NPCC 2019 Interim New York Area Review of Resource Adequacy

Covering the New York Control Area for the Study Period 2020 – 2023

Approved by the RCC on December 3, 2019

Prepared by the NYISO for the NPCC

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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, 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 requirements.

The 2018 Comprehensive Review of Resource Adequacy (2018 Comprehensive Review) covered the five-year study period of 2019-2023. This 2019 Interim Review of Resource Adequacy (2019 Interim Review) report provides the first Interim Assessment of the NYISO's 2018 Comprehensive Review covering the remaining four years of the study period, *i.e.,* from 2020-2023.

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 2020 to 2023.

1. Introduction

The 2019 Interim Review provides the first (of two) update of the 2018 Comprehensive Review, which was based on NYISO's 2018 Reliability Needs Assessment (RNA) assumptions and was approved by NPCC in December 4, 2018. Since the approval of the 2018 NPCC Comprehensive Review, the NYISO has conducted additional resource adequacy assessments as part of the 2018-2019 Reliability Planning Process (RPP), along with additional annual studies to determine the Installed Capacity Requirements[1] for the New York. The major assumptions of this 2019 Interim Review are consistent with the RPP process[2] and the 2019 planning models.

[1] http://www.nysrc.org/reports3.html
[2] https://www.nyiso.com/library

2. Assumption Changes

2.1. Load Model

Figure 1 and Figure 3 compare the baseline and high load (topline) peak demand forecasts from the 2018 Comprehensive Review with the 2019 Load and Capacity Data Report (Gold Book[3]) for this Interim Review. Figure 2 details the amounts of energy efficiency and codes and standards (EE), Behind-the-Meter (BtM) Solar Photovoltaic (Solar PV), BtM energy storage, electric vehicles, and BtM non-solar Distributed Generation (DG) represented in the baseline forecast at the time of summer peak demand. The high load forecast (*i.e.*, the topline forecast from the 2019 Gold Book) does not include the reduction effects of the energy efficiency, Solar PV, non-solar DG and BtM storage resources. The baseline peak load forecast represents an annual average growth rate of -0.39% over the Gold Book's ten-year horizon. This compares to a growth rate of -0.13% from the rate of growth reported in the 2018 Comprehensive Review. There were no changes to the multiple load shape model from the 2018 Comprehensive Review, using the same historical years (2002, 2006, and 2007), scaled up to forecasted seasonal peaks with Load Forecast Uncertainty (LFU) applied equally to all hours.

The BtM Solar PV forecast is discretely modeled with an hourly profile by zone, and the shapes are applied during the load adjustment to account for the impact of the BtM generation on both on-peak and off-peak hours.

Figure 1: Comparison of Baseline Summer Peak Demand Forecasts

Year	Baseline Forecast (MW)		Delta
	2018 Comprehensive Review	2019 Interim Review	
2020	32,629	32,202	-427
2021	32,451	32,063	-388
2022	32,339	31,971	-368
2023	32,284	31,700	-584

[3] https://www.nyiso.com/documents/20142/2226333/2019-Gold-Book-Final-Public.pdf/

Figure 2: Energy Efficiency, BtM Solar, Distributed Generation and Energy Storage Summer Peak Reductions along with Electric Vehicle Summer Peak Usage reflected in the Baseline Forecast

Year	Values included in Baseline Forecast (Values at the time of Peak Demand)				
	Energy Efficiency	BTM Solar PV	Distributed Generation	Electric Vehicle	Energy Storage
2020	495	645	258	40	27
2021	751	745	315	51	50
2022	1,003	836	333	68	81
2023	1,293	918	348	90	117

Figure 3: Comparison of High Load (Topline) Summer Peak Demand Forecasts

Year	High Load Forecast (MW)		Delta
	2018 Comprehensive Review	2019 Interim Review	
2020	34,367	33,627	-740
2021	34,554	33,924	-630
2022	34,727	34,224	-503
2023	34,946	34,376	-570

Year	2019 Interim Review		Delta (Top-Base)
	Baseline	Topline	
2020	32,202	33,627	1,425
2021	32,063	33,924	1,861
2022	31,971	34,224	2,253
2023	31,700	34,376	2,676

2.2. Resources

For this review, resource assumptions are based upon the 2019 summer capability ratings of generation resources in the New York as reported in the 2019 Gold Book. Capacity values in Figure 4 include resources electrically internal to New York, additions, re-ratings, retirements, purchases, sales, UCAP Deliverability Rights (UDRs) with firm capacity, and SCRs (Special Case Resources).

This 2019 Interim Review assumed 2,770 MW (summer capability) of generation deactivations, as compared with 3,650 MW[4] assumed for the 2018 Comprehensive Review. The list of generation deactivations continues to include Indian Point Energy Center Units 2 and 3 (expected in 2020 and 2021, respectively). The generator deactivation notice for the Pilgrim natural gas Units 1 and 2 was rescinded on October 2018, and the notice for the Selkirk natural gas Units 1 and 2 was rescinded on December 2018. Cayuga 2 entered into a deactivation status, and

[4] This figure includes retired plants still having Capacity Rights Interconnection Service (CRIS) such as Dunkirk and Huntley (i.e., CRIS expires 3 years after retirement).

Cayuga 1 provided a notice of intent to deactivate in October 2019.

A total of 1,294 MW of proposed generation, was added over the study period. The primary generation addition is the 1,020 MW Cricket Valley facility that has an expected commercial operation date in 2020.

- The NYSRC annually sets the Installed Reliability Margin (IRM) for the New York Control Area (NYCA) for the upcoming capability year. The current IRM[5] is set at 17% of the forecasted NYCA peak load for the 2019 – 2020 Capability Year (May 1, 2019 through April 30, 2020). The IRM meets NPCC's and NYSRC's resource adequacy criterion to plan for an LOLE of no greater than 0.1 days per year. Additionally, the NYISO sets the Locational Minimum Installed Capacity Requirements (LCRs) for three NY Localities. The 2019–2020 capability year LCRs are: 82.8% for the New York City Locality, 104.1% for the Long Island Locality, and 92.3% for the G-J Locality.

Figure 4: Comparison of Total Resource Assumptions (Summer MW Ratings)

Year	Capacity Resources* (MW)		Delta
	2018 Comprehensive Review	2019 Interim Review	
2020	42,362	42,387	25
2021	41,358	41,508	150
2022	41,500	41,512	12
2023	41,500	41,650	150

*Projected resources includes NYCA Capacity, net purchases and sales as per the 2019 Gold Book and SCR. NYCA Capacity values are resources electrically internal to NYCA, additions, re-ratings, and retirements (including proposed retirements and mothballs). Capacity values reflect the lesser of CRIS and Dependable Maximum Net Capability (DMNC) values.

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

Figure 5: Generation Additions Assumed in the NYISO's 2019 Planning Case and 2019 Interim Review

Queue #	Project Name	Zone	CRIS Request	Interconnection Status	Included in 2019 Planning Base Case From Beginning of
Proposed Generation Additions					
444	Cricket Valley Energy Center II	G	1,020.0	CY 2017	Study Year 1
387	Cassadaga Wind	A	126.0	CY 2017	Study Year 2
349	Taylor Biomass	G	19.0	CY 2011	Study Year 3
505	Ball Hill Wind	A	100.0	CY 2017	Study Year 1
696	Swinging Bridge Unit 3	G	9.0	Non-CY candidate	Study Year 1
477	Riverhead Solar	K	20.0	Non-CY candidate	Study Year 1
	Total MW additions		**1,294.0**		

Figure 6: Generation Deactivations Assumed in the NYISO's 2019 Planning Case and 2019 Interim Review

Owner/Operator	Plant Name	Zone	CRIS	2019 Planning Base Case	2018 Comprehensive Review (i.e.2018 RNA Case)
Helix Ravenswood LLC	Ravenswood 04	J	15.2	out	out
	Ravenswood 05		15.7		
	Ravenswood 06		16.7		
	Ravenswood 09		21.7		
International Paper Company	Ticonderoga [4]	F	7.6	part of SCR program	part of SCR program
NRG Power Marketing LLC	Astoria GT 11	J	23.6	out	out
Binghamton BOP, LLC	Binghamton	C	43.7	out	out
Cayuga Operating Company, LLC	Cayuga 2	C	139.6	out	in
Helix Ravenswood, LLC	Ravenswood 2-1	J	31.4	out	out
	Ravenswood 2-2	J	29.9		
	Ravenswood 2-3	J	28.9		
	Ravenswood 2-4	J	30.7		
	Ravenswood 3-1	J	31.9		
	Ravenswood 3-2	J	29.4		
	Ravenswood 3-4	J	31.2		
Lyonsdale Biomass, LLC	Lyonsdale	E	19.3	out	out
Entergy Nuclear Power Marketing, LLC	Indian Point 2	H	1026.5	out	out
	Indian Point 3	H	1040.4		
Exelon Generation Company, LLC	Monroe Livingston	B	2.4	out	in
Consolidated Edison Co. of NY, Inc.	Hudson Ave 4	J	13.9	out	in
New York State Elec. & Gas Corp.	Auburn State St. GT NYSEG	C	5.8	out	in
Innovative Energy Systems, Inc.	Steuben	C	3.2	out	in
Rockville Centre, Village of	Charles P Keller 07	K	2.0	out	in
	Albany LFGE	F	5.6	out	in
	Cayuga Unit 1	C	154.1	out	in
Long Island Power Authority	PPL Pilgrim ST GT1	K	45.6	in	out
	PPL Pilgrim ST GT2	K	46.2		
Consolidated Edison Energy, Inc.	Selkirk-I	F	82.1	in	out
	Selkirk-II	F	291.3		
	Total MW assumed as deactivated		**2,770**		

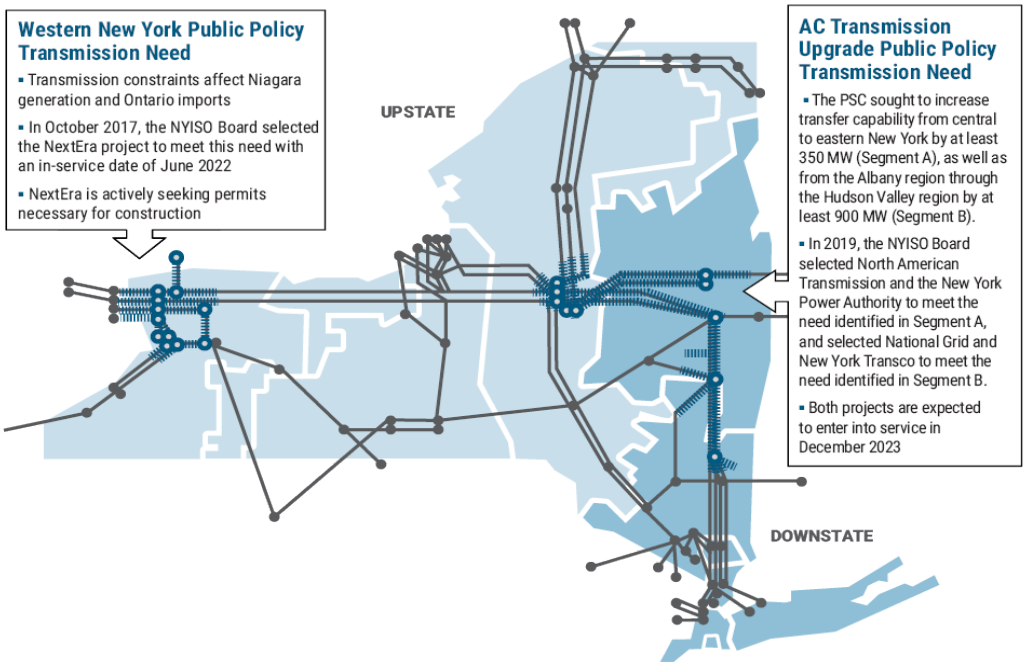
change in status

2.3. Transmission

Highlights of changes since the 2018 NPCC Comprehensive Review:

- On April, 2019, the NYISO Board of Directors announced its selection of two transmission projects with an in-service date of December 2023 to meet public policy needs identified in the Public Policy Transmission Planning Process (PPTPP) to increase the transfer capability of the Central East Interface by at least 350 MW and the transfer capability of the UPNY/SENY interface by at least 900 MW. The AC Transmission projects will add the largest amount of free-flowing transmission capacity to the state's grid in more than 30 years.
- In October 2017, the NYISO's Board of Directors selected a transmission project with an in-service date in June 2022 to increase transfer capability from Western New York and Ontario to central and eastern New York This project includes a new 345 kV circuit and phase angle regulator (PAR) that will alleviate constraints in the Niagara area.
    - The Western NY Public Policy Transmission Project (the Empire State Line Proposal 1), to be developed by NextEra Energy Transmission New York, Inc., was included in the 2018 RNA/Comprehensive Reliability Plan (CRP) Base Case and the 2018 Comprehensive Review of Resource Adequacy.
- Con Edison's cables B and C are assumed out-of-service throughout the study period due to long term unavailability.
- Following deactivation of Indian Point Unit Nos. 2 and 3, the series reactors on lines 71, 72, M51, and M52 will be by-passed each summer.

Figure 7: Public Policy Planning- Selected Transmission



Source: NYISO's 2019 Power Trends

Figure 8: Transmission Additions Assumed in the NYISO's 2019 Planning Case and 2019 Interim Review

Queue #	Project Name	Zone	CRIS Request	SP MW	Interconnection Status	Included in 2019 Planning Base Case From Beginning of
Proposed Transmission Additions, other than Local Transmission Owner Plans (LTPs)						
530	Western NY PPTPP Empire State Line	Regulated Transmission Solutions	n/a	n/a	TIP Facility Study	Study Year 3
556, 543	AC Transmission PPTPP	Regulated Transmission Solutions	n/a	n/a	TIP Facility Study	Study Year 4
CRIS Request						
430	Cedar Rapids Transmission Upgrade	D	80	80		Study Year 1

2.4. Unit Availability

Figure 9 compares the five-year weighted EFORd (Equivalent Demand Forced Outage Rate) values for generation units in the NYCA, which were included in this Interim Review, to the EFORd values used in the 2018 Comprehensive Review. 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:

- Wind capacity factors are ~15% summer and ~34% winter
- Run-of-river capacity factors are ~40% summer and ~52% winter
- Solar capacity factors are ~50% summer and ~ 1% 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.

Figure 9: 5-year Weighted EFORd Values

Unit Type	5-Year Weighted EFORd Values	
	2018 Comprehensive Review	2019 Interim Review
Petroleum	16.6%	13.4%
Gas	5.8%	6.3%
Nuclear	3.1%	2.7%
Conventional Hydro	1.0%	1.1%
Pumped Storage	4.1%	5.7%
Biomass	4.5%	3.3%

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

Federal, state and local government regulatory programs may impact the operation and reliability of the New York bulk electric grid. Compliance with regulatory initiatives and permitting requirements may require investment by the owners of New York's existing thermal power plants. If the owners of those plants have to make considerable investments, the cost of these investments could impact whether they remain available in the NYISO's markets and therefore potentially affect the reliability[6] of the bulk system.

The regulatory programs with the largest potential impacts on the availability of resources needed to maintain reliability are summarized below:

[6] For instance, the 2019-2028 CRP included, for information, a scenario assessment of the impacts to system reliability from the potential deactivation of all generators impacted by the DEC's proposed rulemaking to control oxides of nitrogen (NOx) emissions from simple cycle and regenerative combustion turbines (Peaker Rule). The rule may impact approximately 3,300 MW (nameplate) of simple cycle combustion turbines, mostly located in New York City (Zone J) and Long Island (Zone K) by 2025. For this scenario, the remaining coal plants in New York State were assumed to be retired based upon the DEC's rule setting carbon dioxide emission requirements for existing fossil-fueled generators. The simulation identified a system-wide resource adequacy deficiency and transmission security load pocket deficiencies in New York City and Long Island.

PUBLIC POLICY INITIATIVE	POLICY GOAL	POLICYMAKING ENTITY	POLICY IMPLICATIONS
Accelerated Energy Efficiency Targets (Dec. 2018)	Reduce end-use energy consumption by 185 trillion BTU by **2025**, including potential electrification to reduce fossil fuel use in buildings	New York State Public Service Commission (PSC) / New York State Energy Research and Development Authority (NYSERDA)	Declining load and potentially changing load patterns, such as electrification of building heating systems, impact long-term forecasting and investment signals
Clean Energy Standard (CES) (August 2016)	50%* of electricity consumed in New York State generated from renewable resources by **2030**. Retain upstate nuclear capacity	New York State Public Service Commission (PSC) / New York State Energy Research and Development Authority (NYSERDA)	Incent about **17,000 MW** of new, largely intermittent capacity to enter grid and markets. Avoid premature deactivation of more than 3,100 MW of nuclear capacity
Indian Point Deactivation	Deactivate Indian Point units 2 and 3 by **2020** and **2021**, respectively	Agreement between New York State and Entergy	NYISO Deactivation Assessment found no reliability need with loss of **2,311 MW** based on addition of expected resources
New York City Residual Oil Elimination	Eliminate combustion of fuel oil numbers 6 and 4 in New York City by **2020** and **2025,** respectively	New York City	**2,946 MW** of installed capacity affected
Offshore Wind Development	Develop 2,400 MW of offshore wind capacity by **2030**	New York State Public Service Commission (PSC) / New York State Energy Research and Development Authority (NYSERDA)	As much as **2,400 MW** * of new intermittent capacity interconnecting to the grid in southeastern New York by 2030
CO_2 Performance Standards for Major Electric Generating Facilities	Establish restrictions on carbon dioxide emissions for fossil fuel-fired facilities in New York by **2020**	New York State Department of Environmental Conservation (DEC)	**Approximately 860 MW** of coal-fired capacity expected to deactivate or re-power
Regional Greenhouse Gas Initiative (RGGI)	Reduce carbon dioxide emissions cap by 30% from **2020** to **2030** and expand applicability to currently exempt "peaking units" below current 25 MW threshold	New York and other RGGI states	**26,100 MW** of installed capacity participate in RGGI
"Peaker Rule" Ozone Season Oxides of Nitrogen (NOx) Emissions Limits for simple cycle and regenerative combustion turbines	Reduce ozone-contributing pollutants associated with New York State-based peaking unit generation	New York State Department of Environmental Conservation (DEC)	DEC rule proposal impacts approximately **3,300 MWs** of peaking unit capacity in New York State
Storage Deployment Target	Reduce costs, support renewable resource integration, and increase storage capacity through bulk system, distribution, and customer-based installations	New York State Public Service Commission (PSC) / New York State Energy Research and Development Authority (NYSERDA) / New York Power Authority (NYPA)	Installation and market integration of **1,500 MW** of battery storage capacity by 2025 and **3,000 MW** by 2030
U.S. Clean Water Act	Adoption of "Best Technology Available for Cooling Water Intake" to protect aquatic biota	U.S. Environmental Protection Agency / New York State Department of Environmental Conservation (DEC)	**16,900 MW** of installed capacity must achieve compliance upon licensing renewal

Source: https://www.nyiso.com/documents/20142/2223020/2019-Power-Trends-Report.pdf

* On July 18, 2019 NY State's Governor signed the Climate Leadership and Community Protection Act, which requires the State to achieve a carbon free electricity system by 2040 and reduce greenhouse gas emissions 85% below 1990 levels by 2050 and extends the clean energy targets to 6,000 MW of distributed solar by 2025, 3000 MW of energy storage by 2030, and at least 9,000 MW of offshore wind by 2035."

5. Results

General Electric's Multi-Area Reliability Simulation (GE-MARS) is the computer software program used for probabilistic analysis by the NYISO. Figure 10 summarizes the Loss of Load Expectation (LOLE) results comparing the 2018 Comprehensive Review results with the 2019 Interim Review for the base case and the high load forecast case results.

Figure 10: LOLE Results (day/year): Comparison with the Prior Study

Year	Baseline Load Forecast		High Load Forecast	
	2018 Comprehensive Review	2019 Interim Review	2018 Comprehensive Review	2019 Interim Review
2020	0.00	0.01	0.02	0.01
2021	0.01	0.01	0.06	0.04
2022	0.01	0.01	0.07	0.06
2023	0.01	0.01	0.09	0.07

Figure 11: Summary of 2019 Interim Review LOLE Results, Load, and Resources

Baseline Load and Resources Totals and LOLE Results				
Year	2020	2021	2022	2023
Baseline Load Forecast (MW)	32,202	32,063	31,971	31,700
Projected Resources (MW)	42,387	41,508	41,512	41,650
Projected Resources/ Baseline Load*	131.6%	129.5%	129.8%	131.4%
LOLE Results (days/year)	0.01	0.01	0.01	0.01

* 2019-2020 capability year IRM is 17%

6. Conclusion

This 2019 Interim Review finds that the NYCA will comply with the NPCC resource adequacy criterion under the Base Case peak demand forecast. The LOLE results are similar to the 2018 Comprehensive Review results.

It is important to note that the NYISO continuously plans its system to address potential reliability needs. In the event that there is a potential loss of resources due to a proposed generator retirement or mothballing, the NYISO will administer its Generator Deactivation Process 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 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 cycle if there appears to be an imminent threat to the reliability of the bulk power transmission system arising from causes other than deactivating generation.

The next cycle of the RPP will begin in 2020 and continue through 2021, for which preparation will begin in late 2019. The 2020 RNA will provide a new ten-year reliability assessment of the New York Bulk Power Transmission Facilities.