New York ISO
Independent System Operator

Reserves for Resource Flexibility

SENY Reserve Region Enhancements

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Reposted – Revisions in Green Font

Market Issues Working Group

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Rensselaer NY

Agenda

- Background
- Supplemental Analysis
- Applicable SENY Facilities
- Binding Constraint Analysis
- SENY 30-Minute Reserve Procurement Analysis
- Next Steps
- Appendix I: Proposed SENY Reserve Enhancements
- Appendix II: Normal Transfer Criteria Analysis
- Appendix III: Thunderstorm Alert Treatment

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Background

A Grid in Transition – The Plan

- **Carbon Pricing**
- **Comprehensive Mitigation Review**
- **DER Participation Model**
- **Energy Storage Participation Model**
- **Hybrid Storage Model**

Aligning Competitive Markets and New York State Clean Energy Objectives

- **Enhancing Energy & Shortage Pricing**
  - Ancillary Services Shortage Pricing
  - Constraint Specific Transmission Shortage Pricing
  - Enhanced Fast Start Pricing
- **Review Energy & Ancillary Services Product Design**
  - More Granular Operating Reserves
  - Reserve Enhancements for Constrained Areas
  - Reserves for Resource Flexibility

Valuing Resource & Grid Flexibility

- **Enhancements to Resource Adequacy Models**
- **Revise Resource Capacity Ratings to Reflect Reliability Contribution**
  - Expanding Capacity Eligibility
  - Tailored Availability Metric
- **Capacity Demand Curve Adjustments**

Improving Capacity Market Valuation

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Date	Working Group	Discussion Points and Links to Materials
May 9, 2019	ICAPWG/MIWG	Project overview https://www.nyiso.com/documents/20142/6474763/5_9_2019_Reserves_for_Resource_Flexibility_FINAL.pdf/f5b74852-2b18-9233-a8fa-bfc488ed1238
July 15, 2019	ICAPWG/MIWG	Discuss additional SENY reserve requirement for Normal Transfer Criteria post-contingency https://www.nyiso.com/documents/20142/7575688/7_15_2019_Reserves_for_Resource_Flexibility_FINAL.pdf/60a62b16-895c-9185-9ba5-d3538da9e10b
September 26, 2019	ICAPWG/MIWG	Discuss SENY Reserve Region Enhancements and Uncertainty Analysis https://www.nyiso.com/documents/20142/8414685/9_26_2019_Reserves_for_Resource_Flexibility_FINAL.pdf/ba7fb774-49d5-0c96-1d2c-664a2c9c3c05
October 28, 2019	ICAPWG/MIWG	Market Design Concept Proposal https://www.nyiso.com/documents/20142/8922912/10_28_2019_Reserves_for_Resource_Flexibility_MDCP_FINAL.pdf/e8bedc39-867b-88d6-ef5a-fe92943d48ba
4/27/2020	ICAPWG/MIWG	Discuss draft tariff language https://www.nyiso.com/documents/20142/12170360/4_22_2020_Reserves_for_Resource_Flexibility_FINAL.pdf/b2db3169-5d56-ec11-1541-c83bc5f58ed5
4/27/2020	ICAPWG/MIWG	Discuss Consumer Impact Analysis Methodology https://www.nyiso.com/documents/20142/12170360/CIA%20Methodology%20for%20Reserves%20for%20Resource%20Flexibility.pdf/a994ee00-e91b-1e70-44c8-7eba40645503

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Reserves for Resource Flexibility: SENY Reserve Region Enhancements

- **The NYISO proposes to procure an additional 500 MW of 30-minute reserves in the Southeastern New York (SENY) reserve region as part of the Reserves for Resource Flexibility project.**
  - Proposal contemplates shifting of current locational reserve procurements only and does not propose to increase the 2,620 MW level of 30-minute total reserves procured statewide (NYCA).
  - This additional reserve would be procured at all times in the Day-Ahead and Real-Time Markets.
- **Consistent with the treatment of SENY reserves, the NYISO is also proposing to reduce the NYC (Zone J) reserve requirement to zero MW in real-time during Thunderstorm Alerts (TSAs) as part of this project.**

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Supplemental Analysis

Overview

- The impact of procuring additional reserve in SENY today will be limited. As uncertainty grows as we move toward the grid of the future, the need to incent additional resource flexibility will also grow.
- The facilities relevant to the SENY reserve region can experience forced outages without warning. Though forced outages are infrequent, these facilities are frequently binding.
  - When binding, a forced outage would require 1,800 MW of reserve to return the transmission system in SENY to Normal Transfer Criteria.
- Procuring the proposed additional reserve in the market will provide NYISO Operators access to resource capability in SENY that is needed to meet the operating objective to return to Normal Transfer Criteria now and in the future by incenting the necessary resource fleet flexibility.
  - The initial impact of this proposal on prices is anticipated to be small. The impact will grow only when appropriate with the anticipated increase in grid uncertainty as additional renewable resources interconnect to the grid.
- This presentation was developed in close collaboration with NYISO Operations.

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Supplemental Analysis Background

- **At the April 27, 2020 MIWG meeting, stakeholders requested that the NYISO provide additional information regarding the proposed 500 MW increase to the SENY 30-minute reserve requirement.**
- **The purpose of this presentation is to provide additional information in response to such requests, including:**
  - Ratings for the applicable facilities
  - The frequency of forced outages for the lines in question
  - An assessment of the frequency of the applicable binding transmission constraints

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Applicable SENY Facilities

SENY Limiting Facility Ratings

- The transmission constraints most often binding into SENY, and their current summer ratings are shown in the table below.
- Suffering a contingency on one of these facilities when a transmission constraint for the facility is binding would require 1,800 MW of 30-minute reserve to restore the transmission system to Normal Transfer Criteria.

Equipment Name	PTID	NOR	LTE	STE	Line ID
LEEDS___-PLSNTVLY_345_92	25056	1,331	1,538	1,724	92
ATHENS__-PLSNTVLY_345_91	25054	1,331	1,538	1,724	91

- The NYISO analyzed a summer case with transmission facility flow into SENY at limits to establish the proposed 500 MW of additional SENY 30-minute reserve.
  - "At limits" in this context refers to post-contingency flow being part way between Long Term Emergency ("LTE") and Short Term Emergency ("STE") ratings as allowed by NYSRC Operating Exception #23.

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Facility Forced Outages

- The NYISO examined outages of the applicable lines and found that for the time period of 2015 to 2019, there were four total forced outages.

Equipment Name	Forced Outage Duration
ATHENS__-PLSNTVLY_345_91	21 minutes
	54 minutes
LEEDS___-PLSNTVLY_345_92	15 hours 4 minutes
	13 hours 23 minutes

- Though infrequent, forced outages of these lines can and do occur at any time.
  - Procuring the additional SENY reserve proposed will allow the NYISO to return to Normal Transfer Criteria following a forced outage, as well as manage grid uncertainty in SENY.

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SENY and NYC Reserve Requirements during a TSA

- **During a TSA, the NYISO operates the transmission system as if the worst first contingency has already occurred per the NYSRC Rule G.1.R4[1] and the NYISO Transmission and Dispatching Operations Manual section 4.2.9.[2]**
  - Once the system is secured through this process, sufficient room is created on the transmission system such that normal transfer criteria can be maintained upon the first transmission loss.
  - It is therefore appropriate to reduce SENY and NYC reserve requirements to zero MW in real-time during TSAs.

[1]See NYSRC Reliability Rules, Version 44, at the following link:
http://www.nysrc.org/NYSRCReliabilityRulesComplianceMonitoring.html
[2]See the NYISO Transmission and Dispatching Operations Manual:
https://www.nyiso.com/documents/20142/2923301/trans_disp.pdf/9d91ad95-0281-2b17-5573-f054f7169551

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Binding Constraint Data Analysis

Binding Transmission Constraint Analysis

- If the applicable SENY transmission constraints are binding, then this indicates that a contingency occurring for one of these limiting facilities would require 1,800 MW in SENY to return to normal transfer criteria. As mentioned, these facilities include:
  - LEEDS___-PLSNTVLY_345_92
  - ATHENS__-PLSNTVLY_345_91
- The NYISO analyzed 5 years of historical binding transmission constraint data from January 1, 2015 to December 31, 2019 for the DA and RT markets.*
  - The results of this analysis are presented in the following slides.
- This analysis may underestimate the number of times suffering a contingency on one of the limiting facilities would require 1,800 MW in SENY to return to normal transfer criteria.
  - This is because a transmission constraint may be very close to binding, but not actually bind, and thus not appear in the dataset.
- The data on the following slide should be interpreted as a count of hours out of 5 years of data. The applicable constraints are binding more often in some years compared to other years, depending on system conditions. These constraints, as well as forced outages of the transmission facilities, can and do occur at any time.
  - The NYISO proposes to procure the additional SENY reserve at all times due to the uncertainty of when these constraints will bind, and when outages of the facility will occur.

*This data is publically available on the NYISO website at the following link: https://www.nyiso.com/power-grid-data

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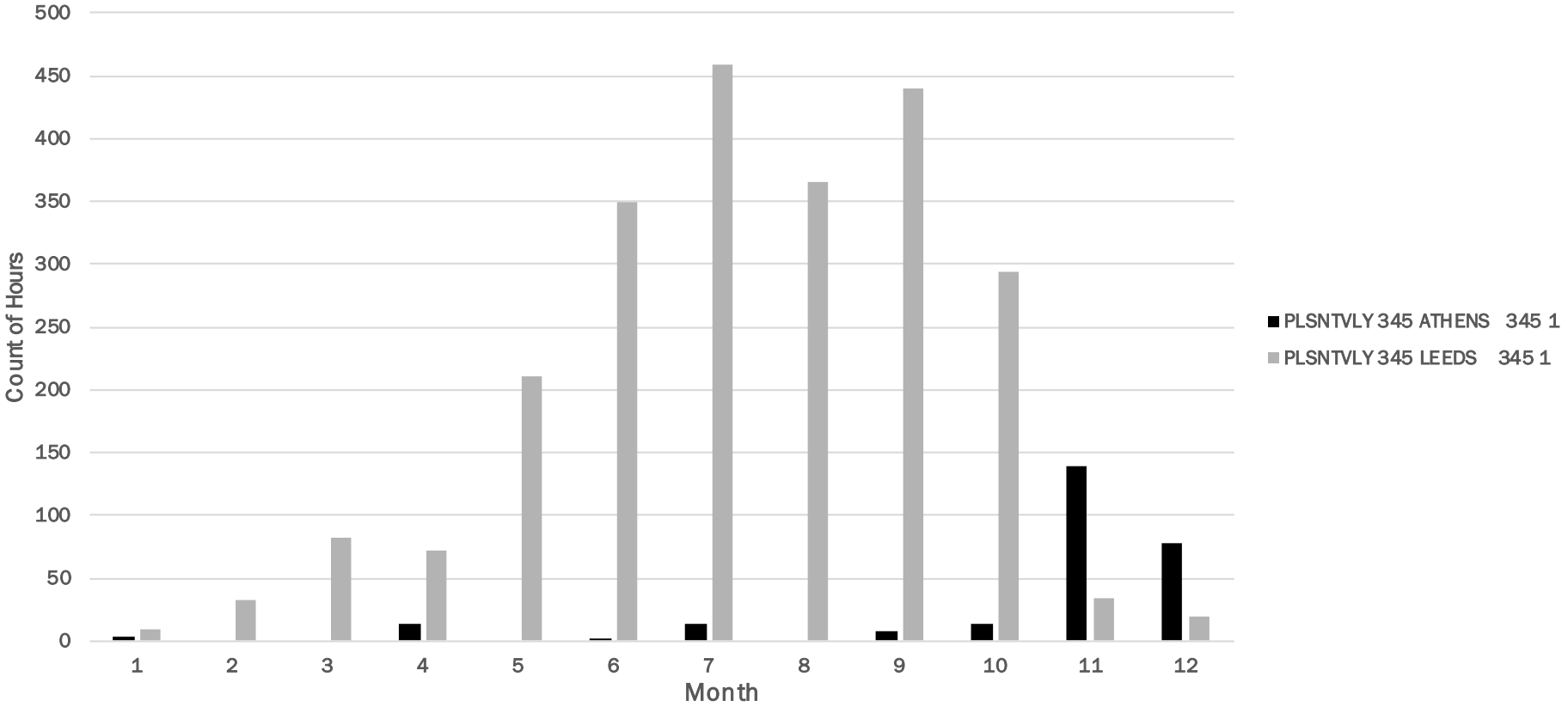
DA Frequency of Binding Constraints by Month (PLSNTVLY 345 LEEDS 345 1 and PLSNTVLY 345 ATHENS 345 1)



Note: Each bar is a count of the hours where the given transmission constraint was binding.

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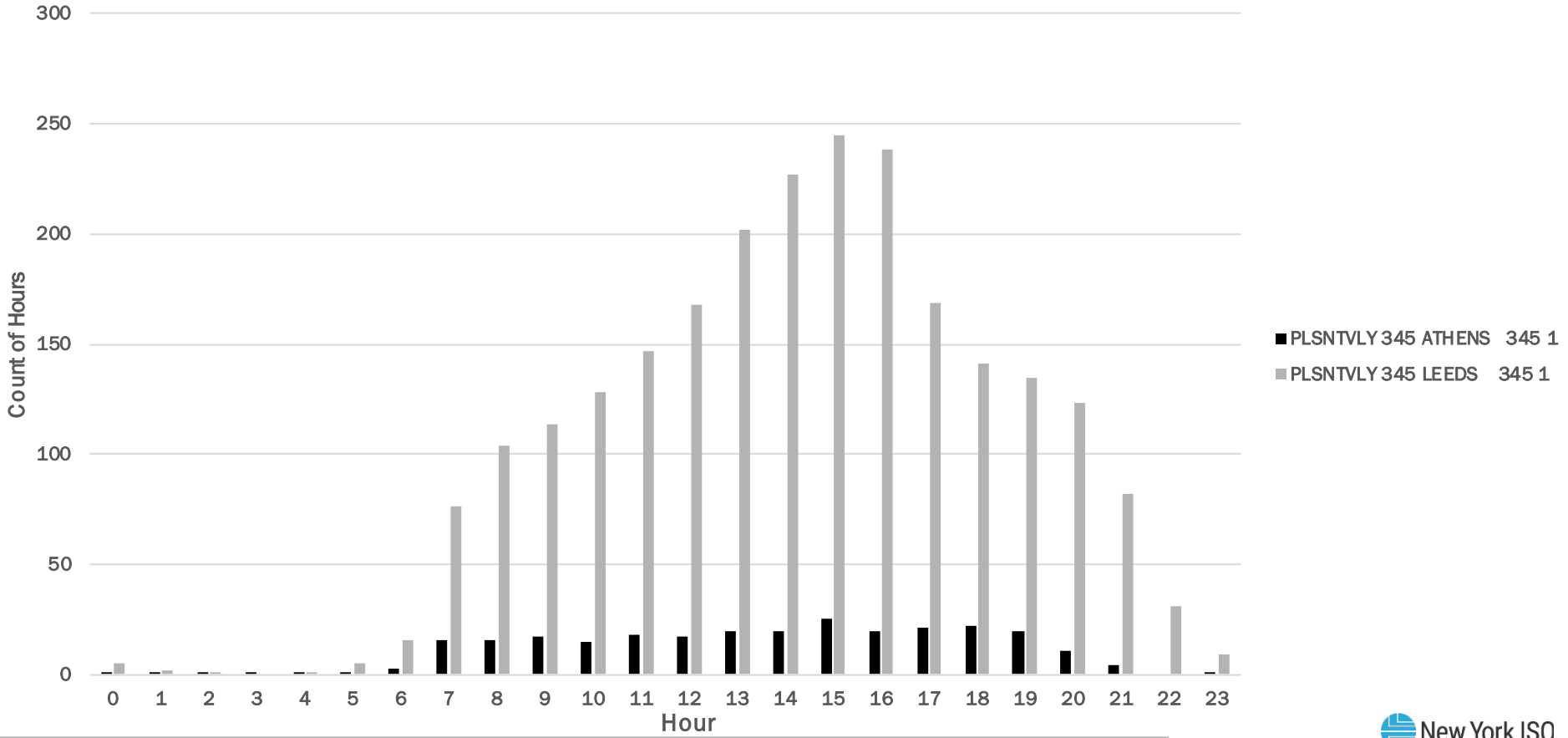
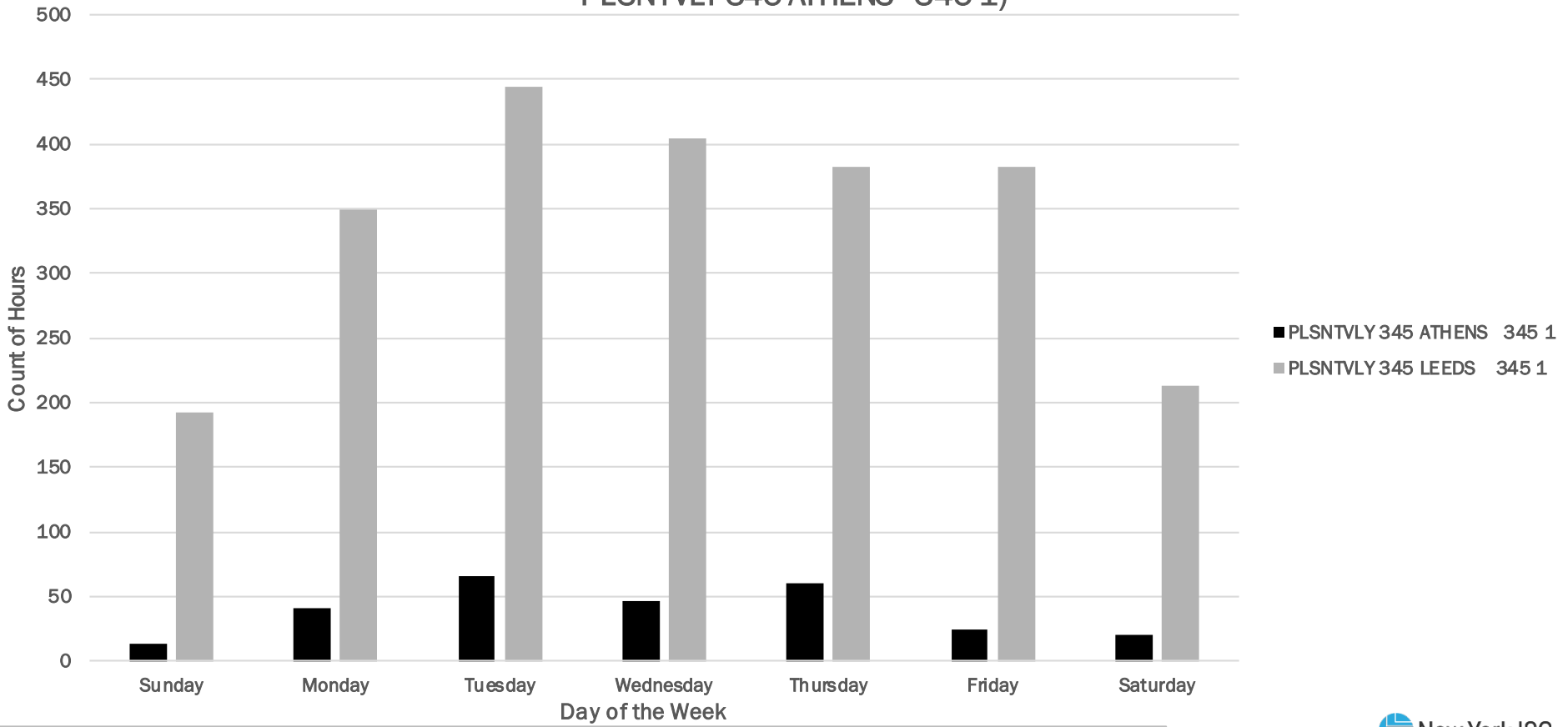
DA Frequency of Binding Constraints by Hour (PLSNTVLY 345 LEEDS 345 1 and PLSNTVLY 345 ATHENS 345 1)



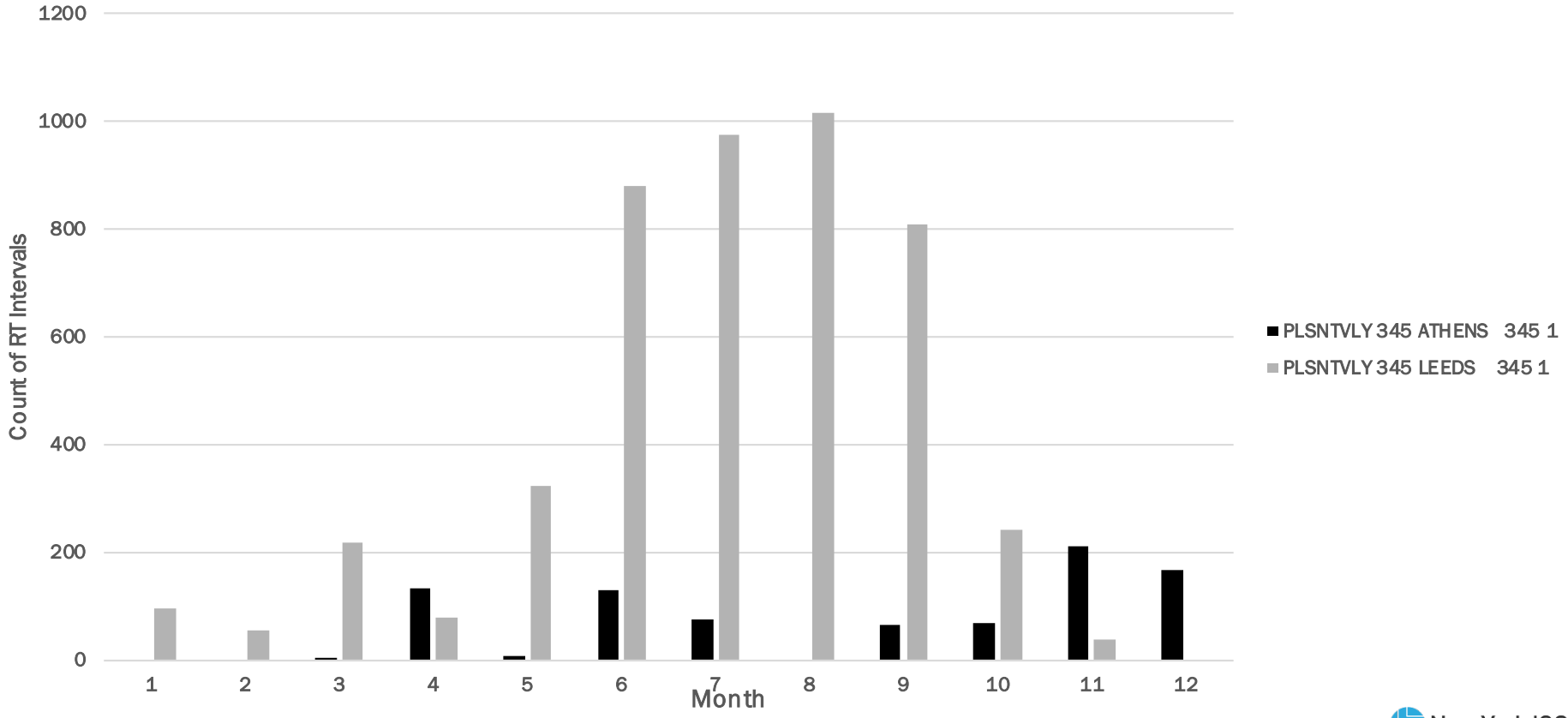
Note: Each bar is a count of the hours where the given transmission constraint was binding.

DA Frequency of Binding Constraints by Day of the Week (PLSNTVLY 345 LEEDS 345 1 and PLSNTVLY 345 ATHENS 345 1)



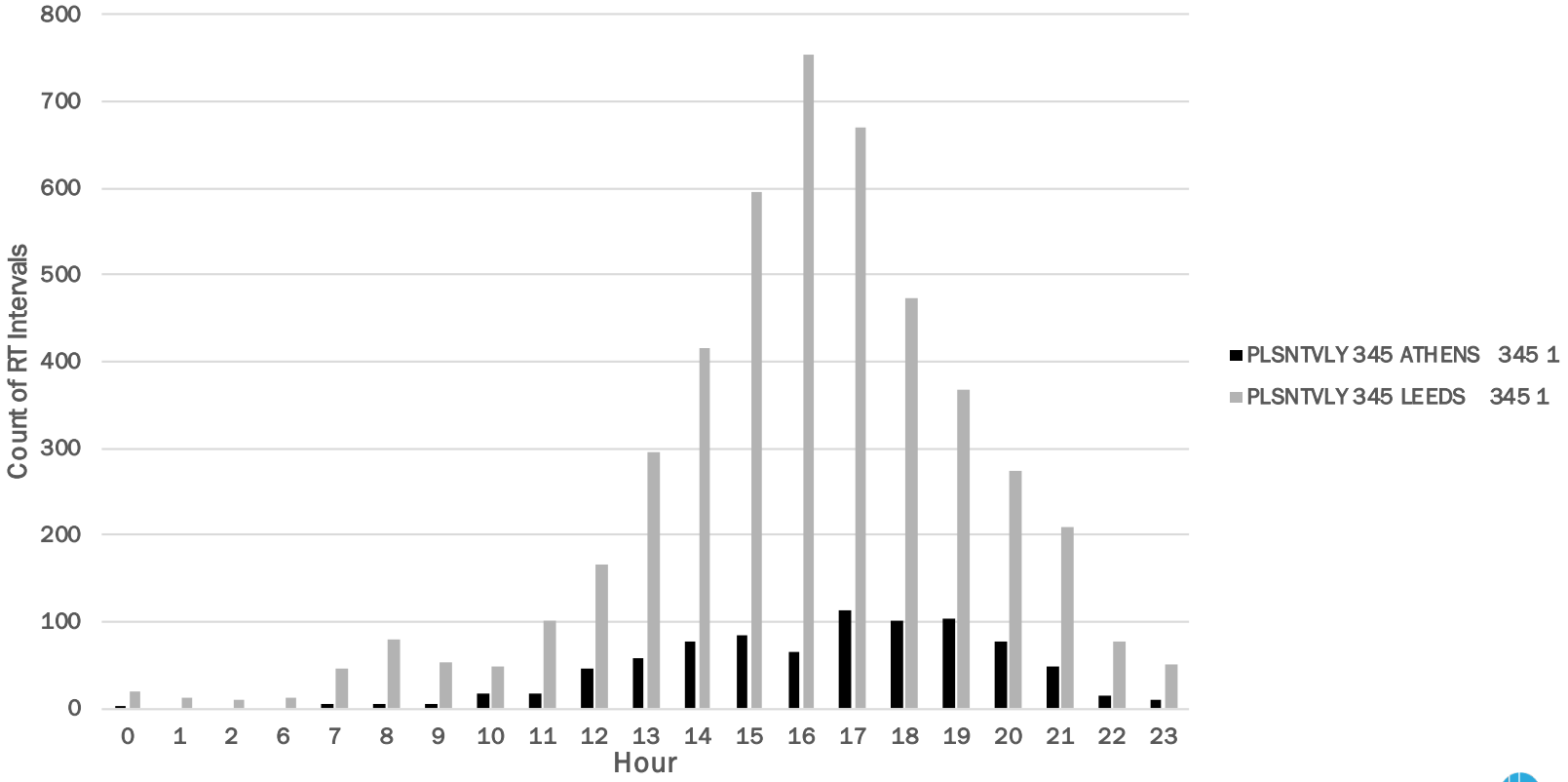
Note: Each bar is a count of the hours where the given transmission constraint was binding.

RT Frequency of Binding Constraints by Month (PLSNTVLY 345 LEEDS 345 1 and PLSNTVLY 345 ATHENS 345 1)



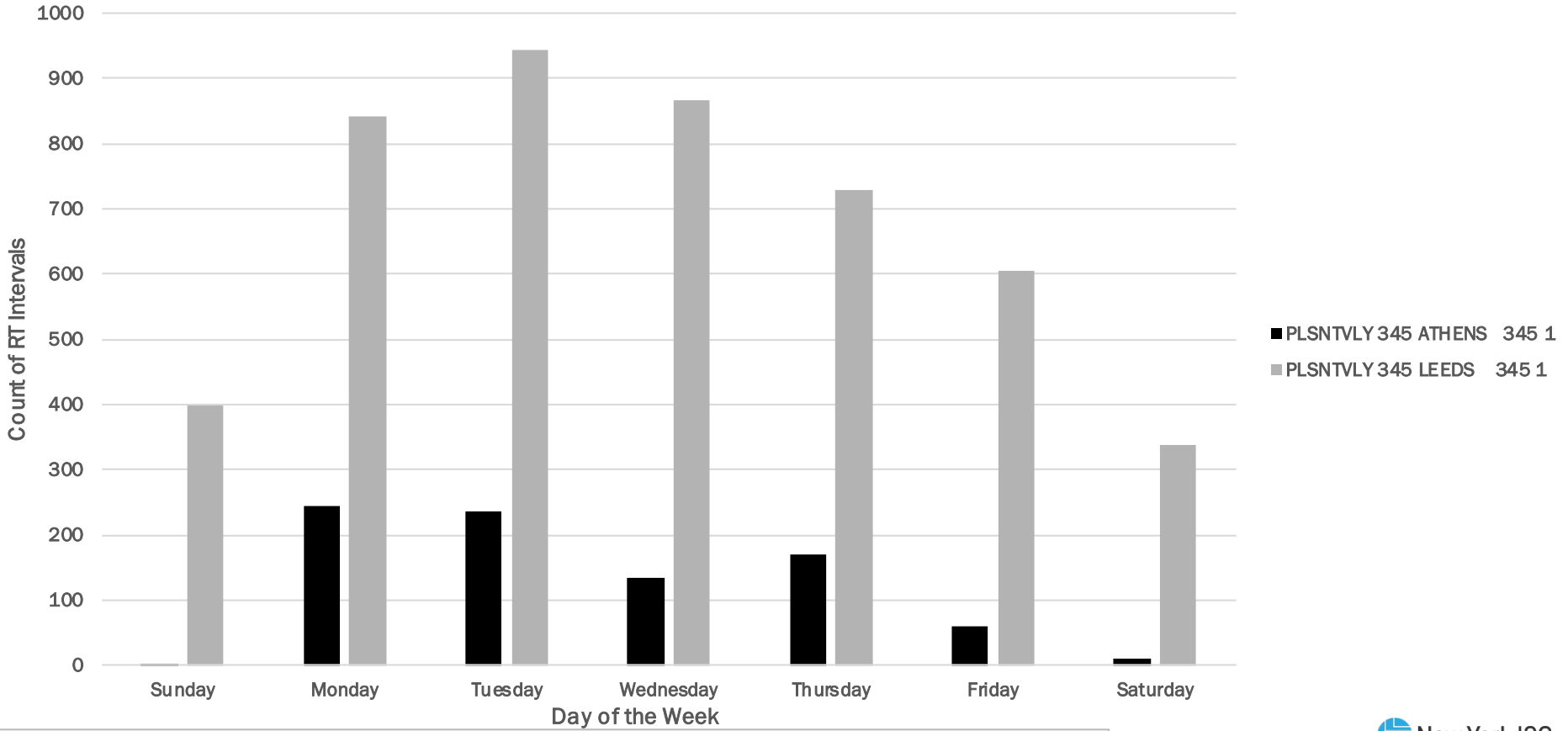
Note: Each bar is a count of RT Intervals where the given transmission constraint was binding.

RT Frequency of Binding Constraints by Hour (PLSNTVLY 345 LEEDS 345 1 and PLSNTVLY 345 ATHENS 345 1)



Note: Each bar is a count of RT Intervals where the given transmission constraint was binding.

RT Frequency of Binding Constrain by Day of the Week (PLSNTVLY 345 LEEDS 345 1 and PLSNTVLY 345 ATHENS 345 1)



Note: Each bar is a count of RT Intervals where the given transmission constraint was binding.

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SENY 30-Minute Reserve Procurement Analysis

Reserve Currently Procured in SENY

- **Today, at least 1,800 MW is already procured in SENY in the majority of DA and RT intervals.**
  - As a reminder, the current statewide 30-minute reserve requirement is 2,620 MW, with a minimum requirement of procuring 1,300 MW from resources located within the SENY reserve region.
- **The following slide depicts, for 2019, how often the market software procured at least 1,800 MW of 30-minute reserve in SENY.**
  - In these instances, procuring 30-minute reserve in SENY in excess of the 1,300 MW requirement was the lowest cost solution for meeting the statewide reserve requirements.

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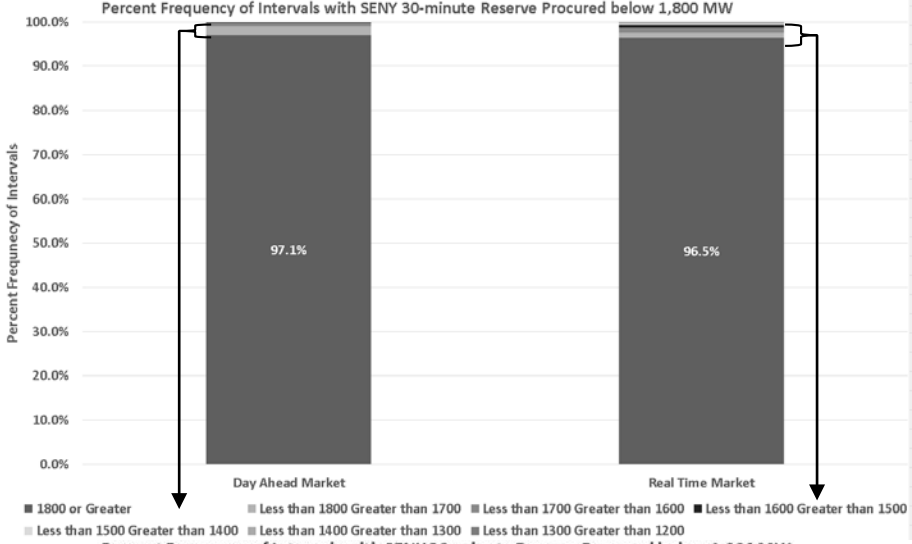
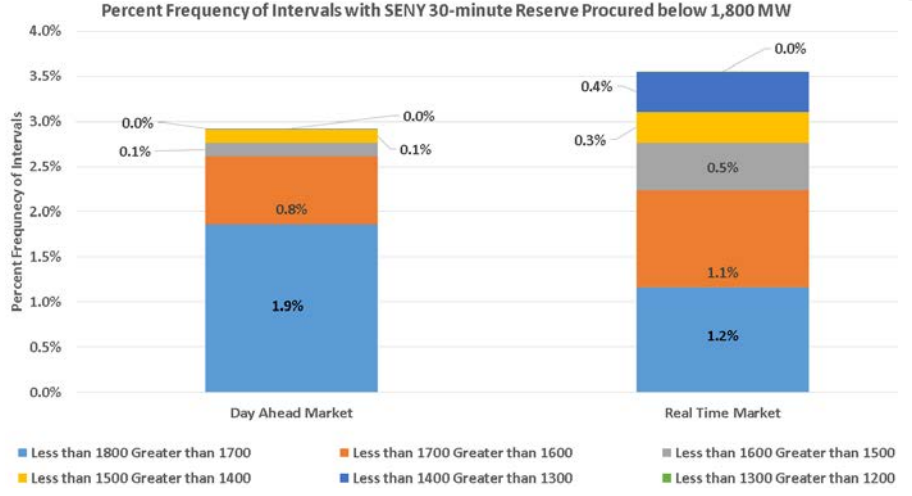
Reserve Currently Procured in SENY

- **The NYISO believes that the short term impact of this proposal will be limited.**
  - 97.1% of DA intervals in 2019 had 1,800 MW or more of SENY 30-minute reserve procured.
    - 256 DA intervals in 2019 had less than 1,800 MW procured in SENY.
  - 96.5% of RTD intervals had 1,800 MW or more of SENY 30-minute reserve procured.
    - 3,730 RTD intervals had less than 1,800 MW procured in SENY.
- **Once this project is implemented, prices will more transparently reflect the value of the additional reserve as needed for reliability today, and also help the NYISO to prepare for a future with increased grid uncertainty.**





Note: due to rounding, values in the charts may not sum to 100%.

Next Steps

Next Steps

- ✓ April/May 2020
  - ✓ Present Consumer Impact Analysis methodology.
- May/June 2020
  - Continue to discuss proposal.
  - Present Consumer Impact Analysis.
- June/July 2020
  - Seek stakeholder approval of proposal at BIC and MC.
- 2021
  - Currently targeted timeframe to develop the necessary software.
- 2022
  - Currently targeted timeframe to implement the proposed enhancements.

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Appendix I: Proposed SENY Reserve Enhancements

Normal Transfer Criteria

- **The NYISO proposes to procure an additional 500 MW of 30-minute reserves in the SENY reserve region (zones G-K).[1]**
  - The current SENY 1,300 MW 30-minute reserve requirement serves to bring transmission assets to Emergency Transfer Criteria after suffering a contingency.
    - This proposal increases the portion of the total statewide reserve requirement carried in SENY from 1,300 MW to 1,800 MW.
  - Procuring additional 30-minute reserves in the SENY reserve region will provide ready access to additional resource flexibility through a market-based mechanism to bring transmission assets to Normal Transfer Criteria following a contingency.
    - Absent such a mechanism, out of market actions may be required to return facilities to Normal Transfer Criteria following a contingency.
- **Proposal contemplates shifting of current locational reserve procurements only and does not propose to increase the 2,620 MW level of 30-minute total reserves procured statewide (NYCA).**
- **This additional reserve would be procured at all times in the Day-Ahead and Real-Time Markets.**
- **The 1,800 MW 30-minute reserve requirement would be reduced to zero MW during a TSA.**

[1] For further information, please see Appendix II: Normal Transfer Criteria Analysis

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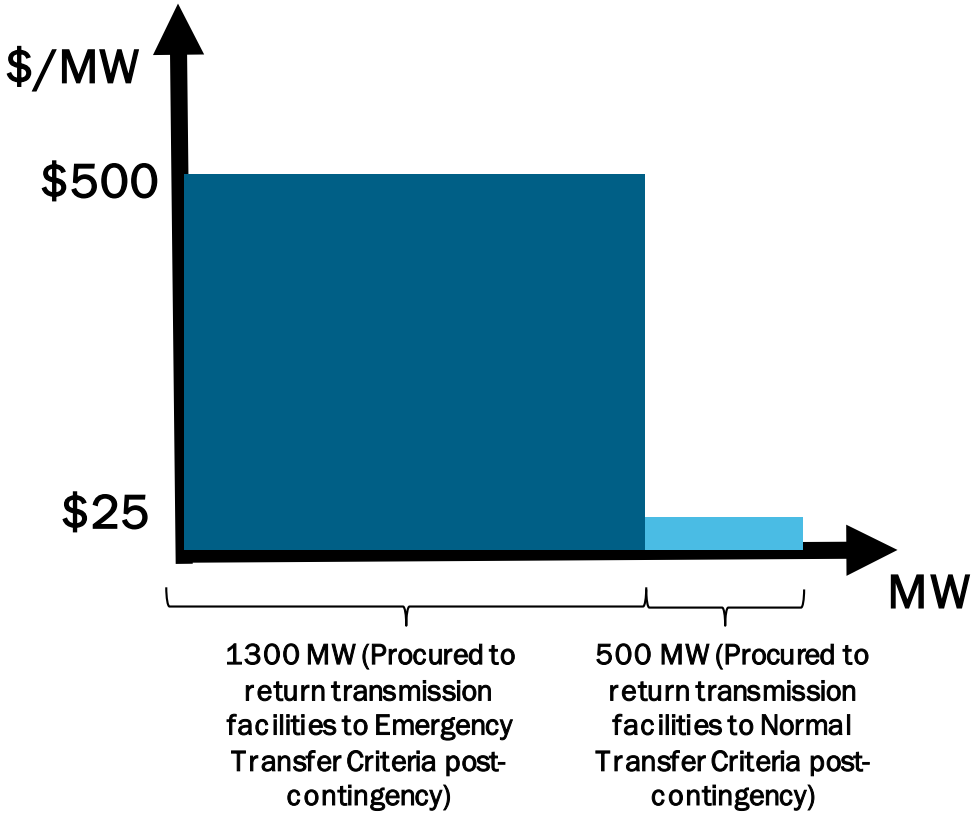
Proposed SENY 30-Minute Reserve Demand Curve



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SENY 30-Minute Reserve Demand Curve

- **The current 1,300 MW SENY 30-minute reserve requirement returns transmission assets to Emergency Transfer Criteria following a contingency.**
  - The shortage price for SENY 30-minute reserves is currently $500/MWh.
  - When evaluating whether to call Special Case Resources/ Emergency Demand Response Program ("SCR/EDRP") resources in SENY, currently valued at $500/MWh, NYISO Operations currently uses post-contingency Emergency Transfer Criteria.
- **As discussed, the addition to the SENY 30-minute reserve requirement will provide a market-based mechanism to bring transmission assets to Normal Transfer Criteria following a contingency.**
  - The NYISO proposes a shortage price value of $25/MWh for the 500 MW increase in the SENY 30-minute reserve requirement.
    - The $25/MWh value is intended to facilitate efficient procurement of additional reserve capability for securing the transmission system in response to real-time contingencies that may arise.
  - This lower shortage price recognizes that reserves procured for Emergency Transfer Criteria are a higher relative priority than reserves procured for Normal Transfer Criteria.

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Scarcity Pricing Logic

- **The NYISO proposes that the $25/MW value for the additional 500 MW in SENY be maintained during an SCR/EDRP activation.**
  - Any Scarcity Reserve Requirement in SENY would be added to the $500/MW "step" of the SENY 30-minute reserve demand curve.
  - This treatment is similar to the treatment of the East of Central-East reserve region during an SCR/EDRP activation.*

*For further information on the treatment of the East of Central-East reserve region during an SCR/EDRP activation, see p.78 of the Ancillary Services Manual: https://www.nyiso.com/documents/20142/2923301/ancserv.pdf/df83ac75-c616-8c89-c664-99dfea06fe2f

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Appendix II: Normal Transfer Criteria Analysis

Normal Transfer Criteria Analysis

- **The NYISO conducted an analysis to determine the proposed additional reserve quantity.**
  - A summer case was analyzed with transmission facility flow into SENY at limits.
  - The analysis confirmed that the current 1,300 MW 30-minute reserve requirement provides ready access to sufficient resource capability to recover from the first worst contingency in SENY, and return transmission facilities into SENY to Emergency Transfer Criteria post-contingency.
    - Emergency Transfer Criteria in this case indicates that post-contingency facility flow would be below short-term emergency (STE) ratings.

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Normal Transfer Criteria Analysis (Continued)

- **The analysis further demonstrated that increasing the SENY 30-minute reserve requirement by an additional 500 MW provides ready access to resource capability that allows the NYISO to return transmission facilities into SENY to Normal Transfer Criteria post-contingency.**
  - Normal Transfer Criteria in this case indicates that post-contingency flow would be below long-term emergency (LTE) ratings.

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Normal Transfer Criteria

- The Central East transmission constraint that led to the creation of the East of Central-East reserve region is currently a voltage collapse Interconnection Reliability Operating Limit (IROL).
  - The current East of Central-East reserve requirements are sufficient to reestablish flows under the IROL limit after suffering the worst contingency.
- The NYC (Zone J) reserve requirements already provide sufficient capability to return to Normal Transfer Criteria following a contingency, thus no increase to the NYC reserve requirement is necessary.
- The NYISO does not recommend changes to the LI reserve requirement at this time, due to the concern that this could result in more reserves being held on LI than is actually deliverable to the rest of the NYCA.[1]

[1]For a discussion of the LI Reserve Modeling, please see the presentation at the following link: https://www.nyiso.com/documents/20142/1403425/LI%20Reserve%20Modeling%20-%20Nov%20MIWG%20FINAL.pdf/439eb65b-879c-fa77-6337-b36eb5435bbf

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Appendix III: Thunderstorm Alert (TSA) Treatment

SENY & NYC Reserve Requirements during a TSA

- **Power transfer into SENY and NYC (Zone J) is lowered during a TSA.**
  - Generation in SENY ramps up during a TSA, and less power flows across lines into SENY.
  - Reserves are effectively carried on the transmission system in these instances, as line flow could be increased to deliver more power into SENY and NYC in the event of a contingency.
    - NYISO Operations would then redispatch additional SENY generation as necessary to re-secure the transmission constraint.

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SENY & NYC Reserve Requirements during a TSA

- **Given that reserves are effectively carried on the transmission system during a TSA, maintaining the otherwise applicable reserve requirements for SENY and NYC may result in pricing outcomes that do not accurately reflect grid conditions.**
  - To address this concern, the 30-minute reserve requirement for SENY (1,300 MW) is currently reduced to zero MW during a TSA.
    - Consistent with current procedures, the NYISO proposed to reduce the revised SENY 30-minute reserve requirement (1,800 MW) to zero MW during a TSA.
  - The NYISO also proposes to extend this logic to reduce the 10-minute and 30-minute reserve requirements for NYC to zero MW during a TSA.

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The Mission of the New York Independent System Operator, in collaboration with its stakeholders, is to serve the public interest and provide benefits to consumers by:

- Maintaining and enhancing regional reliability
- Operating open, fair and competitive wholesale electricity markets
- Planning the power system for the future
- Providing factual information to policy makers, stakeholders and investors in the power system

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