New York ISO
Independent System Operator

Short-Term Assessment of Reliability: 2021 Quarter 1

A Report by the
New York Independent System Operator

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Contents

Executive Summary

This report sets forth the 2021 Quarter 1 Short-Term Assessment of Reliability ("STAR") findings for the five-year study period of January 15, 2021 through January 15, 2026. This assessment finds the planned Bulk Power Transmission Facilities ("BPTF") through 2025 are within applicable reliability criteria under the assumed and forecasted base case system conditions. Included in this STAR is the ICAP Ineligible Forced Outage ("IIFO") of Eastern Generation, LLC's Gowanus gas turbine facility unit 1-8 ("Gowanus 1-8").

The NYISO assessed the resource adequacy of the overall system, per the one-day-in-ten-years (0.1 per year) Loss of Load Expectation ("LOLE") criterion, which measures the probability of disconnecting firm load due to a resource deficiency. Additionally, the NYISO performed a transmission security assessment of the BPTF. No Short-Term Reliability Needs were identified for the BPTF system.

Con Edison and Central Hudson each identified transmission security issues in their service territories on their non-BPTF systems. The issues identified by Central Hudson and Con Edison are primarily driven by the assumed unavailability of certain generation in their areas affected by the New York State Department of Environmental Conservation's "Peaker Rule". The local non-BPTF criteria violations identified by Central Hudson and Con Edison are not Generator Deactivation Reliability Needs or Short-Term Reliability Needs.

This assessment does not identify any Short-Term Reliability Needs and does not identify a Generator Deactivation Reliability Need following the IIFO of Gowanus 1-8. As generators that are subject to the DEC Peaker Rule submit their Generator Deactivation Notices, or provide notice of their intent to transition from an IIFO state to a Retired state, the NYISO and the responsible Transmission Owners will continue to evaluate whether Generator Deactivation Reliability Needs arise from the deactivation of Initiating Generators in future STARs. [1]

[1] Per OATT 38.1, an Initiating Generator is "a Generator with a nameplate rating that exceeds 1 MW that submits a Generator Deactivation Notice for purposes of becoming Retired or entering into a Mothball Outage or that has entered into an ICAP Ineligible Forced Outage pursuant to Section 5.18.2.1 of the ISO Services Tariff, which action is being evaluated by the ISO in accordance with its Short-Term Reliability Process requirements in this Section 38 of the ISO OATT."

Purpose

In 2019, the NYISO established a new quarterly Short-Term Reliability Process ("STRP") with its requirements prescribed in Attachments Y and FF of the NYISO's Open Access Transmission Tariff. The STRP evaluates the first five years of the planning horizon, with a focus on needs arising in the first three years of the study period. With this process in place, the biennial Reliability Planning Process focuses on solutions to longer term needs through the Reliability Needs Assessment ("RNA") and the Comprehensive Reliability Plan ("CRP").

The first step in the STRP is the Short-Term Assessment of Reliability ("STAR"). STARs are performed quarterly to proactively address reliability needs that may arise within five years ("Short-Term Reliability Needs")[2] due to various changes to the grid such as generator deactivations, revised transmission plans, and updated load forecasts. Transmission Owners also assess the impact of generator deactivations on their local systems. A Short-Term Reliability Need that is observed within the first three years of the study period constitutes a "Near-Term Reliability Need."[3] Should a Near-Term Reliability Need be identified in a STAR, the NYISO solicits and selects the solution to address the need. If a need arises beyond the first three years of the study period, the NYISO may choose to address the need within the STRP or, if time permits, through the long-term Reliability Planning Process.

This STAR report sets forth the 2021 Quarter 1 findings for the study period from the STAR Start Date (January 15, 2021) through January 15, 2026. The NYISO, in collaboration with Con Edison, assessed the potential reliability impacts to the BPTF considering system changes, including the availability of resources and the status of transmission plans in accordance with the NYISO Reliability Planning Process Manual.[4] Also as part of this STAR, the NYISO performed analysis in coordination with Con Edison to determine whether a Generator Deactivation Reliability Need would result from the deactivation of Gowanus 1-8. The NYISO, along with Con Edison, timely completed this analysis within the 90-day period that commenced on the January 15, 2020 STAR Start Date.

[2] OATT Section 38.1 contains the tariff definition of a "Short-Term Reliability Process Need."

[3] OATT Section 38.1 contains the tariff definition of a "Near-Term Reliability Need." *See also*, OATT Section 38.3.6.

[4] NYISO Reliability Planning Process Manual, December 12, 2019. *See:* https://www.nyiso.com/documents/20142/2924447/rpp_mnl.pdf

Assumptions

The NYISO evaluated the study period using the most recent Reliability Planning Process base case. In accordance with the base case inclusion rules,[5] generation and transmission projects are added to the base case if they have met significant milestones such that there is a reasonable expectation of timely completion of the project. A summary of key projects is provided in Appendix C.

This assessment used the major assumptions included in the 2020 RNA. Consistent with the NYISO's obligations under its tariffs, the NYISO provided stakeholders information on the modeling assumptions employed in this assessment. Details regarding the study assumptions were reviewed with stakeholders at the January 25, 2021 Electric System Planning Working Group ("ESPWG")/Transmission Planning Advisory Subcommittee ("TPAS"). The meeting materials are posted on the NYISO's public website.[6] In addition to these key study assumptions, pursuant to, NYISO OATT § 38.3.5.2[7], the following updates were included in this assessment:

- Con Edison presented an update to their Local Transmission Plan ("LTP") at a January 25, 2021 stakeholder meeting, which includes three new feeders within New York City, listed below under "Transmission Assumptions."[8] The purpose of these LTP updates is to address local non-BPTF thermal needs in the Astoria East / Corona 138 kV Transmission Load Area ("TLA") and the Greenwood / Fox Hills TLA; and
- The Short-Term Reliability Process solution that the NYISO selected to address the 2023 near-term reliability needs is documented in the *Short-Term Reliability Process Report: 2023 Near-Term Reliability Need,*[9] and consists of changes in the operational status of existing series reactors, as shown in Figure 4 below, to address transient voltage response criteria violations arising on the BPTFs in 2023.

[5] *See* NYISO Reliability Planning Process Manual Section 3.

[6] Short-Term Assessment of Reliability: 2021 Q1 Key Study Assumptions

[7] OATT § 38.3.5.2 states: "As part of the assessment, the ISO shall review whether any potential Short-Term Reliability Process Need can be addressed through the adoption of alternative ISO or Transmission Owner operating procedures or by updates to Local Transmission Plans."

[8] Meeting material for January 25, 2021 ESPWG/TPAS: https://www.nyiso.com/espwg

[9] https://www.nyiso.com/documents/20142/15930753/2020-Quarter-3 Short-Term-Reliability-Process-Report-vFinal3.pdf/

These updates were also included in the post-RNA base case updates.[10] Additional details regarding these changes are included in the transmission assumptions section of this report.

Generation Assumptions

Generator Deactivation Notices

On February 1, 2021, Gowanus 1-8, a 20 MW (nameplate) gas turbine in Zone J was placed in an IIFO.[11] This generator was previously removed from the base case starting in 2023 due to its compliance plan for the Peaker Rule, as further described below.

A list of generator deactivations is provided in Appendix C.

Peaker Rule: Ozone Season Oxides of Nitrogen (NOx) Emission Limits for Simple Cycle and Regenerative Combustion Turbines

In 2019, the New York State Department of Environmental Conservation ("DEC") adopted a regulation to limit nitrogen oxides (NOx) emissions from simple-cycle combustion turbines (referred to as the "Peaker Rule").[12] Combustion turbines known as "peakers" typically operate to maintain bulk power system reliability during the most stressful operating conditions, such as periods of peak electricity demand. The Peaker Rule will impact turbines located mainly in the lower Hudson Valley, New York City and Long Island. Many of these units also maintain transmission security by supplying energy within certain areas of the grid referred to as "load pockets." Load pockets represent transmission-constrained geographic areas where electrical demand can only be served by local generators due to transmission limitations that occur during certain operational conditions.

The Peaker Rule provides a phased reduction in emission limits, in 2023 and 2025, during the ozone season (May 1-September 30) and allows several options for achieving compliance with the new lower limits applicable during the ozone season. The rule required peaking unit owners to submit compliance plans to the DEC in March 2020. Compliance plans submitted to the DEC were provided to the NYISO for assessment and inclusion in the Reliability Planning Process base case. The plans indicate approximately 1,500 MW of peaker capability would be unavailable during the summer by 2025 to comply with the emissions requirements. A subset of those generators would be unavailable starting in 2023. Remaining peaker units stated either that they comply with the emission limits as currently operated, or proposed

[10] The 2020-2021 Reliability Planning Process post-RNA base case updates were presented to stakeholders at the February 23, 2021 ESPWG/TPAS for resource adequacy and steady state transmission security (found here) and the March 26, 2021 ESPWG/TPAS for dynamics (found here).

[11] Notice of ICAP Ineligible Forced Outage (IIFO) of Eastern Generation, LLC Gowanus Gas Turbine Facility Unit 1-8

[12] https://www.dec.ny.gov/regulations/116131.html

equipment upgrades to achieve the emissions limits.

A summary of the list of peaker generation removals is provided in Figure 1. Peaker generators that have already completed a Generator Deactivation Notice or entered an IIFO are indicated in the table.

The DEC regulations include a provision to allow an affected generator to continue to operate up to two years, with a possible further two-year extension, after the compliance deadline if the generator is designated by the NYISO or the local transmission owner as needed to resolve a reliability need until a permanent solution is in place.

Figure 1: Status Change Due to DEC Peaker Rule

Owner/Operator	Station	Zone	Nameplate (MW)	CRIS (MW) (1)		Capability (MW) (1)		Status Change Date (2)
				Summer	Winter	Summer	Winter	
Central Hudson Gas & Elec. Corp.	Coxsackie GT	G	21.6	19.9	26.0	20.2	23.9	5/1/2023
Central Hudson Gas & Elec. Corp.	South Cairo	G	21.6	19.8	25.9	18.1	22.5	5/1/2023
Consolidated Edison Co. of NY, Inc.	74 St. GT 1 & 2	J	37.0	39.1	49.2	35.2	40.9	5/1/2023
NRG Power Marketing, LLC	Astoria GT 2-1, 2-2, 2-3, 2-4	J	186.0	165.8	204.1	141.8	185.4	5/1/2023
NRG Power Marketing, LLC	Astoria GT 3-1, 3-2, 3-3, 3-4	J	186.0	170.7	210.0	140.8	181.8	5/1/2023
NRG Power Marketing, LLC	Astoria GT 4-1, 4-2, 4-3, 4-4	J	186.0	167.9	206.7	132.8	176.2	5/1/2023
Astoria Generating Company, L.P.	Gowanus 1-1 through 1-7	J	140.0	122.6	160.1	122.9	158.9	5/1/2023
Astoria Generating Company, L.P.	Gowanus 1-8	J	20.0	16.1	21.0	15.3	21.7	2/1/2021 (IIFO)
Astoria Generating Company, L.P.	Gowanus 4-1 through 4-8	J	160.0	140.1	182.9	135.3	184.8	5/1/2023
Consolidated Edison Co. of NY, Inc.	Hudson Ave 3	J	16.3	16.0	20.9	0.0	0.0	5/1/2023
Consolidated Edison Co. of NY, Inc.	Hudson Ave 5	J	16.3	15.1	19.7	14.2	20.2	5/1/2023
Helix Ravenswood, LLC	Ravenswood 01	J	18.6	8.8	11.5	8.1	10.1	5/1/2023
Helix Ravenswood, LLC	Ravenswood 10	J	25.0	21.2	27.0	16.5	24.4	5/1/2023
Helix Ravenswood, LLC	Ravenswood 11	J	25.0	20.2	25.7	16.4	22.4	5/1/2023
National Grid	Glenwood GT 01	K	16.0	14.6	19.1	11.4	14.5	2/28/2021 (R)
National Grid	Northport GT	K	16.0	13.8	18.0	11.7	15.1	5/1/2023
National Grid	Port Jefferson GT 01	K	16.0	14.1	18.4	12.9	16.6	5/1/2023
Consolidated Edison Co. of NY, Inc.	59 St. GT 1	J	17.1	15.4	20.1	15.6	20.3	5/1/2025
NRG Power Marketing, LLC	Arthur Kill GT 1	J	20.0	16.5	21.6	12.0	15.0	5/1/2025
Astoria Generating Company, L.P.	Astoria GT 01	J	16.0	15.7	20.5	14.1	19.1	5/1/2025
Astoria Generating Company, L.P.	Gowanus 2-1 through 2-8	J	160.0	152.8	199.6	142.3	190.0	5/1/2025
Astoria Generating Company, L.P.	Gowanus 3-1 through 3-8	J	160.0	146.8	191.7	135.5	182.8	5/1/2025
Astoria Generating Company, L.P.	Narrows 1-1 through 2-8	J	352.0	309.1	403.6	286.5	379.9	5/1/2025
	2023 Total		1,107.4	985.8	1,246.2	853.6	1,119.4	
	2025 Total		725.1	656.3	857.1	606.0	807.1	
	Total		1,832.5	1,642.1	2,103.3	1,459.6	1,926.5	

Notes

1. MW values are from the 2020 Load and Capacity Data Report
2. Dates identified by generators in their DEC Peaker Rule compliance plan submittals for transitioning the facility to Retired, Blackstart, or will be out-of-service in the summer ozone season or the date in which the generator entered (or proposed to enter) Retired (R) or Mothball Outage (MO) or the date on which the generator entered ICAP Ineligible Forced Outage (IIFO)

As compared to the 2020 RNA, all other changes to generation assumptions are specified below.

Generator Return-to-Service

There are no generators that have returned-to-service beyond those included in prior STARs. A list of generators that have returned-to-service included in prior STARs is provided in Appendix C.

Generator Additions

There are no generator additions beyond those included in prior STARs. A list of generator additions included in prior STARs is provided in Appendix C.

Load Assumptions

The NYISO used the base load forecasts presented by the NYISO at a November 19, 2020 stakeholder meeting which addressed an updated peak load forecast to account for the expected impact of COVID-19 and the associated economic and societal effects.[13] Figure 2 provides a summary of the load and energy forecast used in this assessment.

Figure 2: Load and Energy Forecast: Baseline Forecast, and Baseline with BtM Solar PV Forecasts Added Back in

Baseline and Adjusted Baseline Energy Forecasts

Annual GWh	2021	2022	2023	2024	2025
End-Use Energy Forecast - Nov. 2020 update	157,664	159,328	160,833	162,153	163,545
-- Energy Efficiency and Codes & Standards	3,959	6,200	8,599	11,081	13,582
-- BtM Solar PV	3,274	3,899	4,563	5,193	5,738
-- BtM Non-Solar Distributed Generation	1,416	1,059	940	818	852
+ Storage Net Energy Consumption	43	67	99	130	160
+ Electric Vehicle Energy	345	538	781	1,085	1,456
+ Non-EV Electrification	457	815	1,289	1,884	2,591
Baseline Forecast - Nov. 2020 update	149,860	149,590	148,900	148,160	147,580
+ BtM Solar PV	3,274	3,899	4,563	5,193	5,738
Forecast[1]	153,134	153,489	153,463	153,353	153,318

Baseline and Adjusted Baseline Summer Peak Forecasts

Annual MW	2021	2022	2023	2024	2025
End-Use Peak Demand Forecast - Nov. 2020 update	33,615	33,962	34,169	34,346	34,621
-- Energy Efficiency and Codes & Standards	591	943	1,322	1,709	2,108
-- BtM Solar PV	707	841	986	1,102	1,204
-- BtM Non-Solar Distributed Generation	251	189	169	148	154
-- BtM Storage Peak Reductions	14	26	44	63	91
+ Electric Vehicle Peak Demand	68	103	147	201	261
+ Non-EV Electrification	25	46	72	104	146
Baseline Forecast[2] - Nov. 2020 update	32,145	32,112	31,867	31,629	31,471
+ BtM Solar PV	707	841	986	1,102	1,204
Forecast[1]	32,852	32,953	32,853	32,731	32,675

[1] For the resource adequacy study, the Gold Book baseline load forecast was modified by removing the behind-the-meter solar PV impacts in order to model the solar PV explicitly as a generation resource to account for the intermittent nature of its availability.

[2] The transmission security power flow base cases use this baseline forecast.

[13] Meeting material for November 19, 2020 ESPWG/TPAS: https://www.nyiso.com/espwg

Transmission Assumptions

A list of changes in transmission assumptions included in prior STARs is provided in Appendix C. As compared to the prior STAR, the following transmission facility was modeled out-of-service as it is on extended forced outage in the study period:

- Newbridge 345/138 kV (BK1) through February 2022.

The RNA and prior STARs identified for informational purposes local non-BPTF needs in the Con Edison Astoria East / Corona 138 kV Transmission Load Area ("TLA") and the Greenwood / Fox Hills TLA. To address these local issues, at a January 25, 2021 stakeholder meeting Con Edison updated their LTP to include the following new feeders that are included in this STAR:

- A new 345/138 kV PAR controlled Rainey – Corona feeder (to be in-service by summer 2023),
- A new 345/138 kV PAR controlled Gowanus – Greenwood feeder (to be in-service by summer 2025), and
- A new 345/138 kV PAR controlled Goethals – Fox Hills feeder (to be in-service by summer 2025).

On December 3, 2020, the NYISO issued a solution solicitation requesting the submission of proposed STRP Solutions to address 2023 near-term reliability needs. In consideration of all proposed solutions, the NYISO selected the Con Edison proposal regarding the status of several series reactors within their service territory. The selected solution is documented in the *Short-Term Reliability Process Report: 2023 Near-Term Reliability Need*.[14]

The series reactor status utilized in the RNA and prior STARs assumed the series reactor protocol shown in Figure 3 for all study years.

Figure 3 2020 Reliability Planning Studies Series Reactor Status

Terminals		ID	kV	Series Reactor Status in 2020 Quarter 3 STAR
Dunwoodie	Mott Haven	71	345	Series Reactor By-Passed
Dunwoodie	Mott Haven	72	345	Series Reactor By-Passed
Sprainbrook	W. 49th Street	M51	345	Series Reactor By-Passed
Sprainbrook	W. 49th Street	M52	345	Series Reactor By-Passed
Farragut	Gowanus	41	345	Series Reactor In-Service
Farragut	Gowanus	42	345	Series Reactor In-Service
Sprainbrook	East Garden City	Y49	345	Series Reactor In-Service

[14] https://www.nyiso.com/documents/20142/15930753/2020-Quarter-3 Short-Term-Reliability-Process-Report-vFinal3.pdf/

In response to the solution solicitation, Con Edison proposed to revise the planned series reactor statuses to those listed in Figure 4. The planned status changes are for the summer period and would become effective starting in summer 2023.

Figure 4 Con Edison Proposed Series Reactor Status

Terminals		ID	kV	Proposed Series Reactor Status
Dunwoodie	Mott Haven	71	345	Series Reactor In-Service
Dunwoodie	Mott Haven	72	345	Series Reactor In-Service
Sprainbrook	W. 49th Street	M51	345	Series Reactor In-Service
Sprainbrook	W. 49th Street	M52	345	Series Reactor In-Service
Farragut	Gowanus	41	345	Series Reactor By-Passed
Farragut	Gowanus	42	345	Series Reactor By-Passed
Sprainbrook	East Garden City	Y49	345	Series Reactor By-Passed

Findings

This assessment finds that reliability criteria would be met throughout the five-year study period under the assumed and forecasted base case system conditions.

Resource Adequacy Assessments

The NYISO assessed the resource adequacy of the NYCA system, per the one-day-in-ten-years (0.1 days per year) loss of load expectation ("LOLE") criterion, which measures the probability of disconnecting firm load due to a resource deficiency. This assessment finds the planned system through 2025 is within the resource adequacy criterion.

Transmission Security Assessments

The NYISO performed a transmission security assessment for the BPTF and identified no Short-Term Reliability Needs. This assessment finds the planned BPTF system through 2025 is within transmission security criteria.

The NYISO performed a transmission security assessment for the BPTF and Con Edison performed a transmission security assessment for their non-BPTFs for the IIFO of Gowanus 1-8. The NYISO reviewed and verified the analysis performed by Con Edison. Without Gowanus 1-8 no transmission security-related Generator Deactivation Reliability Need was identified. This assessment also finds that without Gowanus 1-8 the resource adequacy criterion is met throughout the study period. Therefore, no Generator Deactivation Reliability Needs are observed based on the IIFO of Gowanus 1-8. Please also see

the Additional Transmission Owner Local Criteria Assessment for Con Edison for additional information.[15]

Transmission Owner Local Criteria Assessments

As described in the following sections, Con Edison and Central Hudson each identified transmission security issues in their service territories on their non-BPTF systems. The local non-BPTF criteria violations identified below are not Generator Deactivation Reliability Needs, and are provided for information only.[16]

Central Hudson Assessment

Central Hudson currently owns and operates two 25 MVA (nameplate) combustion turbines that are subject to the DEC Peaker Rule, namely the Coxsackie and South Cairo generators. Both of these generators provide local substation reserve capacity for transformer outages and post-contingency voltage support for the Westerlo transmission loop. Without these generators, there is no reserve capability for local transformer outages and the Westerlo loop is voltage constrained. These transmission security issues, first identified in the 2020 Quarter 3 STAR, arise on non-BPTF facilities beginning in 2023 and continuing through 2025.

Con Edison Assessment

Transient voltage response issues are observed on Con Edison's non-BPTF system in year 2025 in the Greenwood / Fox Hills 138 kV TLA as well as the East 13th Street 138 kV TLA.[17] As first identified in the 2020 Quarter 3 STAR, the issues observed are for events UC25A and UC25B. Figure 5 provides a high-level description of events UC25A and UC25B.

Figure 5: Description of Events UC25A and UC25B

Event Name	Description
UC25A	Fault at Ravenswood 3 345 kV and L/O Ravenswood 3
UC25B	Fault at Rainey 345 kV and L/O 60L 345 kV circuit

Figure 6 shows an example of transient voltage response for a bus in the Con Edison transmission district that satisfies the stated criteria as observed in assessments that have the peaker units in-service, as compared to the response observed with the peaker units out-of-service. For Con Edison, to pass the

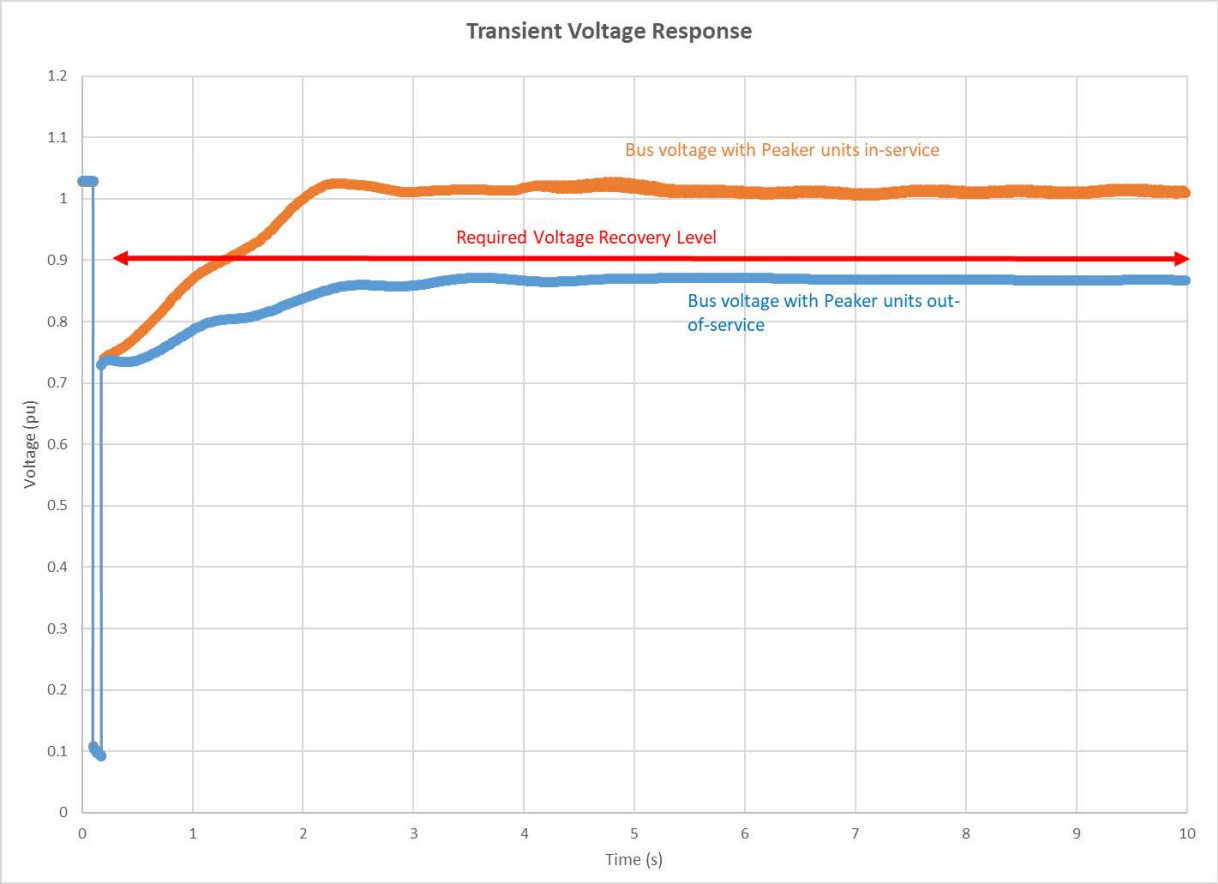
[15] OATT Section 38.1 contains the tariff definition of a Generator Deactivation Reliability Need.

[16] *See* OATT §§ 38.1 (definition of Generator Deactivation Reliability Need) 38.2 (scope of Short-Term Reliability Process), 38.10.1.2 (other reliability needs that arise on non-BPTFs may be reported in a STAR for informational purposes).

[17] At the March 26, 2021 ESPWG/TPAS (See https://www.nyiso.com/espwg) the NYISO presented to stakeholders the post-RNA Base Case updates showing that transient voltage response issues are observed on Con Edison's non-BPTF system from 2025 through 2030.

transient voltage response criteria, the post-fault value must settle to at least 0.9 p.u. voltage five seconds after the fault has cleared. When the transient voltage response fails the stated criteria (as shown in Figure 8), this is referred to as fault-induced delayed voltage recovery ("FIDVR"). FIDVR events are driven by end-use load behavior and load composition; primarily by induction motor loads. One of the causes of FIDVR is the stalling of induction motors due to low voltages. When an induction motor stalls, the motors draws excessive reactive power from the grid and require five to six times their typical steady-state running current in this locked-rotor condition,[18] which can eventually lead to a significant loss of generation and load.

Figure 6: New York City (NYC) Transient Voltage Response Example



The non-BPTF transient voltage response issues observed in 2025 are driven by the collective impact of all unavailable generation due to the Peaker Rule, which include generators that have not yet completed a deactivation notice or have not yet entered an IIFO. Approximately 600 MW (summer capability) of peaker units in Zone J change status in 2025 due to the Peaker Rule. As generators that are subject to the

[18] https://www.nerc.com/docs/pc/tis/FIDVR_Tech_Ref%20V1-2_PC_Approved.pdf

DEC Peaker Rule submit their Generator Deactivation Notices, or provide notice of their intent to transition from an IIFO state to a Retired state, the NYISO and the responsible Transmission Owners will continue to evaluate whether Generator Deactivation Reliability Needs arise from the deactivation of Initiating Generators in future STARs. For purposes of determining whether the issues identified are Generator Deactivation Reliability Needs that arise from Initiating Generators, including Gowanus 1-8, the generators that have not provided a Generator Deactivation Notice or entered into an IIFO were modeled in-service. With only Initiating Generators removed from the base case the non-BPTF issues are not observed, and therefore the issues are not Generator Deactivation Reliability Needs.

The compensatory resources needed to address the non-BPTF transient voltage response issues are shown in Figure 7. The compensatory MVAr are measured by modeling generic static synchronous compensators ("STATCOMS") at the Greenwood 138 kV and East 13th Street 138 kV buses. These compensatory MVAr additions are not intended to represent specific solutions. Rather, the compensatory MVAr provides a generic order-of-magnitude measure of the deficiency and provides a generic order-of-magnitude measure to guide the formulation of solutions. The impact of specific solutions can depend on the type of the solution and its location on the grid. Transmission security needs could potentially be met by combinations of solutions including generation, transmission, energy efficiency, and demand response measures.

Figure 7: Non-BPTF Compensatory MVAr

Transmission Load Area (TLA)	Compensatory MVAr (2025)
Greenwood / Fox Hills 138 kV	100
East 13th Street 138 kV	50
Total	150

Con Edison will address these non-BPTF transient voltage response violations with a corrective action plan as required by NERC Standard TPL-001-4. Additionally, the corrective action plan will be documented in an update to Con Edison's local transmission plan.

Conclusions and Next Steps

This assessment finds the planned BPTF system through the study period is within applicable reliability criteria. This assessment does not identify a Generator Deactivation Reliability Need following the IIFO of Gowanus 1-8.

This concludes the 2021 Quarter 1 Short-Term Reliability Process.

Appendix A: List of Short-Term Reliability Needs

No short-term reliability needs are observed in this assessment.

Appendix B: Short-Term Reliability Process Solution List

The Short-Term Reliability Process solution list and the status of these solutions is posted on the NYISO website at the following location:

https://www.nyiso.com/documents/20142/19556596/SolutionStatus-03092021.pdf/

Appendix C: Summary of Transmission and Generation Assumptions

The figures below summarize the generator deactivations, generator additions, major topology changes, additional proposed transmission projects, and firm transmission plans included in this STAR. There are no changes as compared to the 2020 RNA report, with the exception of the additional generator deactivations noted in this report.

Figure C. 1 Generator Deactivations

Owner/ Operator	Plant Name	Zone	CRIS (MW)		Capability (MW)			Deactivation date
			Summer	Winter	Summer	Winter	Status	
International Paper Company	Ticonderoga (1)	F	7.6		9.5	9.8	I	05/01/2017
Helix Ravenswood, LLC	Ravenswood 09	J	21.7	27.6	16.3	22.8	R	11/01/2017
Binghamton BOP, LLC	Binghamton	C	43.8	57.2	43.7	47.1	I	01/09/2018
Helix Ravenswood, LLC	Ravenswood 2-1	J	40.4	51.4	31.4	41.7	I	04/01/2018
	Ravenswood 2-2	J	37.6	47.8	29.9	41.9	I	04/01/2018
	Ravenswood 2-3	J	39.2	49.9	28.9	37.3	I	04/01/2018
	Ravenswood 2-4	J	39.8	50.6	30.7	41.6	I	04/01/2018
	Ravenswood 3-1	J	40.5	51.5	31.9	40.8	I	04/01/2018
	Ravenswood 3-2	J	38.1	48.5	29.4	40.3	I	04/01/2018
	Ravenswood 3-4	J	35.8	45.5	31.2	40.8	I	04/01/2018
Lyonsdale Biomass, LLC	Lyonsdale	E	20.2	20.2	19.3	19.7	R	07/18/2019
Exelon Generation Company LLC	Monroe Livingston	B	2.4	2.4	2.4	2.4	R	09/01/2019
Innovative Energy Systems, Inc.	Steuben County LF	C	3.2	3.2	3.2	3.2	R	09/01/2019
Consolidated Edison Co. of NY, Inc	Hudson Ave 4	J	13.9	18.2	14.0	16.3	R	09/10/2019
New York State Elec. & Gas Corp.	Auburn - State St	C	5.8	6.2	4.1	7.3	R	10/01/2019
Somerset Operating Company, LLC	Somerset	A	686.5	686.5	676.4	684.4	R	02/15/2020
Entergy Nuclear Power Marketing, LLC	Indian Point 2	H	1,026.5	1,026.5	1,011.5	1,029.4	R	04/30/2020
Cayuga Operating Company, LLC	Cayuga 1	C	154.1	154.1	151.0	152.0	R	05/15/2020
Cayuga Operating Company, LLC	Cayuga 2	C	154.7	154.7	139.6	158.0	R	05/15/2020
Albany Energy, LLC	Albany LFGE (3)	F	4.5	4.5	5.6	5.6	I	07/01/2020
National Grid	West Babylon 4	K	49.0	64.0	50.2	65.4	R	12/11/2020 (2)
Eastern Generation, LLC	Gowanus 1-8 (4)	J	16.1	21.0	15.3	21.7	I	02/01/2021
National Grid	Glenwood GT 01 (3)	K	14.6	19.1	11.4	14.5	R	2/28/2021 (2)
Entergy Nuclear Power Marketing, LLC	Indian Point 3	H	1040.4	1040.4	1036.3	1038.3	R	04/30/2021
		Total	3,536.4	3,651.0	3,423.2	3,582.3		

Notes
(1) Part of SCR program
(2) This date is the proposed Generator Deactivation Date stated in the generator deactivation notice.
(3) The Generator Deactivation Assessment for this facility is included in the 2020 Quarter 3 STAR
(4) The Generator Deactivation Assessment for this facility is included in this STAR

Figure C. 2 Generator Return-to-Service

Generator Name	Zone	MW (Nameplate)	Returned to Service	STAR Assessment	Notes
Hudson Ave 3	J	16.3	10-Jul-20	2020 Q4	1

Notes
1. This generator status changes May 2023 to comply with the DEC Peaker Rule

Figure C. 3 Generation Additions

Queue	Owner/ Operator	Proposed Generator Project	Zone	Proposed Date in 2020 Gold Book (1)	Requested CRIS (MW)[1]	Summer (MW)	STAR Assessment
387	Cassadaga Wind, LLC	Cassadaga Wind	A	Dec-20	126.0	126.5	2020 Q3
396	Baron Winds, LLC	Baron Winds	C	Dec-20	300.0	238.4	2020 Q3
422	NextEra Energy Resources, LLC	Eight Point Wind Enery Center	B	Dec-20	101.2	101.8	2020 Q3
505	RES America Development Inc.	Ball Hill Wind	A	Dec-22	100.0	100.0	2020 Q3
430	HQUS	Cedar Rapids Transmission Upgrade	D	Oct-21	80.0	N/A	2020 Q3
546	Atlantic Wind, LLC	Roaring Brook Wind	E	Dec-20	79.7	79.7	2020 Q3
678	LI Solar Generation, LLC	Calverton Solar Energy Center	K	Dec-20	22.9	22.9	2020 Q3
758	Sithe/Independence Power Partners, LP	Sithe Independence	C	In-Service	56.6	N/A	2020 Q4

Notes

(1) Generation projects that met the Reliabilty Planning Process base case inclusion rules are assumed to be in-service one year later than the 2020 Gold Book Proposed Date to reflect the potential impact of COVID-19 on construction and completion

Figure C. 4 Existing Transmission Facilities Modeled Out-of-Service

From	To	kV	ID	Out-of-Service Through	STAR
Marion	Farragut	345	B3402	Long-Term	2020 Q3
Marion	Farragut	345	C3403	Long-Term	2020 Q3
Moses	St. Lawrence	230	L33P	Oct-22	2020 Q3
Plattsburg (1)	Plattsburg	230/115	AT1	Dec-21	2020 Q3
Moses	Moses	230/115	AT2	Dec-22	2020 Q3
Newbridge	Newbridge	345/138	BK1	Feb-22	2021 Q1

Notes

(1) A spare transformer is placed in-service during the outage

Figure C. 5 Changes to Planned Transmission Assumptions

From	To	kV	STAR
Shoemaker (1)	Sugarloaf	138 kV	2020 Q4
Van Wagner Substation (1)		345 kV	2020 Q4

Notes

1. Q#543 (AC Transmission Segment B) non-material project changes

Figure C. 6 Additional Proposed Transmission Projects

Queue #	Transmission Owner	Terminals		Expected In-Service		Nominal Voltage in kV	
				Season	Year	Operating	Design
430	Empire State Connector Corp.	Dennison	Alcoa	W	2020	115	115
545A	NextEra Energy Transmission NY	Dysinger (New Station)	East Stolle (New Station)	S	2022	345	345
545A	NextEra Energy Transmission NY	Dysinger (New Station)	Dysinger (New Station)	S	2022	345	345
556	NGRID	Porter	Rotterdam	W	2023	230	230
556	NGRID	Porter	Rotterdam	W	2023	230	230
556	NGRID	Edic	New Scotland	W	2023	345	345
556	NAT/NYPA/NGRID	Edic	Rotterdam	W	2023	345	345
556	NAT/NYPA	Rotterdam	Princetown	W	2023	345	345
556	NAT/NYPA	Edic	Princetown	W	2023	345	345
556	NAT/NYPA	Princetown	New Scotland	W	2023	345	345
556	NGRID	Princetown	New Scotland	W	2023	345	345
543	NGRID	Greenbush	Hudson	W	2023	115	115
543	NGRID	Hudson	Pleasant Valley	W	2023	115	115
543	NGRID	Schodack	Churchtown	W	2023	115	115
543	NGRID	Churchtown	Pleasant Valley	W	2023	115	115
543	NGRID	Milan	Pleasant Valley	W	2023	115	115
543	NGRID	Lafarge	Pleasant Valley	W	2023	115	115
543	NGRID	North Catskill	Milan	W	2023	115	115
543	O&R	Shoemaker, Middle	Sugarloaf, Chester	W	2023	138	138
543	NGRID	New Scotland	Alps	W	2023	345	765
543	New York Transco	Schodack	Churchtown	W	2023	115	115
543	New York Transco	Churchtown	Pleasant Valley	W	2023	115	115
543	NGRID	Lafarge	Churchtown	W	2023	115	115
543	NGRID	North Catskill	Churchtown	W	2023	115	115
543	New York Transco	Knickerbocker	Pleasant Valley	W	2023	345	345
543	New York Transco	Knickerbocker	Knickerbocker	W	2023	345	345
543	NGRID	Knickerbocker	New Scotland	W	2023	345	345
543	NGRID	Knickerbocker	Alps	W	2023	345	345
543	New York Transco	Shoemaker	Sugarloaf	W	2023	138	138
543	New York Transco	Shoemaker, Middle	Sugarloaf, Chester	W	2023	138	138

Figure C. 7 Firm Transmission Plans

Transmission Owner	Terminals		Line Length in Miles	In-Service Date/Yr		Nominal Voltage in kV		# of ckts	Thermal Ratings (4)		Project Description / Conductor Size
				Prior to (2)	Year	Operating	Design		Summer	Winter	
Firm Plans (included in FERC 715 Base Case)											
ConEd	Jamaica	Jamaica	Reconfiguration	In-Service	2019	138	138		N/A	N/A	Reconfiguration
ConEd	East 13th Street	East 13th Street	xfmr	In-Service	2019	345	345		N/A	N/A	Replacing xfmr 10 and xfmr 11
ConEd	Gowanus	Gowanus	xfmr	In-Service	2019	345	345		N/A	N/A	Replacing xfmr T2
ConEd	East 13th Street	East 13th Street	Reconfiguration	In-Service	2019	345	345		N/A	N/A	Reconfiguration (xfmr 10 - xfmr 11)
ConEd	Rainey	Corona	xfmr/Phase shifter	In-Service	2019	345/138	345/138	1	268 MVA	320 MVA	xfmr/Phase shifter
LIPA	Far Rockaway	Far Rockaway	Reconfiguration	In-Service	2019	34.5	34.5		N/A	N/A	Reconfigure 34.5 kV switchgear
LIPA	Elwood	Elwood	Breaker	In-Service	2019	138	138		N/A	N/A	Install double bus tie - Operate Normally Open
LIPA	Canal	Southampton	5.20	In-Service	2019	69	69	1	1107	1169	2500 kcmil XLPE CU
LIPA	Deer Park	Deer Park	-	W	2019	69	69	1	N/A	N/A	Install 27 MVAR Cap Bank
LIPA	MacArthur	MacArthur	-	W	2019	69	69	1	N/A	N/A	Install 27 MVAR Cap Bank
LIPA	West Hempstead	East Garden City	-2.92	In-Service	2019	69	69	1	1158	1245	477 ACSS
LIPA	West Hempstead	Hempstead	0.97	In-Service	2019	69	69	1	1158	1245	477 ACSS
LIPA	Hempstead	East Garden City	1.95	In-Service	2019	69	69	1	1158	1245	477 ACSS
LIPA	Pilgrim	West Bus	-11.86	In-Service	2019	138	138	1	2087	2565	2493 ACAR
LIPA	West Bus	Kings	8.25	In-Service	2019	138	138	1	2087	2565	2493 ACAR

Transmission Owner	Terminals		Line Length in Miles	In-Service Date/Yr		Nominal Voltage in kV		# of ckts	Thermal Ratings (4)		Project Description / Conductor Size
				Prior to (2)	Year	Operating	Design		Summer	Winter	
Firm Plans (included in FERC 715 Base Case)											
LIPA	Pilgrim	Kings	4.81	In-Service	2019	138	138	1	2087	2565	2493 ACAR
NGRID	Golah	Golah	Cap Bank	In-Service	2019	115	115	1	18MVAR	18MVAR	Capacitor Bank
NGRID	Falls Park	Schodack(NG)	17.33	In-Service	2019	115	115	1	186 MVA	227 MVA	Loop for NYSEG Sub Will Reconfigure NG Line #14 Into Two New Lines
NGRID	Falls Park	Churchtown	9.41	In-Service	2019	115	115	1	175 MVA	206 MVA	Loop for NYSEG Sub Will Reconfigure NG Line #14 Into Two New Lines
NGRID	Batavia	Batavia	Cap Bank	In-Service	2019	115	115	1	30MVAR	30MVAR	Second Capacitor Bank
NGRID	Battenkill	Eastover Road	-22.72	In-Service	2019	115	115	1	937	1141	New Schaghticoke Switching Station
NGRID	Battenkill	Schaghticoke (New Station)	14.31	In-Service	2019	115	115	1	937	1141	New Schaghticoke Switching Station
NGRID	Schaghticoke (New Station)	Eastover Road	8.41	In-Service	2019	115	115	1	937	1141	New Schaghticoke Switching Station
NGRID	Mohican	Luther Forest	-34.47	In-Service	2019	115	115	1	937	1141	New Schaghticoke Switching Station
NGRID	Mohican	Schaghticoke (New Station)	28.13	In-Service	2019	115	115	1	937	1141	New Schaghticoke Switching Station
NGRID	Ohio St	Ohio St		In-Service	2019	115	115		N/A	N/A	New Distribution Station at Ohio Street
NGRID	Albany Steam	Greenbush	6.14	In-Service	2019	115	115	2	1190	1527	Reconductor Albany - Greenbush 115kV lines 1 & 2
NGRID	Schodack	Churchtown	-26.74	In-Service	2019	115	115	1	937	1141	Line removal tapped by Falls Park Project
NGRID	Sodeman Rd	Sodeman Rd		In-Service	2019	115	115		N/A	N/A	New Distribution Station at Sodeman Road
NGRID	Dewitt	Dewitt		In-Service	2019	115	115		N/A	N/A	New Distribution Station at Dewitt
NGRID	Luther Forest	Schaghticoke (New Station)	6.34	In-Service	2019	115	115	1	1280	1563	New Schaghticoke Switching Station

Transmission Owner	Terminals		Line Length in Miles	In-Service Date/Yr		Nominal Voltage in kV		# of ckts	Thermal Ratings (4)		Project Description / Conductor Size
				Prior to (2)	Year	Operating	Design		Summer	Winter	
Firm Plans (included in FERC 715 Base Case)											
NGRID	Seneca	Seneca	-	In-Service	2019	115/22	115/22	-	50MVA	50MVA	Damage/Failure on TR2
NGRID	Mortimer	Mortimer	Reconfiguration	In-Service	2019	115	115	1	N/A	N/A	Reconfiguration of Station
NGRID	Mohican	Butler	3.50	S	2019	115	115	1	TBD	TBD	Replace 3.5 miles of conductor w/min 336.4 ACSR
NYSEG	Wood Street	Carmel	1.34	In-Service	2019	115	115	1	261 MVA	261 MVA	477 ACSR
NYSEG	Flat Street	Flat Street	xfmr	In-Service	2019	115/34.5	115/34.5	2	40MVA	45.2MVA	Transformer #2
NYSEG	Falls Park 115/34.5kV Substation			In-Service	2019	115/34.5	115/34.5				Tap to interconnect NG Line #14
NYSEG	Falls Park	Falls Park	xfmr	In-Service	2019	115/34.5	115/34.5	1	62 MVA	70 MVA	Transformer #1
RGE	Station 42	Station 23	Phase Shifter	In-Service	2019	115	115	1	253 MVA	253 MVA	Phase Shifter
RGE	Station 23	Station 23	xfmr	In-Service	2019	115/11.5/11.5	115/11.5/11.5	2	75 MVA	84 MVA	Transformer
RGE	Station 23	Station 23	xfmr	W	2019	115/34.5	115/34.5	2	75 MVA	84 MVA	Transformer
CHGE	North Chelsea	North Chelsea	xfmr	S	2020	115/69	115/69	1	564	728	Replace Transformer 1
CHGE	Fishkill Plains	East Fishkill	2.05	S	2020	115	115	1	995	1218	1-1033.5 ACSR
CHGE	North Catskill	North Catskill	xfmr	W	2020	115/69	115/69	2	560	726	Replace Transformer 4 & 5
ConEd	Buchanan North	Buchanan North	Reconfiguration	S	2020	345	345		N/A	N/A	Reconfiguration (bus work related to decommissioning of Indian Point 2)
LIPA	Meadowbrook	East Garden City	-3.11	S	2020	69	69	1	458	601	4/0 CU
LIPA	East Garden City	Lindbergh	2.50	S	2020	69	69	1	575	601	750 kcmil CU

Transmission Owner	Terminals		Line Length in Miles	In-Service Date/Yr		Nominal Voltage in kV		# of ckts	Thermal Ratings (4)		Project Description / Conductor Size
				Prior to (2)	Year	Operating	Design		Summer	Winter	
Firm Plans (included in FERC 715 Base Case)											
LIPA	Lindbergh	Meadowbrook	2.11	S	2020	69	69	1	458	601	4/0 CU
LIPA	Elmont	Floral Park	-1.59	S	2020	34.5	34.5	1	644	816	477 AL
LIPA	Elmont	Belmont	1.82	S	2020	34.5	34.5	1	342	457	2/0 CU
LIPA	Belmont	Floral Park	2.04	S	2020	34.5	34.5	1	644	816	477 AL
LIPA	MacArthur	-	Cap Bank	S	2020	69	69	1	27MVAR	27 MVAR	Capacitor bank
NGRID	Rosa Rd	Rosa Rd	-	S	2020	115	115		N/A	N/A	Install 35.2MVAR Cap Bank at Rosa Rd
NGRID	Rotterdam	Curry Rd	7	S	2020	115	115	1	808	856	Replace 7.0 miles of mainly 4/0 Cu conductor with 795kcmil ACSR 26/7
NGRID	Elm St	Elm St	xfmr	S	2020	230/23	230/23	1	118MVA	133MVA	Add a fourth 230/23kV transformer
NGRID	West Ashville	West Ashville		S	2020	115	115		N/A	N/A	New Distribution Station at West Ashville
NGRID	Spier	Rotterdam (#2)	-32.74	S	2020	115	115	1	1168	1416	New Lasher Rd Switching Station
NGRID	Spier	Lasher Rd (New Station) (#2)	21.69	S	2020	115	115	1	1168	1416	New Lasher Rd Switching Station
NGRID	Lasher Rd (New Station)	Rotterdam	11.05	S	2020	115	115	1	2080	2392	New Lasher Rd Switching Station
NGRID	Spier	Luther Forest (#302)	-34.21	S	2020	115	115	1	916	1070	New Lasher Rd Switching Station
NGRID	Spier	Lasher Rd (New Station) (#302)	21.72	S	2020	115	115	1	916	1118	New Lasher Rd Switching Station
NGRID	Lasher Rd (New Station)	Luther Forest	12.49	S	2020	115	115	1	990	1070	New Lasher Rd Switching Station

Transmission Owner	Terminals		Line Length in Miles	In-Service Date/Yr		Nominal Voltage in kV		# of ckts	Thermal Ratings (4)		Project Description / Conductor Size
				Prior to (2)	Year	Operating	Design		Summer	Winter	
Firm Plans (included in FERC 715 Base Case)											
NGRID	Rotterdam	Rotterdam	-	S	2020	115	115	2	N/A	N/A	Install Series Reactors at Rotterdam Station on lines 17 & 19
NGRID	Huntley	Lockport	6.9	S	2020	115	115	2	1303	1380	Replace 6.9 miles of 36 and 37 lines
NGRID	Two Mile Creek	Two Mile Creek		S	2020	115	115		N/A	N/A	New Distribution Station at Two Mile Creek
NGRID	Maple Ave	Maple Ave		S	2020	115	115		N/A	N/A	New Distribution Station at Maple Ave
NGRID	Randall Rd	Randall Rd		S	2020	115	115		N/A	N/A	New Distribution Station at Randall Road
NGRID	GE	Geres Lock	7.14	S	2020	115	115	1	785	955	Reconductoring 4/0CU & 336 ACSR to 477 ACCR (Line #8)
NGRID	Gardenville 115kV	Gardenville 115kV	-	S	2020	-	-	-	-	-	Rebuild of Gardenville 115kV Station to full breaker and a half
NGRID	Rotterdam	Woodlawn	7	S	2020	115	115	1			Replace 7.0 miles of mainly 4/0 Cu conductor with 795kcmil ACSR 26/7
NGRID	Gardenville 230kV	Gardenville 115kV	xfmr	S	2020	230/115	230/115	-	347 MVA	422 MVA	Replacement of 230/115kV TB#4 stepdown with larger unit
NGRID	Oswego	Oswego	-	W	2020	115	115		N/A	N/A	Rebuild of Oswego 115kV Station
NYPA	Fraser Annex	Fraser Annex	SSR Detection	S	2020	345	345	1	1793 MVA	1793 MVA	MSSC SSR Detection Project
NYPA	Niagara	Rochester	-70.20	W	2020	345	345	1	2177	2662	2-795 ACSR
NYPA	Somerset	Rochester	-44.00	W	2020	345	345	1	2177	2662	2-795 ACSR
NYPA	Niagara	Station 255 (New Station)	66.40	W	2020	345	345	1	2177	2662	2-795 ACSR
NYPA	Somerset	Station 255 (New Station)	40.20	W	2020	345	345	1	2177	2662	2-795 ACSR

Transmission Owner	Terminals		Line Length in Miles	In-Service Date/Yr		Nominal Voltage in kV		# of ckts	Thermal Ratings (4)		Project Description / Conductor Size
				Prior to (2)	Year	Operating	Design		Summer	Winter	
Firm Plans (included in FERC 715 Base Case)											
NYPA	Station 255 (New Station)	Rochester	3.80	W	2020	345	345	2	2177	2662	2-795 ACSR
NYPA	Niagara 230 kV	Niagara 230 kV	Breaker	W	2020	230	230	1	N/A	N/A	Add a new breaker
NYPA	Niagara 230 kV	Niagara 115 kV	Autotransformer	S	2020	230	115	1	240 MVA	240 MVA	Replace Niagara AT #1
NYPA	Astoria 138 kV	Astoria 13.8 kV	Astoria CC GSU Refurbishment	W	2020	138	18	1	234	234	Astoria CC GSU Refurbishment
NYSEG	Watercure Road	Watercure Road	xfmr	W	2020	345/230	345/230	1	426 MVA	494 MVA	Transformer #2 and Station Reconfiguration
NYSEG	Willet	Willet	xfmr	W	2020	115/34.5	115/34.5	1	39 MVA	44 MVA	Transformer #2
NYSEG	Coddington	E. Ithaca (to Coddington)	8.07	W	2020	115	115	1	307 MVA	307 MVA	665 ACCR
O & R	West Nyack	West Nyack	Cap Bank	S	2020	138	138	1	-	-	Capacitor Bank
O & R	Harings Corner (RECO)	Closter (RECO)	3.20	S	2020	69	69	1	1098	1312	UG Cable
O & R	Ramapo	Ramapo	xfmr	S	2020	345/138	345/138	1	731	731	-
RGE	Station 122-Pannell-PC1	Station 122-Pannell-PC1 and PC2		S	2020	345	345	1	1314 MVA-LTE	1314 MVA-LTE	Relay Replacement
RGE	Station 262	Station 23	1.46	W	2020	115	115	1	2008	2008	Underground Cable
RGE	Station 33	Station 262	2.97	W	2020	115	115	1	2008	2008	Underground Cable
RGE	Station 262	Station 262	xfmr	W	2020	115/34.5	115/34.5	1	58.8MVA	58.8MVA	Transformer
RGE	Station 255 (New Station)	Rochester	3.80	W	2020	345	345	1	2177	2662	2-795 ACSR
RGE	Station 255 (New Station)	Station 255 (New Station)	xfmr	W	2020	345/115	345/115	1	400 MVA	450 MVA	Transformer

Transmission Owner	Terminals		Line Length in Miles	In-Service Date/Yr		Nominal Voltage in kV		# of ckts	Thermal Ratings (4)		Project Description / Conductor Size
				Prior to (2)	Year	Operating	Design		Summer	Winter	
Firm Plans (included in FERC 715 Base Case)											
RGE	Station 255 (New Station)	Station 255 (New Station)	xfmr	W	2020	345/115	345/115	2	400 MVA	450 MVA	Transformer
RGE	Station 255 (New Station)	Station 418	9.60	W	2020	115	115	1	1506	1807	New 115kV Line
RGE	Station 255 (New Station)	Station 23	11.10	W	2020	115	115	1	1506	1807	New 115kV Line
CHGE	Hurley Avenue	Leeds	Static synchronous series compensator	S	2021	345	345	1	2336	2866	21% Compensation
LIPA	Valley Stream	East Garden City	7.36	S	2021	138	138	1	1171	1171	2000 SQMM XLPE
LIPA	Amagansett	Montauk	-13.00	S	2021	23	23	1	577	657	750 kcmil CU
LIPA	Amagansett	Navy Road	12.74	S	2021	23	23	1	577	657	750 kcmil CU
LIPA	Navy Road	Montauk	0.26	S	2021	23	23	1	577	657	750 kcmil CU
LIPA	Riverhead	Wildwood	10.63	S	2021	138	138	1	1399	1709	1192ACSR
LIPA	Riverhead	Canal	16.49	S	2021	138	138	1	1000	1110	2368 KCMIL (1200 mm²) Copper XLPE
LIPA	Deer Park	-	Cap Bank	S	2021	69	69	1	27MVAR	27 MVAR	Capacitor bank
NGRID	Clay	Dewitt	10.24	S	2021	115	115	1	220MVA	268MVA	Reconductor 4/0 CU to 795ACSR
NGRID	Clay	Teall	12.75	S	2021	115	115	1	220 MVA	268MVA	Reconductor 4/0 CU to 795ACSR
NGRID	Gardenville 230kV	Gardenville 115kV	xfmr	S	2021	230/115	230/115	-	347 MVA	422 MVA	Replacement of 230/115kV TB#3 stepdown with larger unit
NGRID	Huntley 115kV	Huntley 115kV	-	S	2021	230	230	-	N/A	N/A	Rebuild of Huntley 115kV Station
NGRID	Mortimer	Mortimer	xfmr	S	2021	115	115		50MVA	50MVA	Replace Mortimer 115/69kV Transformer

Transmission Owner	Terminals		Line Length in Miles	In-Service Date/Yr		Nominal Voltage in kV		# of ckts	Thermal Ratings (4)		Project Description / Conductor Size
				Prior to (2)	Year	Operating	Design		Summer	Winter	
Firm Plans (included in FERC 715 Base Case)											
NGRID	Mortimer	Mortimer	-	S	2021	115	115		N/A	N/A	Second 115kV Bus Tie Breaker at Mortimer Station
NGRID	New Bethlehem	New Bethlehem	-	S	2021	115	115		N/A	N/A	New Bethlehem 115/13.2kV station
NGRID	New Cicero	New Cicero		S	2021	115	115		N/A	N/A	New Distribution Station at New Cicero
NGRID	Mountain	Lockport	0.08	S	2021	115	115	2	174MVA	199MVA	Mountain-Lockport 103/104 Bypass
NGRID	Royal Ave	Royal Ave	-	S	2021	115/13.2	115/13.2	-	-	-	Install new 115-13.2 kV distribution substation in Niagara Falls (Royal Ave)
NGRID	Niagara	Packard	3.4	W	2021	115	115	1	344MVA	449MVA	Replace 3.4 miles of 192 line
NYPA	Moses 230 kV	Adirondack 230 kV	Series Compensation	S	2021	230	230	-	±13.2kV	±13.2kV	Voltage Source Series Compensation
NYPA	St. Lawrence 230kV	St. Lawrence 115kV	xfmr	S	2021	230/115	230/115	1	TBD	TBD	Replacement of St. Lawrence AutoTransformer #2
NYPA	Plattsburg 230 kV	Plattsburg 115 kV	xfmr	W	2021	230/115	230/115	1	249	288	Refurbishment of Plattsburgh Auto Transformer #1
NYPA	Astoria Annex	Astoria Annex	Shunt Reactor	W	2021	345	345	2	TBD	TBD	
O & R	Lovett 345 kV Station (New Station)	Lovett	xfmr	S	2021	345/138	345/138	1	562 MVA	562 MVA	Transformer
O & R	Little Tor	-	Cap Bank	S	2021	138	138	1	32 MVAR	32 MVAR	Capacitor bank
O & R	Deerpak	Port Jervis	2	S	2021	69	69	1		1604	
O & R	Westtown	Port Jervis	7	S	2021	69	69	1		1604	
O & R/ConEd	Ladentown	Buchanan	-9.5	S	2021	345	345	1	3000	3211	2-2493 ACAR
O & R/ConEd	Ladentown	Lovett 345 kV Station (New Station)	5.5	S	2021	345	345	1	3000	3211	2-2493 ACAR

Transmission Owner	Terminals		Line Length in Miles	In-Service Date/Yr		Nominal Voltage in kV		# of ckts	Thermal Ratings (4)		Project Description / Conductor Size
				Prior to (2)	Year	Operating	Design		Summer	Winter	
Firm Plans (included in FERC 715 Base Case)											
O & R/ConEd	Lovett 345 kV Station (New Station)	Buchanan	4	S	2021	345	345	1	3000	3211	2-2493 ACAR
CHGE	St. Pool	High Falls	5.61	W	2022	115	115	1	1010	1245	1-795 ACSR
CHGE	High Falls	Kerhonkson	10.03	W	2022	115	115	1	1010	1245	1-795 ACSR
CHGE	Modena	Galeville	4.62	W	2022	115	115	1	1010	1245	1-795 ACSR
CHGE	Galeville	Kerhonkson	8.96	W	2022	115	115	1	1010	1245	1-795 ACSR
CHGE	Hurley Ave	Saugerties	11.40	W	2022	69	115	1	1114	1359	1-795 ACSR
CHGE	Kerhonkson	Kerhonkson	xfmr	W	2022	115/69	115/69	1	564	728	Add Transformer 3
CHGE	Kerhonkson	Kerhonkson	xfmr	W	2022	115/69	115/69	1	564	728	Add Transformer 4
CHGE	Rock Tavern	Sugarloaf	12.10	W	2022	115	115	1	N/A	N/A	Retire SL Line
CHGE	Sugarloaf	NY/NJ State Line	10.30	W	2022	115	115	2	N/A	N/A	Retire SD/SJ Lines
NGRID	South Oswego	Indeck (#6)	-	S	2022	115	115	1	-	-	Install High Speed Clearing on Line #6
NGRID	Porter	Porter	-	S	2022	230	230		N/A	N/A	Porter 230kV upgrades
NGRID	Watertown	Watertown		S	2022	115	115		N/A	N/A	New Distribution Station at Watertown
NGRID	Golah	Golah	xfmr	S	2022	69	69		50MVA	50MVA	Replace Golah 69/34.5kV Transformer
NGRID	Niagara	Packard	3.7	S	2022	115	115	1	344MVA	449MVA	Replace 3.7 miles of 191 line
NGRID	Lockport	Mortimer	56.5	S	2022	115	115	3	-	-	Replace Cables Lockport-Mortimer #111, 113, 114

Transmission Owner	Terminals		Line Length in Miles	In-Service Date/Yr		Nominal Voltage in kV		# of ckts	Thermal Ratings (4)		Project Description / Conductor Size
				Prior to (2)	Year	Operating	Design		Summer	Winter	
Firm Plans (included in FERC 715 Base Case)											
NGRID	Niagara	Packard	3.7	W	2022	115	115	2	344MVA	449MVA	Replace 3.7 miles of 193 and 194 lines
NGRID	Gardenville	Big Tree	6.3	W	2022	115	115	1	221MVA	221MVA	Gardenville-Arcade #151 Loop-in-and-out of NYSEG Big Tree
NGRID	Big Tree	Arcade	28.6	W	2022	115	115	1	129MVA	156MVA	Gardenville-Arcade #151 Loop-in-and-out of NYSEG Big Tree
NGRID	Coffeen	Coffeen	-	S	2022	115	115	-	TBD	TBD	Terminal equipment replacements
NGRID	Browns Falls	Browns Falls	-	S	2022	115	115	-	TBD	TBD	Terminal equipment replacements
NGRID	Taylorville	Taylorville	-	S	2022	115	115	-	TBD	TBD	Terminal equipment replacements
NYPA	Niagara 345 kV	Niagara 230 kV	xfmr	W	2022	345/230	345/230	1	TBD	TBD	Replacement of Niagara AutoTransformer #3
NYSEG	South Perry	South Perry	xfmr	W	2022	115/34.5	115/34.5	1	59 MVA	67 MVA	Transformer #3
NYSEG	South Perry	South Perry	xfmr	W	2022	230/115	230/115	1	246 MVA	291 MVA	Transformer
NYSEG	Fraser	Fraser	xfmr	W	2022	345/115	345/115	1	305 MVA	364 MVA	Transformer #2 and Station Reconfiguration
NYSEG	Fraser 115	Fraser 115	Rebuild	W	2022	115	115		N/A	N/A	Station Rebuild to 4 bay BAAH
NYSEG	Delhi	Delhi	Removal	W	2022	115	115		N/A	N/A	Remove 115 substation and terminate existing lines to Fraser 115 (short distance)
NYSEG	Erie Street Rebuild	Erie Street Rebuild	Rebuild	W	2022	115	115				Station Rebuild
NYSEG	Big Tree Road	Big Tree Road	Rebuild	W	2022	115	115				Station Rebuild
NYSEG	Meyer	Meyer	xfmr	W	2022	115/34.5	115/34.5	2	59.2MVA	66.9MVA	Transformer #2

Transmission Owner	Terminals		Line Length in Miles	In-Service Date/Yr		Nominal Voltage in kV		# of ckts	Thermal Ratings (4)		Project Description / Conductor Size
				Prior to (2)	Year	Operating	Design		Summer	Winter	
Firm Plans (included in FERC 715 Base Case)											
O & R	Ramapo (NY)	South Mahwah (RECO)	5.50	W	2022	138	138	2	1980	2120	1272 ACSS
RGE	Station 168	Mortimer (NG Trunk #2)	26.4	W	2022	115	115	1	145 MVA	176 MVA	Station 168 Reinforcement Project
RGE	Station 168	Elbridge (NG Trunk # 6)	45.5	W	2022	115	115	1	145 MVA	176 MVA	Station 168 Reinforcement Project
RGE	Station 127	Station 127	xfmr	W	2022	115/34.5	115/34.5	1	75MVA	75MVA	Transformer #2
CHGE	Saugerties	North Catskill	12.46	W	2023	69	115	1	1114	1359	1-795 ACSR
NGRID	Cortland	Clarks Corners	0.2	S	2023	115	115	1	147MVA	170MVA	Replace 0.2 miles of 1(716) line and series equipment
NGRID	Maplewood	Menands	3	S	2023	115	115	1	220 MVA	239 MVA	Reconductor approx. 3 miles of 115kV Maplewood – Menands #19
NGRID	Maplewood	Reynolds	3	S	2023	115	115	1	217 MVA	265 MVA	Reconductor approx 3 miles of 115kV Maplewood – Reynolds Road #31
NGRID	Elm St	Elm St	-	S	2023	230/23	230/23	-	118MVA	133MVA	Replace TR2 as failure
NGRID	Packard	Huntley	9.1	W	2023	115	115	1	262MVA	275MVA	Walck-Huntley #133, Packard-Huntley #130 Reconductor
NGRID	Walck	Huntley	9.1	W	2023	115	115	1	262MVA	275MVA	Walck-Huntley #133, Packard-Huntley #130 Reconductor
NGRID	Kensington Terminal	Kensington Terminal	-	W	2023	115/23	115/23	-	50MVA	50MVA	Replace TR4 and TR5
NGRID	Malone	Malone	-	S	2023	115	115	-	TBD	TBD	Station Rebuild
NGRID	Taylorville	Boonville	-	S	2023	115	115	-	TBD	TBD	Install series reactors on the 5 and 6 lines. Size TBD
NYPA	Moses	Adirondack	78	S	2023	230	345	2	1088	1329	Replace 78 miles of both Moses-Adirondack 1&2
NYPA	Niagara 345 kV	Niagara 230 kV	xfmr	W	2023	345/230	345/230	1	TBD	TBD	Replacement of Niagara AutoTransformer #5

Transmission Owner	Terminals		Line Length in Miles	In-Service Date/Yr		Nominal Voltage in kV		# of ckts	Thermal Ratings (4)		Project Description / Conductor Size
				Prior to (2)	Year	Operating	Design		Summer	Winter	
Firm Plans (included in FERC 715 Base Case)											
NYSEG	Gardenville	Gardenville	xfmr	W	2023	230/115	230/115	1	316 MVA	370 MVA	NYSEG Transformer #3 and Station Reconfiguration
NYSEG	Wood Street	Wood Street	xfmr	W	2023	345/115	345/115	1	327 MVA	378 MVA	Transformer #3
O & R	Burns	West Nyack	5.00	S	2023	138	138	1	940	940	UG Cable
O & R	Shoemaker	Pocatello	2.00	W	2023	69	69	1	1604	1723	795 ACSS
O & R	Sugarloaf	Shoemaker	12.00	W	2023	69	138	2	1062	1141	397 ACSS
ConEd	Hudson Ave East	New Vinegar Hill Distribution Switching Station	xfmrs/PARs/Feeders	S	2024	138/27	138/27		N/A	N/A	New Hudson Ave Distribution Switching Station
ConEd	Farragut	Farragut	Reconfiguration	S	2024	138	138		N/A	N/A	Install PASS Breaker
NGRID	Dunkirk	Laona	-	S	2024	115	115	2	N/A	N/A	Remove series reactors from New Road Switch Station and install new to Moons Switch Station
NGRID	Laona	Moons	-	S	2024	115	115	2	N/A	N/A	Remove series reactors from New Road Switch Station and install new to Moons Switch Station
NGRID	Golah	Golah	Reconfiguration	S	2024	115	115		-	-	Add a Golah 115kV bus tie breaker
NGRID	Dunkirk	Dunkirk	-	S	2024	115	115		N/A	N/A	Rebuild of Dunkirk 115kV Station
NGRID	Gardenville	Dunkirk	20.5	S	2024	115	115	2	1105	1346	Replace 20.5 miles of 141 and 142 lines
NGRID	Homer Hill	Homer Hill	-	S	2024	115	115	-	116MVA	141MVA	Homer Hill Replace five OCB
NGRID	Inghams	Saint Johnsville	2.94	W	2024	115	115	1	1114	1359	Reconductor 2.94mi of 2/0 + 4/0 Cu (of 7.11mi total) to 795 ACSR

Transmission Owner	Terminals		Line Length in Miles	In-Service Date/Yr		Nominal Voltage in kV		# of ckts	Thermal Ratings (4)		Project Description / Conductor Size
				Prior to (2)	Year	Operating	Design		Summer	Winter	
Firm Plans (included in FERC 715 Base Case)											
NGRID	Inghams 115kV	Inghams 115kV	Breaker	W	2024	115	115	-	2000	2000	Add series breaker to Inghams R15 (Inghams - Meco #15 115kV)
NGRID	Schenectady International	Rotterdam	0.93	W	2024	69	115	1	1114	1359	Reconductor 0.93mi of 4/0 Cu + 336.4 ACSR (of 21.08mi total) to 795 ACSR
NGRID	Rotterdam	Schoharie	0.93	W	2024	69	115	1	1114	1359	Reconductor 0.93mi of 4/0 Cu (of 21.08mi total) to 795 ACSR
NYSEG	Westover 115	Westover	Removal	W	2024	115	115		N/A	N/A	Remove 115 substation and terminate existing lines to Oakdale 115 (short distance)
O & R	Montvale (RECO)	-	Cap Bank	S	2024	69	69	1	32 MVAR	32 MVAR	Capacitor bank
O & R	Ramapo	Sugarloaf	17.00	W	2024	138	138	1	1980	2120	1272 ACSS
O & R	Burns	Corporate Drive	5.00	W	2024	138	138	1	1980	2120	1272 ACSS
RGE	Station 418	Station 48	7.6	W	2024	115	115	1	175 MVA	225 MVA	New 115kV Line
RGE	Station 82	Station 251 (Upgrade Line #902)		W	2024	115	115	1	400MVA	400MVA	Line Upgrade
RGE	Mortimer	Station 251 (Upgrade Line #901)	1.00	W	2024	115	115	1	400MVA	400MVA	Line Upgrade
LIPA	Southampton	Deerfield	4.00	S	2025	69	138	1	1171	1171	2000 SQMM XLPE
NGRID	Stoner	Rotterdam	9.81	W	2025	115	115	1	1398	1708	Reconductor 9.81mi of 4/0 Cu + 336.4 ACSR (of 23.12mi total) to 1192.5 ACSR
NGRID	Meco	Rotterdam	9.81	W	2025	115	115	1	1398	1708	Reconductor 9.96mi of 4/0 Cu + 336.4 ACSR (of 30.79mi total) to 1192.5 ACSR
LIPA	Syosset	Shore Rd	11.00	S	2026	138	138	1	1171	1171	2000 SQMM XLPE
LIPA	Syosset	Shore Rd	Phase Shifter	S	2026	138	138	1	TBD	TBD	Phase Shifter

Transmission Owner	Terminals		Line Length in Miles	In-Service Date/Yr		Nominal Voltage in kV		# of ckts	Thermal Ratings (4)		Project Description / Conductor Size
				Prior to (2)	Year	Operating	Design		Summer	Winter	
Firm Plans (included in FERC 715 Base Case)											
NGRID	Niagara	Gardenville	26.3	S	2026	115	115	1	275MVA	350MVA	Packard-Erie / Niagara-Garenville Reconfiguration
NGRID	Packard	Gardenville	28.2	S	2026	115	115	2	168MVA	211 MVA	Packard-Gardenville Reactors, Packard-Erie / Niagara-Garenville Reconfiguration
NGRID	Mortimer	Pannell	15.7	S	2026	115	115	2	221MVA	270MVA	
NGRID/NYSEG	Erie St	Gardenville	5.5	S	2026	115	115	1	139MVA	179MVA	Packard-Erie / Niagara-Garenville Reconfiguration, Gardenville add breakers
O & R	West Nyack	West Nyack	-	S	2026	138	138	1			Station Reconfiguration
O & R	West Nyack (NY)	Harings Corner (RECO)	7.00	W	2026	69	138	1	1604	1723	795 ACSS

Appendix D: Resource Adequacy Assumptions

Resource Adequacy Assumptions Matrix

#	Parameter	2020 RNA (2020 GB) Study Period: 2024(y4) -2030 (y10)	2020 Q4 STAR Study Period: 2021(y1) -2025 (y5)	2021 Q1 STAR *(as compared with Q4STAR)* Study Period: 2021(y1) -2025 (y5)
Load Parameters				
1	**Peak** Load Forecast	Adjusted 2020 Gold Book NYCA baseline peak load forecast. The GB 2020 baseline peak load forecast includes the impact (reduction) of behind-the-meter (BtM) solar at the time of NYCA peak. For the Resource Adequacy load model, the deducted BtM solar MW was added back to the NYCA zonal loads, which then allows for a discrete modeling of the BtM solar resources.	Same	Adjusted NYCA baseline peak load forecast based on the November 19, 2020 Load Forecast Update. Reference: Nov 19, 2020 ESPWG/LFTF/TPAS presentation: [link] Same method.
2	Load **Shapes** (Multiple Load Shapes)	Used Multiple Load Shape MARS Feature 8,760 hour historical load shapes were used as base shapes for LFU bins: Bin 1: 2006 Bin 2: 2002 Bins 3-7: 2007 Peak adjustments on a seasonal basis. For the BtM Solar adjustment, the BtM shape is added back to account	Same	Same

#	Parameter	2020 RNA (2020 GB) Study Period: 2024(y4) -2030 (y10)	2020 Q4 STAR Study Period: 2021(y1) -2025 (y5)	2021 Q1 STAR *(as compared with Q4STAR)* Study Period: 2021(y1) -2025 (y5)
		for the impact of the BtM generation on both on-peak and off-peak hours.		
3	Load Forecast Uncertainty (**LFU**)	Updated via Load Forecast Task Force (LFTF) process Reference: April 13 2020 LFTF presentation: https://www.nyiso.com/documents/20142/11883362/LFU_Summary.pdf	Same	Same
Generation Parameters				
1	**Existing** Generating Unit Capacities	2020 Gold Book values. Use summer min (DMNC vs. CRIS). Use winter min (DMNC vs. CRIS). Adjusted for RNA inclusion rules.	Same	Same
2	**Proposed New Units Inclusion** Determination	GB2020 with Inclusion Rules Applied	Same	Same

#	Parameter	2020 RNA (2020 GB) Study Period: 2024(y4) -2030 (y10)	2020 Q4 STAR Study Period: 2021(y1) -2025 (y5)	2021 Q1 STAR *(as compared with Q4STAR)* Study Period: 2021(y1) -2025 (y5)
3	Retirement, Mothballed Units, IIFO	GB2020 with Inclusion Rules Applied	Same	Same
4	Forced and Partial Outage Rates	Five-year (2015-2019) GADS data for each unit represented. Those units with less than five years – use representative data. Transition Rates representing the Equivalent Forced Outage Rates (EFORd) during demand periods over the most recent five-year period For new units or units that are in service for less than three years, NERC 5-year class average EFORd data are used.	Same	Same
5	Planned Outages	Based on schedules received by the NYISO and adjusted for history	Same	Same
6	Summer Maintenance	None	Same	Same
7	Combustion Turbine Derates	Derate based on temperature correction curves For new units: used data for a unit of same type in same zone, or neighboring zone data.	Same	Same
8	Existing Landfill Gas Plants	Actual hourly plant output over the period 2013-2017. Program randomly selects a LFG shape of hourly production over the 2013-2017 for each model replication.	Same	Same

#	Parameter	2020 RNA (2020 GB) Study Period: 2024(y4) -2030 (y10)	2020 Q4 STAR Study Period: 2021(y1) -2025 (y5)	2021 Q1 STAR *(as compared with Q4STAR)* Study Period: 2021(y1) -2025 (y5)
		Probabilistic model is incorporated based on five years of input shapes, with one shape per replication randomly selected in the Monte Carlo process.		
9	Existing **Wind** Units (>5 years of data)	Actual hourly plant output over the period 2015-2019. Probabilistic model is incorporated based on five years of input shapes with one shape per replication being randomly selected in Monte Carlo process	Same	Same
10	Existing **Wind** Units (<5 years of data)	For existing data, the actual hourly plant output over the period 2013-2017 is used. For missing data, the nameplate normalized average of units in the same load zone is scaled by the unit's nameplate rating.	Same	Same
11a	Proposed **Land based Wind** Units	Inclusion Rules Applied to determine the generator status. The nameplate normalized average of units in the same load zone is scaled by the unit's nameplate rating.	Same	Same
11b	Proposed **Offshore Wind** Units	N/A	N/A	Same
12a	Existing **Utility-scale Solar Resources**	The 31.5 MW Upton metered solar capacity: probabilistic model chooses from 5 years of production data output shapes covering the	Same	Same

#	Parameter	2020 RNA (2020 GB) Study Period: 2024(y4) -2030 (y10)	2020 Q4 STAR Study Period: 2021(y1) -2025 (y5)	2021 Q1 STAR *(as compared with Q4STAR)* Study Period: 2021(y1) -2025 (y5)
		period 2013-2017 (one shape per replication is randomly selected in Monte Carlo process.)		
12b	Proposed **Utility-scale Solar Resources**	Inclusion Rules Applied to determine the generator status. The nameplate normalized average of units in the same load zone is scaled by the unit's nameplate rating.	Same	Same
13	Projected **BtM Solar Resources**	Will use 5-year of inverter production data. Probabilistic model is incorporated based on five years of input shapes with one shape per replication being randomly selected in Monte Carlo process **Reference**: April 6, 2020 TPAS/ESPWG meeting materials	Same	Same
14	Existing **BTM-NG Program**	These are former load modifiers to sell capacity into the ICAP market. Modeled as cogen type 2 unit in MARS. Unit capacity set to CRIS value, load modeled with weekly pattern that can change monthly.	Same	Same

#	Parameter	2020 RNA (2020 GB) Study Period: 2024(y4) -2030 (y10)	2020 Q4 STAR Study Period: 2021(y1) -2025 (y5)	2021 Q1 STAR *(as compared with Q4STAR)* Study Period: 2021(y1) -2025 (y5)
15	Existing **Small Hydro** Resources	Actual hourly plant output over the period 2013-2017. Program randomly selects a hydro shape of hourly production over the 5-year window for each model replication. The randomly selected shape is multiplied by their current nameplate rating.	Same	Same
16	Existing **Large Hydro**	Probabilistic Model based on 5 years of GADS data. Transition Rates representing the Equivalent Forced Outage Rates (EFORd) during demand periods over the most recent five-year period (2013-2017). Methodology consistent with thermal unit transition rates.	Same	Same
17	Proposed **Energy Storage**	N/A	Same	Same
18	Existing Energy Limited Resources	N/A	Existing elections were made by August 1st, 2020 and are incorporated into the model as hourly shapes consistent with operational capabilities. Resource output is aligned with the NYISO's peak load window, when most loss-of-load events are expected to occur.	Same
Transaction – Imports/ Exports				

#	Parameter	2020 RNA (2020 GB) Study Period: 2024(y4) -2030 (y10)	2020 Q4 STAR Study Period: 2021(y1) -2025 (y5)	2021 Q1 STAR *(as compared with Q4STAR)* Study Period: 2021(y1) -2025 (y5)
1	Capacity Purchases	Grandfathered Rights and other awarded long-term rights Modeled using MARS explicit contracts feature.	Same	Same
2	Capacity Sales	These are long-term contracts filed with FERC. Modeled using MARS explicit contracts feature. Contracts sold from ROS (Zones: A-F). ROS ties to external pool are derated by sales MW amount	Same	Same
3	FCM Sales	Model sales for known years Modeled using MARS explicit contracts feature. Contracts sold from ROS (Zones: A-F). ROS ties to external pool are derated by sales MW amount	Same	Same
4	UDRs	Updated with most recent elections/awards information (VFT, HTP, Neptune, CSC)	Same	Same
5	EDRs	Cedars Uprate 80 MW. Increased the HQ to D by 80 MW. Note: the Cedar bubble has been removed and its corresponding MW was reflected in HQ to D limit. References:	Same	Same

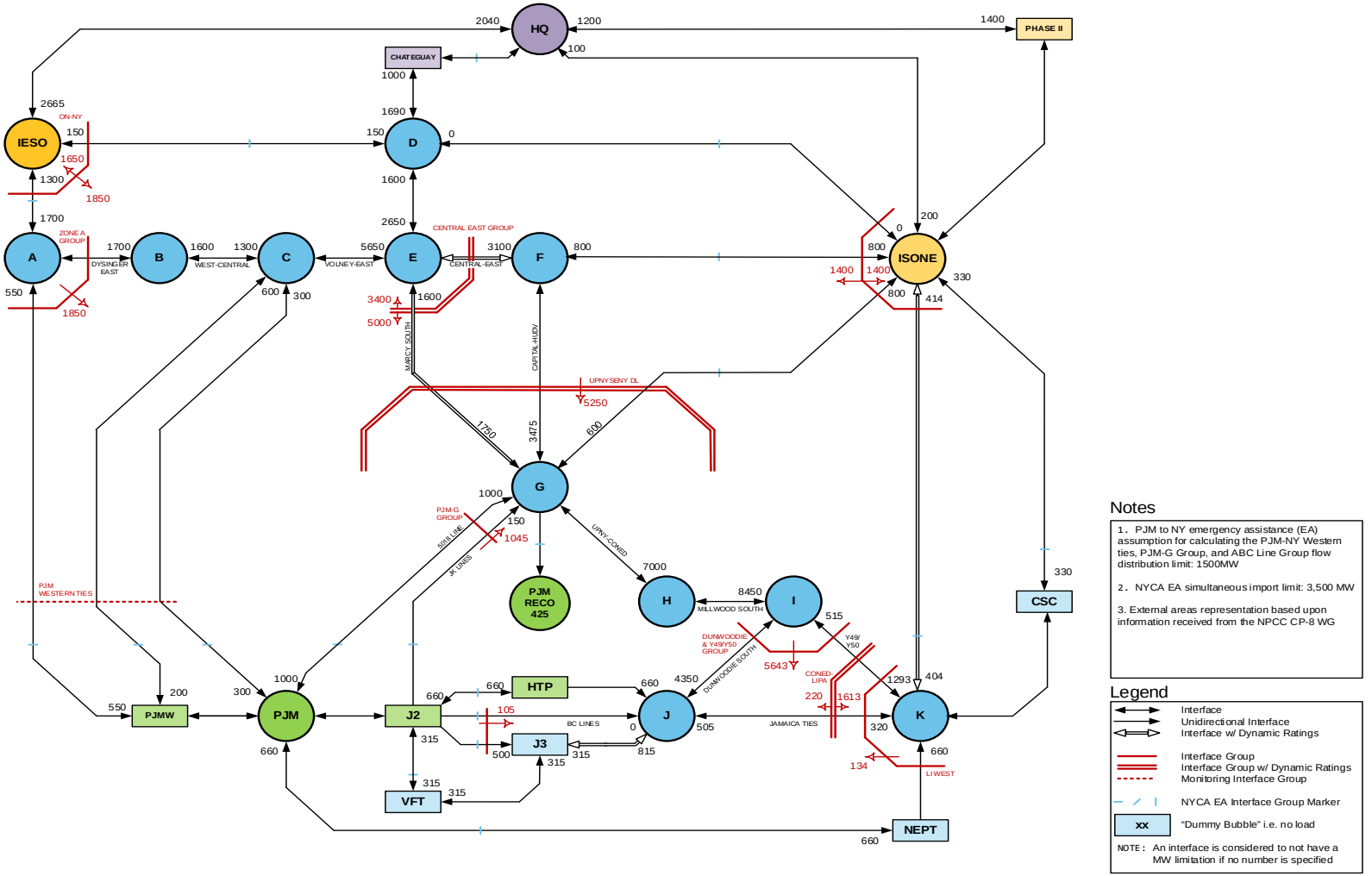
#	Parameter	2020 RNA (2020 GB) Study Period: 2024(y4) -2030 (y10)	2020 Q4 STAR Study Period: 2021(y1) -2025 (y5)	2021 Q1 STAR *(as compared with Q4STAR)* Study Period: 2021(y1) -2025 (y5)
		1. March 16, 2020 ESPWG/TPAS 2. April 6, 2020 TPAS/ESPWG		
6	Wheel-Through Contract	300 MW HQ through NYISO to ISO-NE. Modeled as firm contract. Reduced the transfer limit from HQ to NYISO by 300 MW and increased the transfer limit from NYISO to ISO-NE by 300 MW.	Same	Same
MARS Topology: a simplified bubble-and-pipe representation of the transmission system				
1	Interface Limits	Developed by review of previous studies and specific analysis during the RNA study process	Same	Developed by review of previous studies and specific analysis during the post-RNA study process Feb 23, 2021 ESPWG post-RNA reference: [link]
2	New Transmission	Based on TO- provided firm plans (via Gold Book 2020 process) and proposed merchant transmission; inclusion rules applied	Same	Same
3	AC Cable Forced Outage Rates	All existing cable transition rates updated with data received from ConEd and PSEG-LIPA to reflect most recent five-year history	Same	Same
4	UDR unavailability	Five-year history of forced outages	Same	Same

#	Parameter	2020 RNA (2020 GB) Study Period: 2024(y4) -2030 (y10)	2020 Q4 STAR Study Period: 2021(y1) -2025 (y5)	2021 Q1 STAR *(as compared with Q4STAR)* Study Period: 2021(y1) -2025 (y5)
Emergency Operating Procedures				
1	Special Case Resources	SCRs sold for the program discounted to historic availability ("effective capacity"). Summer values calculated from the latest available July registrations, held constant for all years of study. 15 calls/month	Same. Used 2020 SCR elections	Same
2	EDRP Resources	Not modeled: the values are less than 2 MW.	Same	Same
3	Other EOPs	Based on TO information, measured data, and NYISO forecasts	Same. Used updated elections, as applicable	Same
External Control Areas				
1	PJM	Simplified model: The 5 PJM MARS areas (bubbles) were consolidated into one	Same	Same

#	Parameter	2020 RNA (2020 GB) Study Period: 2024(y4) -2030 (y10)	2020 Q4 STAR Study Period: 2021(y1) -2025 (y5)	2021 Q1 STAR *(as compared with Q4STAR)* Study Period: 2021(y1) -2025 (y5)
2	ISONE	Simplified model: The 8 ISO-NE MARS areas (bubbles) were consolidated into one	Same	Same
3	HQ	As per RNA Procedure External model (load, capacity, topology) provided by PJM/NPCC CP-8 WG. LOLE of pool adjusted to be between 0.10 and 0.15 days per year by adjusting capacity pro-rata in all areas.	Same	Same
4	IESO	As per RNA Procedure External model (load, capacity, topology) provided by PJM/NPCC CP-8 WG. LOLE of pool adjusted to be between 0.10 and 0.15 days per year by adjusting capacity pro-rata in all areas.	Same	Same
5	Reserve Sharing	All NPCC Control Areas indicate that they will share reserves **equally** among all members before sharing with PJM.	Same	Same
6	NYCA Emergency Assistance Limit	Implemented a statewide limit of 3,500 MW	Same	Same
Miscellaneous				
1	MARS Model Version	3.29.1499	3.30.1531	Same

Resource Adequacy Topology from the 2020 Post-RNA Study

MARS Topology Study Year 1 (2021)



Notes

1. PJM to NY emergency assistance (EA) assumption for calculating the PJM-NY Western ties, PJM-G Group, and ABC Line Group flow distribution limit: 1500MW

2. NYCA EA simultaneous import limit: 3,500 MW

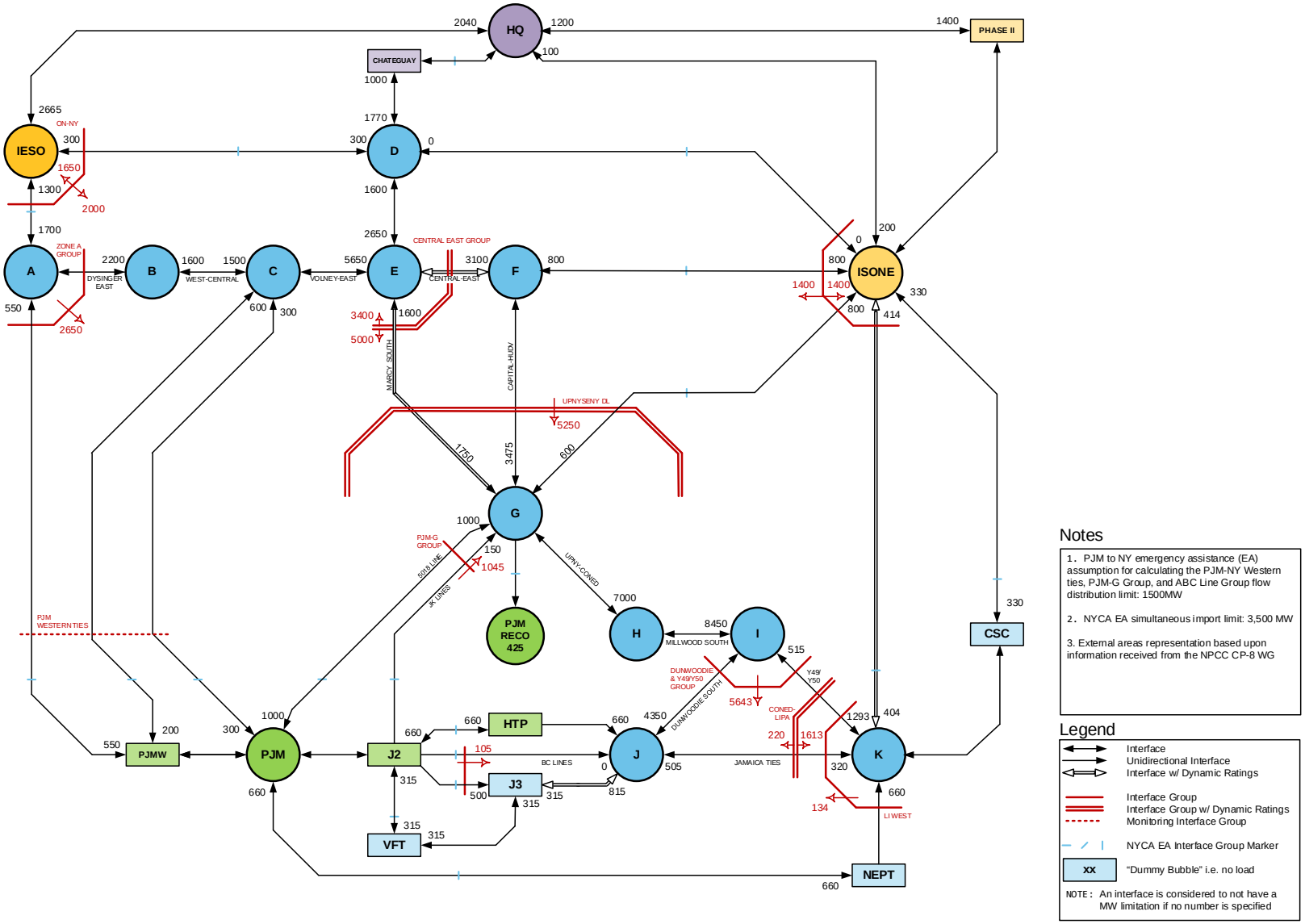
3. External areas representation based upon information received from the NPCC CP-8 WG

Legend

- Interface
- Unidirectional Interface
- Interface w/ Dynamic Ratings
- Interface Group
- Interface Group w/ Dynamic Ratings
- Monitoring Interface Group
- NYCA EA Interface Group Marker
- XX "Dummy Bubble" i.e. no load

NOTE: An interface is considered to not have a MW limitation if no number is specified

MARS Topology Study Year 2 (2022)



Notes

1. PJM to NY emergency assistance (EA) assumption for calculating the PJM-NY Western ties, PJM-G Group, and ABC Line Group flow distribution limit: 1500MW

2. NYCA EA simultaneous import limit: 3,500 MW

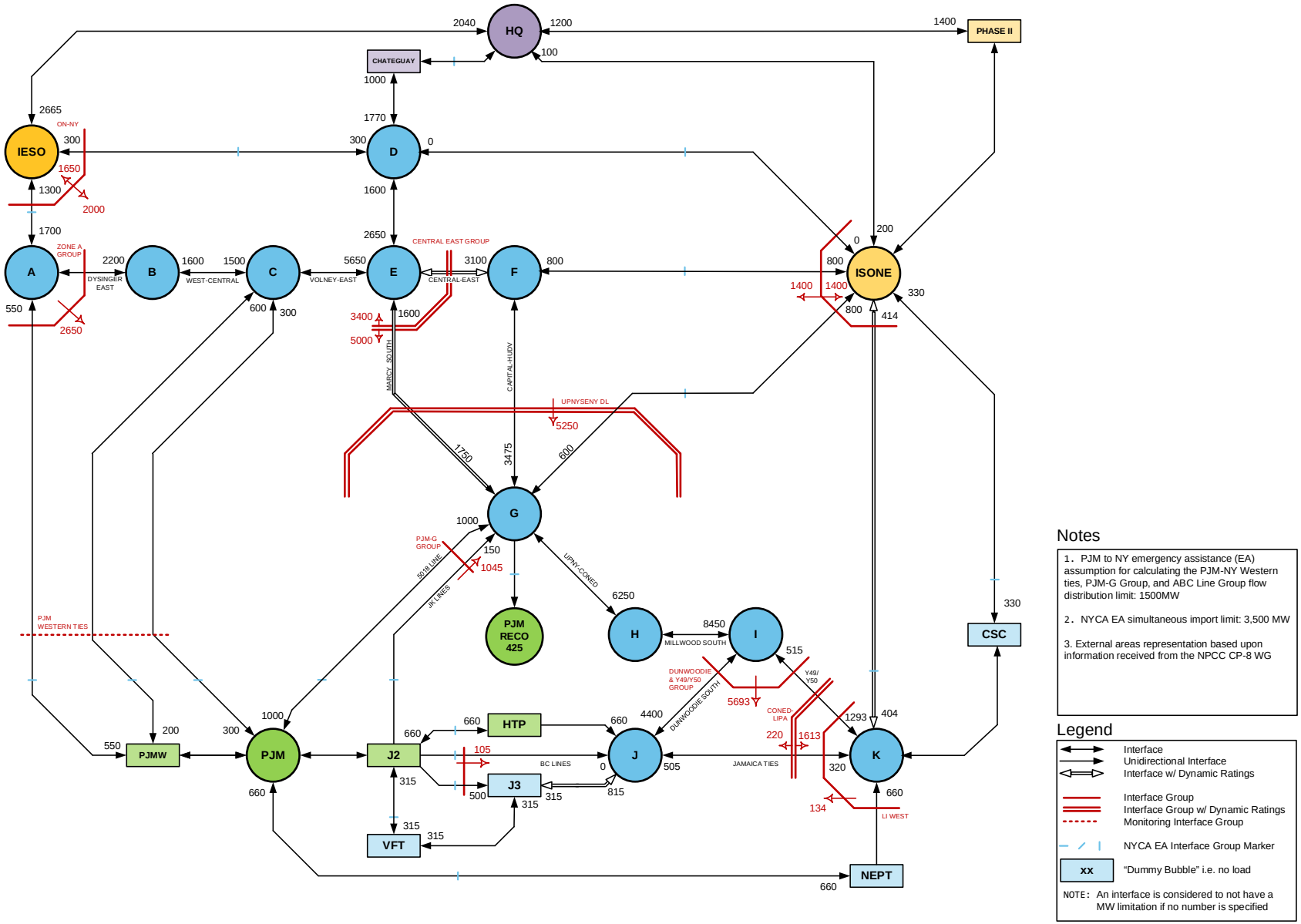
3. External areas representation based upon information received from the NPCC CP-8 WG

Legend

- Interface
- Unidirectional Interface
- Interface w/ Dynamic Ratings
- Interface Group
- Interface Group w/ Dynamic Ratings
- Monitoring Interface Group
- NYCA EA Interface Group Marker
- XX — "Dummy Bubble" i.e. no load

NOTE: An interface is considered to not have a MW limitation if no number is specified

MARS Topology Study Year 3 (2023)



Notes

1. PJM to NY emergency assistance (EA) assumption for calculating the PJM-NY Western ties, PJM-G Group, and ABC Line Group flow distribution limit: 1500MW

2. NYCA EA simultaneous import limit: 3,500 MW

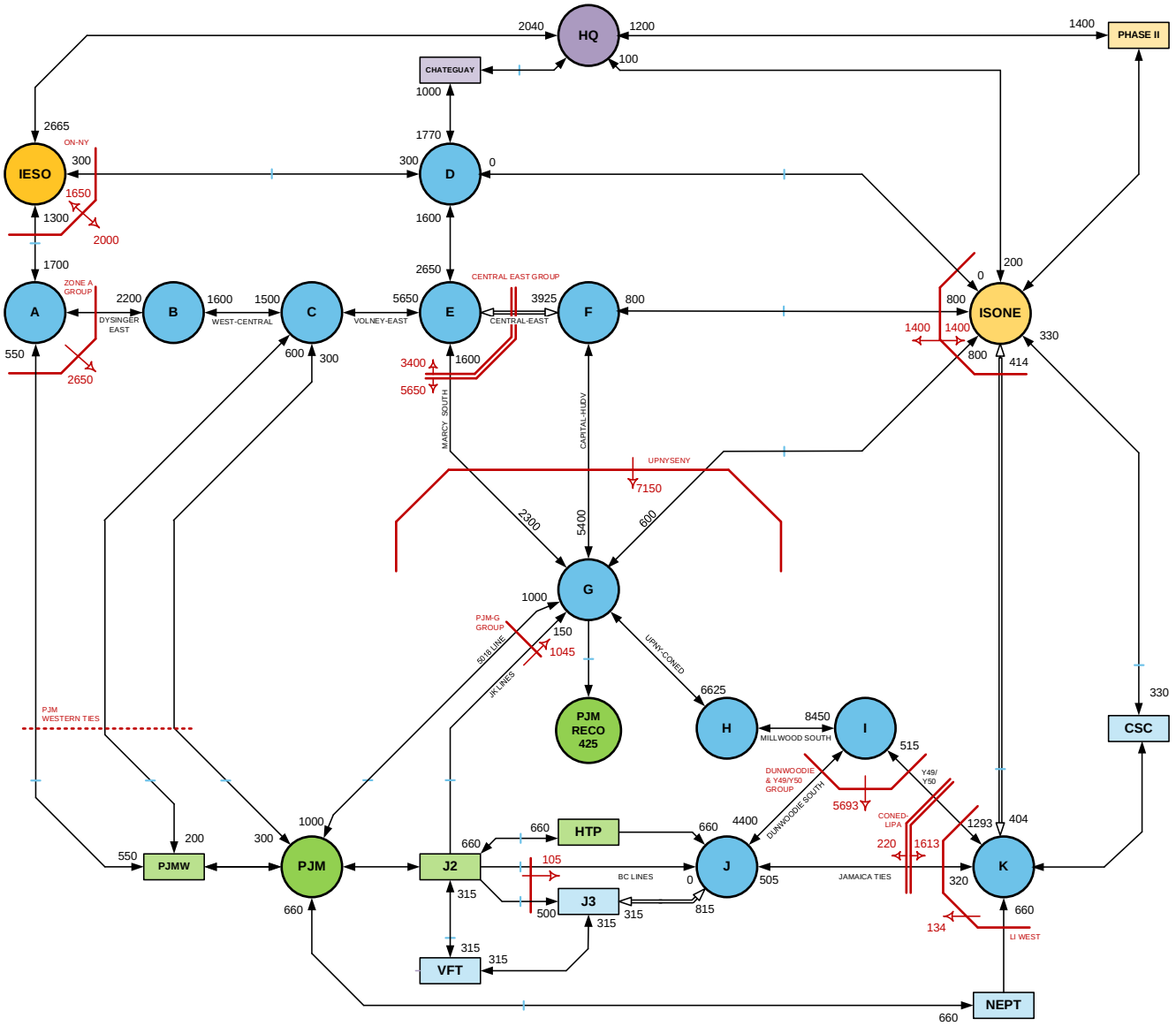
3. External areas representation based upon information received from the NPCC CP-8 WG

Legend

- Interface
- Unidirectional Interface
- Interface w/ Dynamic Ratings
- Interface Group
- Interface Group w/ Dynamic Ratings
- Monitoring Interface Group
- NYCA EA Interface Group Marker
- xx — "Dummy Bubble" i.e. no load

NOTE: An interface is considered to not have a MW limitation if no number is specified

MARS Topology Study Years 4-5 (2024 -2025)



Notes

1. PJM to NY emergency assistance (EA) assumption for calculating the PJM-NY Western ties, PJM-G Group, and ABC Line Group flow distribution limit: 1500MW

2. NYCA EA simultaneous import limit: 3,500 MW

3. External areas representation based upon information received from the NPCC CP-8 WG

Legend

- Interface
- Unidirectional Interface
- Interface w/ Dynamic Ratings
- Interface Group
- Interface Group w/ Dynamic Ratings
- Monitoring Interface Group
- NYCA EA Interface Group Marker
- xx — "Dummy Bubble" i.e. no load

NOTE: An interface is considered to not have a MW limitation if no number is specified