2019 Project Candidates

Product and Project Management

8/17/2018

This document represents potential 2019 project candidates identified through (1) the State of the Market (SOM) Report; (2) internal NYISO discussions; and (3) discussions with Market Participants in the stakeholder process. These project candidates and their corresponding descriptions reflect information known about each of the project candidates as of the date of this document.

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Business and Finance Products

Enterprise Information Management - Data Integration Phase IV [Continuing]

The Enterprise Information Management initiative is a multi-year strategic initiative focused on bringing together process, design, and technology to satisfy market and operations information needs at the NYISO. This phase of the project will migrate the Customer Settlements data mart, positioning the NYISO to upgrade the Oracle database to the latest version, and to retire Oracle Warehouse Builder.

Rate Schedule 12 Settlement [Continuing]

This project is a continuation of a 2017 Business Requirement Project (FRS) and a 2018 Software Design Project (SDS). This project will be implemented in multiple phase with the first phase including handling of TCCs associated with new transmission followed by future project phase to implement settlements for Rate Schedule 12 to allow for NYISO's settlements systems to provide for cost recovery, consistent with Attachment S to the OATT, for the portion of a Highway System Deliverability Upgrade (SDU) not funded by contributing Class Year Developers.

S&P Credit Ratings Platform Change [Mandatory]

Credit ratings are used in determining the amount of unsecured credit a Market Participant may use as collateral. Standard & Poor's (S&P) is one of three credit ratings companies used by the NYISO's Credit Management System (CMS). The NYISO receives daily updated Credit Ratings as a component of CMS. S&P is decommissioning the current version of its platform, RatingsXpress v3, and requiring all clients to upgrade to v4 by April 1, 2019. The NYISO will need to make the required updates to accept the v4 data feed, with final testing and deployment prior to April 1, 2019 to continue receiving S&P's credit ratings.

Financial Risk Assessment and Scoring Enhancement

This project would allow for integration of additional functionality, including reporting, for the NYISO's automated Financial Risk Assessment process used to evaluate each Market Participant's potential risk exposure. The project will also provide for automation of the NYISO Credit Scoring Model. These updates are intended to further increase efficiencies in identifying and mitigating credit risk.

Oracle Financials Upgrade

The Oracle Financials premise product is being sunsetted by Oracle and will not be enhanced after 2020. NYISO is evaluating the upgrade path to an Oracle Financials Hosted Cloud solution. This project would assess the migration path to move our current data and processes to use this new Oracle solution and then manage that migration.

FERC Form 1 Redesign

This project would procure and install or will create a utility to enter and submit data in a new electronic format as being required by FERC and NAESB. This financial data is currently provided to FERC using FERC's online Form 1 and is supplied quarterly and annually. Currently this is a 2018 project but the NAESB standards have not yet been released. This delay moves the projected deliverable into the 2019 projects timeframe.

Vendor Management Tool [Continuing]

This project is a continuation of a 2018 Business Requirements Project. NYISO's Procurement Department manually maintains data on procurement activity for over 1,000 vendors and several thousand contracts/ agreements/ tax documents that are used to support approximately 800 annual procurement events. The primary goal of this project is to create a single database, with query/ reporting capabilities, to house all vendor and contract information. This project would facilitate vendor management, minimize errors, and increase organizational efficiency.

Position Control System

The Human Resources department is responsible for managing all of the positions within NYISO, both filled and unfilled, for accurate budget and headcount purposes. Currently, there are labor intensive, manual processes, which are required to track all of the information regarding these positions. This project would identify, procure and deploy a Position Control System, which would track actual staffing levels and costs over time, enabling more efficient vacancy tracking and more accurate staffing and salary budgeting.

Finance Systems Strategic Vision Planning

The NYISO Finance team would study current and anticipated technology requirements necessary to support the Finance function and determine what changes and improvements will be required for all supporting software and hardware products and to develop a future implementation path for the products. This project would determine the best approach to building sustainable and secure systems that integrate Finance departments, systems, and processes while maintaining flexibility to adapt to market support requirements.

Capacity Market Products

ICAP AMS Redesign Phase III [Continuing]

ICAP AMS is a NYISO application that supports a $3 billion annual capacity market. Developed in house and launched in 2005, ICAP AMS is using multiple aging technologies. The application was built in a rapid succession of numerous market design projects under strict and aggressive implementation timelines, continually adding to its complexity. In 2016, the NYISO identified a multi-phase project for 2017 to start the process of redesigning the ICAP AMS in order to support future requirements. This project is a continuation of Phase II project efforts to re-

write the ICAP AMS application over multiple phases to improve end-user experience, increase code quality and maintainability, and automate and streamline testing.

CRIS for External-ROS Transmission Investments [Mandatory]

This project is a continuation of the market design completed in 2018 (See March 28, 2018 presentation to the Management Committee) and relates to FERC Docket ER17-505 in 2017 (the HQUS waiver request). The 2018 design allows Market Participant-funded transmission projects for new, or upgrades to, scheduled lines to be considered for CRIS in the Class Year process and obtain CRIS MW associated with the incremental transfer capacity from an external control area into the Rest-of-State (ROS) region through External-to-ROS Deliverability Rights (EDRs). EDRs backed by external resources can then participate in the capacity market. Consistent with the NYISO filings in FERC Docket ER17-505 and tariff language approved by stakeholders in 2018, the NYISO will implement software revisions necessary to effectuate this project.

Tailored Availability Metric

Evaluate alternative metrics that could improve the measurement of resource performance and availability. Specifically, assess the current structure, which calculates availability using a rolling-average EFORd. This current method may not accurately represent a unit's preparedness during critical operating periods and may not set an appropriate level of accountability for performance. Enhancing these measurements might help NYISO markets accommodate the entrance of significant renewable generation, as well as create a more efficient cost structure for consumers. This project is a product of the work conducted in 2017 and 2018 on Performance Assurance. More information on the Performance Assurance project can be found in the Analysis Group's presentation and report to the October 2017 BIC, and NYISO management's response.

Competitive Entry Exemption for Increased CRIS

Currently, Class Year projects requesting to increase their CRIS are not eligible to request a Competitive Entry Exemption from buyer-side mitigation. This project would be to discuss with stakeholders how the Competitive Entry Exemption rules might need to be modified or expanded to extend an opportunity for eligibility to these projects.

BSM Repowering

While there exists a competitive entry exemption to buyer-side mitigation, that exemption may not be adequate to facilitate the replacement of an existing generating unit with a new unit (sometimes referred to as "repowering"). A focused exemption may be appropriate in order to revise market rules so that they do not discourage or prevent replacements, while adequately protecting the integrity of the wholesale markets. This project would seek to evaluate and develop a proposal for a buyer-side mitigation exemption that specifically addresses the concerns with replacement (repowered) generation projects and encourages private investment. This exemption is intended to provide greater certainty and decrease the risk to generation developers/owners that pursue replacement projects. The exemption would be

compatible with market-based principles and would not seek to support or encourage subsidized new entry.

External Capacity Performance & Obligations

This effort will build upon the Performance Assurance project developed with stakeholders in 2018. In particular, it was recommended by the consultant (Analysis Group) in its report that the NYISO review the rules by which external resources participate in the NYISO capacity market, including eligibility requirements and offer obligations and terms. In 2018, the NYISO worked with stakeholders on the "Deliverability Requirements for Capacity Imports" effort. This effort has enhanced the notice regarding required documentation of transmission service for external capacity from PJM into the NYISO. The 2019 effort would continue to evaluate what, if any, additional performance requirements and obligations are needed, including an evaluation of documentation requirements to demonstrate deliverability to the NYCA border at other interfaces. This project will evaluate the potential enhancement of requirements for external capacity resources to improve their comparability to internal resources for grid operations. More information on the Performance Assurance project can be found in the Analysis Group's presentation and report at the November 2017 BIC, and NYISO management's response.

Demand Curve Reset [Mandatory]

The NYISO will work to select a consultant to study and recommend the parameters used to set the NYISO's ICAP Demand Curves for four years beginning with the Summer 2021 Capability Period. More information can be found in the previous DCR consultant report and the NYISO recommendations.

Enhancing Fuel and Energy Security

The Enhancing Fuel and Energy Security project would examine fuel and energy security for the bulk power system looking over a ten-year horizon in order to assess potential grid resilience concerns. The NYISO also appreciates stakeholder concerns related to a wide range of potential grid resilience risks, including extreme weather scenarios and climate change impacts. The NYISO is concerned that future changes to New York's fuel supply mix as well as the expected increased demands for natural gas may challenge the ability to meet electric system demands under certain stressed system conditions, such as a prolonged cold weather event and/or natural gas supply/transportation disruptions. The study would also report on similar fuel and energy security studies and initiatives underway by other ISOs/RTOs. Depending on the results of the study, the NYISO would facilitate the subsequent development of recommendations for potential operational and/or capacity and energy market enhancements necessary to achieve desired improvements in grid resilience as related to fuel and energy security.

DER Products

DER Participation Model [Mandatory]

The NYISO is developing enhancements to its market rules to permit Distributed Energy Resources (DER) to participate in NYISO's capacity, Day-Ahead and Real Time energy and ancillary services markets. The NYISO is also currently evaluating potential modifications to its existing Demand Response programs in order to enable this effort.

This project will have many facets that align with New York's Reforming the Energy Vision (REV) goals and support compliance with FERC Order No. 719, while simplifying the product offerings for demand response and distributed resources.

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

Links to stakeholder presentations:
DER 2017 Market Design Concept Proposal (MDCP)
DER 2017 MDCP Summary Presentation

Enabling Technologies for DER

This project will leverage the Map and API software deployed for the 2018 Granular Pricing and Market Price Delivery effort. This project will identify additional NYISO market data, data delivery process improvements, and/or delivery methods that can assist REV development opportunities and DER participation. If additional NYISO market data, data delivery process improvements, and/or delivery methods are deemed to be needed, it is anticipated that a business approved FRS documenting the requirements for this need will be developed.

Links to stakeholder presentations:
2018 Granular Pricing Updates
2017 Granular Pricing & Market Price Delivery

NYISO Pilot Framework [Continuing]

The NYISO has initiated a Pilot Project Program to test innovative technology and assist with the development of the Distributed Energy Resource Participation. This project will use the newly-created Pilot Program 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. Resources in the Pilot Program will not receive any compensation from the NYISO for their participation in the Program.

Links to stakeholder presentations:

Energy Market Products

ESR Participation Model (SOM) [MANDATORY]

In 2019, the Energy Storage Integration and Optimization project will continue to develop and deploy a participation model tailored to Energy Storage Resources (ESRs). The NYISO will develop the software code and implement the ESR participation model in compliance with FERC Order No. 841. The ESR participation model will capture the unique operational characteristics of ESR's, including their ability to withdraw from and inject energy onto the grid, and establish rules for participation in the NYISO's Energy, Capacity, and Ancillary Services markets.
Links to stakeholder presentations: February 21, 2018 MIWG, December 20, 2017 MIWG

Constraint Specific Transmission Shortage Pricing (SOM)

The NYISO currently uses a single graduated transmission constraint pricing mechanism to set prices under many transmission constraint conditions. However, some transmission constraints are not resolved using this graduated mechanism. This project will continue 2018 efforts to develop enhancements to the current graduated transmission pricing mechanism. In 2019, the NYISO will seek stakeholder approval of a completed market design for the proposed enhancements, including any required tariff language revisions. This effort was identified as potentially beneficial by the MMU, the 2017 Securing 100+ kV Facilities whitepaper, and the 2017 Integrating Public Policy Market Assessment report.

Links to stakeholder presentations: February 21, 2018 MIWG, January 16, 2018 MIWG

Enhanced Fast Start Pricing [MANDATORY]

On December 20, 2017, FERC instituted a proceeding in Docket No. EL18-33-000, pursuant to FPA section 206 concerning fast start pricing in NYISO 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. This project will begin developing the market design changes discussed in the NYISO's Initial Brief.

Carbon Pricing

In 2017, the Brattle Group published a report detailing how pricing carbon into NYISO's wholesale markets could help to harmonize the wholesale markets and New York State's public policies. After the report was published, a NYISO, NYSERDA, and DPS "Joint Staff" team worked with the Integrating Public Policy Task Force (IPPTF), to analyze the mechanics and benefits of

incorporating carbon pricing into NYISO's wholesale markets. In 2018, IPPTF work continues with the goal of developing a Joint Staff Carbon Pricing proposal by the end of 2018.

In 2019, this project will continue the vetting of wholesale market concepts for incorporating the cost of carbon into the NYISO's wholesale markets through the NYISO working group process. The goal of the 2019 effort will be a completed market design for stakeholder approval.

More Granular Operating Reserves (SOM)

This effort will pursue a study to determine whether the NYISO should establish and secure a distinct 10-minute reserve requirement for New York City. Exploring load pocket reserves, as well as reviewing and evaluating potential enhancements to current scheduling practices to ensure deliverability of reserves from resources located within load pockets, would further enhance the location-specific value of maintaining short notice responsive resources in desirable locations. This effort has been identified as potentially beneficial in both the 2018 Performance Assurance Management Response and the 2017 Integrating Public Policy Market Assessment report.

Reserve Procurement for Resilience

This effort will consider enhancements to the current operating reserve shortage pricing construct to facilitate procurement of additional operating reserves beyond established minimum requirements to incent resource performance and promote grid resiliency. Procurement of additional reserves above minimum requirements could enhance resilience by recognizing the value of resource availability to be responsive to unanticipated real-time operating needs. The additional financial incentives could also encourage procurement of the necessary fuel to meet scheduled obligations and incent improved resource performance. This effort was identified as potentially beneficial by the 2017 Integrating Public Policy Market Assessment report.

Ancillary Services Shortage Pricing (SOM)

This project will reevaluate the NYISO's current Ancillary Services shortage pricing values in consideration of the relative shortage pricing values for each product. Performance incentives in neighboring ISO/RTO regions indicate that a review of the NYISO's current shortage pricing values could offer significant value. In addition, the relative value of ancillary services and resources flexibility may increase as the NYISO moves toward a future with more intermittent renewable resources. Further improvements to the current shortage pricing values could enhance the financial incentives for the construction and operation of resources with specific capabilities in desirable locations. This project has been identified as potentially beneficial in the Integrating Public Policy Market Assessment report.

Automated Default Mitigation Implementation

Default bid mitigation is a Tariff-prescribed mitigation measure that requires the Market Participant to submit bids equal to a reference level for a period of time. This project will

implement software changes to ensure that during these mitigation periods, generator bidding will conform to the Tariff rules for default bid mitigation.

Enterprise Products

Database Platform Upgrades - 2019 [Continuing]

This is a continuation of a multi-year effort to upgrade the NYISO's database systems and implement changes to improve the overall performance of critical databases. This technology lifecycle project is necessary to ensure the ongoing availability of security patches and vendor support for critical systems.

Application Platform Upgrade Phase - 2019 [Continuing]

This is a continuation of a multi-year effort to replace aging server infrastructure and migrate to a new application platform standard. This phase includes hardware/operating system migrations and middleware upgrades.

Identity and Access Management (IAM) – 2019 [Continuing]

This is a continuation of a multi-year project to improve identity and access management (IAM) controls for cyber systems and physical facilities. The IAM 2019 project builds upon the completed deliverables from earlier IAM project phases. This phase seeks to further extend automated provisioning capabilities and implement infrastructure upgrades for enhanced security and improved system availability.

Microsoft Systems Upgrade [Continuing]

This is a continuation of a multi-year effort to upgrade NYISO's aging Microsoft Systems infrastructure. This technology lifecycle project is necessary to maintain system performance and availability, as well as ensure ongoing vendor support for critical systems.

Network Infrastructure Upgrade [Continuing]

This is a continuation of a multi-year project to replace and/or upgrade network infrastructure components. This technology lifecycle project is necessary to maintain system performance and availability, as well as ensure ongoing vendor support for critical systems.

IT Infrastructure Automation

This project is the implementation of tools and processes to automate a number of infrastructure management function which support critical systems.

EMS/BMS System Upgrade [Continuing]

This is a multi-year project to upgrade both the Energy Management System (EMS) and the Business Management System (BMS). The EMS encompasses the core reliability functions used by the system operators such as load flow and contingency analysis. The BMS encompasses the day ahead and real time energy market functionality.

PI System Upgrade [Continuing]

The PI Server currently in production is not compatible with the new version of EMS/BMS software that the NYISO is implementing as part of the multi-year EMS/BMS Upgrade Project. The PI System Upgrade project will update PI Server to a version compatible with the new EMS/BMS platform, and will be performed in conjunction with the EMS/BMS Upgrade testing and deployment. In addition, the new version of PI Server will result in decreased database licensing costs and improved maintainability and reliability.

EMS/BMS Workstation Upgrade [Continuing]

As part of the EMS/BMS upgrade project, NYISO must deploy new operator workstations that host the Network Manager (NM) platform in the control room and to run the Day-Ahead Market. The new workstations are being setup to support parallel execution of the markets in the NM-R and NM environments until we switch over to the NM platform. The scope of this project is to add new NM workstations and update the ESX cluster in place, which will run both Ranger and NM virtual workstations. This upgrade is required to be completed before the EMS/BMS System Upgrade.

Gurobi (MIP) Refresh [Continuing]

The math engine responsible for solving the unit commitment and dispatch optimization for Ranger and the EMS BMS replacement (NM) is a commercial product called Gurobi. Major releases of this product occur every two years and mainline support rolls off for a particular release after about four years. This project is to upgrade to the current version of Gurobi along with the hardware systems it runs on.

TOA Platform Upgrade Phase III [Continuing]

This project continues the efforts started in 2016 to upgrade the TOA (Transmission Outage Application) used for transmission and generation outage scheduling and coordination by the NYISO and stakeholders. The dated platform is costly to both change and test, which limits the NYISO's ability to implement new functionality. Additionally, there is also an increasing concern with our ability to support the application on aging technologies. The goal of this project is to replace the end-of-life software and hardware of the TOA by replacing it with a new application built on a modern technology framework that is easier to support and enhance to meet customer expectations.

Interconnection Project Queue (or Portal) Automation [Continuing]

This is a continuation of a 2018 Business Requirements Project. NYISO's Interconnection Projects team currently uses a manual process to manage both the receipt of Interconnection Project requests and to manage the administration of the Interconnection Projects queue. The NYISO is experiencing a sustained increase is the number of Interconnection Project requests received. This project will implement a solution to allow for automated management of the interconnection processes to create increased efficiencies in the interconnection process and to improve customer service for parties involved in the interconnection process.

Comprehensive System Planning Process Review [Continuing]

The purpose of this project is to review the NYISO's separate comprehensive system planning processes and consider whether it may be beneficial to revise and/or further integrate the reliability, economic, and public policy planning processes.

Climate Change Impact and Resilience Study

To inform the NYISO's planning, forecasting, and operations, as well as the development of wholesale market mechanisms to enhance grid resilience, the NYISO will undertake a three-phased project to examine issues associated with resilience and reliability and develop potential market solutions.

In Phase I, the project would develop long-term NYCA load forecasts through year 2050. In addition to developing the baseline 50/50 forecast, the project would identify variables and appropriate accounting measures for:

- Warming and cooling trends for summer and winter peak producing days
- Heatwaves, cold snaps, extreme weather events, and resulting impacts on hourly load profiles
- Distributed (behind-the-meter) solar generation
- Electrification, such as wider application of electric vehicles and heating technologies
- Energy storage

This phase will expand NYISO's load forecasting capability to consider the impacts of electrification and energy storage, and assess the likelihood that alternative projections of weather variables in New York State may occur that take into account changing climate conditions, such as how these events may change in magnitude, duration and frequency. Within Phase I, the scope for Phase II is expected to be further refined and a work plan developed. Upon the completion of this phase, the load forecasts developed could then be used in other studies, such as Reliability Needs Assessment and CARIS, as a scenario for further study if appropriate.

Phase II is expected to identify and examine impacts to the bulk power system under the conditions identified in Phase I that could potentially impact system stability and resiliency,

focusing specifically on the ability of the system to meet NYCA load requirements and facilitate prompt system restoration in the event of an outage or disruption. It will identify the attributes and actions necessary to mitigate the reliability and resilience risks identified in this study. In Phase III, stakeholders would develop market design concepts targeted to provide adequate compensation for attributes needed for resilience and system stability. This could include capacity market reforms, additional ancillary services and revisions to the planning process.