates the project's impact on transfer capability and system reliability. The final study in the interconnection process is the CYFS. The CYFS is a detailed study that evaluates the cumulative impact of a group of projects that have completed similar milestones—a "Class Year" of projects. The CYFS identifies the upgrade facilities needed to reliably interconnect all the projects in a Class Year. A Class Year is comprised of projects that have met specified CYFS eligibility requirements by the time the combined group study begins. The hallmark of the NYISO's CYFS process is that it is performed for a group of projects that have achieved similar interconnection milestones to determine the cumulative impact of such projects. Each CYFS allocates the cost of System Upgrade Facilities ("SUFs") and System Deliverability Upgrades ("SDUs") identified in the study among the

projects in the Class Year in accordance with the cost allocation methodologies set forth in Attachment S.

Attachment Z contains the procedures for processing interconnection of Small Generating Facilities. Like the LFIP, Attachment Z calls for three successive Interconnection Studies of each proposed project: a feasibility study ("Small Generator Feasibility Study"), a system impact study ("Small Generator SIS") and a facilities study ("Small Generator Facilities Study").

All Large Facilities (studied in the LFIP under Attachment X) are subject to the CYFS procedures. Certain Small Generating Facilities are also required to participate in the CYFS and other Small Generating Facilities may elect to participate in a CYFS. The CYFS procedures are primarily contained in Attachment S.

Attachment S sets forth the eligibility requirements for Class Year entry, establishes the Class Year Start Date and schedule, describes the obligations of Class Year Projects once they enter a Class Year Study and details the scope and the cost allocation methodology for interconnection of new generation and merchant transmission facilities. It sets forth the detailed procedures for the identification and cost allocation of SUFs required for a project to reliably interconnect to the system and thereby provide Energy Resource Interconnection Service ("ERIS"). For those Class Year Projects that elect Capacity Resource Interconnection Service ("CRIS"), Attachment S provides for the evaluation of a project's Deliverability and the identification and cost allocation of SDUs required for a project's proposed capacity to be fully deliverable. Attachment S also provides for the decisional process toward the completion of the Class Year Study during which Class Year Projects accept or reject their Project Cost Allocations (the costs allocated to a Class Year Project for SUFs and SDUs, as applicable), and the process by which Security and Headroom obligations must be satisfied. Through this unique clustered Class Year Study, the NYISO is able to equitably allocate upgrade costs and generate detailed good faith cost estimates that provide reasonable closure on upgrade costs.

Project Scope

2019	2020	2021	2022	2023	2024		Benefits
Deployment						Effort	✕

With the intent to maintain the basic structure of the NYISO's interconnection process, the NYISO engaged in discussions with stakeholders in the early 2019 regarding the CY/IQ Redesign to decrease the overall time it may take a Developer to proceed through the interconnection process and to develop potential alternatives to the current structure of and requirements related to the deliverability study (required for a project larger than 2 MW to obtain CRIS). The NYISO and its stakeholders worked collaboratively to identify potential ideas that may improve the interconnection process and narrowed down those potential ideas.

Through 2019, this project will continue to refine the initial proposals as well as develop tariff language to support the CY/IQ Redesign. Specific deliverables include:

- Continue developing revisions to the existing interconnection process to expedite the interconnection process.
- Ensure that the final solution maintains key qualities, e.g., (1) identification of SUFs for projects to reliably interconnect, including detailed design, engineering and constructions estimates, (2) binding, good faith cost estimates that provide reasonable closure on upgrade costs, and (3) equitable allocation of upgrade costs.
- Work through the stakeholder process to develop revised tariff language to support changes to the CY/IQ Redesign.
- File revised tariff language with FERC prior to the Class Year 2019 Notice of Additional SDU Studies.

Benefits & Effort

This is a **high benefit** project. It will increase efficiencies in the interconnection process while reduce the study cost and timing for the Developers.

The effort required to continue the CY/IQ Redesign will be significant; this is a **high effort** project. Proposed ideas do exist and have been shared with stakeholders. The effort to draft the revised tariff language to support the needed changes to the CY/IQ Redesign will be intense. Due to the limited number of stakeholder meetings available, it will be necessary to develop and follow a rigorous schedule to complete the work of drafting the tariff language and following the stakeholder process prior to filing.

Dependencies

There are no dependencies for this project.

New Resource Participation Models

Energy Storage Resource Participation Model

This project aims to deploy a participation model for Energy Storage Resources ("ESRs") with a minimum size of 100kW to effectively participate in the NYISO's energy, capacity and ancillary services markets.

Problem Statement

The NYISO does not yet offer a market participation model that recognizes the unique physical and operational characteristics of ESRs. Although certain types of ESRs can participate in the NYISO's markets today, existing market products offer limited opportunities for them to provide Energy and Ancillary Services. A participation model for ESRs would increase resource flexibility, enhance the reliability of market operations, and help prepare for a future where a significant number of generation assets are intermittent

and weather-dependent.

Background

In December 2017, the NYISO published a report that outlined the Market Design Concept Proposal for ESR integration, including minimum eligibility requirements, aggregation eligibility requirements, registration and offer parameters, scheduling logic, settlements logic and mitigation framework.[21] This report was prepared in consideration of the benefits that ESRs could provide to the NYISO's markets, and the FERC's Notice of Proposed Rulemaking (NOPR) on Energy Storage participation in ISO/RTO markets.[22]

On February 15, 2018, the FERC issued *Order 841 on Electric Storage Participation in Markets Operated by RTO/ISO's*.[23] The order includes a set of requirements that will help facilitate the participation of ESRs in the RTO/ISO markets as the ISOs' current tariffs do not recognize the operational characteristics of ESRs and limits the participation of ESRs in the markets.

On December 3, 2018, the NYISO submitted its compliance filing in response to the FERC's Order No. 841 directives. The NYISO's ESR participation model, in recognition of the physical and operational characteristics of ESRs, will allow storage resources to set wholesale clearing prices both when injecting and withdrawing from the grid, and enable suppliers with a minimum offer size of 100kW to participate in the Energy, Capacity and Ancillary Services markets.

New York State's public policy initiatives, such as the goals to install 1,500 MW of storage capacity by 2025, and 3,000 MW of storage capacity by 2030, provide incentives for developers to invest in storage technologies. Given these and other State and federal goals, it is imperative for the NYISO to implement a participation model that leverages the benefits that ESRs can provide.

Project Scope

2019	2020	2021	2022	2023	2024	Benefits
Development Complete	Deployment					Effort ✕

This project is a continuation of the implementation project started in 2019. The NYISO will develop the software code and implement the ESR participation model to enable storage resources to participate in

[21] See NYISO, Energy Storage Integration: Market Design Concept Proposal, December 2017, available at this link: https://www.nyiso.com/documents/20142/1404721/2017%20ESR%20Market%20Design%20Concept%20Proposal.pdf/7d0d243a-0ebb-f369-f196-3a52db0d1f35

[22] See FERC, Electric Storage Participation in Markets Operated by Regional Transmission Organizations and Independent System Operators, November 17, 2016, available at this link: https://www.ferc.gov/whats-new/comm-meet/2016/111716/E-1.pdf

[23] See FERC, Electric Storage Participation in Markets Operated by Regional Transmission Organizations and Independent System Operators, February 15, 2018, available at this link: https://www.ferc.gov/whats-new/comm-meet/2018/021518/E-1.pdf

NYISO's Energy, Capacity, and Ancillary Services markets. The deliverable for this project in 2020 is deployment. The following deliverables will be in scope once dependent projects are completed, and prior to deployment.

- Updating Manuals and Guides
- Software development
- Testing

Benefits & Effort

This project is considered **high benefit** because it will provide investment signals for ESRs and enhance their opportunities for efficient market participation. ESRs have the unique ability to shift load by withdrawing energy as consumers when demand is low and injecting energy as suppliers when demand is high. This attribute will help the NYISO to meet peak load and manage the variability of intermittent resources. ESRs are also valued for their ability provide quick responding standby services, such as synchronous operating reserves. Their participation could significantly increase both resource flexibility and grid resilience.

The market rules for the NYISO's ESR participation model were submitted to the FERC in December of 2018 as part of the NYISO's compliance filing. The implementation of the ESR participation model rules remains a complex process, however, because the NYISO's market software has limited precedent for the concept of energy withdrawals. Software is currently under development for this project, and will require extensive testing and quality analysis. Capacity market changes are smaller in scope than energy market changes, and impact fewer systems. Although this project will be completed by Q2 of 2020, its impact across many different teams at the NYISO and the extensive resources it requires warrant its rating as a **medium effort**.

Dependencies

The NYISO's market software is undergoing a significant upgrade as part of the EMS/BMS project. The EMS/BMS Upgrade project is currently slated to be deployed in October, 2019. Because the ESR participation model has to be tested and deployed on the new software platform, it is dependent on the timely deployment of the EMS/BMS project. In its compliance filing with FERC Order No. 841, the NYISO requested an implementation date no earlier than May 2020 pending FERC acceptance of the proposed tariff.

Hybrid Storage Model

This project seeks to develop market participation rules for front-of-the-meter generators collocated with energy storage resources.

Problem Statement

The NYISO's market rules do not offer a participation model for co-located front-of-the-meter generators and energy storage resources today. Instead, where two or more resource types are collocated behind the same point of interconnection, each resource type must be separately metered and have its own point identifier (PTID).

Background

Federal tax credits provide incentives for developers to couple storage and intermittent renewable assets. Such programs are aimed at reducing the volatility and improving the availability of intermittent resources. In order to improve flexibility and availability while reducing emissions, some developers are also considering coupling ESRs with gas turbines. This project will build on work completed as part of the Energy Storage Resource and Distributed Energy Resource Integration initiatives to develop market rules that better integrate generators and energy storage resources co-located behind a single interconnection point.

Developing a method for hybrid generation plus storage participation in the wholesale markets will support policy efforts to integrate more clean energy into the grid.

Project Scope

NYISO staff recommend that the development of a market design for a hybrid storage installations begin in 2020. In the 2018 Master Plan, the NYISO proposed to consider participation rules for front-of-the-meter intermittent renewables collocated with ESRs. This project would accomplish the same goals with a slightly expanded scope by including other generator types that are collocated with energy storage resources. Deliverables to be completed prior to deployment will include:

- Market Design Complete presentations to MIWG, BIC, and MC, including a consumer impact analysis and tariff revisions
- Tariff filing with the FERC under FPA Section 205
- FRS
- Software development
- Testing

Benefits & Effort

While the full project scope is unknown at this time, NYISO staff anticipate that this project will require

high effort to complete, ultimately depending on the complexity of the design and its interaction with existing participation models. The full scope of such a participation model and the software changes it would require are unknown at this time, but it would affect multiple NYISO systems and processes, such as credit requirements, settlements, market software, and mitigation. The market design phase will build upon work that has been completed for dependent projects. While it will require dedicated resources, market design is not expected to be a multi-year effort.

Hybrid storage facilities may offer increased flexibility and have the potential to enhance grid reliability. Because there are not a large number of hybrid storage projects currently in the NYISO's interconnection queue, implementation is currently estimated to be of **medium benefit**.

Dependencies

It is expected that the extensive design work that has already been completed for both the ESR and DER initiatives will provide a foundation for the development of this participation model. This project is distinct from the DER Integration initiative which has developed aggregation rules for smaller resources that are generally distributed behind multiple interconnection points.

Distributed Energy Resource Integration

DER Participation Model

This effort will position the NYISO for future trends in electric grid advancements and allow for aggregations, including DER to participate in the wholesale electricity markets as well as more closely align those resources with limited duration capability to their respective Capacity payments.

Problem Statement

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.

Background

Throughout 2018 & 2019 the NYISO will have worked through concepts, proposals and Tariff edits for the Distributed Energy Resource (DER) Market Design Concept Proposal to enhance its market rules for DER to participate in NYISO's capacity, Day-Ahead and real-time 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 & performance changes to existing demand response programs are not required at this time but net payments to these resources will be impacted by the outcome of the proposed

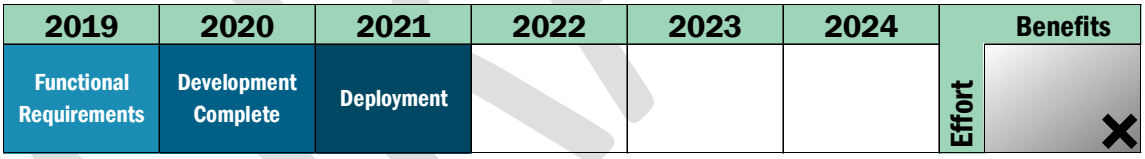
capacity market rule changes which are to be filed with this project.

This project will have many facets that ultimately support New York's REV goals and compliance with FERC Order 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 & 2019 Market Design effort to develop the Functional Requirements Specification (FRS) that will drive the software development effort in 2020.

The software development required to support the FRS 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.

Project Scope



The 2019 deliverable for this project includes Functional Requirements. In 2020, Development complete will allow for Deployment in 2021 upon approval from stakeholders and the Board, as well as FERC acceptance of tariff revisions. In order to meet the 2021 deployment timeline milestone, the following deliverables will need to be completed:

- Market Design Complete Presentations to MIWG, BIC, Board and MC, including tariff revisions
- Tariff filing with FERC under FPA Section
- FRS
- Software development
- Testing

Development complete for new software and/or modifications to existing software that supports the business approved FRS implement dispatchable distributed energy resource participation in the wholesale

markets which includes:

- 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

Benefits & Effort

DER Participation will have a significant impact on the market, diversifying resources and encouraging a more resilient grid that is more efficient than the conventional electricity grid structure. As a result, this project is expected to have **high benefits**, allowing the NYISO to cultivate a market that is accessible and competitive for DER, in line with REV state policy goals.

The NYISO expects the above deliverables and overall initiative to require ongoing **high effort**, given the extent of software development and market design necessary for effective and timely implementation. The next milestone, Functional Requirements, is underway and will be completed in 2019, with Development Complete and Deployment milestones following in 2020 and 2021.

Dependencies

The DER Participation model is dependent on the following initiatives:

- EMS/BMS System Upgrade
- ESR Participation Model
- Meter Service Entity for DER
- Expanding Capacity Eligibility

Additionally, FERC acceptance of the proposed tariff is required before deployment.

NYISO Pilot Framework

This effort would allow NYISO staff to engage and learn about nascent technologies and their applications

on the electric power system which would allow staff to prepare for future market design changes.

Problem Statement

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.

Background

In conjunction with the development of the Distributed Energy Resource Participation Model, the NYISO will leverage Pilot projects to test new energy technologies. This project will use the Pilot Test Environment and framework that will 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. This will ultimately inform the NYISO of possible changes to market rules to appropriately incorporate new technology capabilities and meet grid needs. This pilot framework concept will not pay resources while the resource is within the pilot phase.

This project helps to position the NYISO for 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.

Project Scope

2019	2020	2021	2022	2023	2024		Benefits
Study Complete	Study Complete					Effort	✕

The NYISO expects this effort to span two years, with the anticipated Study Complete in 2020. In order to effectively execute this study, the following deliverables will need to be completed:

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

Benefits & Effort

The project will have **medium benefits**, as the results of the study will ultimately allow the NYISO to develop market rules that appropriately incorporate new technological capabilities and meet grid needs.

This is a **medium effort** project that involves a number of stakeholders in testing, and requires continuous development of operating procedures to accompany new methodologies. The remainder of the Study will be complete by the 2020 milestone.

Dependencies

The Pilot Framework is dependent upon the schedules, availability and cooperation of participating entities. Further, progress is also dependent upon utility and developer time commitment and resourcing, as participation in the Pilot Program is voluntary and energy dispatch is uncompensated within the program.

Meter Services Entity for DER

This project seeks to create a third party metering construct providing additional flexibility, optionality, and a modern approach to data services currently unavailable to Market Participants.

Problem Statement

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 Distributed Energy Resources play an increasingly larger role in meeting system needs.

Background

The proliferation of Distributed Energy Resource 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.

Throughout 2017, 2018, and 2019 the NYISO will have 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 previous Meter Data Service Provider construct. 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.

Project Scope

2019	2020	2021	2022	2023	2024	Benefits
	Functional Requirements	Deployment				Effort ✕

The NYISO has been developing 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. In order to achieve this milestone, the following deliverables will need to be completed prior to deployment:

- Market Design Complete presentations to MIWG, BIC, and MC, including tariff revisions
- FERC tariff filing under FPA Section 205
- FRS
- Software development
- Testing

Benefits & Effort

The project is expected to have a **medium benefit,** as a third party metering construct has the potential to reduce barriers to entry for DER in wholesale markets.

It is expected that these deliverables will require a **medium effort** to complete with Functional Requirements complete in 2019 followed by Deployment in 2020. The creation of a new metering construct is an area the NYISO has limited subject matter expertise.

Dependencies

The Meter Services Entity project is dependent upon any changes resulting from the recent complaint of NRG Curtailment Solutions to FERC on the matter of meter services in NYISO markets.

Dual Participation

The NYISO's proposed DER market design will allow resources that provide wholesale market services to also provide services to entities outside of the NYISO wholesale markets (e.g., the utility or a host facility).

Problem Statement

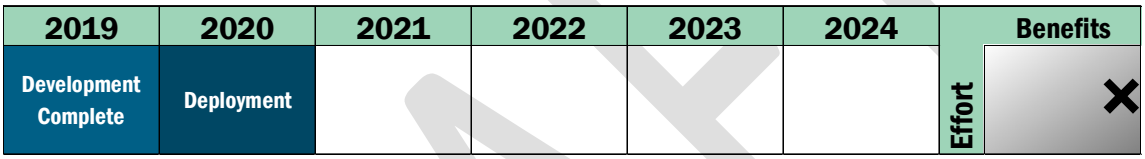
Current NYISO wholesale market rules do not outline avenues for injection type resources to contribute both wholesale and retail services, restricting the potential net benefit to the electrical grid. From a reliability,

resiliency and economic standpoint, disallowing wholesale resources from accessing the retail market hinders growth in the grid and an overall transition to a more dynamic operation. 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.

Background

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.

Project Scope



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. It will be required that resources appropriately reflect any non-wholesale (*e.g.*, retail) obligations when bidding into wholesale markets. 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 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 deliverables for this project include:

- Market Design Complete Presentations to BIC, Board and MC, including tariff revisions
- FERC tariff filing under FPA Section 205
- FRS
- Software development

- Testing

Benefits & Effort

The NYISO anticipates a **medium effort** for this project, considering the software developments and market design specifications in the DER Participation Model. Dual Participation will impact the range of market participants directly, encouraging maximized net economic and grid benefits. This project is currently underway in the Functional Requirements Specification phase, requiring effort from internal contributors involved in the broader DER Market Design. The Deployment phase of this project will occur in 2020. The NYISO believes this project will have **high benefits**, enabling resources to access both retail and wholesale market opportunities.

Dependencies

This project is dependent on FERC acceptance of related tariff revisions before Dual Participation will be available for use.

Conclusion

NYISO is currently developing many of the projects discussed in this document, and nearly half are in the conceptual design phase. While all of the initiatives described herein may offer value to the wholesale markets, the NYISO does not have the resources to complete the detailed design and implementation of all of them simultaneously. Unplanned work may also result from future FERC orders and stakeholder input, causing the proposed timelines to require revision. In light of these and other unknowns, this document lays out what the NYISO believes to be an efficient path toward market reform, in preparation for anticipated changes to the bulk power system as a result of state policies, FERC compliance directives, and evolving technology.