New York ISO
Independent System Operator

NPCC 2022 Interim
New York Area
Review of Resource Adequacy

Prepared by the NYISO for the NPCC covering the New York Control Area for the Study Period 2023-2026

Final
NPCC RCC Approved December 6, 2022

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Table of Contents

Executive Summary

The New York Independent System Operator (NYISO) conducts an annual Area Review of Resource Adequacy of New York's Bulk Power System (BPS) as required by the Northeast Power Coordinating Council (NPCC). As described in the NPCC's Directory 1 (R4 and R5), a Comprehensive Review of Resource Adequacy is required every three years and analyzes a time period of five years. In the two interim years between comprehensive reviews, each Planning Coordinator conducts an Annual Interim Review of Resource Adequacy that will cover, at a minimum, the remaining years of the five-year period studied in the Comprehensive Review of Resource Adequacy.

The purpose of this assessment is to demonstrate conformance with the applicable NPCC resource adequacy planning criteria.

The *2021 Comprehensive Review of Resource Adequacy* (2021 Comprehensive Review) covered the five-year study period of 2022-2026. This *2022 Interim Review of Resource Adequacy* (2022 Interim Review) report provides the first Interim Assessment of the NYISO's *2021 Comprehensive Review* covering the remaining four years of the study period, i.e., from 2023 through 2026, and it is based on the NYISO's *2022 Reliability Needs Assessment* (RNA) planning models.

This report demonstrates that New York will meet the NPCC resource adequacy criterion that the probability of an unplanned disconnection of firm load due to resource deficiencies (i.e., Loss of Load Expectation, LOLE) shall be, on average, no more than one occurrence in ten years (0.1 days per year) for the baseline system covering the study period from 2023 to 2026.

1. Introduction

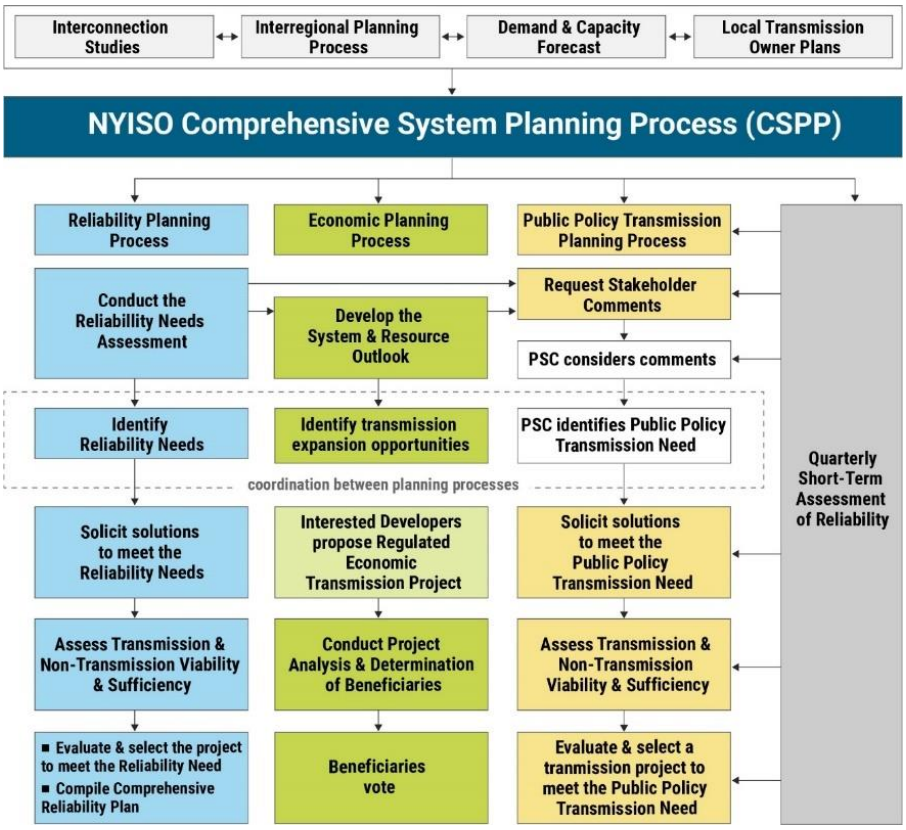
The *2022 Interim Review* provides the first (of two) updates to the *2021 Comprehensive Review*, which was based on NYISO's 2021 reliability planning MARS models assumptions (such as information from the *2021 Load & Capacity Data Report* or *Gold Book*) and was approved by NPCC RCC on November 30, 2021. Since the approval of the *2021 NPCC Comprehensive Review*, the NYISO has conducted additional resource adequacy assessments as part of the current 2022-2023 cycle of the Reliability Planning Process (RPP) and as part of the quarterly Short-Term Reliability Process (STRP). The NYISO also conducts annual studies to determine the Installed Capacity Requirements[1] for New York. The major assumptions of this *2022 Interim Review* are consistent with the NYISO's 2022 RNA process[2] and the 2022 planning MARS

[1] http://www.nysrc.org/reports3.html

[2] https://www.nyiso.com/library

models. A visual depiction of the NYISO's Comprehensive System Planning Process is in Figure 1 below.

Figure 1: NYISO's Comprehensive System Planning Process



2. Assumption Changes

2.1. Load Model

The RNA Base Cases use a peak demand and energy forecast originating from the baseline forecast reported in the NYISO's *2022 Gold Book*. The baseline forecast from the *2022 Gold Book* is derived from energy and peak models that are built based on projections of end-use intensities and economic variables. End-use intensities include those for lighting, refrigeration, cooking, heating, cooling, and other plug loads. The forecasts account for the load-reducing impacts of energy efficiency programs, building codes, and appliance efficiency standards; behind-the-meter Photovoltaic (Solar PV); and behind-the-meter non-solar distributed energy generation. The forecasts also include the expected impacts of electric vehicle usage and building electrification. The impacts of net electricity consumption of all energy storage resources are added to the baseline energy forecast, while the peak-reducing impacts of behind-the-meter energy storage resources are deducted from the baseline peak forecasts. The forecasts also include projected load increases from several interconnecting large load projects.

Economic variables considered in the forecast include gross state product (GSP), households, population, and commercial and industrial employment.

The demand-side management impacts included or accounted for in the 2022 forecast derive from actual and projected spending levels and realization rates for state-sponsored programs, such as the Climate Leadership and Community Protection Act (CLCPA), Clean Energy Standard (CES), the Clean Energy Fund (CEF), the NY-SUN initiative, the energy storage initiative, and earlier programs developed as part of the Reforming the Energy Vision (REV) proceedings.

For the *2022 RNA* resource adequacy assessments, the NYISO uses behind-the meter (BtM) solar PV production data. For General Electric's Multi-Area Reliability Simulations (GE-MARS) modeling, the BtM solar PV component is added back in the baseline forecast in order to explicitly model the BtM solar PV as generation resources. The load shapes used in the study were adjusted from the historic shapes to a shape that meets the forecasted zonal peak, NYCA peak, Zones G through J Locality peak, and NYCA energy forecast. Discretely modeling BtM solar PV as a resource provides for flexibility to adjust the amount of resource available across the system. For the *2022 RNA* resource adequacy assessments, gross peak load forecasts were developed, representing zonal load during the maximum system-wide gross demand hour (net load plus BtM solar). With BtM solar modeled as a resource, these values represent the maximum annual load needed to be served by BtM solar and other resources. The system gross peak load hour typically occurs earlier in the afternoon relative to the system net peak hour reported in the Gold Book.

Following the NYISO's 2019 Climate Change Impact Study Phase I, scenario forecasts have been included to reflect the increasing uncertainty in forecasting future energy usage across the state. The high load scenario forecast reflects faster adoption of electric vehicles and building electrification, and slower adoption of BtM solar PV and energy efficiency measures. The baseline forecast reflects the expected implementation rates of these programs and technologies.

The baseline and scenario energy and peak forecasts also differ in their economic assumptions. The high load scenario forecast assumes slightly higher than baseline expected economic growth over the forecast horizon. The baseline scenario forecast assumes population and household decline in New York during the later forecast years, while the high scenario econometric and building electrification forecasts assume a slight increase in the number of households over the duration of the forecast horizon. Additional details are in the NYISO's *2022 Gold Book*.[3]

The baseline forecasts project the NYCA and zonal loads under expected future weather conditions,

[3] NYISO's Gold Books and related data are here: https://www.nyiso.com/library

which include increasing temperature trends over the forecast horizon.

The baseline peak load forecast represents an annual average growth rate of 0.14% over the horizon of the Gold Book's ten-year forecast. This compares to a growth rate of -0.24% from the 2021 Comprehensive Review (based on the 2021 Gold Book forecast). The increasing summer peak during the outer years of the forecast is primarily attributed to electric vehicle charging during the system peak hour and electrification of non-weather sensitive appliances. The higher forecasted growth in energy usage can be attributed primarily to the increasing impacts of electric vehicle usage, space heating electrification, and electrification of other end uses. Comparing the 5-year average growth rate: -0.30% for this Interim as vs -0.62% for the 2021 Comprehensive Review,

The load model in the NYISO GE-MARS model consists of historical load shapes and Load Forecast Uncertainty (LFU). The NYISO uses three historical load shapes (8,760 hourly MW) in the GE-MARS model in seven different load levels using a normal distribution. The load shapes are adjusted on a seasonal (summer and winter) basis to meet peak forecasts while maintaining the energy target. LFU is applied to every hour of these historical shapes and each hour of the seven load levels is run through the GE-MARS model for each replication for resources availability evaluations. The historical shapes used in the past (2002, 2006, and 2007) were replaced by 2013, 2017, and 2018 based on detailed analysis performed by the NYISO.[4]

The BtM Solar PV forecast is discretely modeled with an hourly production data by zone, while expected gross peak values are modeled. Historical load shapes are adjusted accordingly on both on-peak and off-peak hours.

Figure 2: Comparison of Baseline Summer Peak Demand Forecasts and Figure 4 compare the baseline and high load (topline) peak demand forecasts from the *2021 Comprehensive Review* with the *2022 Load & Capacity Data Report* (*2022 Gold Book*[5]) for this *2022 Interim Review.*

Figure 3 details the amounts and direction of forecasted impacts on the baseline demand at the time of summer peak from energy efficiency and codes and standards (EE), BtM Solar PV, BtM energy storage, electric vehicles, building electrification and BtM non-solar Distributed Generation (DG) represented in the baseline forecast.

[4] Additional details are included in the March 24, 2022 LFTF/TPAS/ESPWG presentations, which are available at: https://www.nyiso.com/documents/20142/29418084/07%20LFU%20Phase%202_Recommendation.pdf and https://www.nyiso.com/documents/20142/29418084/08%20MARS_PlanningModel-NewLoadShapes.pdf.

[5] NYISO's 2022 Gold Book: https://www.nyiso.com/documents/20142/2226333/2022-Gold-Book-Final-Public.pdf

Figure 2: Comparison of Baseline Summer Peak Demand Forecasts

Study Year	Baseline Forecast (MW)		Delta *(current - past)*
	2021 Comprehensive Review	2022 Interim Review	
2023	32,380	32,018	-362
2024	32,211	31,778	-433
2025	32,140	31,505	-635
2026	32,076	31,339	-737

Figure 3: 2022 Gold Book - Summary of NYCA Baseline Summer Coincident Peak Demand Forecasts – MW

Year	(a) Econometric Peak Demand	(b) (-) EE and C&S	(c) = a - b End-Use Peak Demand	(d) (-) Solar PV, BTM	(e) (-) Non-Solar DG, BTM	(f) (-) BTM Storage Peak Reductions	(g) (+) EV Peak Demand	(h) (+) Building Electrification	(i) = c-d-e-f+g+h Baseline Summer Peak Forecast
2023	34,295	769	33,526	1,113	304	244	96	57	32,018
2024	34,669	1,213	33,456	1,216	319	365	139	83	31,778
2025	34,946	1,696	33,250	1,314	330	416	193	122	31,505
2026	35,308	2,197	33,111	1,386	342	469	269	156	31,339

Figure 4: Comparison of High Load (Topline) Summer Peak Demand Forecasts

Study Year	2022 Interim Review (MW) Load Forecasts		Delta *(High-Base)*
	Baseline	High Load	
2023	32,018	32,780	762
2024	31,778	32,849	1,071
2025	31,505	32,854	1,349
2026	31,339	32,946	1,607

Study Year	High Load Forecast (MW)		Delta *(current vs past)*
	2021 Comprehensive Review	2022 Interim Review	
2023	32,971	32,780	-191
2024	33,035	32,849	-186
2025	33,156	32,854	-302
2026	33,307	32,946	-361

2.2. Resources

For this review, resource assumptions are based upon the 2022 summer capability of generation resources in the New York as reported in the *2022 Gold Book*. Resources values in Figure 5 include resources electrically internal to New York, additions, re-ratings, proposed deactivations, purchases, sales, UCAP Deliverability Rights (UDRs) with firm capacity, and SCRs (Special Case Resources).

The *2022 Interim Review* assumes:

- A total of 2,132 MW (summer capability) of proposed generation projects, mainly wind and solar (as shown in Figure 6). The *2021 Comprehensive Review* assumed 880 MW.
- A total of 929 MW (summer capability) of proposed generation deactivations, as shown in Figure 7 (*e.g.,* retirement, mothball, or ICAP-Ineligible Forced Outage (IIFO) or proposed to retire or mothball), as compared with 1,100 MW assumed for the *2021 Comprehensive Review*. An additional 864 MW are operationally impacted by the DEC Peaker Rule (as shown in Figure 8).[6] Some of the units are assumed out of service only in the May-September ozone season). The DEC rule impacts were also reflected in the *2021 Comprehensive Review* models.

The NYSRC annually sets the Installed Reliability Margin (IRM) for the New York Control Area (NYCA) for the upcoming capability year. The current IRM[7] is set at 19.6% of the forecasted NYCA peak load for the 2022 – 2023 Capability Year (May 1, 2022, through April 30, 2023). The IRM meets NPCC's and NYSRC's resource adequacy criterion to plan for a Loss of Load Expectation (LOLE) of no greater than 0.1 days/year.

Additionally, the NYISO sets the Locational Minimum Installed Capacity Requirements (LCRs) for three New York Localities. The LCRs for the 2022-2023 capability year are: 81.2% for Zone J, 99.5% for Zone K, and 89.2% for Zones G through J. The NYISO establishes statewide and Locational Installed Capacity (ICAP) requirements for the Load Serving Entities (LSEs).Figure 5 shows a comparison between the total capacity resources between this interim review and the 2021 Comprehensive review. By 2026, the total resources are assumed to be around 2,090 MW higher, mainly due to the proposed projects assumed and also due to the proposed Champlain Hudson Power Express (CHPE) 1,250 MW HVDC from Hydro Quebec

[6] In 2020, the New York State Department of Environmental Conservation adopted a regulation to limit nitrogen oxides (NOx) emissions from simple-cycle combustion turbines ("Peaking Units") (referred to as the "Peaker Rule"). The Peaker Rule required all impacted plant owners to file compliance plans by March 2, 2020. NYISO considered the affected Generators' compliance plans in the development of the 2020 Reliability Needs Assessment Base Case, on which this Interim is also based.

[7] All values in the IRM calculation are based upon full installed capacity values of resources.

into New York City, which has a proposed commercial operation date of December 2025.

Figure 5: Comparison of Total Resource Assumptions (Summer MW Ratings)

Study Year	Capacity Resources (MW)*		Delta
	2021 Comprehensive Review	2022 Interim Review	
2023	40,343	39,662	-681
2024	40,165	40,897	731
2025	39,890	40,273	383
2026	39,890	41,977	2,087

* NYCA total capacity include resources electrically internal to NYCA, additions, reratings, and proposed deactivations (including proposed retirements, mothballs, and peaker rule impacts). Capacity values reflect the lesser of Capacity Resource Interconnection Service (CRIS) and Dependable Maximum Net Capability (DMNC) summer MW values from the Gold Book. NYCA resources include Special Resource Resources (SCRs) and also the net purchases and sales from the Gold Book. Net purchases and sales (transactions) include the election of Unforced Capacity Deliverability Rights (UDRs), External CRIS Rights, Existing Transmission Capacity for Native Load (ETCNL) elections, estimated First Come First Serve Rights (FCFSR), and grandfathered exports. Starting 2026, the proposed 1250 MW HVDC from Hydro Quebec into New York City is included in the summer calculation.

Figure 6: Generation Additions Assumed in the NYISO's 2022 RNA Case and this 2022 Interim Review

Queue #	Project Name/(Owner)	Zone	Point of Interconnection	Type	COD or I/S Date	Summer Peak MW
Proposed Large Generation (LG) Additions						
396	Baron Winds	C	Hillside - Meyer 230kV	W	Dec-23	238.4
422	Eight Point Wind Enery Center	B	Bennett 115kV	W	Sep-22	101.8
495	Mohawk Solar	F	St. Johnsville - Marshville 115kV	S	Nov-24	90.5
505	Ball Hill Wind	A	Dunkirk - Gardenville 230kV	W	Nov-22	100.0
531	Number 3 Wind Energy	E	Taylorville - Boonville 115kV	W	Oct-22	103.9
579	Bluestone Wind	E	Afton - Stilesville 115kV	W	Oct-22	111.8
612	South Fork Wind Farm	K	East Hampton 69kV	OW	Aug-23	96.0
617	Watkins Glen Solar	C	Bath - Montour Falls 115kV	S	Nov-23	50.0
618	High River Solar	F	Inghams - Rotterdam 115kV	S	Nov-22	90.0
619	East Point Solar	F	Cobleskill - Marshville 69kV	S	Nov-22	50.0
637	Flint Mine Solar	G	LaFarge - Pleasant Valley 115kV, Feura Bush - North Catskill 115kV	S	Sep-23	100.0
678	Calverton Solar Energy Center	K	Edwards Substation 138kV	S	Jun-22	22.9
695	South Fork Wind Farm II	K	East Hampton 69kV	OW	Aug-23	40.0
720	Trelina Solar Energy Center	C	Border City - Station 168 115 KV	S	Nov-23	80.0
721	Excelsior Energy Center	A	N. Rochester - Niagara 345 kV	S	Nov-22	280.0
758	Independence GS1 to GS4 *+9MW ERIS only*	C	Scriba 345 kV	Gas	I/S	9.0
Also included inte 2021 Planning Models (2021 Comprehensive Review)					**Total LG**	**1,564**

Queue #	Project Name/(Owner)	Zone	Point of Interconnection	Type	COD or I/S Date	Summer Peak MW
Proposed Small Generation (SG) Additions						
545	Sky High Solar* (Sky High Solar, LLC)	C	Tilden -Tully Center 115kV	S	06/2023	20
565	Tayandenega Solar* (Tayandenega Solar, LLC)	F	St. Johnsville - Inghams 115kV	S	10/2022	20
570	Albany County 1* (Hecate Energy Albany 1 LLC)	F	Long Lane - Lafarge 115kV	S	12/2022	20
572	Greene County 1* (Hecate Energy Greene 1 LLC)	G	Coxsackie - North Catskill 69kV	S	01/2023	20
573	Greene County 2* (Hecate Energy Greene 2 LLC)	G	Coxsackie Substation 13.8kV	S	03/2023	10
584	Dog Corners Solar* (SED NY Holdings LLC)	C	Aurora Substation 34.5kV	S	05/2022	20
586	Watkins Road Solar* (SED NY Holdings LLC)	E	Watkins Rd - Ilion 115kV	S	06/2023	20
590	Scipio Solar (Duke Energy Renewables Solar, LLC)	C	Scipio 34.5kV Substation	S	05/2023	18
592	Niagara Solar (Duke Energy Renewables Solar, LLC)	B	Bennington 34.5kV Substation	S	05/2023	20
598	Albany County 2* (Hecate Energy Albany 2 LLC)	F	Long Lane - Lafarge 115kV	S	12/2022	20
638	Pattersonville* (Pattersonville Solar Facility, LLC)	F	Rotterdam - Meco 115kV	S	12/2022	20
666	Martin Solar* (Martin Solar LLC)	A	Arcade - Five Mile 115kV	S	10/2022	20
667	Bakerstand Solar* (Bakerstand Solar LLC)	A	Machias - Maplehurst 34.5kV	S	10/2022	20
682	Grissom Solar* (Grissom Solar, LLC)	F	Ephratah - Florida 115kV	S	06/2022	20
730	Darby Solar* (Darby Solar, LLC)	F	Mohican - Schaghticoke 115kV	S	12/2022	20
731	Branscomb Solar* (Branscomb Solar, LLC)	F	Battenkill - Eastover 115kV	S	I/S	20
735	ELP Stillwater Solar (ELP Stillwater Solar LLC)	F	Luther Forest - Mohican 115kV	S	09/2022	20
748	Regan Solar* (Regan Solar, LLC)	F	Market Hill - Johnstown 69kV	S	06/2022	20
768	Janis Solar* (Janis Solar, LLC)	C	Willet 34.5kV	S	04/2022	20
775	Puckett Solar* (Puckett Solar, LLC)	E	Chenango Forks Substation 34.5kV	S	04/2022	20
564	Rock District Solar* (Rock District Solar, LLC)	F	Sharon - Cobleskill 69kV	S	12/2022	20
670	Skyline Solar* (SunEast Skyline Solar LLC)	E	Campus Rd - Clinton 46kV	S	04/2022	20
581	Hills Solar (SunEast Hills Solar LLC)	E	Fairfield - Inghams 115kV	S	08/2023	20
734	Ticonderoga Solar* (ELP Ticonderoga Solar LLC)	F	ELP Ticonderoga Solar LLC	S	8/1/2022	20
759	KCE NY 6* (KCE NY 6, LLC)	A	Gardenville - Bethlehem Steel Wind 115kV	ES	04/2022	20
769	North County Energy Storage (New York Power Authority)	D	Willis 115kV	ES	03/2022	20
807	Hilltop Solar (SunEast Hilltop Solar LLC)	E	Eastover - Schaghticoke 115kV	S	07/2023	20
848	Fairway Solar (SunEast Fairway Solar LLC.)	E	McIntyre - Colton 115kV	S	10/1/2023	20
855	NY13 Solar (Bald Mountain Solar LLC)	F	Mohican - Schaghticoke 115kV	S	11/1/2023	20
Also included inte 2021 Planning Models (2021 Comprehensive Review)					**Total SG**	**568**
*Only these proposed SGs obtained Capacity Resource Interconnection Service (CRIS) and therefore are modeled for the resource adequacy cases					**Total LG+SG**	**2,132**

Figure 7: Generation Deactivations Assumed in the NYISO's 2022 RNA and this 2022 Interim Review

2022 GB Table	Owner/ Operator	Plant Name	Zone	Summer Capability	Date
Table IV-3: Deactivated Units with Unexpired CRIS Rights Not Listed in Existing Capacity Table III-2	International Paper Company	Ticonderoga	F	9.5	05/01/2017
	Helix Ravenswood, LLC	Ravenswood 2-4	J	30.7	04/01/2018
	Helix Ravenswood, LLC	Ravenswood 3-1	J	31.9	04/01/2018
	Helix Ravenswood, LLC	Ravenswood 3-2	J	29.4	04/01/2018
	Helix Ravenswood, LLC	Ravenswood 3-4	J	31.2	04/01/2018
	Exelon Generation Company LLC	Monroe Livingston	B	2.4	09/01/2019
	Innovative Energy Systems, Inc	Steuben County LF	C	3.2	09/01/2019
	Consolidated Edison Co. of NY, Inc	Hudson Ave 4	J	14	09/10/2019
	New York State Elec& Gas Corp.	Auburn - State St	C	4.1	10/01/2019
	Cayuga Operating Company, LLC	Cayuga 1	C	151	06/04/2020
	Albany Energy LLC	Albany LFGE	F	5.6	07/01/2020
	Somerset Operating Company, LLC	Somerset	A	676.4	03/12/2020
	Entergy Nuclear Power Marketing, LLC	Indian Point 2	H	1011.5	04/30/2020
	Astoria Generating Company L.P.	Gowanus 1-8	J	16	02/01/2021
Table IV-4: Deactivated Units Listed in Existing Capacity Table III-2	Entergy Nuclear Power Marketing, LLC	Indian Point 3	H	1036.3	04/30/2021
	Helix Ravenswood, LLC	Ravenswood 01	J	7.7	01/01/2022
		Ravenswood 11	J	16.1	12/01/2021
Table IV-5: Notices of Proposed Deactivations as of March 15, 2022	National Grid	West Babylon 4	K	41.2	12/12/2020
	Long Island Power Authority	Glenwood GT 01	K	13	02/28/2021
	Seneca Power Partners. L.P.	Allegheny Cogen	B	62	05/02/2022
		Sithe Batavia	B	48.7	05/02/2022
		Sithe Sterling	B	49.2	05/02/2022
	ENGIE Energy Marketing NA, Inc.	Nassau Energy Corporation	K	38.5	03/31/2022
	Astoria Generating Company, L.P.	Gowanus 1-1 through 1-7	J	117.1	11/01/2022
		Gowanus 4-1 through 4-8	J	138.8	11/01/2022
	NRG Power Marketing LLC	Astoria GT 2-1 through 2-4	J	141.6	05/01/2023
		Astoria GT 3-1 through 3-4	J	140.5	05/01/2023
		Astoria GT 4-1	J	138.3	05/01/2023
			Total Proposed Deactivations as of March 15	**928.9**	
			Total	**4005.9**	

Figure 8: Peaker Rule Compliance

2022 GB Table	Owner/ Operator	Plant Name	Zone	Summer Capability	Date
Table IV-6: Proposed Staus Change to Comply with DEC Peaker Rule**	Central Hudson Gas & Elec. Corp.	Coxsackie GT	G	19.2	05/01/2023
		South Cairo	G	18.9	05/01/2023
	Consolidated Edison Co. of NY, Inc.	74 St. GT 1 & 2	J	39.3	05/01/2023
		Hudson Ave 3	J	13.6	05/01/2023
		Hudson Ave 5	J	12.3	05/01/2023
		59 St. GT 1	J	15.3	05/01/2025
	Helix Ravenswood, LLC	Ravenswood 10	J	16.0	05/01/2023
	National Grid	Northport GT	K	12.0	05/01/2023
		Port Jefferson GT 01	K	12.6	05/01/2023
		Shoreham 1	K	44.7	05/01/2023
		Shoreham 2	K	15.7	05/01/2023
		Glenwood GT 03	K	44.7	05/01/2023
	NRG Power Marketing, LLC	Arthur Kill GT 1	J	13.1	05/01/2025
	Astoria Generating Company, L.P.	Astoria GT 01	J	12.1	05/01/2023
		Gowanus 2-1 through 2-8	J	145.5	05/01/2025
		Gowanus 3-1 through 3-8	J	137.4	05/01/2025
		Narrows 1-1 through 2-8	J	291.5	05/01/2025
** Some of the units are assumed out of service only in the May-September ozone season			**Total**	**863.9**	

2.3. Transmission

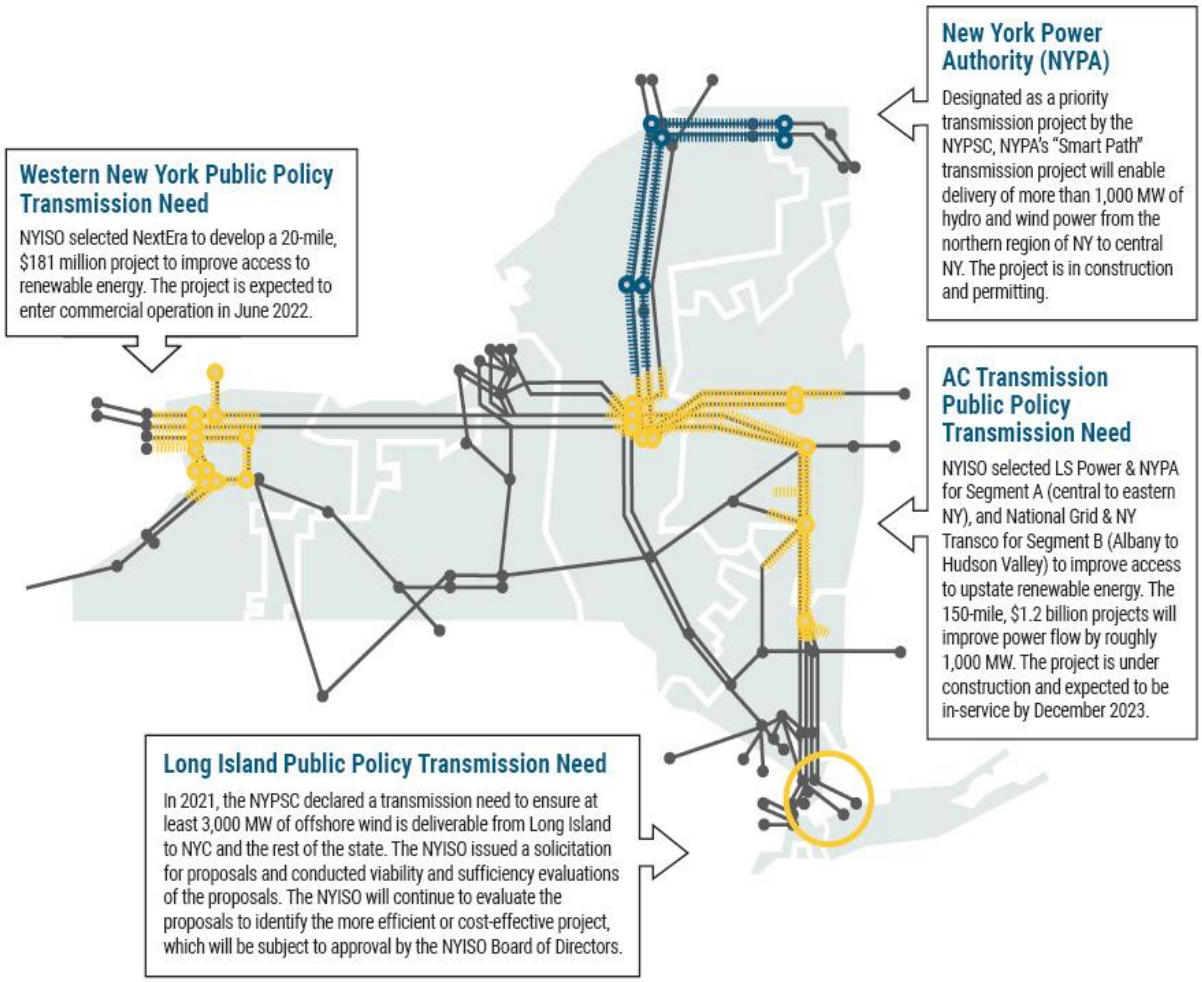
The notable bulk transmission projects that met the inclusion rules and continue to be modeled in the 2022 RNA Base Case are (as also shown in Figure 9 and Figure 10):

- The NextEra Empire State Line Project that was selected by the NYISO Board of Directors in October 2017 to address the Western New York Public Policy Transmission Need. This project includes a new 345 kV circuit and phase angle regulator (PAR) that will alleviate constraints in the Niagara area. This project is in service as of June 2022.
- The Segment A Double Circuit Project, being jointly developed by LS Power Grid New York Corporation I and New York Power Authority (NYPA), that was selected by the NYISO Board of Directors in April 2019 to address Segment A of the AC Transmission Public Policy Transmission Needs. The project includes a new double-circuit 345 kV line between Edic and New Scotland substations, two new 345 kV substations at Princetown and Rotterdam, two new 345 kV lines between Princetown to Rotterdam substations, and retirement of the existing Porter to Rotterdam 230 kV lines. The planned in-service date for all components of the project is December 2023.
- The New York Energy Solution project, being developed by New York Transco, LLC, that was selected by the NYISO Board of Directors in April 2019 to address Segment B of the AC Transmission Public Policy Transmission Needs. The project includes a new double-circuit 345/115 kV line from a new Knickerbocker 345 kV switching station to the existing Pleasant Valley substation, 50% series compensation on the Knickerbocker to Pleasant Valley 345 kV line, and retirement of 115 kV lines between Greenbush and Pleasant Valley substations. The planned in-service date for all components of the project is December 2023.
- Additionally, new proposed projects that passed the inclusion rules for the 2022 RNA Base Case are:
    - Champlain Hudson Power Express (CHPE) 1,250 MW HVDC project from Hydro Quebec to Astoria Annex 345 kV in Zone J (awarded under NYSERDA's Tier 4 REC program), and
    - NYPA/National Grid's Northern New York Priority Transmission Project proposed under the New York State Accelerated Renewable Energy Growth and Community Benefit Act (AREA), which seeks to accelerate siting and construction of large-scale clean energy projects. The project is expected to increase the capacity of transmission

lines in northern New York, where significant wind and hydro capacity exists and constraints on existing lines contribute to curtailment of these resources.

Additionally, the 2022 RNA Base Cases include Local Transmission Owner Plans. As part of the NYISO's Local Transmission Planning Process, the New York TOs present their Local Transmission Owner Plans (LTPs) to the NYISO and stakeholders during ESPWG and TPAS meetings. The firm transmission plans presented in the LTPs and reported as firm in the *2022 Gold Book* are included in the 2022 RNA Base Case and modeled based on their in-service dates.

Figure 9: Public Policy Planning Major Projects



Source: NYISO's 2022 Power Trends

Figure 10: Transmission Additions Assumed in the NYISO's 2022 RNA and this 2022 Interim Review (Other than LTPs)

Queue #	Project Name/(Owner)	Zone	Point of Interconnection	Type	COD or I/S Date	Summer Peak MW
Proposed Transmission Additions, other than Local Transmission Owner Plans						
0545A	Empire State Line	A	Dysinger - Stolle 345kV	AC Transmission (WNYPP)	I/S July 2022	n/a
0543	Segment B Knickerbocker-Pleasant Valley 345 kV	F,G	Greenbush - Pleasant Valley 345kV	AC Transmission (ACPPTPP)	12/2023	n/a
0556	Segment A Double Circuit	E, F	Edic - New Scotland 345kV		12/2023	n/a
0430	Cedar Rapids Transmission Upgrade	D	Dennison - Alcoa 115kV	AC Transmission	I/S	+80
0631	NS Power Express (CHPE)	J	Hertel 735kV (Quebec)-Astoria Annex 345kV (NYC)	HVDC Transmission	12/2025	1000
0887	CH Uprate					250
1125	Northern New York Priority Transmission Project (NNYPTP)	D, E	Moses/Adirondack/Porter Path	AC Transmission	12/2025	n/a
Also included inte 2021 Planning Models (2021 Comprehensive Review)						

To be noted that a new Public Policy Transmission Planning Process is in progress (not yet included in the reliability planning models): the Long Island Offshore Wind Export Public Policy Transmission Need, which seeks to increase the export capability of the LIPA-Con Edison interface, which connects NYISO's Zone K to Zones I and J, to ensure that the full output from at least 3,000 MW of offshore wind is deliverable from Long Island to the rest of the state. The project will also include upgrading associated local transmission facilities to accompany the expansion of the proposed offshore export capability.

2.4. Unit Availability

The EFORd values for thermal units and large hydro units are calculated from NERC GADS data submitted by the generator owners.

Production data for wind, solar and run-of-river hydro units are used to determine the summer and winter capacity factors for these resources:

- Solar capacity factors: ~42% summer and ~ 1% winter
- Wind capacity factors: ~15% summer and ~26% winter
- Run-of-river capacity factors: ~46% summer and ~58% winter

The performance factor for SCRs is determined based upon those resources' actual load reductions in either required system tests of their capability to reduce load or in actual demand response activation calls.

3. Gas Infrastructure

New York's reliance on natural gas as the primary fuel for electric generation justifies continued vigilance regarding the status of the natural gas system. The NYISO is actively involved in natural gas/electric coordination efforts with New York State and federal regulators, pipeline owners, generator owners, local distribution companies, and neighboring ISOs and Regional Transmission Operators (RTOs).

The NYISO's efforts with respect to gas supply assurance focus on: (i) improving communication and coordination between the gas and electric sectors; (ii) annual, weekly and, when conditions warrant, *ad hoc* generator surveys of fuel supplies to enhance awareness in the control room and provide electric system reliability benefits; and (iii) addressing the electric system reliability impact of the sudden catastrophic loss of gas.

4. Environmental Initiatives and Other Regulatory Activities

New York's climate goals continue to impact the electric system in profound ways. State and local requirements have created what are arguably the most aggressive energy and environmental policies in the nation. The question of how to maintain system reliability on the road to meeting the state's decarbonization goals has become a central issue.

This past year alone featured several state announcements and developments that are reshaping the grid. In late 2021, the Climate Action Council (CAC), created under the CLCPA, released a *Draft Scoping Plan* to guide the state in reaching the CLCPA's requirements. In addition to addressing the clean energy objectives of the CLCPA, the *Draft Scoping Plan* calls for eliminating the use of fossil fuels in any new home construction by 2025, and for multi-family or commercial buildings by 2030. In addition, the PSC approved the results of the state's competitive Tier 4 Clean Energy Standard solicitations, which sought proposals to deliver additional renewable energy into New York City. Two proposed transmission projects have since been awarded Tier 4 Renewable Energy Credit (REC) contracts, of which one was included in this interim (i.e., CHPE).

Figure 11 summarizes key environmental regulations and energy policies.

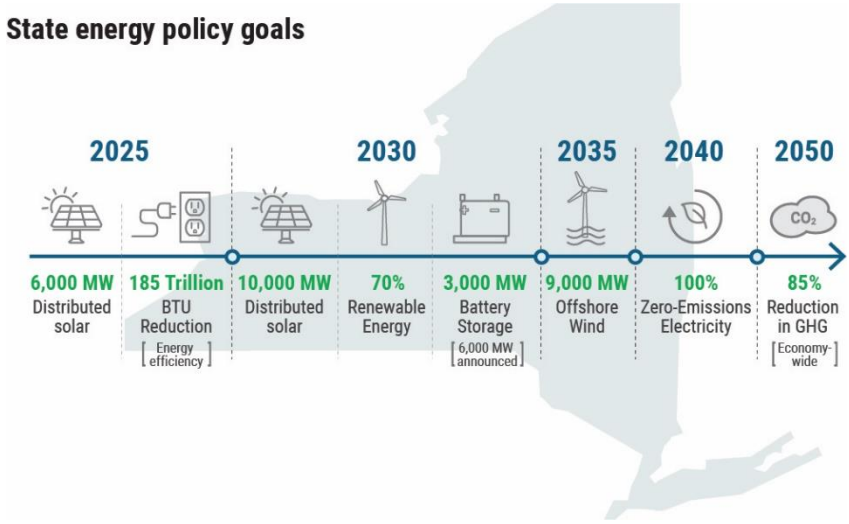
Figure 11: Summary Table of Key Environmental Regulations and Energy Policies

PUBLIC POLICY INITIATIVE	POLICYMAKING ENTITIES	PUBLIC POLICY GOALS	PUBLIC POLICY IMPLICATIONS
Climate Leadership and Community Protection Act (CLCPA)	New York Public Service Commission (NY PSC), New York State Energy Research and Development Authority (NYSERDA), Department of Environmental Conservation (DEC), Climate Action Council (CAC)	**10,000 MW** of distributed solar installed by 2030; **185 trillion** BTU reduction in total energy consumption, including electrification to reduce fossil fuel use in buildings by 2025; **3,000 MW** of storage installed by 2030, with an announced goal of 6,000 MW by 2030; 70% of load supplied by renewable resources by 2030; **9,000 MW** of offshore wind installed by 2035; and 100% of load supplied by zero-emissions resources by 2040. Reduce New York's greenhouse gas emissions by 85% of 1990 levels by 2050.	Transformation of the power grid, necessitating examination of market structures, planning processes, flexible load, and investment in bulk power system infrastructure.
"Peaker Rule" Ozone Season Oxides of Nitrogen (NOx) Emissions Limits for Simple Cycle and Regenerative Combustion Turbines	DEC	Reduce ozone-contributing pollutants associated with New York State-based peaking unit generation. Compliance obligations phased in between **2023** and **2025.**	DEC rule impacts approximately **3,300 MW** of peaking unit capacity in New York State. The NYISO analyzes compliance plans through its Reliability Planning Process (RPP) to determine whether the plans trigger reliability needs that must be addressed with solutions to maintain system reliability.
NYS Accelerated Renewable Energy Growth and Community Benefit Act	Office of Renewable Energy Siting (ORES) within the NYS Department of State, NY PSC, NYSERDA	Provides for an accelerated path for the permitting and construction of renewable energy projects other than the Article 10 power plant siting law, calls for a comprehensive study to identify cost-effective distribution, local and bulk electric system upgrades to support the state's climate goals, and to file the study with the New York State Public Service Commission. Calls for use of the NYISO's competitive Public Policy Process to meet transmission needs to meet CLCPA goals.	Intended to help accelerate siting of **eligible renewable resources** in support of state policy goals. Intended to establish new transmission investment priorities to facilitate the achievement of state policies.
New York City Residual Oil Elimination	City of New York	Eliminate combustion of fuel oil numbers 6 and 4 in New York City by **2020** and **2025,** respectively.	**2,946 MW** of installed capacity affected.
New York City Local Law 97	New York City	Requires reduced building greenhouse gas emissions by 40% by **2030**, with compliance starting in **2024,** and 80% by **2050.**	Mandate applies to any building in NYC 25,000 square feet or larger; the law was updated in 2020 to include buildings in which up to 35% of units are rent regulated, starting in 2026. Officials estimate that the law would **apply to roughly 50,000** of the city's more than one million buildings.

4.1. Discussion of Key Environmental Regulations and Energy Policies

4.1.1. Climate Leadership and Community Protection Act (CLCPA)

The Climate Action Council (CAC), created under the CLCPA, established six advisory panels, including a Power Generation Advisory Panel that included NYISO representation. The CAC also approved the formation of a Just Transition Working Group and a Climate Justice Working Group.



The CAC is expected to issue a final Scoping Plan by the end of 2022 outlining recommendations for the state to achieve the emissions reductions called for by the CLCPA.

Starting 2020, the NYISO has been performing CLCPA scenarios in both its reliability and economic planning processes.

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

In December 2019, the DEC issued requirements to reduce emissions of nitrogen oxides, which are smog-forming pollutants, from peaking generation units.

The Peaker Rule, which phases in compliance obligations between 2023 and 2025, will affect approximately 3,300 MW of simple-cycle turbines located mainly in the lower Hudson Valley, New York City, and Long Island. While some of these units will be capable of complying with the rule's stricter emissions limits, approximately 1,600 MW of capability will be unavailable during the summer of 2025 based on filed compliance plans. Approximately 950 MW of that capability becomes unavailable starting May 2023. Importantly, the Peaker Rule allows the NYISO to designate resources that are needed to sustain reliability and continue operation on a temporary basis beyond 2023 and 2025.

The NYISO is actively assessing the implications of these compliance plans in its Reliability Planning Process, particularly via the 2022 Reliability Needs Assessment (RNA) and ongoing quarterly Short-Term Assessments of Reliability reports.

4.1.3. NYS Accelerated Renewable Energy Growth and Community Benefit Act

The Accelerated Renewable Energy Growth and Community Benefit Act (the Act) seeks to accelerate siting and construction of large-scale clean energy projects by establishing the Office of Renewable Energy Siting (ORES) within the New York State Department of State to oversee permitting approval for renewable generators larger than 25 MW. Under regulations issued by ORES, it must act on applications in the siting process within one year, or six months if the applicant is seeking to locate on certain former commercial or industrial sites.

The Act also authorized the New York Power Authority (NYPA) to undertake the development of transmission investments needed to achieve CLCPA targets. Under this authority, the NYPSC directed the NYPA to pursue construction of its "Smart Path Connect" transmission expansion project in northern New York. NYPA, in partnership with National Grid, submitted its application to the NYPSC's Article VII transmission permitting process, which entails public participation prior to a final determination from the NYPSC before construction can begin. The project is expected to increase the capacity of transmission lines in northern New York, where significant wind and hydro capacity exists and constraints on existing lines contribute to curtailment of these resources.

The Act also directed the New York State Department of Public Service (DPS), in consultation with the New York State Energy Research and Development Authority (NYSERDA), NYPA, the Long Island Power Authority (LIPA), the investor-owned utilities, and the NYISO, to conduct a comprehensive study to identify cost-effective distribution and local and bulk power system upgrades to support the state's climate and clean energy policies.

The initial *Power Grid Study*, delivered by the DPS and NYSERDA in January 2021, concluded that the public policy transmission projects already approved by the NYISO and the NYPSC, together with the NYPA priority projects, position the state to achieve the 70% by 2030 renewable energy requirement of the CLCPA. The report indicated that additional transmission would be needed to move toward the goal of a zero-emission electric system by 2040. Finally, the report indicated that transmission upgrades would be needed to facilitate delivery of land-based renewable resources and 9,000 MW of offshore wind capacity called for in the CLCPA.

As projects advance through this development process, they will be included in the reliability studies base cases.

4.1.4. New York City Residual Oil Elimination

New York City passed legislation in December 2017 prohibiting the combustion of fuel oil number 6 beginning in 2020 and fuel oil number 4 beginning in 2025. After 2025, only fuel oil number 2 may be

combusted within New York City based generation. The rule is expected to impact 2,946 MW of generation in New York City, which previously used fuel oil number 6, or continue to use fuel oil number 4. Many generators in New York City that are connected to the local gas distribution network are required to maintain alternative fuel combustion capabilities.

Generators have taken steps to convert their facilities to comply with the law. While oil accounts for a relatively small percentage of the total electricity production in New York State, it is often called upon to fuel generation during critical periods, such as when severe cold weather limits access to natural gas. Dual-fuel capability serves as both an important tool in meeting reliability and an effective economic hedge against high natural gas prices during periods of high demand for natural gas.

In addition, the NYSRC has a minimum oil-burn requirement rule that is intended to maintain electric system reliability in the event of gas supply interruptions.

4.1.5. New York City Local Law 97

The New York City Council passed Local Law 97 in 2019, which mandates that any building 25,000 square feet or larger reduce its greenhouse gas emissions by 40% by 2030, and 80% by 2050, with compliance starting in 2024. One expected approach to comply with this new requirement is through the electrification of building systems that currently rely on fossil fuels. However, this approach is expected to significantly increase the demand for electricity. Officials estimate that this new law applies to roughly 50,000 of New York City's more than one million buildings.

5. Results

General Electric's Multi-Area Reliability Simulation (GE-MARS) is the computer software program used for probabilistic analysis by the NYISO.

Figure 12 summarizes the NYCA Loss of Load Expectation (LOLE) results by comparing the *2021 Comprehensive Review* results with the *2022 Interim Review* for the base case (baseline load) and the high load forecast case results. NYCA LOLE is below its 0.1 days/year criterion throughout the study period; therefore, this 2022 Interim Review finds that the NYCA complies with the NPCC resource adequacy criterion under the Base Case (baseline) peak demand forecast.

Scenarios are simulated for information only and for identification of future, potential risks. The High Load scenario shows LOLE violations starting 2025, which indicates a potential risk should the actual load be at the level assumed in the high load models starting in 2025.

Figure 12: LOLE Results (day/year): Comparison with the Prior Study

	LOLE for the Baseline Load Forecast Models		LOLE for the High Load Forecast Models	
Study Year	2021 Comprehensive Review	2022 Interim Review	2021 Comprehensive Review	2022 Interim Review
2023	0.033	0.025	0.065	0.044
2024	0.041	0.018	0.097	0.039
2025	0.044	0.024	0.147	0.068
2026	0.046	0.004	0.175	0.027

Figure 13: Summary of 2022 Interim Review LOLE Results, Load, and Resources

	Baseline Load, Resources Totals, and LOLE Results			
	2023	2024	2025	2026
Baseline Load Forecast (MW)	32,018	31,778	31,505	31,339
Projected Resources (MW)	39,662	40,897	40,273	41,977
Projected Resources/Baseline Load Ratio*	123.9%	128.7%	127.8%	133.9%
LOLE Results (event-days/year)	0.025	0.018	0.024	0.004

Note: * 2022-2023 Capability Year IRM is 19.6%. The IRM is established each year for the upcoming Capability Year with 2023-2024 IRM in progress.

In addition to the studies and reviews detailed herein, the New York State Reliability Council (NYSRC), in collaboration with the NYISO, annually establishes an Installed Reliability Margin (IRM) for the following Capability Year. The IRM established for the 2022-2023 Capability Year is 19.6% of the forecasted load. The process that will establish the IRM for the 2023-2024 capability year is targeted to conclude in December 2022.

6. Conclusion

This *2022 Interim Review* finds that the NYCA will comply with the NPCC resource adequacy criterion under the Base Case (baseline) peak demand forecast. The NYCA LOLE baseline results from this Interim Review are lower when compared with the 2021 Comprehensive Review results. The difference is mainly due to a lower forecast and more resources included in the model.

Comparing the Interim Review's LOLE results from study year to study year, the 2023 higher NYCA LOLE is due to, among other things, the impacts of planned generator deactivations in response to the impacts of the DEC's Peaker Rule in 2023. However, the drop in LOLE in 2026 is primarily due to the

inclusion of the proposed 1,250 MW (summer) HVDC from Hydro Quebec into New York City (for winter it was assumed at zero MW).

The high load scenario shows that there is a risk of NYCA LOLE violations if the actual load is at the level assumed in the study year 2025.

It is important to note that the NYISO continuously plans its system to address potential reliability needs, in its Reliability Planning Process (RPP), as well as in its newly defined Short-Term Reliability Process (STRP), which includes the Generator Deactivation Process. This process was approved by the FERC in 2020 and its requirements are contained in Attachments Y and FF of the NYISO's OATT. With this process in place, the RPP's Study Period changes from a year 1 to year 10 analysis, into a year 4 to year 10 look ahead. At the same time, the STRP evaluates year 1 through year 5 from the Short-Term Assessment of Reliability (STAR) Start Date, with a focus on short-term reliability needs arising in years 1 through 3 of the study period. Each quarterly STRP concludes if the STAR or Generator Deactivation Assessment does not identify a need and states whether a STRP Need will be addressed in the RPP or in the STRP.

In the event that there is a potential loss of resources due to a proposed generator retirement or mothballing, the NYISO will administer its SRTP for Generator Deactivation Notices that it receives. If necessary, the NYISO will seek market-based and regulated solutions to address any Generator Deactivation Reliability Needs identified through that process. As a last resort, the NYISO may enter into Reliability Must Run (RMR) agreements with specific generators to continue to operate until market-based projects or permanent transmission solutions are built. Moreover, the NYISO continuously monitors all planned projects and any changes to the New York State transmission system and may request solutions outside of its normal planning cycles if there appears to be an imminent threat to the reliability of the bulk power transmission system arising from causes other than deactivating generation.